PRODUCT CLASSIFICATION LIST: All products are normally classified based on standard Sales Manual description of purpose. I/O or terminal products exclusive to one division which attach to selected products of the other division through RPQs are considered Common (for those uses only) with the approval of both divisions.

MACHINES CURRENTLY IN THE PRODUCT LINE

(*) Certain models of these machine types have been withdrawn from marketing. Refer to applicable machine page or announcement letters for models that have been withdrawn from marketing.

** SSD Product

29		3104		3525		3736		4952		5224	
59		3138		3540		3741		4954		5225	
129		3148		3601		3742		4955		5229	
1255		3203		3602		3747		4959		5231	
1287	(*)	3211		3603		3760		4962		5234	
1288		3213		3604		3762		4963		5235	
1402		3215		3606		3767		4964		5236	
1403	(*)	3216		3608		3771		4965		5239	
1416		3230		3610		3774	(*)	4966		5241	
1419		3232		3611	(*)	3775	(*)	4969		5242	
1442	(*)	3251		3612		3776		4973		5251	
1443	(*)	3255		3615		3777		4974		5252	
1445		3258		3616		3782		4975		5253	
2222		3262		3618		3784		4978		5254	
2305	(*)	3268		3624		3791	(*)	4979		5256	
2501		3271		3631		3792		4982		5257	
2502		3272		3632		3793		4987		5258	
2520		3274	(*)	3641		3800		4990		5265	
2540		3275	(*)	3642		3803		4993		5266	
2560		3276		3643		3811		4997		5281	
2701		3277		3644		3814		4999		5282	
2821		3278		3645		3830		5010		5285	
2835	(*)	3279		3646		3838		5012		5286	
3017		3284		3647		3843		5013		5288	
3027		3286	(*)	3651	(*)	3845		5014		5320	
3031		3287		3653		3846		5022		5321	
3032		3288		3657		3848		5024		5340	
3033		3289		3659		3851		5026		5381	
3036		3310		3661		3863		5028		5412	
3037		3330		3663		3864		5029		5415	(*)
3038		3333		3667		3865		5100		5421	
3041		3340		3669		3867		5103		5424	
3042		3344		3683		3872		5103-11		5425	
3046		3348	**	3684		3874		5103-12		5471	
3047		3350		3685		3880		5106		5486	
3066	(*)	3370		3686		3881		5110		5496	
3081		3375		3687		3886		5114		5525	
3082		3380	(*)	3689		3890		5120		7770	
3083		3410		3694		4321		5203		8101	(*)
3084		3411		3704		4331	(*)	5210		8130	
3087		3420		3705	(*)	4341		5211		8140	
3088		3501		3713		4701		5213		8775	
3089		3504		3715		4704		5219		8809	
3101		3505		3717		4710		5222			
3102		3521		3732							

MACHINES WHICH ARE CURRENTLY WITHDRAWN FROM MARKETING

01
10
11
12
13
15
16
20
24
26
27
28
31
36
37
41
43
44
46
47
50
51
52
53
54
55
56
58
60
63
64
65
66
67
68
71
72
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
101
106
108
131
143
151
155
156
163
188
210
285
298
305
323
340
350
355
357
358
360
361
370
372
373
374
376
377

380
381
382
402
403
404
405
407
408
409
412
416
418
419
420
421
424
426
444
447
450
501
512
513
514
516
517
518
519
520
521
522
523
524
526
527
528
529
533
534
535
536
537
541
542
543
544
545
548
549
550
551
552
556
557
601
602
603
604
605
607
608
609
610
614
626
630
631
632
634
635
636
637
638
641
644
645
648
649
650
652
653
654
655
701

702
704
705
706
709
711
712
714
716
717
719
720
721
722
726
727
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
752
753
754
755
756
757
758
759
760
766
767
771
772
774
775
777
780
781
782
797
801
802
803
805
808
812
813
814
815
816
817
818
819
820
824
826
834
836
838
850
854
856
857
858
863
865
866
867
868

869
870
872
884
891
939
941
942
953
954
955
957
961
962
963
964
966
972
973
978
1001
1009
1011
1012
1013
1014
1015
1016
1017
1018
1026
1051
1052
1053
1054
1055
1056
1057
1058
1061
1062
1071
1072
1073
1074
1075
1076
1077
1078
1081
1082
1083
1084
1092
1093
1094
1131
1132
1133
1134
1201
1202
1203
1210
1219
1220
1221
1230
1231
1232
1241
1257
1259
1282
1285
1287
1301
1302
1311
1316
1351
1352
1355
1361
1364

1365
1367
1401
1402
1403-1
1403-3
1403-4
1403-6
1404
1405
1406
1407
1408
1409
1411
1412
1414
1415
1418
1421
1428
1441
1442-1
1442-2
1442-3
1442-4
1443
1444
1445
1446
1447
1448
1461
1462
1501
1502
1505
1510
1512
1518
1620
1621
1622
1623
1624
1625
1626
1627
1653
1711
1712
1713
1714
1715
1716
1717
1801
1802
1803
1810
1816
1826
1827
1828
1851
1854
1856
2020
2022
2025
2030
2040
2044
2050
2060
2065
2067
2070
2075
2085
2091
2095
2150
2152
2167

2203
2213
2250
2260
2265
2280
2282
2285
2301
2302
2303
2310
2311
2312
2313
2314
2315
2316
2318
2319
2321
2360
2361
2362
2365
2385
2395
2401
2402
2403
2404
2415
2420
2495
2596
2671
2680
2702
2703
2711
2712
2715
2721
2730
2740
2741
2760
2772
2780
2791
2792
2793
2795
2796
2797
2798
2802
2803
2804
2814
2816
2820
2822
2826
2840
2841
2844
2845
2846
2848
3060
3066
3067
3080
3085
3086
3115
3125
3135
3145
3155
3158
3165
3168
3195

3210
3286
3345
3346
3360
3614
3666
3671
3672
3673
3674
3707
3735
3773
3780
3781
3842
3875
4872
4953
5100
5103-1
5103-2
5106
5110-1
5110-2
5246
5257
5275
5322
5404
5406
5408
5410
5422
5444
5445
5447
5448
5475
6405
6420
6422
6425
6426
6428
6454
6455
70XX

MACHINES DISCONTINUED FROM LEASE/RENTAL AND WITHDRAWN FROM IBM MAINTENANCE AGREEMENT SERVICE

1	Mechanical Punch
12	Duplicating Punch
15	Motor Drive Punch
16	Motor Drive Duplicating Punch
27	Card Proof Punch
28	Printing Card Proof Punch
31	Alpha Duplicating Punch
36	Alpha Printing Punch
44	Tape Control Punch
50	Magnetic Data Inscriber
51	Mechanical Verifier
52	Verifier
55	Verifier
58	Card Typewriter
63	Card to Tape Punch
67	Telegraph Signal Unit
70	Vertical Sorter
71	Vertical Sorter
72	Collator
75	Sorter
76	Searching Sorter
77	Collator
78	Stencil Collator
79	Stencil Printing Collator
80	Sorter
81	Stencil Sorter
86	Coupon Sorter
89	Collator
90	Accounting Machine
91	Accounting Machine
92	Accounting Machine
93	Accounting Machine
94	Automatic Checking Machine
101	Statistical Sorter
106	Coupon Statistical Machine
108	Card Proving Machine
116	Numeric Duplicating Punch
131	Alpha Duplicating Punch
143	Tape Controlled Card Punch
151	Verifier
155	Numeric Verifier
156	Alpha Verifier
163	Card Controlled Tape Punch
210	Electric Verifier
211	Accounting Machine
212	Accounting Machine
285	Numerical Accounting Machine
298	Numerical Accounting Machine
305	RAMAC
323	RAMAC Card Punch
340	RAMAC Power Unit
350	RAMAC Disk
353	Disk Storage Unit
355	Disk Storage
370	RAMAC Printer
380	RAMAC Console
381	RAMAC Printer
404	Accounting Machine
405	Accounting Machine
408	Accounting Machine
409	Accounting Machine
412	Alphabetic Accounting Machine
416	Accounting Machine
417	Numerical Accounting Machine
418	Numerical Accounting Machine
426	Accounting Machine
450	Accounting Machine
501	Numbering Gangpunch
512	Reproducer
513	Reproducing Punch
515	Interpreting Reproducing Punch
516	Duplicating Summary Punch
517	Gang Summary Punch
518	Reproducer
520	Computing Punch
521	Electronic Calculating Punch
522	Duplicating Summary Punch
527	Electronic Calculator Punch
528	Accumulating Reproducer
529	Electronic Calculating Punch
533	Card Read Punch
535	Card Read Punch
537	Card Read Punch
541	Card Read Punch
542	Reader Punch
543	Card Reader
544	Card Punch
549	Ticket Converter
550	Interpreter
551	Interpreter
552	Interpreter
554	Interpreter
556	Interpreter
601	Multiplier
602	Calculating Punch
603	Electronic Multiplier
604	Electronic Calculator
605	Electronic Calculator
607	Calculator
608	Transistor Calculator
609	Calculator
610	Multiplier
614	Typewriter (632 and 633)
623	Calculating Punch
625	Calculating Punch
626	Calculating Punch
628	Calculating Punch
630	Calculating Unit (632)
631	Calculating Unit (632)
634	Calculating Unit (632)
635	Calculating Unit (632)
636	Calculating Unit (632 and 633)
637	Calculating Unit (632 and 633)
638	Calculating Unit (632)
641	Card Reader (632)
644	Calculating Punch
645	Card Reader (632)
648	Paper Tape Punch (632)
649	Paper Tape Reader (632)
650	Console (650)
651	RPQ Machine
652	Control Unit
653	Storage Unit
654	Auxiliary Alphabetic Unit
655	Power Unit
701	Central Processing Unit (701)
702	Central Processing Unit (702)
704	Central Processing Unit (704)
705	Central Processing Unit (705)
709	Central Processing Unit (709)
711	Card Reader
712	Card Reader
714	Card Reader
716	Printer
717	Printer
719	Printer
720	Printer
721	Card Punch
722	Card Punch
726	Magnetic Tape Unit
727	Magnetic Tape Unit
728	Magnetic Tape Unit
729	Magnetic Tape Unit
730	Printer
731	Magnetic Drum Storage
732	Magnetic Drum
733	Magnetic Drum
734	Magnetic Drum
735	Print Control
736	Power Supply
737	Magnetic Core Storage
738	Magnetic Core Storage
739	Additional Core Storage
740	CRT Recorder
741	Power Supply
742	Power Unit
743	Power Supply
744	Power Unit
745	Power Unit
746	Power Distribution Unit
747	Tape Data Selector PS
748	Data Synchronizer
752	Tape Control
753	Tape Control
754	Tape Control
755	Tape Control
756	Control Unit
757	Printer Control
758	Card Punch Control

MACHINES DISCONTINUED FROM LEASE/RENTAL AND WITHDRAWN FROM IBM MAINTENANCE AGREEMENT SERVICE

759	Card Reader Control
760	Control & Storage
766	Data Synchronizer
767	Data Synchronizer
771	Card/Tape Converter
774	Tape Data Selector
775	Record Storage Unit
776	Sp EDPM
777	Tape Record Coordinator
780	CRT Display
781	Console
782	Console Control Unit
786	Stretch
801	Proof Machine
805	Test Scoring Machine
812	Automatic Production Recorder
813	Portable Keyboard
814	Remote Control Unit
815	Automatic Typewriter
816	Remote Automatic Typewriter
817	Card Reader
818	Remote Shaft Position Converter
819	Printing Card Punch
820	Time Punch
824	Typewriter Card Punch
826	Typewriter Punch Printer
838	Inquiry Station
850	Stencil Cutter
856	Card-A-Type
857	Document Writer
858	Control Unit
861	Stencil Charger
863	Arithmetic Unit
865	Output Typewriter
867	Output Typewriters (108)
868	Transmitting Typewriter
869	Typewriter
884	Typewriter Tape Punch
919	Comparing Bill Feed
920	Bill Feed
921	Carriage
933	Carbon Ribbon Feed
942	Electronic Storage Unit
953	Multiline Posting Machine
954	Auxiliary Printing Type Punch
966	Code Comparing Unit
973	Keyboard
1003	SABRE Terminal
1004	SABRE Controller
1009	Data Transmission Unit
1011	Paper Tape Reader
1013	Communication Reader Punch
1014	Remote Inquiry Unit
1026	Transmission Control Unit
1081	Data Acquisition Control
1082	Card Reader
1083	Remote Control
1084	Sampler Reader
1202	Utility Inscriber
1210	Reader Sorter
1241	Bank Processing Unit
1259	Reader Sorter
1301	Disk Storage Unit
1302	Disk Storage Unit
1311	Disk Storage Drive
1401	Processing Unit
1402	Card Reader Punch
1403-001	Printer
1403-004	Printer
1405	Disk Storage
1406	Storage Unit
1407	Console
1409	Console Auxiliary Unit
1411	Central Processing Unit (1410)
1412	Magnetic Character Reader
1414	Input/Output Synchronizer
1415	Console
1421	Bank Transit Machine
1441	Processing Unit
1442-001	Card Reader Punch
1442-002	Card Reader Punch
1442-003	Card Reader
1442-004	Card Reader
1443-003	Printer
1443-004	Printer
1444	Card Punch
1445-001	Printer
1446	Printer
1447	Console
1448	Transmission Control Unit
1461	Input Output Control
1462	Printer
1502	Station Control
1506	Audio Unit
1510	Instruction Display
1512	Image Projector
1518	Typewriter
1601	Central Processing Unit
1602	Auxiliary Processing Unit
1603	Input Output Processing Unit
1604	Output Control Unit
1605	Terminal & Multiplex Unit
1606	Process Operators Console
1608	Remote Printing Station
1620	Central Processing Unit
1621	Paper Tape Reader
1622	Card Read Punch
1623	Core Storage
1624	Magnetic Tape Punch
1625	Core Storage
1626	Plotter Control
1711	Data Converter
1712	Multiplexer and Terminal
1713	Manual Entry Unit
1714	Sense Switch Unit
1715	Digital Display Unit
1716	Output Printer Control
1717	Output Printer
1780	Space Plotter
1783	Uptime 1500 Reader
1789	Rixon Modem
1791	Digital Input Control
1792	Terminal Box for Control System
1793	File Storage Unit
1794	Additional Process Input Output
1795	RPQ
1796	Adapter Unit
1797	Terminal Box for Control System
1798	Data Control Unit
1902-003	Paper Tape Output (RPQ)
1903-002	Paper Tape Reader
1903-013	Paper Tape Reader (RPQ)
1905-022	Self Check Numbering (RPQ)
1912-017	Teletype to Card (RPQ)
1912-022	Teletype to Card (RPQ)
1912-046	Buffer (RPQ)
1922-001	Tape Adapter (RPQ)
1922-002	Tape Adapter (RPQ)
1922-004	Tape Adapter (RPQ)
1922-019	Tape Adapter (RPQ)
1924-006	RPQ
1924-012	Control Unit (RPQ)
1924-033	RPQ
1924-035	RPQ SW1-1403
1924-038	Punch Control (RPQ)
1924-043	RPQ Controller for 2nd 1403
1924-044	Buffer Punch
1924-063	Printer Control Unit
1924-066	Control Unit (RPQ)
1924-067	Control Unit (RPQ)
1924-077	Control Unit
1925-022	Switch
1925-025	Switch
1927-001	Inquiry Station (RPQ)
1933-002	Reader Punch (RPQ)
1935-001	Ticket Reader
1939-001	Serial Card Reader (RPQ)
1940-001	RPQ
1940-007	Serial Printer (RPQ)
1944-005	Card Transceiver (RPQ)
1944-006	Terminal Control Unit (RPQ)
1944-009	Reader-Mark Sense (RPQ)
1945-003	Magnetic Tape Transfer (RPQ)
1946-004	Card Terminal (RPQ)
1973-001	Card Read Punch (RPQ)
1974-002	Data Transmission Processor
1976-004	RPQ Data Communication Terminal
1979	RPQ
1980-006	RPQ

1980-014	RPQ Selective Tape
1980-015	Listing Printer
1991-001	Sequence Keyboard (RPQ)
1998-009	SMS Cube (RPQ)
1998-013	Storage Power Control Unit
1998-014	Drum Power Converter
1998-015	Drum Control Unit
1998-016	D.C.C.E. Console
1998-017	Drum
1998-018	Drum Air Compressor
1998-019	Drum Air Receiver
1998-024	Impulse Readout Clock (RPQ)
1998-028	Clock
1998-029	RPQ Clock Input
1998-033	Card Proof Punch (RPQ)
1988-034	Card Proof Punch (RPQ)
1998-043	Data Channel Repeater (RPQ)
2020-E02	Processing Unit
2030-C02	Processing Unit
2030-D02	Processing Unit
2030-F02	Processing Unit
2280	Film Recorder
2495	Tape to Card Reader
2596	Card Read Punch
2712	Remote Multiplexer
2902-001	RPQ Communication Controller
2911-006	Switch
2911-014	RPQ Communication Switch Unit
2925-004	Operator Station RPQ
2947-004	RPQ Check Collection Controller
2962-001	RPQ Display Controller
2971-006	TV Display Control Unit RPQ
2973-007	RPQ Two Channel Switch
2976-003	Transmission Control Unit
2976-004	Printer Keyboard
2976-005	Signal Converter
2983-001	Supervisor Data Capture Unit
2989-001	Tape Control RPQ
2989-010	Real Time Recorder
2989-011	Basic Counter Unit
3671-001	Shared Terminal Control
4872	Modem
6405	Accounting Machine (6400)
6410	Accounting Machine (6400)
6420	Accounting Machine (6400)
6422	Automatic Ledger Feed (6400)
6424	Card Punch (6400)
6425	Magnetic Ledger Unit (6400)
6426	Card Punch (6400)
6428	Card Reader (6400)
6454	Paper Tape Reader (6400)
6455	Paper Tape Punch (6400)
7100	Central Processing Unit
7101	Central Processing Unit (7030)
7102	Arithmetic & Logical Unit (7080)
7104	High Speed Processor (7074)
7105	Central Processing Unit
7106	Processing Unit (7040)
7107	Processing Unit (7044)
7108	Instruction Processing Unit (7090)
7109	Arithmetic Sequence Unit
7110	Instruction Processing Unit (7094)
7111	Instruction Processing Unit (7094)
7114	Processing Unit (7010)
7150	Console Control Unit
7151	Console Control Unit
7152	Stretch Console
7153	Core Storage
7155	Console
7230-001	Input Output Multiplexer
7256-001	Photo Store Unit
7262	Console
7266-001	Lexical Processor
7275-002	Toll Rating Interface
7286-003	Channel Direct Data
7286-005	Channel Direct Data & LCM
7293	Power Supply & Power Control
7294-001	Tape Independent Power
7300	Disk Storage
7301	Core Storage
7302	Core Storage
7305	Central Storage & Control
7320	Drum Storage
7330	Magnetic Tape Unit
7335	Magnetic Tape Unit
7340	Hypertape
7400	Printer
7404	Graphic Output Unit
7473-002	RPQ Display Terminal
7500	Card Reader
7501	Console Card Reader
7502	Console Card Reader
7503	Card Reader
7550	Card Punch
7553	Card Punch
7600	Input/Output Control
7601	Arithmetic & Program Control (7070)
7602	Core Storage Control
7603	Input/Output Synchronizer
7604	Tape Control
7605	Disk Storage Control
7606	Multiplexer
7607	Data Channel
7608	Power Converter
7612	Disk Synchronizer & Storage
7613	Tape Control
7614	Card Reader Control
7615	Card Punch Control
7616	Printer Control
7617	Data Channel Console
7618	Power Control
7619	Exchange
7620	Channel
7621	Tape Control
7622	Signal Control
7623	Console Central
7631	File Control
7634	Graphic Control Unit
7640	Hypertape Control
7641	Hypertape Control
7701	Tape Transmission Terminal
7702	Magnet Tape Transmission Terminal
7710	Data Communication Unit
7711	Data Communication Unit
7741	Programmable Trans. Control Unit
7750	Programmed Trans. Control
7765	Paper Tape to Mag Tape Converter
7772	Audio Response Unit
7802	Power Converter
7803	Power Distribution
7804	Power Unit
7900	Inquiry Station
7904	Data Channel
7907	Data Channel
7908	Data Channel
7909	Data Channel
7951	Stretch
7952	Stretch
7956	Stretch
7957	Stretch
7958	Stretch
7959	Stretch

MACHINES WHICH WILL NO LONGER BE ACCEPTED FOR MAINTENANCE AGREEMENT SERVICE

1905-012	RPQ
1905-015	RPQ
1905-018	RPQ
1905-025	RPQ
1923-027	RPQ
1924-013	RPQ
1924-024	RPQ
1924-029	RPQ
1924-032	RPQ
1924-041	RPQ
1924-047	RPQ
1924-076	RPQ
1925-002	RPQ
1925-024	RPQ
1926-004	RPQ
1926-013	RPQ
1926-014	RPQ
1926-016	RPQ
1937-008	RPQ
1937-023	RPQ
1940-022	RPQ
1947-001	RPQ
1947-002	RPQ
1947-008	RPQ

1947-020	RPQ
1947-021	RPQ
1971-026	RPQ
1971-027	RPQ
1972-001	RPQ
1980-007	RPQ
2906-004	Transmission Control Unit RPQ
2910-001	Intercept System RPQ
2925-002	Operator Station RPQ
2946-003	Transmission Control Unit RPQ
2950-002	Batch Buffer RPQ
2956-006	Badge and Badge Card Reader RPQ
2956-007	Badge and Badge Card Reader RPQ
2968-002	RPQ
2970-003	Terminal RPQ
2970-012	Terminal RPQ
2970-014	Terminal RPQ
2980-021	Terminal RPQ
2987-005	RPQ
2987-007	RPQ
2989-004	RPQ
2989-005	RPQ
2989-006	RPQ
2989-014	RPQ
2995-005	RPQ

MACHINES DECLARED FOR DISCONTINUANCE OF LEASE/RENTAL AND WITHDRAWAL OF IBM MAINTENANCE AGREEMENT SERVICE PLANNED DATES

February 29, 1984

020	Card Punch	2/13/84
834	Control Unit (Non Printing)	2/29/84
836	Control Unit (Printing)	2/29/84
866	Non-Transmitting Typewriter	2/29/84
961	Tape Punch (8 Track)	2/29/84
962	Tape Punch (5 Track)	2/29/84
972	Auxiliary Keyboard	2/29/84
1960-10	RPQ - Special Reader	2/29/84
1960-20	RPQ - Special Processing Unit	2/29/84
2946-1	RPQ Terminal Control Unit	2/29/84

September 30, 1984

84	Sorter	9/30/84
85	Collator	9/30/84
87	Collator	9/30/84
138	Collator	9/30/84
188	Collator	9/30/84
402	Accounting Machine	9/30/84
403	Accounting Machine	9/30/84
407	Accounting Machine	9/30/84
419	Accounting Machine	9/30/84
421	Accounting Machine	9/30/84
444	Accounting Machine	9/30/84
447	Accounting Machine	9/30/84
523	Gang Summary Punch	9/30/84
526	Printing Summary Punch	9/30/84
548	Interpreter	9/30/84
954	Facsimile Posting Machine	9/30/84
1926-019	RPQ	9/30/84
1926-021	RPQ	9/30/84
1926-022	RPQ	9/30/84
2905-001	Remote Multiplexer RPQ	9/30/84
2905-002	Transmission Control Unit RPQ	9/30/84
2906-001	Transmission Control Unit RPQ	9/30/84
2978-001	Transmission Control Unit RPQ	9/30/84
2990-016	Work Station RPQ	9/30/84
4275	Terminal Control Unit	9/30/84
4279	Terminal Control Unit	9/30/84
4505-001	Display Station	9/30/84
4505-022	Display Station	9/30/84
4505-023	Display Station	9/30/84
4506	Display Station	9/30/84

September 30, 1985

357	Input Station	9/30/85
358	Input Control Unit	9/30/85
360	Clock Read-Out Control	9/30/85
361	Read-Out Clock	9/30/85
372	Manual Entry	9/30/85
373	Punch Switch	9/30/85
374	Cartridge Reader	9/30/85
1131	Processing Unit	9/30/85
1132	Printer	9/30/85

MACHINES DECLARED FOR DISCONTINUANCE OF LEASE/RENTAL AND WITHDRAWAL OF IBM MAINTENANCE AGREEMENT SERVICE PLANNED DATES

1133	Multiplex Control	9/30/85
1135	Paper Tape Reader	9/30/85
1403-006	Printer	9/30/85
1625	Plotter	9/30/85
1801	Processor	9/30/85
1802	Processor	9/30/85
1803	Storage Unit	9/30/85
1810	Disk Storage Unit	9/30/85
1816	Printer Keyboard	9/30/85
1826	Data Adapter Unit	9/30/85
1827	Data Control	9/30/85
1828	Enclosure	9/30/85
1851	Multiplex Terminal	9/30/85
1856	Analog Output Terminal	9/30/85
1892	Printer Control	9/30/85
1894	Temperature Control	9/30/85
1896	Communications Adapter	9/30/85
1897	Housing Set Output	9/30/85
1898	Power Supply	9/30/85
2310	Disk Storage	9/30/85

February 10, 1986

082	Sorter	2/10/86
514	Reproducer	2/10/86
519	Document Originating Machine	2/10/86
557	Interpreter	2/10/86

LIST OF SPECIAL FEATURE/MODEL UPGRADES FOR PURCHASE MACHINES FOR WHICH THE REPLACED PARTS BECOME THE PROPERTY OF IBM

Machine Type	Special Feature Addition	... Model Conversion ... From	To
3032	7850		
3033	3832	*U4,6,8; or	
	7850	*M4,6,8; or	U12,16;M12,16;A12,16
		U (all mdls)	A (all mdls),M (all mdls)
		N (all mdls)	U,A or M (all mdls)
		S (all mdls)	N (all mdls)
3042	3832	1	2
3081		D16	D24,D32,K16,K24,K32, K48
		D24	D32,K24,K32,K48
		D32	K32,K48
		G16	G24,G32,G48,K16,K24, K32,K48
		G24	G32,G48,K32,K48
		G32	G48,K48
		K16	K24,K32,K48 or 3084-Q-32
		K24	K32,K48 or 3084-Q-48
		K32	K48, 3084-Q-64
3082		24	Q48
3083		E8	E16,B8 thru B32
		E16	B16 thru B32
		B8	B16,B24,B32,J8 thru J32, 3081-G16,G24 & G32
		B16	B24,B32,J16 thru J32, 3081-G16,G24 & G32
		B24	B24,B32,J24 or J32, 3081-G24 & G32
		B32	J32,3081-G32
		J8	J16,J24,J32,3081-K16, K24 & K32
		J16	J24,J32,3081-K24 & K32
		J24	J32,3081-K32
3084		Q32	Q48,Q64
		Q48	Q64
3145		GE	H2,HG2,I2,IH2,J2
		GFD	H2,HG2,I2,IH2,J2
		H	H2,HG2,I2,IH2,J2
		HG	I2,IH2,J2
		I	IH2,J2
3158	2151		
	7220		
3158-3	2151		
	7220		
3168	7220		
3168-3	7220	U31	A31 thru A38
		U32	A32 thru A38
		U33	A33 thru A38
		U34	A34 thru A38
		U35	A35 thru A38
		U36	A36 thru A38
		U37	A37,A38
		U38	A38
		A31	M31 thru M38
		A32	M32 thru M38
		A33	M33 thru M38
		A34	M34 thru M38
		A35	M35 thru M38
		A36	M36 thru M38
		A37	M37,M38
		A38	M38
3344		B2	B2F
3350		A2	A2F
		B2	B2F
		C2	C2F
3601		2A	2B,3A,3B
		2B	3B
		3A	3B
3602		1A	1B
3631		1A	1B
3632		1A	1B
3651		B25	B75
		A50	B50
		A60	B60
		A50	A75,B75
		B50	B75
		A60	A75,B75
		B60	B75
		A75	B75
		C25	C75,D75
		C75	D75
3653		1	1P
3661		1	2
3663	3880	1	1P
		3	3P
3683		1	1A
		2	2A
		3	3A
3684		1	2
3776		1	2,3,4
		2	4
		3	4
3777		1	2,3
		2	3
3791	3220	1A	1B
	3221		
3803		1	2
3830-1,2	2151	2	3
3880	6550		
		4321 J11	4331 J02
4331		1	2
		1	11
4341		1	2
		1	11
		1	12
		10	11
		10	12
		11	2
		11	12
		2	12
8101		A10	A11,A13
		A11	A13
8130		A21	A22,A23,A24
		A22	A23,A24
		A23	A24
8140		A31	A32,A33,A34
		A32	A33,A34
		A33	A34
		A41	A42,A43,A44
		A42	A43,A44
		A43	A44
		A51	A52,A53,A54
		A52	A53,A54
		A53	A54

* Single dense storage technology models (U4, U6, U8; M4, M6, M8; A4, A6, A8).

Note: This list does not include standard machine types below 3000, RPQ machine types, special feature or model conversion RPQs, or former GSD "Exclusive" machines. For machine types below 3000, affected model conversions (special features are not affected) are so indicated on the applicable page of the RPQ Reference List or, for other RPQs, on the RPQ Description and Price Transmittal form received from ISG Special Product Marketing Support.

LIST OF NON-FIELD INSTALLABLE SPECIAL FEATURES/MODEL CONVERSIONS

Machine Type-Model	SPECIAL FEATURES Not Recommended for Field Installation	SPECIAL FEATURES At Time of Manufacture Only	MODEL CONVERSIONS Not Recommended for Field Installation	MODEL CONVERSIONS At Time of Manufacture Only
1031				All
1032				All
1033		#9509		
1255				*
1287		#5370		All
1288		#5370		
1403		#5381		*
1419		#3610 #3791 #3795		
1442				*
1443		#5567 #5568 #5569		*
2305				All
2501				*
2520				*
2540		#4151		
2560		#1575		*
2701		#7695 #7696		
2791				*
2792				All
2821		#7945 #8100		*
2835				All
2860				All
2880			All	
3033-N, S			*	
3042		*		
3062	#4525			
3066-2	#4525 #7127 #7128 #7129			
3066-3	#7127 #7128 #7129			
3067-2	#4525 #7127 #7128 #7129			
3067-3	#4525 #7127 #7128 #7129			
3067-5	#4525			
3081			3081-K to 3081-G, 3081-G to 3083-B 3081-K to 3083-J	3081-K to 3081-D
3082			Q48 to 8, 16, or 24	
3083			3083-B to 3083-E 3083-J to 3083-B	
3084			3084-Q to 3081-K	
3087				Mdl 1 to 2, Mdl 2 to 1
3115-2			3115-2 to 3115-0	
3135-3			3135-3 to 3135	
3145	#4650		3145-2 to 3145-0	
3145-3	#4650		3145-3 to 3145-2	
3158-3	#7119		3158-3 to 3158	
3168	#4525 #7127 #7128 #7129			
3168-3	#4525 #7127 #7128 #7129		3168-3 to 3168	
3203				*
3210			1 to 2 2 to 1	
3271-11,12		#1200		
3274	#8801			*
3275-2		#3440		
3275-3				All
3275-12		#1200		
3276	#1068			
3277				All
3278-2A	#8802		2A	
3278-5			*	
3279	#6340		*	
3279-2C	#6340	#4631 #4632 #4633 #4634	*	
3284				*
3287			*	
3289			*	*
3310				*
3330				*
3340				All
3345			*	
3350				*
3370				All
3380				*
3420-3,5,7		#3550 #6407		
3504	#3921			
3505	#3921			
3525	#1421			
3601				*
3602	#1010 #1011			
3603	#6352			All
3604-1	#4661 #4663			All

LIST OF NON-FIELD INSTALLABLE SPECIAL FEATURES/MODEL CONVERSIONS

Machine Type-Model	SPECIAL FEATURES Not Recommended for Field Installation	SPECIAL FEATURES At Time of Manufacture Only	MODEL CONVERSIONS Not Recommended for Field Installation	MODEL CONVERSIONS At Time of Manufacture Only
3604-2,3,4	#4771 #4772 #4773 #4774			All
3604-5,6			5 to 6	All, except 5 to 6
3604-7				All
3606				All
3608		#5454		All
3610-1,2,3		#6900 #6901 #6903 #6904		All
3610-4				All
3611		#6900 #6901 #6903 #6904	All	
3612		#6900 #6901 #6903 #6904		All
3615				All
3616		#8701		
3618	#3550 #3860			
3624	#6301* #6302* #7820* #7950			All
3632	#1010 #1011			
3641	#5781 #5801 #5802	#4652 #4653		All
3642				All
3643		#4772 #4774		All
3647		#1501 #3850		
3651			*	
3653	#4990			
3659				All
3663	#3425 #3451 #5330		*	
3683				*
3694				*
3760		#6660		All
3762		#1310 #3805 #4660 #5100		
3767	#1201			
3771	#1201			
3773	#1201 #4660			
3774	#1201 #4660			
3775	#1201 #3551 #4660			
3776	#1201			
3777	#1201			
3782				All
3791				*
3803				*
3814				*
3830				*
3845				All
3846				All
3863				All
3864				All
3865				All
3872		#3602		
3880	#6550*			
3881				*
4331				*
4341				*
4704			All	
5424	#6510			
5496	#3666	#7850		
8775	#1009 #6340			

* See applicable machine page for model conversion/feature restrictions.

Note: This list does not include former GSD "Exclusive" machines or RPQ machines.

29 CARD PUNCH

PURPOSE

Punches coded data into cards serially by manual operation of the keyboard. For independent operation only.

MODELS

Model A Card Punch

A11	Numeric Keyboard	12 characters	Nonprinting
A12	Expanded Keyboard	64 characters	Nonprinting
A21	Numeric Keyboard	12 characters	Printing
A22	Expanded Keyboard	64 characters	Printing

Model B Card Punch (with left zero insertion)

B11	Numeric Keyboard	12 characters	Nonprinting
B12	Expanded Keyboard	64 characters	Nonprinting
B21	Numeric Keyboard	12 characters	Printing
B22	Expanded Keyboard	64 character	Printing

Model C Interpreting Card Punch

C22	Expanded Keyboard	64 characters	Printing

Limitations: Cards with lower corner-cuts (except lower left corner-cut C-3, 30 degrees, 0.0130 inch base measurement) cannot be fed. Round corner-cut cards are acceptable.

HIGHLIGHTS

Keyboard switches control the following automatic functions: Clear, card feeding, duplication and skipping, program 1-2 selection. A punched program-card in the program unit also controls duplication and skipping in addition to field definition, alphabetic shift, and on B mdls, automatic left-zero insertion.

Mdls equipped with the print feature are provided with keyboard switches to suppress all printing or to inhibit left-zero printing only. When printing is activated, the characters print along the top edge of the card as each column is punched. The hopper and stacker each hold approximately 500 cards. Skipping and card release are at the rate of 80 columns per second. Automatic duplication is at the rate of 20 columns per second on nonprinting models and at 18 columns per second on printing models.

Other Standard Features: Column indicator, multiple punch control, backspacing, and two program levels. **Note:** A keyboard switch can be preset to establish program 1 or 2 as the normal program. Functional keys permit shifting between program levels at will.

Printing: Punching and printing is at the rate of 18 columns per seconds. See "Type Catalog" for punching/printing options. Alphabetic "O" is squared slightly to distinguish it from numeric zero. The 64 characters of arrangement EL can be punched while duplicating, regardless of the special character arrangement installed. However, only the graphics of the specified arrangement can be printed while punching or duplicating. On printing models, other multipunched characters may cause damage to the print unit if duplication is attempted.

Keyboard: Depending upon the mdl, either an alphameric or numeric keyboard is furnished. See "Type Catalog" for available special character arrangements.

Arrangement EL: Extended BCD Interchange Code (64 characters), permits punching of any of the 64 EBCDIC characters with a single keystroke. On printing mdls, all of the 64 characters can be printed. This arrangement includes graphics associated with the following S/360 character sets of the 1403 Printer equipped with the Universal Character Set feature:

Programming	1403 Print Arrangement
PL/I	PN
PL/I	QN
FORTRAN/COBOL	RN

Graphics of all character sets associated with the 1443 mdl N1 and 2203 mdl A1 (S/360) are also included. **Exception:** 12-8-4 always prints as < on mdls A22, B22, C22. Arrangement EL is recommended for 1800 systems programming.

Arrangements A-K: Standard BCD Interchange Code (48 characters). When any of these arrangements is ordered, 16 special characters (graphics) associated with the 64-character set (EL) do not appear on the keytops. In place of these graphics, the punched hole codes are shown. These codes indicate the digits which can be punched by a single key depression in numeric shift, a savings in time for the operator, obviating the necessity for depressing the "Mult Pch" key and two or three separate keys to obtain a multipunched card column. Depression of these keys will not result in printing a recognizable character.

Left-Zero Insertion: [B mdls] Under program control, the operator keys only the significant digits within the field (maximum field size of 8 numerical positions), and then, by depressing the left-zero key, the field (including preceding left-zeros) is automatically punched. In the event the operator detects an error prior to depression of the left-zero key, the error reset key may be depressed and the data reentered.

Interpreting Card Punch: Mdl C22 is equipped with an early read station to permit printing over each column when prepunched cards are processed. This feature is under switch control. Machine will not punch when functioning as an interpreter. Cannot be equipped with automatic left-zero function.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621), *Reference Manual* (GA24-3332).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz):

  For Locking Plug:
  115V **#9880** 208V **#9884**
  230V **#9886**

  For Non-locking plug:
  115V **#9881** 208V **#9885**
  230V **#9887**

- Special Character Arrangement: [All mdls except A11, B11] See "Type Catalog".
- Acoustic Cover: If desired, **#9014** for card transport. May be field installed.

SPECIAL FEATURES

For detailed description of special features, see *Reference Manual* (GA24-3332).

Auxiliary Duplication (#1350): To duplicate from a master card on the auxiliary drum rather than from the reading station. **Limitations:** Cannot be installed with Self-Checking Number - Modulus 11 (#7062).

Card Insertion (#1535): Simplifies manual insertion of a master duplicating card in front of a group of cards to be punched, or insertion of a blank or prepunched trailer card at the end of a group of punched cards. **Limitations:** Cannot be installed with Feed, Variable-Length (#4360).

Character Inhibit (#1540): To restrict the number of active characters to 48 on alphameric keyboard arrangements A through K and EL (mdls A12, A22, B12, B22, C22). A switch in the program drum area permits selection of 48- or 64-character mode of operation. When set to 48-character mode, keying and punching of the following special characters is inhibited:

Card Code:	12-8-2	12-8-5	12-8-6	12-8-7	1-8-2	11-8-5	11-8-6	11-8-7
	¢	(	+	|	!	)	;	¬
Card Code:	0-8-2	0-8-5	0-8-6	0-8-7	8-2	8-5	8-6	8-7
	blank	—	>	?	:	'	=	"

Column Locate (#1570): [Mdls A, C] Enhances the ability to make over a card by automatically skipping or duplicating to the column or columns to be changed. A 17-key cluster located on the keyboard to the left of the existing keys is used to select the column or columns to be changed. **Limitations:** One program level must be dedicated to the use of this feature. Cannot be installed with Self-Checking Number - Modulus 10 (#7061).

Feed, Variable-Length (#4360): Permits processing of 51-, 60-, 66-, and 80-column cards. **Limitations:** Cannot be installed with Card Insertion (#1535) or Interspersed Gangpunch (#4720). Discontinuance of this feature requires replacement of the machine. **Field Installation:** No.

High-Speed Skip (#4595): For skipping at approximately three times the normal speed. Operates under program control in conjunction with normal skipping. Provides the greatest advantage for applications which require skipping at least 55 consecutive columns. **Limitations:** Cannot be installed with Interspersed Gangpunch (#4720).

Interspersed Gangpunch (#4720): For interspersed gangpunching with standard upper corner-cut master cards. A switch is provided for selecting cards with upper left of upper right corner-cuts as masters. Information is punched from the master card into detail cards until the next master is recognized. **Limitations:** Detail cards must have an upper corner-cut opposite to that designated for the master card. Cannot be installed with High-Speed Skip (#4595) or Feed, Variable-Length (#4360).

Self-Checking Number (#7061, #7062): [A mdls] A self-checking number consists of two parts, the basic identifying number and its check-digit. The check-digit, derived from the basic identifying number by one of two techniques, is always the units digit of the self-checking number. The feature assures that all digits of a number such as an account or item field have been correctly punched. Fields containing self-checking numbers can be any size up to 79 columns plus the check-digit. More than one self-checking field can be checked per card, but there must be at least one intervening column between such fields. The field is controlled by program-card coding. A detected error

29 Card Punch (cont'd)

punches a "12" over the units position of the field and locks the keyboard. For a correctly punched card, an "11" is punched in the blank space (81) following column 80. **Note**: Self-checking numbers of Modulus 10 are not compatible with those for Modulus 11.

Self-Checking Number - Modulus 10 (#7061): Uses weighting factors of 1, 2. When the self-checking field is greater than two digits, the weighting factor is repeated. Auto-duplication within the self-checking field is not possible. Includes self-checking number generator for assignment of new numbers. **Limitations:** Does not accommodate left base numbers. cannot be installed with Column Locate (#1570).

Self-Checking Number - Modulus 11 (#7062): Uses weighting factors of 7, 6, 5, 4, 3, 2. When the self-checking field is greater than six digits, the weighting factor is repeated. Auto-duplication within the self-checking field is possible, but must start with the first digit and can extend to, but not include, the self-checking digit. **Limitations:** Does not accommodate left base numbers. Cannot be installed with Auxiliary Duplication (#1350).

Self-Checking Number Generator - Modulus 11 (#7063): [A mdls] Determines and punches the check-digit. Used when assigning new numbers. **Prerequisites:** #7062.

Ordering: Before ordering special features see the following chart for possible feature combinations. Maximum combinations, indicated by "x", are shown in the vertical columns.

Features	Models														
	[				A				]	[	B	]	[	C	]
Auxiliary Duplication (#1350)	x	x	x		x		x	x		x	x	x	x	x	x
Card Insertion (#1535)		x			x	x	x	x	x		x	x		x	x
Character Inhibit (#1540)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Column Locate (#1570)	x	x	x	x	x	x		x	x				x	x	x
Feed, Variable-Length (#4360)	x		x	x						x			x		
High Speed Skip (#4595)	x		x	x			x	x	x	x		x	x		x
Interspersed Gangpunch (#4720)		x			x	x					x			x	
Reading Board Extension (#6065)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Self-Checking Number-Mod 10 (#7061)	x	x					x								
Self-Checking Number-Mod 11 (#7062)				x		x			x						
Self-Checking Number Generator (#7063)				x		x			x						

MODEL CONVERSIONS

Can be made in the field only between A11 and A12, A21 and A22, B11 and B12, B21 and B22.

ACCESSORIES

Reading Board Extension (#6065): The extension can be attached to the front edge of the standard reading board to provide an additional 28 cm (11-1/2 inches) x 28.5 cm (12 inches) working area to the left. The Reading Board Extension is available on a purchase-only basis. For shipment with machine, specify #6065.

SUPPLIES (None)

59 CARD VERIFIER

PURPOSE

Used to verify alphabetic, numeric, and special character punching in cards.

MODELS

Model 1	001	Numeric Verification	12 Characters
Model 2	002	Alphameric Verification	48 or 64 Characters

Limitations: Cards with lower corner-cuts (except lower left corner-cut C-3, 30 degree, 0.130 inches base measurement) cannot be fed. Round corner-cut cards are acceptable.

HIGHLIGHTS

Uses photosensing for quiet operation. Program card and keyboard switches and keys allow complete flexible control of all operations, including multiple changes between program levels within a card. Hopper and stacker each hold approximately 500 cards. Skips and releases at 80 cps. Verifies automatically under program or key control at 80 or 50 cps. Notches completely-verified correct cards on right edge between "0" and "1" punch positions. Verifies blank columns automatically at 50 cps. When an error is detected, the keyboard locks and error light is lit. Depression of "Error Reset" key unlocks keyboard. After the third trial of a column the error column is notched at the top of the card and the card advances to the next column. When high-speed auto-verifying at 80 cps (program controlled), notching of the error column is controlled by operator from keyboard. Verification of "X" does not cause skipping. Keyboard rotates approximately +/-12 degrees. For card codes of Expanded Character Set, see "Type Catalog".

Standard Features: Automatic Feed, Skip and Verify Switches. Column Indicator. Error Light, Error Reset key... Second Program Level, switch and keyboard controlled... Automatic Blank Column Verification, keyboard controlled... Program Unit, Program Drum and Control Lever... Stacker Overflow Stop Device... Release, Register, Feed, Skip, Multipunch, Verify Dup, Notch, Alpha and Numeric Shift keys... Clear Switch.

Automatic Left-Zero Verification: Allows auto-verification or left-zeros under program control at 50 cps. Operator controls verification of left-zero field by programming and optional use of "Left-Zero Control" key to signal end of data entry. If control key is used, depression must occur in correct sequence or error is signaled. See *Left-Zero Control Circuit Operation* (GN22-0221).

Publications: *IBM Marketing Publications KWIC Index* (G320-1621), *59 Operator's Reference Manual* (GA24-3333).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): For Locking plug, **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. For Non-locking plug, **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Special Character Arrangement: [Mdl 2] See "Type Catalog".
- 0-9 and 11-12 Elimination: **#9143**, if desired.
- Acoustic Cover: **#9014** for card transport, if desired. **Limitations:** Will interfere with operator access to card during error-marking procedure. Should be ordered only if requested by customer. **Field Installation:** Yes.
- Left-Zero Control: **#9378**. For machines below serial number 22401, standard on all others. **Field Installation:** Yes. Not for Plant installation.

SPECIAL FEATURES

For detailed descriptions of special features, see *59 Operator's Reference Manual* (GA24-3333).

Auxiliary Verification (#1380): Depression of the Auxiliary Verify key causes verification of the common information field from the master card on the auxiliary drum.

Feed, Variable-Length (#4360): For processing 51-, 60-, 66- and 80-column cards. **Field Installation:** No.

High-Speed Skip (#4595): For skipping at approximately three times the normal speed. Operates under program control in conjunction with normal skipping. Provides the greatest advantage in applications that require skipping at least 55 consecutive columns. **Note:** For information regarding field changes of keytops see "Type Catalog".

MODEL CONVERSIONS

Model conversions can be made in the field.

ACCESSORIES

Reading Board Extension (#6065): The extension can be attached to the front edge of the standard reading board to provide an additional 28 cm (11-1/2 inches) x 28.5 cm (12 inches) working area to the left. The Reading Board Extension is available on a purchase-only basis. For shipment with machine, specify **#6065**.

SUPPLIES (None)

83 SORTER

PURPOSE

To group punched cards in numerical or alphabetic sequence.

MODELS

Model 1 001

Limitations: Because cards stack on end, internally-scored cards (Standard Card Score M-2A or M-3), aperture cards, Punched Hole Score OM-2 or OM-3, cards that have been folded or creased (Card Fold Crease S-2), or circulating card documents such as card checks are likely to cause stacking and jamming problems and should not be recommended without prior customer acceptance of these limitations. Only external scores M-2A, M-3, M-4, M-5 and CF-4 (on column 1 end of card) have been approved. Tumble cards with verify notches or similar conditions on the column 1 end of the feed, and cards with folded, bent, or creased corners are likely to cause stacking and jamming problems and should not be recommended without prior customer acceptance of these limitations.

HIGHLIGHTS

The 83 has 13 pockets, each holds from 400 to 900 cards and has an adjustable stop. The hopper holds 1,200 cards and can be equipped with File Feed (#4015). Has Sort Selection Switch (Numeric Zone, Alphabetic 1, Alphabetic 2, and Alphameric). Digit Suppression Keys direct cards of predetermined categories to the reject pocket. Edit Switch and Edit Stop Switch pre-edit cards for absence of selected multiple punches. Dynamic brake to stop machine quickly. Jam bar to stop machine quickly if card jams.

Publications: *Catalog of Marketing Publications* (G310-0012), *Unit-Record Installation-Manual Physical-Planning* (GC24-1037), *Reference Manual* (GA24-1034).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Locking plug **#9880** for 115 V, **#9884** for 208 V, **#9886** for 230 V. Non-locking plug **#9881** for 115 V, **#9885** for 208 V, **#9887** for 230 V.

SPECIAL FEATURES

Alphabetic Sorting (#1225): Reduces number of card passes for alphabetic and alphameric sorts. See *Reference Manual* (GA24-1034) for sorting charts. **Field Installation:** No.

Card Counting Unit (#1520): Counts holes punched in a column, with or without sorting. Also registers number of cards not punched in that column. Has 14 5-digit adding counters, one for each punching position, one for rejects, and one for subtotals. Auxiliary Card Counter (#2370) is required for a grand total. The unit is connected to the sorter by a 5-foot cable. May be attached (mounted on) to it or placed nearby. Does not affect normal operation. **Field Installation:** No.

Auxiliary Card Counter (#2370): A 6-position unit counter, each is switch controlled, manually reset.

File Feed (#4015): Increases card loading capacity from 1,200 to 3,900 cards. Allows up to 3-1/2 minutes running time without reloading. Usually eliminates operator fanning and joggling of cards. Has joggle plate, modified card weight and pocket jogglers. Joggle plate swings aside for loading up to 300 cards into hopper for small sorts. See *Reference Manual* (GA24-1034) for details. **Limitations:** Is not practical if most cards are to be processed in batches of 3,000 or less. Limits visibility of column indicator and Auxiliary Card Counter (#2370). Limits access to 12 and reject pockets of sorter rack if rack is behind sorter. **Field Installation:** No.

Sorting Suppression (#7240): To separate cards into either reject or 12 pocket without disturbing card sequence.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

129 CARD DATA RECORDER

PURPOSE

Used to punch or verify alphabetic, numeric and special character data in cards by manual keyboard operation, and print if desired.

MODELS

Model 1	001	Alphameric	Punch	Non-Print	Verify
Model 2	002	Alphameric	Punch	Print	Non-Verify
Model 3	003	Alphameric	Punch	Print	Verify

Limitations: Cards with lower corner-cuts (except lower left corner-cut C3, 30 degrees, 0.130 inch base measurement) cannot be fed. Round corner cards are acceptable.

Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores (before separation) S-1, and for a maximum of five passes M-4 ... M-5 may be used ... cards folded at the crease (Card Fold Creases S-2) must be properly flattened.

External Scores (after separation), for reading, punching and printing. On column 1 end, M-6, M-7 ... on column 51, 60, 66 and 80 end, M-3, M-7, OM-2, CF-4.

There should never be punching in the area of the score ... nor should scored cards be used for program cards or data read-in. All other scores may result in unsatisfactory performance. Consult IBM for more details.

HIGHLIGHTS

Has a buffer storage area into which data is keyed prior to punching, allowing error correction by character, word, field or record backspacing before punching. Also allows complete overlap of keying and automatic functions, for maximum operator throughput. Six program levels, plus an unformatted level, are standard. Formats are read into the storage area via punched program cards. Unlimited switching among levels is possible. Programs control automatic functions of skipping, duplicating, left-zeros or blanks, alpha or numeric keyboard shifting, and field definition. Hopper and stacker each hold approximately 500 cards. Skips and releases at 80 columns per second. Punches and prints at 18 columns per second for printing mdls, 20 columns per second for non-printing mdl. Printing is under switch control. A column indicator display shows the next column to be keyed. Punch or Verify mode is under keyboard switch control.

When equipped with a Card Input/Output Attachment (#7503), all mdls can be attached to a System/3 mdl 6 as an online card I/O device. When equipped with a 3741/5320 Attachment (#8201), the mdl 2 can be attached to a 3741 as an auxiliary card reader or punch, or as an online card I/O device to any mdl 5320.

Verify Mdls: Punched cards are read into buffer storage at 80 columns per second, and the operator key-verifies against the data in storage. For correct cards (no errors), digits 2 and 3 are punched in the column 81 area of the card and operation continues (similar to OK notch on the 59 Verifier). If keyed data does not match data in memory, an error is signaled ... operator can reset error and re-try verification ... if OK, operation continues ... if not OK after second try, machine automatically prepares to "rewrite" memory and next keystroke "rewrites" storage with correct data. Field or character backspace is then used to reverify corrected data in proper sequence within the field. When the buffer storage data is corrected and reverified, and at the completion of that record, the original card is released without any punching in column 81. A blank card is then inserted and punched from the buffer with the correct data and a "2" is punched in column 81. Thus, cards which had a correction punched can be identified from those without errors, and error cards have no punching in column 81.

Standard Features: Auto Skip/Dup switch ... Record Advance/Card Feed Switch ... Program Mode Dial ... Print On/Off (mdls 2, 3) ... Keyboard Mode 48/64 Character switch ... Read pushbutton ... Clear switch ... Record Backspace pushbutton ... Column Indicator ... Multipunch key ... Release key ... Program Select key ... Manual Dup key ... Feed key ... Skip key ... Register key ... Left-Zero Control key ... - LZ key ... Alpha and Numeric Shift key ... Space bar ... Stacker Full Stop switch and stacker card-volume measuring scale. Mdls 1 and 3 have a Punch/Verify Mode switch on the keyboard console ... also have Verify Reset key ... Verify Correct key ... Verify Error light ... Blank Columns Verify key is combined with Left-Zero Control key to provide dual function of blank columns verification and left-zero verification.

Printing: On mdls 2 and 3, is under Print On/Off switch control ... 64-character set EL, or the 48-character subset, is under 48/64-Character Keyboard Mode switch control. Leading zeros, in a field which is under program control, are automatically print-suppressed. **Note:** On mdl 3, printing is not active during verify except when a correction card is being punched.

Programs: Six levels plus a level "0" are standard. Levels 1-6 are read in via a punched card under Program Mode Dial and Read switch control ... level-zero format is 80 single-position fields, alpha shift. Desired level for start of a record is selected by the dial ... unlimited Program Select key switching within a record is possible. Program Mode Dial also controls program card punch out from storage, and data read in from a pre-punched card. Program card or data card read-in is at 80 columns per second.

Left-Zero or Left-Blanks Insertion: Either is under operator keyboard control. Program coding is not needed for punching ... any field may be left-zero punched by operator action. The operator keys the significant digits and then depresses Left-Zero key causing zeros to be inserted in numeric fields or blanks inserted in alpha field under storage control when the record is punched. Leading zeros are automatically print-suppressed. Maximum size of single field is 79 positions in punching.

Verify Mdls: Require program card coding to indicate the start and end column of a field to be verified using the left-zero control function. Operator keys the significant digits and depresses the Left-Zero Control key ... machine automatically verifies leading zeros and compares keyed data against data in the buffer and checks that depression of the Left-Zero Control key was in proper data sequence to prevent undetected errors.

Publications: *Machine Description* (GA22-6980), *Operator's Reference Manual* (GA22-6968).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Locking plug: **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Nonlock plug: **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Acoustic Cover: **#9014** for card transport, if desired. **Field Installation:** Yes.
- Character Arrangement: See "Type Catalog".

SPECIAL FEATURES

For detailed descriptions of special features, see *Operator's Reference Manual* (GA22-6968). **Note:** Before ordering special features, see the following chart for possible feature combinations. Maximum combinations, indicated by X, are shown in the vertical columns. Each vertical column represents compatible feature combinations.

Accumulate (#1020)	x	x	x	x	x
Accumulate Program Level, Add'l (#1025)	x	x	x	x	x
Auxiliary Storage (#1201)	x				
Card I/O Attachment (#7503)		x			
Direct Punch Control (#3215)	x	x	x		
Expansion Feature (#3610)	x	x	x	x	x
Feed, Variable-Length (#3950)			x		x
Interpret (#4601)				x	
Production Statistics (#5570)	x	x	x	x	
Reading Board Extension (#6065)	x	x	x	x	x
Self-Checking Number - Mod 10 (#7061)	x		x	x	
Self-Checking Number - Mod 11 (#7062)	x		x	x	
3741/5320 Attachment (#8201)					x
Verify Read Control (#8705)		x	x		

Accumulate (#1020): Allows users to balance to a predetermined total or create a hash total for a group of cards, a batch of work, or to crossfoot and punch totals in the same card ... operates in program levels 1 and 2 only. It consists of three 14-position electronic accumulators that will algebraically add any numeric manually-keyed, duplicated, or Ver/Dup fields into any assigned accumulator, under program control. The maximum size of input is 14 decimal positions. Any accumulation beyond the 14th position will carry and maintain valid total up to 19 positions. The input field may be a left-zero or left-blank field, or an auto-dup or manual-dup field. The feature will recognize only the first punch of the numeric portion (0-9) of any keyed data in addition to the "11" for sign control in the units position. The responsibility for input size limitations and accumulator overflow is left to the user. Maximum punch field is 19 positions. Accumulate arithmetic will only occur after the entire record has been keyed in, therefore, there are no restrictions in the use of any backspace functions. **Limitations:** Accumulate (#1020) and Self-Checking Number (#7061 or #7062) are mutually exclusive within the same field. **Field Installation:** No. **Prerequisites:** #3610.

Accumulate Program Levels, Add'l (#1025): The accumulator operates only in program levels 1 and 2. Program levels 1 through 6 remain normal and active in the basic machine. This feature adds levels 3 through 6 to the program capacity of Accumulate (#1020). **Field Installation:** Yes. **Prerequisites:** #1020.

Auxiliary Storage (#1201): Allows insertion of up to 80 columns of common information into the corresponding field of a record from a stored location in memory. The Blank Columns/Left-Zero Control key is split and the Auxiliary Storage key replaces the lower portion of the Blank Columns/Left-Zero Control key. Readout of auxiliary storage is accomplished by impulsing the Auxiliary Storage key or under program control with 0 and 1 code in the first column followed by field definition punches for the remainder of the field. **Limitations:** Available only on machines with serial numbers above 20000. **Field Installation:** No.

Direct Punch Control (#3215): Provides a switch for control of card motion during keying, allowing punching to occur as each keystroke is made, and card motion to occur in synchronism with keying. Thus, source documents may be punched in similar fashion as on the 29, and

129 Card Data Recorder (cont'd)

the untrained or casual user of the 129 may conveniently operate the machine as a 29. Program control may also be used to cause one or more fields to be "buffered" while in direct-punch mode. **Limitations:** Operates in punch mode only. Available only on machines with serial numbers above 20000. **Field Installation:** Yes.

Expansion Feature (#3610): Provides additional capacity to permit installation of Accumulate (#1020), Self-Checking Number - Modulus 10 or 11 (#7061, #7062), or Card Input/Output Attachment (#7503). **Maximum:** One. **Field Installation:** No.

Feed, Variable-Length (#3950): Permits processing of 51-, 60-, 66- and 80-column cards. **Note:** Direct Punch Control (#3215) and/or Verify Read Control (#8705) may be required to provide additional card visibility for those customers punching or verifying into the source document. **Field Installation:** No.

Interpret (#4601): [Mdls 2, 3] Allows mdls 2 and 3 of the 129 to be used to interpret pre-punched cards. Under program card control with the Punch/Interpret/Verify switch in Interpret and the Auto Skip/Dup switch on, the machine is capable of the following:

1. Skipping columns not requiring interpreting.
2. Ignoring 12- and 11-zone punches on fields programmed, thus interpreting the numeric portion only.
3. Printing of leading zeros is under program control.

Interpreting takes place at normal punching speed, 18 columns per second. Skipping takes place 80 columns per second. If two or more adjacent columns are sensed as blank, the equivalent of skip speed will be achieved until a nonblank column is sensed. **Limitations:** In Interpret mode, punch/verify features (i.e., Accumulate, Self-Check) are inoperative. Available only on machines with serial numbers above 20000. **Field Installation:** No.

Production Statistics (#5570): Provides machine statistics for customer use in measurement of work load or production, analysis of errors, and job accounting. Counts automatically under machine control (no programming). Totals-punching is under operator keyboard control. Three electronic counters are provided in a combination package as follows:

1. Keystroke counter, 6 decimal positions (000,000 - 999,999). Counts every data and functional keystroke except multipunch, verify-correct, program select, feed, alpha, numeric, verify-reset, register, dup ... does not decrement.
2. Card counter, 4 decimal positions (0000 - 9999). Counts every output record in punch, or every verify correct or correction punching card ... does not decrement.
3. Verify Correction Keystroke counter, 4 decimal positions (0000 - 9999). Counts each verify correction data keystroke ... does not decrement. Counters reset to zeros when power is turned on. **Field Installation:** Yes.

Self-Checking Number (#7061, #7062): A self-checking number consists of two parts, the basic identifying number and its check-digit. The check-digit, derived from the basic identifying number by one of two techniques, is always the units-digit of a self-checking number. The feature assures that all digits of a number, such as an account or item field have been correctly keyed. Fields containing self-checking numbers can be any size up to 79 columns including the the check-digit. See "Limitations". More than one self-checking field can be checked per card. The field is controlled by program coding. A detected error locks the keyboard and the operator:

A. Chooses a recovery procedure to allow bypassing the field without punching any data, or
B. Provides a "12" or "11" punch over the units-position of the field which includes incorrect punching.

For a correctly punched card, an "11" is punched in the blank space (81) following column 80. Auto duplication of a self-checking field is possible. Self-check also operates in the verify mode.

Self-Checking Number - Modulus 10 (#7061): Uses weighting factors of 1, 2 ... when the self-checking field is greater than two digits, the weighting factor is repeated. **Field Installation:** No. **Prerequisites:** #3610.

Self-Checking Number - Modulus 11 (#7062): Uses weighting factors of 7, 6, 5, 4, 3, 2 ... when the self-checking field is greater than six digits, the weighting factor is repeated. **Field Installation:** No. **Prerequisites:** #3610.

Limitations: Self-Checking Number - Modulus 10 or 11 and Left-Zero Insertion are mutually exclusive within the same field. Accumulate (#1020) and the self-checking number features are also mutually exclusive within the same field. **Note:** Self-checking numbers of modulus 10 are not compatible with those of modulus 11. Self-checking number generating, self-check punch elimination, and left-based number (without a full-field) are not available for modulus 10 or 11.

Card Input/Output Attachment (#7503): To attach all mdls of the 129 as a card reader and/or output punch to a properly interfaced using system. The 129 attachment circuitry operating within a 64-character set arrangement performs the following internal conversions: (1) Input Read Mode - converts 80-column card code to System/3 card code format (B, A, 8, 4, 2, 1) and ... (2) Output Punch Mode - converts System/3 card code format to 80-column card code. Online the 129 reads, punches or punch/prints cards under system control at the following rated speeds: Card Reading - up to 50 cpm ... Punch/Print - 12 to 50 cpm. In Punch/Print mode throughput can vary dependent on the number of columns punched or printed. When two or more adjacent columns are blank, the equivalent of read speed is achieved until a nonblank column is encountered. In offline mode the 129 operates as a conventional card data recorder. **Limitations:** Accumulate (#1020), Accumulate Program Levels, Add'l (#1025), Direct Punch Control (#3215), Verify Read Control (#8705), and Production Statistics (#5570) are inoperative in the online mode. The 129 Card Data Recorder keyboard arrangement is not compatible with the proof keyboard, typewriter keyboard or System/3 mdl 6 keyboard arrangements. If a proof arrangement is desired on the 129, RPQ AA4942 should be ordered. **Maximum:** One. **Field Installation:** No, see "Card I/O Attachment" in "Specify". **Prerequisites:** #3610. #3210 on the 5406 when attaching to System/3 mdl 6, or #3210 on the 5231 mdl 3 when attaching to the 5230 Data Collection System. Connecting cable for 5406 ... Connecting cable for 5231 ... an 8m (25 foot) cable will be sent with the 5231 Control Unit as part of the Secondary Punch (#3210), no cable order is required.

3741/5320 Attachment (#8201): To attach a 129 mdl 2 as a card reader and/or punch to any mdl 5320 or a 3741 Data Station/Programmable Workstation equipped with the Data Recorder Attachment (#3200). An online switch is located on the 129 keyboard console. The 129 attachment circuitry interfaces to the 3741 or 5320 via 8-bit EBCDIC code, thus affording a 256-character set. Any character not within the standard 129 64-character set will not print during punch mode. Online, the 129 reads, punches, or punch/prints cards under control of the 3741 at the following speeds: card reading - up to 50 cpm ... punch/print - 11 to 39 cpm. Under control of the 5320: Card reading - up to 50 cpm ... punch/print - 12 to 50 cpm. **Note:** To read cards at speeds up to 80 cards per minute, order RPQ Z04771. In punch/print mode throughput can vary dependent on the number of columns punch/printed. When two or more adjacent columns are blank, the equivalent of read speed is achieved until a nonblank column is encountered. In offline mode, the 129 operates as a conventional card data recorder. **Limitations:** Accumulate (#1020) and Accumulate Program Levels, Add'l (#1025), are inoperative in the online mode. Available only on machines with serial numbers above 20,000. **Maximum:** One. **Field Installation:** No. **Note:** An 8m (25 foot) cable to attach a 129 to a 3741 is included in #3200 on the 3741. A 3m (10 foot) cable to attach a 129 to a 5320 is included in #3200 on the 5320.

Verify Read Control (#8705): [Mdls 1, 3] Allows the machine reading of a card to be interrupted by program card control, so that the operator may visually read from the "source document" card for verifying, before a portion of the card passes under read station. Facilitates reading columns 72-80 for source document verifying. **Limitations:** Available only on machines with serial numbers above 20000. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Reading Board Extension (#6065): The extension can be attached to the front edge of the standard reading board to provide an additional 28 cm (11-1/2 inches) x 28.5 cm (12 inches) working area at the left. The Reading Board Extension is available on a purchase-only basis. For shipment with machine, specify **#6065**. For shipment to the field order from IBM.

SUPPLIES (None)

357 INPUT STATION

NO LONGER AVAILABLE

PURPOSE

Badge and/or serial card reader input unit for a 357 Data Collection System.

MODELS

Model 4 004 — A badge reader which operates as an independent input station. Reads identification badges (size of a 22-column stub card) prepunched in IBM code with a maximum of ten numeric digits. Badges, which are punched on a 13 Badge Punch, are inserted and removed manually. Badge read-out is automatic with insertion of badge. See *0357 Badge Specifications Manual* (GA21-9028). Badges can be purchased from outside vendors or produced with commercially available laminating equipment.

Model 5 005 — A serial card reader. Standard unscored 80-column cards are inserted and removed manually, one at a time. Reads numbers, letters, IBM special characters, and instruction codes. Blank columns are not recognized and are automatically skipped. Provision is made for attaching a 372 Manual Entry or 374 Cartridge Reader.

Model 6 006 — A combination serial card reader and badge reader. Information pertaining to models 4 and 5 applies to model 6. This model, in conjunction with a 372 or 374, provides a means of loading the station with variable source data as well as fixed employee and job data prior to transmission to the output unit. An instruction code in the card shifts transmission of data from card to badge. A separate column must be used in the card being read for each column of the badge which is to be read out, unless Badge Read-out (#1450), a special feature, is installed. See *0357 Badge Specifications Manual* (GA21-9028) for badge specifications.

Prerequisites: A 358 Input Control Unit ... each 358 controls up to 20 357s, in any combination of mdls.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

SPECIAL FEATURES

Badge Read-Out (#1450): [Mdl 6] Enables the mdl 6 to read a badge only. When both a card and a badge are to be read, a single instruction code in the card shifts transmission to the badge reader for automatic read-out of the badge. Patch-panel wiring in the mdl 6 controls read-out. A "Badge" position on the mode switch provides automatic badge read-out upon insertion of a badge. **Field Installation:** No.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

358 INPUT CONTROL UNIT

NO LONGER AVAILABLE

PURPOSE

Links up to 20 357 Input Stations with one 24/26 Card Punch in a 357 Data Collection System.

MODELS

Model 1 001

HIGHLIGHTS

Analyzes instruction codes in input cards and controls card reading. Instruction codes are wired through a transaction selector in the 358 to format control. Data, in the form of DC pulses, is transmitted over multiconductor cable and punched at the rate of approximately 18 characters/second on the 26, or 20 characters/second on the 24.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

360 CLOCK READ-OUT CONTROL

NO LONGER AVAILABLE

PURPOSE

Controls read-out of time from a 361 Read-Out Clock to up to 35 card punches in a 357 Data Collection System ... see "Limitations" below.

MODELS

Model 1 001

Limitations: Time can be provided for simultaneous output to up to ten 24/26s ... for applications such as attendance recording a 360 and 361 are required for each group of ten 24/26s which may simultaneously call for time.

Prerequisites: #1945 on the 24/26 Card Punch.

HIGHLIGHTS

Has connections for two 361s ... a toggle switch permits switching from one clock to the other.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug.
- Cable: **#9081** for direct connection to a single output punch, **#9082** for connection to multiple punches via a common line ... see *Physical Planning Manual* (GA24-1032).

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

361 READ-OUT CLOCK

[NO LONGER AVAILABLE]

PURPOSE

Provides a means of punching time into output cards in a 357 Data Collection System.

MODELS

Model 1 001

Prerequisites: A 360 Clock Read-Out Control and #1945 on the 24/26 Card Punch.

HIGHLIGHTS

Time is read out as four digits ... hours (0-23) and nearest hundredths of hours.

Publications: *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

372 MANUAL ENTRY

[NO LONGER AVAILABLE]

PURPOSE

For manual entry of data for transmission in a 357 Data Collection System.

MODELS

Model 1	001	Has six slides
Model 2	002	Has nine slides
Model 3	003	Has twelve slides

Limitations: Either a 372 or a 374 Cartridge Reader can be attached to a 357 mdl 5 or 6, not both.

Prerequisites: Each 372 requires a 357 mdl 5 or 6.

HIGHLIGHTS

Has up to 12 numeric slides, each with 11 character positions (0-9 and blank), which can be individually labeled. Slides may be locked in any desired position, or may restore to blank after each transmission. CE can wire any or all of the slides to read-out zero from the blank position ... to change all positions to read-out zero from the blank position, no additional parts are required ... to change any other number of positions, Jumper Assembly (P/N 765993), must be ordered on a no-charge MES.

Slides are codes for individual read-out under card read control. The high-order code position is on the left. Mdl 1 has six left-hand positions blanked-out and the six right-hand slides are coded 6 through 1 ... mdl 2 is similar with the three left-hand positions blanked-out and the slide positions coded 9 through 1 ... mdl 3 is codes 12 through 1.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

SPECIAL FEATURES

Supervisor Key (#7578): Replaces left-hand slide on mdl 1, 2 or 3 with a key-operated switch which provides a controlled ability to insert a specific authorizing digit in the output card for a transaction. **Field Installation:** No.

MODEL CONVERSIONS

If Supervisor Key (#7578) is *not* installed, conversions can be made from model 1 to 2 or 3, or from model 2 to 3.

ACCESSORIES (None)

SUPPLIES (None)

373 PUNCH SWITCH

[NO LONGER AVAILABLE]

PURPOSE:

For automatic switching to a second output punch in a 357 Data Collection System.

MODELS

Model 1 001 Multiwire connection

Prequisites: Two output punches per system ... 24/26 mdls 7 or 8, each with Punch Switch Control (#5930).

HIGHLIGHTS

Provides automatic switching to a second back-up punch if the first fails to duplicate, jams, or runs out of cards. Either or both punches may be placed in offline mode for use as a regular card punch by placing the "Auto" switch to "Keypunch".

Publications: See *IBM Marketing Publications KWIK Index* (G320-1621).

SPECIFY

- If the connector on the 358 is an old-style Elco (rectangular), order Adapter Cable Assembly (A/N 765183), on no-charge MES. If the connector on the punch cable is an old-style Elco (rectangular), and an adapter cable which provides a round Cannon connector is not available, order Adapter Cable Assembly (A/N 765181), on no-charge MES.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

374 CARTRIDGE READER

[NO LONGER AVAILABLE]

PURPOSE

Data cartridge input unit for a 357 Data Collection System.

MODELS

Model 1 001 Multiwire connection

Limitations: Either a 372 or a 374 can be attached to a 357 mdl 5 or 6, but not both ... however, 372s and 374s can be interchanged on a terminal without requiring changes in the output card or the output program.

Prerequisites: Each 374 requires a 357 mdl 5 or 6.

HIGHLIGHTS

The Data Cartridge permits the user to pre-set up to 12 positions of variable numeric data at his regular workstation ... use is applicable primarily where variable numeric data must be entered into the system at a peak period. Throughput and accuracy at the 357 Input Station are increased and employee waiting time is reduced. The cartridge is manually inserted and removed. For use with 357 mdl 5 or 6, the cartridge is read out by the card in the same manner as the 372. One data cartridge is supplied with each 374 ... see "Supplies" for additional cartridges.

The reader is connected to the 357 by a 1 meter (3-1/2 foot) cable, and is wall-mounted to the right of the 357.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Cartridges: To purchase additional cartridges contact IBM.

1201 PROOF INSCRIBER

[No longer available ... features, model conversions, RPQs and accessories are not affected.]

PURPOSE

Performs all functions, except subtraction, of an 803 Proof Machine ... plus document inscribing.

MODELS

Models	Endorsing	Number of Pockets Operative	Number of Pockets Inoperative	Selector Key Arrangement
1	Yes	1-32	None	4 rows of 8
A1	Yes	1-24	25-32	4 rows of 6, or 3 rows of 8
B1	Yes	1-16	17-32	2 rows of 8, or 2 rows of 6, plus 1 row of 4
2	No	1-32	None	4 rows of 8
A2	No	1-24	25-32	4 rows of 6, or 3 rows of 8
B2	No	1-16	17-32	2 rows of 8, or 2 rows of 6, plus 1 row of 4
3	Yes	1-24	None	4 row of 6
B3	Yes	1-16	17-24	2 rows of 6, plus 1 row of 4
4	No	1-24	None	4 rows of 6
B4	No	1-16	17-24	2 rows of 6, plus 1 row of 4

HIGHLIGHTS

List, distribute, prove, inscribe, and (mdls 1 and 3) endorse checks, deposit slips, batch-control slips and similiar documents in one operation. Each pocket holds about 150 documents. See M803 pages for proof machine functions.

Documents: Intermixed card and paper documents within the following specifications can be inscribed:

Length	6 - 8.75 inches for paper or 4.852 - 8.75 inches for cards
Width	2.75 - 3.66 inches
Thickness	0.003 - 0.007 inch

Inscribing: Recommendations of the American Bankers Association are used. Two fields can be inscribed in magnetic ink on face of documents in a 1/4 inch band parallel to and 3/16 inch up from bottom edge. Spaced 8 characters/inch, starting approximately 5/16 inch from right edge. Type font is E13B. Fields are, from right to left: Amount - set up on adding keyboard and inscribed as ten digits bracketed by amount symbol ... Process Control - established by setting levers mounted in top cover of machine and inscribed adjacent to amount. Used to identify types of transcations or batches of work. Distribution pocket totals, as well as process control codes, can be inscribed on control slips during compartment total printing operations. **Note:** If desired, up to four process control positions are supplied at no charge ... see "Specify."

Endorsing: Endorsing models can endorse documents with date, identification numbers, and bank's legal endorsement. The Endorser Plate is made to the customer's specifications. See "Accessories" below. A Blank Endorser Plate is also available if only partial endorsements are required. When ordering #3792 attach *Endorser Plate Specification* (Z120-1348) ... not required for #3793.

Control Panel: Has hubs for Inscribe Suppress and Process Control Suppress, plus hubs for all 803 functions.

Publications: See *IBM Marketing Publications KWIC Index* (G320-1621).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): With locking plug, **#9880** for 115 V, **#9884** for 208 V, or **#9886** for 230 V.
- Process Control: If desired **#9190** for 1 position, **#9191** for 2, **#9192** for 3, **#9193** for 4 ... number of positions can be changed or eliminated by MES.
- Endorsing (mdls 1, A1, B1, 3, B3 only): See "Endorsing" under "Highlights" and "Accessories".
- Selector Key Arrangement: Mdls A1, A2 - **#9771** for 4 rows of 6 keys, or **#9772** for 3 rows of eight keys. Mdls B1, B2 - **#9773** for 2 rows of 8 keys, or **#9774** for 2 rows of 6 keys plus 1 row of 4 keys.

SPECIAL FEATURES

Process Control, Add'l (#5701, #5702): Up to four digits are standard ... see "Specify" above. Up to two add'l digits can be installed. #5701 for fifth digit ... #5702 for sixth. **Prerequisites: #9193** for #5701 ... #5701 for #5702.

MODEL CONVERSIONS

Conversions from endorsing to non-endorsing models, and vice versa, can be made between the following models: 1 and 2 ... A1 and A2 ... B1 and B2 ... 3 and 4 ... B3 and B4.

ACCESSORIES

Endorser Plates: The following items are available on a purchase only basis for mdls 1, A1, B1, 3 and B3 only. The normal plate charge will apply whenever replacement of a worn or damaged plate is required. A completed *Endorser Plate Specification Sheet* (Z120-1348) must be forwarded to the plant for each machine. If available a sample endorsment should be attached to each specification sheet.

Endorser Plate	(#3792)
Blank Endorser Plate	(#3793)

Note: When ordering #3792, it is recommended that at least one spare plate be stocked, as they cannot be immediately replaced.

SUPPLIES (None)

1203 UNIT INSCRIBER

[*No Longer Available ... features, RPQs and accessories are not affected*]

PURPOSE

Key-operated machine for printing numerals and special symbols on check and other documents in magnetic ink ... combined with functions of an adding machine.

MODELS

Model 1 001

HIGHLIGHTS

Continuous high-speed proving possible with a 10-key electric adding machine which prints individual amounts and totals on a paper tape. At the same time, document can inscribed with an amount field, a process control field, and be fully or partially endorsed and serial numbered ... see Serial Numbering/Endorsing (#3791) under "Special Features".

Speed depends upon operator and type of work processed. Has one stacker and one 10-position net balance accumulator which accumulates 11-position totals. Storage space provided for documents which cannot be processed.

Documents: Intermixed card and paper documents within the following specifications can be inscribed:

Length	6 - 8.75 inches for paper or 4.852 - 8.75 inches for cards
Width	2.75 - 3.66 inches
Thickness	0.003 - 0.007 inch

Inscribing: Recommendations of American Bankers Association are used. Two fields can be inscribed in magnetic ink on face of documents in a 1/4 inch band parallel to and 3/16 inch up from bottom edge. Spaced 8 characters/inch, starting approximately 5/16 inch from right edge. Type font is E13B. Fields are, from right to left: Amount -- set up on adding keyboard and inscribed as ten digits bracketed by amount symbol ... Process Control -- established by setting knobs in top cover of machine, inscribed adjacent to amount field as one to four digits. Used to identify types of transactions or batches of work. Machine total and process control codes can also be inscribed on control slips during total printing operations. **Note:** If desired, up to four process control positions are supplied at no charge ... see "Specify."

Document Counter: A six position counter ... reset manually.

Publications: See *IBM Marketing Publications KWIC Index* (GC320-1621).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): With locking plug, **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. With non-locking plug, **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Process Control: If desired, **#9190** for 1 digit, **#9191** for 2, **#9193** for 4 ... number of positions can be changed or eliminated by MES.

SPECIAL FEATURES

Account Number Field Inscriber (#1012): Inscribes a fixed-length account number and "On-Us" symbols. Field can be any one length from 5 to 10 digits, as specified by customer. **Specify: #9210** for 5 digits, **#9211** for 6, **#9212** for 7, **#9213** for 8, **#9214** for 9, **#9215** for 10.

Serial Numbering/Endorser (#3791): Imprints full or partial endorsement and serial number. Endorsement prints fixed distance (about 1-1/4 inches) from bottom of document. Operator can select left or right horizontal printing positions separated from 2 manually-set positions by a selectable blank or dash. Serial number advance available in any one of the following options: [1] Advance one digit on credit feed (subtract key depression) ... [2] Advance one digit on zero-balance test (sub-total key depression) ... [3] Advance one digit on each document feed ... [4] Advance one digit on manual key control. Advancing method will be set by CE at installation or as required subsequently by customer. With this feature, documents can be endorsed with date, identification number and bank's legal endorsement. The etched endorser plate is made to the customer's specifications. See "Accessories" below. A blank endorser plate is also available if only partial endorsements are required. **Note:** The old Endorser on 1203s shipped prior to July 1, 1964 may be changed to the new feature by ordering #3791. A new endorser plate must also be ordered. On purchased machines, the new feature may be substituted for the old one at no charge except for the Field Installation Charge and price of the new endorser plate ... see "Accessories" below. When ordering #3792 attach *Endorser Plate Specification Sheet* (Z120-1348) ... not required for #3793.

Non-Zero Balance Test (#5350): Depression of Sub-total Key automatically locks keyboard if accumulated total is not zero.

Process Control, Add'l (#5701, 5702): Up to four digits are standard ... see "Specify" above. Up to two add'l digits can be installed. #5701 for fifth digit ... #5702 for sixth digit. **Prerequisites: #9193** for #5701, #5701 for #5702.

Transit Number Field Inscriber (#8020): Inscribes Transit-Routing numbers, dash and transit symbols.

MODEL CONVERSIONS (None)

ACCESSORIES

Endorser Plates: The normal plate charge will apply whenever replacement of a worn or damaged plate is required. Charges for art and layout work (#3796) are to be added if applicable. A completed *Endorser Plate Specification Sheet* (Z120-1348), must be forwarded to the plant for each machine. If available a sample of the endorsement should be attached to the specification sheet. The following items are available on a purchase only basis.

Endorser Plate (#3792)
Blank Endorser Plate (#3793)

Note: When ordering #3792, it is recommended that at least one spare plate be stocked, as they cannot be immediately replaced.

SUPPLIES

To order the following, contact IBM.

Magnetic Transfer Ribbon: Each Magnetic Transfer Ribbon provides about 13,300 impressions.

Disposable Ink Roll

Adding Machine Unit Ribbon

Adding Machine Paper Roll

1255 MAGNETIC CHARACTER READER

PURPOSE

Sorts documents, used in banking and other applications, meeting specifications under "Highlights" below. Available as a stand-alone sorter, or with an appropriate attachment feature, reads magnetic character data into a System/3 model 6, 8, 10, 12 or 15, a System/32, a System/34, a System/36 into a 2770 system in home or line mode, into a S/360 model 22, 25, 30, 40, 50, a S/370 model 115 through 158, 3031 Processor, or 4300 processor.

MODELS

Model 1	001	Reads and/or sorts up to 500 6-inch documents per minute into six stackers.
Model 2	002	Reads and/or sorts up to 750 6-inch documents per minute into six stackers.
Model 3	003	Reads and/or sorts up to 750 6-inch documents per minute into 12 stackers.

Mdls 1, 2 and 3 read the E13B type font. The characters, print quality, and codeline arrangement must meet the specifications recommended by the American Bankers Association Technical Committee on Check Handling. The specifications and related data are available in booklets 147R3 and the Supplement to 147R3, both of which are available at a nominal charge from the American Bankers Association, 1120 Connecticut Avenue NW, Washington, D.C. 20036.

Prerequisites:

For 1255 -- all documents must be mechanically joggled prior to each pass through the machine ... joggers are available from commercial sources. A sorting tray is recommended.

For System/3 -- one 1255 can be attached . Serial I/O Channel (#7081) is required on the 5406, 5408, 5410, 5412 or 5415 ... System/3/32/34 Adapter (#6303) is required on the 1255 itself. See "Special Features" for additional information, also see "Specify". **Limitations:** The 1255 utility program (5702-UT2 for both the mdl 8 and mdl 10 disk systems, and 5703-UT2 for the mdl 6) requires at least 12K bytes of main storage. The 1255 support for the mdl 12 and mdl 15 requires a minimum system. IBM's ability to service a mdl 10 card system with a 1255 attached may be impaired with an effect on system availability.

For System/32 -- one 1255 can be attached. System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required on the 5320. See "Special Features" for additional information, also see "Specify".

For System/34 -- one 1255 System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required on the 5340. See "Special Features" for additional information, also see "Specify".

For System/36 -- one 1255 System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required on the 5360. See "Special Features" for additional information, also see "Specify".

For 2770 -- one 1255 can be attached to a 2770 system. 1255 Attachment (**#9755**) and Buffer Expansion (#1490) are required on the 2772 ... 2772 Adapter (#7850) is required on the 1255 itself. See "Special Features". For audit, maintenance, error recovery and application procedures, the 2770 system must include a printer.

For S/360 mdl 22, 30, 40, 50, or S/370 mdl 115 through 158, 3031 Processor, or a 4300 processor -- one 1255 can be attached to a system ... requires a channel control unit position ... a byte multiplexer channel is recommended. The 1255 should normally be the highest priority device on the channel. S/360/370 Adapter (#6360) is required on the 1255 ... see "Special Features". Direct Control (#3274) or External Interrupt (#3895) is required on the processing unit. There are no special features required on the 4361 or 4381 Processor to attach the 1255. External Signal (#3898) is required on the 3115, 3125 and the 4331 Processor.

S/360 mdl 25 -- multiplexer channel (special feature), or selector channel (special feature).

S/360 mdl 22, 30, 40, 50 -- multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/370 mdl 115, 125 -- byte multiplexer channel (special feature), External Signal (#3898) ... see M3115, 3125 pages. On a 3115-0, **#9336** is required.

S/370 mdl 135 -- multiplexer channel (standard), selector channels (special features) ... M3135 pages.

S/370 mdl 135-3 -- byte multiplexer channel (standard), block multiplexer channels (special feature) ... see M3135-3 pages.

S/370 mdl 138 -- byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145 -- multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3 -- byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148 -- byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158 -- multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

3031 Processor -- byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 pages.

4300 processor -- byte multiplexer channel, block multiplexer channel.

Limitations: For S/360, S/370 or 4300 Processors -- the 1255 is not supported by any 1400 or 7000 series compatibility features. The 1255 is not supported by the Mdl 20 Compatibility Feature (#7520) on the 3115, 3125.

HIGHLIGHTS

Actual sorting and processing speeds depend upon length of document, paper quality, atmospheric conditions, and/or 2772 terminal and transmission limitations, or host system limitations. Reads all fields and sorts on any field.

Uses a lower cost, single-gap MICR reading technique, providing MICR capabilities for smaller volume operations. Reading performance may differ from other reader sorters. Pre-installation runs of actual documents are strongly recommended to determine expected performance. The input hopper holds 139.7mm (5-1/2") of documents in a gravity feed, permitting non-stop feeding. Mdls 1 and 2 each have six horizontal stackers in one vertical bay, while mdl 3 has 12 horizontal stackers arranged in two vertical bays of six stackers each. Individual stackers have a document capacity of 63.5mm (2-1/2"). The transport mechanism opens for access to the document path. An operator-resettable document counter is provided.

The unit is designed for ease of operation and operator training. The operator panel, feed hopper and stackers are in a compact area for operator convenience and minimum space requirements.

In addition to performing the basic Modulus 10 or 11 checking function, the Self-Checking Number/Improved Recognition feature, when installed and operative, is integrated with the MICR reading circuitry to reduce account number rejects and substitutions. This field is especially subject to folds, banding, and print specification deviations. Rejects and character substitutions will be reduced in proportion to the severity of document degradations, thus reducing customer reconciliation expense.

Sorting: For mdls 1 and 2, offline sorting uses five sort stackers and one reject stacker for a 2-phase digital sort. Phase 1 sorts even digits, rejecting odd digits which are sorted in phase 2. This conforms to the sort pattern of other 6-stacker sorters and permits the start of phase 2 sorting without removing phase 1 documents from the stacker. If Alternate Sort Pattern (**#9301**) is specified, digits 0-4 sort in phase 1 and digits 5-9 sort in phase 2.

For mdl 3, 1-phase sorting on digits 0-9 with rejects directed to stacker "R" at top of first bay. Stacker "A" at top of second bay is used to select items when the High Order Zero and Blank Column Selection feature is installed.

Online 2770 system operation suspends sorting, automatically alternating between two stackers on a stacker-full condition, with the rejecting of invalid documents.

Stacker selection is under program control when operating online to a computer system.

Field Lengths: The amount field and transit-routing (bank and branch) field are fixed-length ... the process control (transaction code) field and serial number (auxiliary on-us) field are variable-length ... the account number field may be fixed- or variable-length. See "Specify" below.

Checking: Readability of each magnetic character and special symbol, and the field-length check on fixed-length fields, are checked on all fields designated by the operator for reading into the system or terminal in the online mode, or on all fields designated for checking in the offline mode. When attached to the 2770 system, error documents are automatically rejected by the 1255 and data is not transferred to the 2772 buffer.

Documents: Intermixed paper and card documents (including traveler's checks) within the following specifications can be processed:

Width -- 64 to 108mm (2.5" to 4.25")
Length -- 146 to 225mm (5.75" to 8.875")
Thickness -- 0.076 to 0.178mm (0.003" to 0.007")
Paper Stock -- 75 to 165g/sq.m (20 lb. to 44 lb) (card stock)
Carrier documents, enclosing a non-processable item, up to 0.33mm (0.013") in thickness may be processed.

1255 Magnetic Character Reader (cont'd)

Document Evaluation: Documents must be evaluated at least six months prior to installation to determine whether the level of print quality is acceptable to the customer, with time for corrective action if necessary. Sub-standard E13B quality may cause excessive rejects and character substitutions.

Transmission: When used with the 2770 system, the 1255 reads into the two 2772 buffers, automatically stopping and alternating between buffers on a specified number of documents. Buffer Expansion (#1490) is required on the 2772. The number of records (documents) held by the buffer is determined by the maximum record length for the fields selected for reading. The records/buffer is set at 4, 6, 8, 10 or 12. The records/buffer may be changed by the CE, but is not subject to customer control. In online transmission and pre-transmission verification operations, reading characters in excess of the maximum record length specified causes an error condition. The following options are available:

Maximum Record Length (including special symbols)	Records/buffer
53	4
41	6
30	8
24	10
20	12

Balance-List (#1470) facilitates pre-transmission balancing to batch total tickets of stacked batches. In Mode A, operating under 1255 speed limitations, the feature totals the Amount Field on good items and prints the good item total, batch ticket total, and derived difference on the 2770 system printer. In Mode B, under 2770 system printer speed limitations, good items are detail listed with the same total cycles as Mode A. Documents are listed with limited print editing and limited columnar formatting.

Bibliography: System/3 -- GC20-8080 ... System/32 -- GC20-0032 ... System/34 -- GH30-0231 ... System/36 -- GC21-9015 ... 2770 -- GA24-3089 ... S/360 -- GC20-0360 ... S/370, 4300 -- GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): For stand-alone and use with 2770 system: Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V ... non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V. For use with System/3, S/360, S/370 or 4300 Processors: **#9902** for 208V, **#9904** for 230V, for 4381 Processor, 230V is not available. Specify **#9915** fo 240V. For use with System/32, System/34 andSystem/36: Locking plug -- **#9884** for 208V, **#9886** for 230V ... non-locking plug -- **#9885** for 208V, **#9887** for 230V. Must be consistent with system voltage ... specify code consistent with system/voltage for pre-system 1255 installation.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.
- Alternate Sort Pattern: **#9301**, if desired. Replaces the standard even/odd pattern with the 0-4/5-9 pattern. See "Sorting" above. May be changed in the field by MES.
- Account Number Field Length: Specify **#9210** for 5 digits ... **#9211** for 6 digits ... **#9212** for 7 digits ... **#9213** for 8 digits ... **#9214** for 9 digits ... **#9215** for 10 digits ... **#9219** for variable-length. A fixed-field length assures maximum processing accuracy. However, a variable-field length may be specified in lieu of a fixed-field length. Length of the account number field may be changed in the field by MES.
- Superior Reading Performance: Self-Checking Number/Improved Recognition (#7060) is recommended ... see "Highlights" above and "Special Features" below.
- Use With System/3, System/32 or System/34: System/3/32/34 Adapter (#6303) is required ... see "Special Features" below.
- Use with 2770: Transmission Code -- **#9761** for EBCDIC, **#9762** for ASCII ... must be consistent with 2772 code. May be changed in the field by MES. **Prerequisites:** #7850 ... see "Special Features".
- Use with S/360 mdls 22, 25, 30, 40, 50, S/370 mdls 115 through 158, a 3031 Processor, or a 4300 processor: S/360/370 Adapter (#6360) is required ... see "Special Features".
- Kickstrips: **#9431**, if desired. **Field Installation:** Yes. **Note:** When installed, the open area under the machine is enclosed. This reduces the amount of "toe-room" for the operator and may be inconvenient to the customer if the power outlet is located under the machine.

MODEL CONVERSIONS

Field installable only between model 1 and model 2.

SPECIAL FEATURES

Balance-List (#1470): [For use on 2770 system only] For pre-transmission balancing of stacked document batches. Accumulates the total of good items, with or without detail listing ... a batch total ticket initiates terminal printing of the good item total, batch ticket total, and net difference. Invalid items are rejected. In totaling mode, documents are checked for the maximum characters per document specified for transmission. In listing mode, a different number of characters per document may be specified on installation. In listing mode, selected fields are printed in document order with limited print editing ... the amount field is right justified with decimal insertion and high order zero suppression ... other fields are left justified in columns tabulated on the terminal printer ... special symbols, except dashes and the right amount field symbol, are indicated with substitute printer symbols. Selected fields, other than the process control field, missing from the document causes fields to print in alternate columns. **Limitations:** The feature is not operative during line transmission or fine sorting operations. **Field Installation:** Yes. **Prerequisites:** #7850 ... the 2770 system must include a printer or display unit.

Dash Symbol Transmission (#3215): Transmits the E13B dash symbol from transit field to storage. With symbol in storage, the program can distinguish between duplicate foreign and U.S. transit numbers. **Field Installation:** Yes.

51-Column Card Sorting (#4380): Mdl 1 -- for reading and sorting 51-column card documents. When installed, machine speed is reduced to approximately 405 dpm for 6-inch documents. For 51-column cards, speed is approximately 500 dpm. Mdls 2 and 3 -- when installed, machine speed is reduced to approximately 605 dpm for 6-inch documents. For 51-column cards, speed is approximately 750 dpm. **Note:** For optimum performance on all mdls, card documents should be separated out from standard size ABA documents on first pass operations. **Field Installation:** Yes.

High-Order Zero and Blank Selection (#4520): Permits selection to pocket "A" of documents during a digit sort having only blanks or zeros in the sort position and in all higher order positions of the field. **Limitations:** Available on mdl 3 only ... operates offline only. **Field Installation:** Yes.

System/3/32/34/36 Adapter (#6303): To attach the 1255 to the Serial I/O Channel (#7081) on the 5406, 5408, 5410, 5412, 5415, or to the 1255 Attachment Feature (#1100) on the 5320, 5340, and 5360. **Field Installation:** Yes. **Specify: #9791** for use with 5406, or **#9792** for use with 5408, 5410, 5412, 5415, 5320, 5340, or 5360. **#9791** can be changed in the field to **#9792**, or vice versa.

S/360/370 Adapter (#6360): To attach the 1255 to the Byte Multiplexer Channel. **Field Installation:** Yes.

Self-Checking Number/Improved Recognition (#7060): For reducing rejects and substitutions caused by defects in the account number field and for checking Modulus 10 or 11 self-check digit account numbers up to 10 positions long, including the self-check digit and dashes. SLT pluggable card wiring determines the modulus calculated and weighting factor for each digit. SLT card is removed and inserted by the CE for customer wiring. An operator panel on/off switch is the only customer control of the feature. The self-check digit may be in any position, always using a weighting factor of 1. Modulus 10 will check any weighting factor 0 through 9, summing the product digits, and checking for an even multiple of 10. Modulus 11 will check any weighting factor, summing the products and checking for either an even multiple of 11, or for a constant remainder of 4.

This feature, when installed and operative, replaces the basic character substitution checking circuitry with the more accurate Modulus 10 or 11 checking circuitry while the account number field is being read. Documents with marginal printing that might normally be rejected as potential substitutions will be processed if all characters pass the self-checking digit test, thus reducing the chances of a reject. All account numbers that fail the self-checking digit test will cause the document to reject, thus reducing the chances of a substitution. Since the account number field is frequently subject to folds, banding, multilation and print specification deviations, rejects and substitutions will be reduced in proportion to the severity of document degradation. **Field Installation:** Yes.

2772 Adapter (#7850): To attach the 1255 to a 2772 Control Unit. A switch (adjacent to the self-checking number switch) is provided which permits listing documents previously rejected to determine which field and which character caused the reject. **Field Installation:** Yes.

ACCESSORIES (None)

SUPPLIES (None)

1287 OPTICAL READER

PURPOSE

Optically reads machine printed numeric digits, alphabetic characters, special symbols and handprinted numeric digits and certain alphabetic characters into a S/360 model 22, 25, 30, 40, 50, 65, 65MP, 67 (in 65 mode), 75, any S/370 processor except 3081, 3083 or 3084 (1287 model 005 only on 115 and 125), or a 4331 or 4341 Processor. Machine printed or handprinted character reading is dependent on model and features. See "Special Features".

MODELS

Model 1	001	Can read multiple lines of numeric printed data from cut form paper or card documents.
Model 2	002	[NO LONGER AVAILABLE] In addition to reading multiple lines of numeric printed data from cut form paper or card documents, can also read data from continuous rolls of paper (journal tapes) ... machine design permits easy operator change-over from document to journal tape handling, and vice versa, in a matter of seconds.
Model 3	003	Identical to model 1, with the added capability of reading the alphameric ANSCS OCR Size A font character set.
Model 4	004	[NO LONGER AVAILABLE] Identical to model 2, with the added capability of reading the alphameric ANSCS OCR Size A font character set.
Model 5	005	Can read multiple lines of numeric handprinted digits and certain alphabetic handprinted characters from cut form paper or card documents.

Note: Although the 1287 models 2 and 4 are no longer available model conversions, features, RPQs and accessories are not affected.)

Prerequisites: Multiple 1287s, all mdls in any combination, can be attached to a system ... each 1287 contains its own control unit and requires a channel control unit position.

S/360 mdl 25: Special feature on 2025: Multiplexer channel or selector channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), or selector channels (special features, except on 2022 one selector channel is standard). For attachment to a S/360 mdl 30, a 2030 mdl D or larger is required.

S/360 mdl 65, 65MP, 67 (in 65 mode), 75: Basic multiplexer channel of a 2870, selector subchannels (special features) of a 2870 ... see M2870 pages.

S/370 mdl 115, 125: [1287 mdl 005 only] Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channel (special feature) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

S/370 mdl 165, 168: Basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2870 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor: Byte multiplexer channels, block multiplexer channels ... see M3033 pages.

4300 Processor: Byte multiplexer channel or block multiplexer channel.

HIGHLIGHTS

All Mdls: The basic machine includes an input hopper with a capacity for an 11-inch stack of documents, an optical read station, a document transport, and three output stackers, each with a capacity for four inches of documents. Documents are fed, one at a time, under program control to the read station where each document is held stationary while it is scanned and read by an electronic flying spot optical scanner. Documents can range in size from 2.25" x 3" to 5.91" x 9".

Format control flexibility is provided under S/360, S/370, 4331 or 4341 Processor program control to allow reading variable-length fields in any sequence. Depending on mdl and feature mix, fields may contain machine printed, typewritten, imprinted or handprinted characters, oriented in either of two directions on the same document. The stored program directs the beam, a field at a time, to the data to be read. Information is scanned from right to left (units to high order) and fed serially, a character at a time, to the system channel.

Unreadable characters are automatically rescanned . Unrecognizable characters may be displayed selectively under program control for online correction (except ANSCS OCR characters read in alphameric mode) The document remains in the read station until ejected under processor program control. Final disposition of each document into one of the three output stackers (A, B or R) is controlled by the program. Stackers A and B can be used for selecting two classes of documents. Stacker R is normally used for selecting documents with unrecognizable characters. Automatic overflow between stackers A and B can be used to extend the length of document runs without stopping the machine.

All mdls provide the following features:

- Multi-line, normal and "plus 90 degrees" reading of numeric 1428 or ANSCS OCR Size A type fonts produced by high speed printers and IBM Selectric® typewriters, and reading of imprinted (1428 E or ANSCS OCR Size C fonts) or handprinted numeric digits and certain handprinted alphabetic characters from documents.
- Format flexibility under processor program control.
- Automatic rescan of unreadable characters.
- Cathode ray tube character display with selective online correction of unreadable numeric characters from the operator keyboard.
- Document counter.

Mdls 1 or 2: The digits 0-9 and the alphabetic characters C, N, S, T, X, Z, printed in 1428 font, plus a special preprinted vertical field mark symbol, can be recognized ... or the digits 0-9 and the three abstract symbols, "hook", "fork" and "chair" printed in the American National Character Set for Optical Character Recognition (ANSCS OCR) font, plus the special preprinted vertical field mark symbol, can be recognized.

Mdls 3 or 4: The alphameric ANSCS OCR character set described below and the characters described for mdl 001 or 002 can be read.

Mdl 5: The handprinted digits 0-9 and handprinted alphabetic characters C, S, T, X and Z and numbers preprinted in Gothic 3/16" font can be recognized.

Features for mdl 005 are:

- Numeric handprinting basic font.
- Alternate NHP character Read-Verify Mode selectable under program control.
- Keyboard and Display Console for online correction.
- Hopper Preload Tray.
- Stacker Foot Treadle start-stop control.
- Background color contrast.

Speed (Documents): Maximum document throughput depends upon document size, the number of characters and fields to be read (machine printed, handprinted, mark read), printed character registration or alignment, characters rescanned, use of online correction, and the processor program. For full details, including speed formula , see GA21-9064 and GA21-9150.

Maximum document throughput can range from about 665 documents per minute for a 3" long stub with one field of 20 machine-printed characters, to less than 100 documents per minute for a 6" long document containing 50 fields of handprinted characters.

Documents and Printing (all mdls): For optimum operation, print quality must conform to quality specifications established for the 1287 described in GA21-9064 and GA21-9150. Except for imprinting, only original copy may be processed. Document sizes and weights must conform to those specified in GA21-9064 and GA21-9150. Also see Serial Numbering (#6550, #6555) under "Special Features" for special document size restriction.

Additional document considerations relating to the printing device, recommended ribbons and type styles can be found in GA21-9064 and GA21-9150.

Journal Roll Reading: [mdl 002 or 004 only] A journal tape transport permits reading the digits 0-9 and the selected characters C, N, S, T, X, Z and "slash-minus" printed in 1428 Font (**#9735** or #4470); 0-9, the selected characters C, N, S, T, X, Z and symbols "hook", "fork" and "chair" printed in ANSCS OCR Size A (with **#9736** or #4470); or the digits 0-9 and six special symbols printed in NCR Optical Type Font (with #5300) from journal rolls. The same reading station described above for document reading is used for reading rolls. A maximum of 38 characters may be read from a single journal roll line. Maximum

1287 Optical Reader (cont'd)

character spacing is 10 characters/inch. Unreadable characters are automatically rescanned.

The line to be read is positioned automatically and scanned under program control from units to high order (right to left - read forward orientation) ... tapes may be processed in either direction. The operator can control the fields to be scanned, the font selection and tape processing direction (forward or backward) by manual console settings. Unreadable characters may be corrected online by the operator, or the line containing the unreadable characters may be marked under program control for offline correction.

In addition to all the features of the mdl 001 and 003, mdls 002 and 004 provide:

- Forward or backward tape reading.
- Input roll feeding up to 200 feet capacity.
- Online manual correction of unreadable characters via operator keyboard.
- Line marking of lines containing unreadable characters under program control.
- Easy operator changeover from document to journal tape handling, and vice versa, in a matter of seconds.

Speed (Journal Rolls): Depends upon the number of characters per line, tape width, line spacing and vertical registration printing accuracy. For complete details, including speed formulas , see GA21-9064.

Throughput is affected by online correction and the user's program ... rescan and line marking of lines containing unreadable characters may also affect throughput.

Journal Rolls: Size ranges and specific journal tape considerations relating to the printing device, ribbons, type styles, paper color and quality are contained in GA21-9064.

Printing: For efficient operation, printing must conform to the quality specifications established for the 1287. For optimum operation, black, purple or approved red ink colors should be used ... colors other than black or cash register purple should be referred to the Data Entry Product Center for review. Journal rolls may be prepared by adding machines, cash registers and similar devices. Acceptable type styles are IBM 1428, ANSCS OCR Size A and NCR Optical Font (NOF type style developed by NCR) ... for allowable characters, see "Table of Acceptable Characters - 1287" below. For reading NOF type style, NCR Optical Type Font (#5300) is required ... see "Special Features".

Optional Features: Available on mdls 001, 002, 003, 004 are -- Numeric Handprinting (#5370) including preprinted number recognition of 3/16" Gothic characters, Farrington 7B Font (#3945), 1428 and ANSCS OCR Font (#4470) which permits alternate reading of both fonts in separate, pre-identified fields under program control, and Serial Numbering (#6550). The following are also available: On mdls 002 and 004 -- NCR Optical Font (#5300) ... on mdls 003 and 004 -- Expanded Symbol Set (#3850) ... on mdl 005 -Machine Printed OCR Font (#4900) which includes alternate reading of numeric 1428, ANSCS OCR and Farrington 7B fonts in separate, pre-identified fields under program control and Serial Numbering (#6555) ... on all mdls -- Optical Mark Reading (#5479). See "Special Features".

Bibliography: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Type Font: [mdls 001, 002, 003, 004] **#9735** for reading 1428 and 1428 E Type Font only, or **#9736** for reading only the American National Standard Character Set for Optical Character Recognition

  ... neither of these are to be specified if 1428 and ANSCS OCR Font (#4470) is ordered. See "Special Features".

- National Graphics: One of the following characters may be ordered in place of the dollars symbol: #2915 for British pound sign, #2916 for Y bar (Yen sign), #2917 for Umlaut U, #2918 for Umlaut A.

  In addition, order #2919 for Umlaut O or #2921 for slash zero.

  Also, order #2920 for Angstrom), #2922 for AE dipthong, #2923 for tilde N.

- Background Color Contrast: **#9030**, if desired (standard on mdl 005). This feature allows use of darker background colors for outlining numeric handwriting boxes and mark read positions on documents where high visual contrast is desired. Background color is limited to blue range of visual spectrum when printed to maximum intensity permissible with this feature. Refer to GA21-9064 and GA21-9150 for description of ink characteristics. The feature is compatible with 1287 approved blue-green to blue range of background colors printed at standard machine maximum intensities. **Limitations**: Not compatible with purple ink journal tape processing (mdls 002 and 004). Certain background colors approved for the 1287 mdls 001 through 004 (particularly in the yellow-green range) are not compatible with this feature. The Data Entry Product Center will review any existing forms for background ink compatibility with this feature. **Field Installation**: Yes.

SPECIAL FEATURES

Expanded Symbol Set (#3850): [mdl 003, 004] To recognize the following eight special symbols when they are created by an IBM Selectric® typewriter or equivalent: plus, equals, left bracket, right bracket, per cent, query, quote, double quote.

Farrington 7B Font (#3945): [mdls 001, 002, 003, 004] For reading characters imprinted on documents by credit plate imprinters in Farrington Selfchek* 7B Font ... see characters listed under"7B - #3945" below.

1428 and ANSCS OCR Font (#4470): [mdls 001, 002, 003, 004] Provides the ability to read numeric 1428 and ANSCS OCR fonts, each in separate, pre-identified fields of a document ... selection of the font to be read for a specific field or document type is under program control. See characters under "IBM 1428 Font" and "ANSCS OCR" shown below. On mdls 002 or 004 only, reading of 1428 or ANSCS OCR Size A font on journal rolls is interchangeable under operator switch control. **Note**: When this feature is ordered for plant installation, neither **#9735** nor **#9736** under "Specify" need be specified.

Machine Printed OCR Font (#4900): [mdl 005] Provides the ability to read numeric 1428, ANSCS OCR and Farrington Selfchek* 7B Font, each in separate, pre-identified fields of a document ... selection of the font to be read for a specific field or document type is under program control. See characters under "IBM 1428 Font", "ANSCS OCR" and "7B" shown in the "Table of Acceptable Characters - 1287" below. Also, see GA21-9150.

NCR Optical Type Font (#5300): [mdl 002, 004] For reading characters from journal tapes printed in "NOF" type style developed by NCR. The characters listed under "NOF - #5300" below can be read. Reading of this type style and IBM 1428 or ANSCS OCR Size A type style is interchangeable, under operator switch control. This feature also provides the capability to selectively skip the 11-digit account number field in the NCR C-53 NOF journal tape format. Reading or skipping is under console switch control and customer-specified characters in columns "1" and "2" on the journal tape. Partial line correction (one-two character keyboard entry) may be performed by the operator when processing NOF tapes. **Specify**: Customer may specify up to three character code combinations in positions "1" and "2" to control selective reading of account number field for NCR C-53 format only. **Note**: If NCR registers' tapes contain Line Finder Character Marks, RPQ 841159 is also required.

Numeric Handwriting (#5370): [Mdls 1, 2, 3, 4] [Plant installation only] For reading handprinted numeric digits 0-9 and handprinted alphabetic characters C, S, T, X, Z from documents (N is not available) ... C, S, T, Z must be used in the units position of a field ... X can be anywhere. For optimum operation, character shapes and spacing must conform to the basic rules of handwriting as outlined in GA21-9064 and GA21-9150. Information should be handprinted with ordinary #2 pencils or grade HB fine line lead for mechanical pencils. Includes the ability to read numbers preprinted on documents by the forms supplier in Gothic 3/16" font.

Optical Mark Reading (#5479): For reading mark-entered data from documents. Marks may be oriented vertically, slanted at an angle of 45 degrees as defined for mark reading with the 1418 Optical Character Reader feature codes #4950, #4951, respectively, or drawn horizontally as defined for mark sensing features on the 519 Document Originating Machine. A timing mark is required for each mark-read column regardless of the orientation of the marks. Data should be recorded with ordinary #2 pencils.

Serial Numbering (#6550): [Mdls 1, 2, 3, 4] Provides the capability of sequentially numbering documents from 00000 to 99999. Printing is done along the trailing edge of the front face of the document after reading. A ten-position numbering head is provided, of which five positions are unit-advanced and five are stationary. Selection of documents to be printed is governed by manual control switch setting in conjunction with stacker select commands. Printing in flight is accomplished without decreasing machine throughput. Printing is non-OCR quality. **Ribbons**: The feature uses a black ribbon (1136843) or purple ribbon (1136844), or equivalent. See SSD sales manual. **Limitations**: Cannot be field installed on units below serial number 10155 shipped from the plant prior to March , 1969 ... machines equipped with this feature cannot process documents smaller than 3.00" wide x 4.75" long.

Serial Numbering (#6555): [Mdl 5] Function and limitations same as Serial Numbering (#6550) except provides two alternate print positions in a band adjacent to the normal print position. Selection of print

* Trademark of Farrington Manufacturing Company.

1287 Optical Reader (cont'd)

position is under manual control ... also provides five stacker-serial numbering control combinations and independent batch numbering document printing control.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (none)

LIST OF ACCEPTABLE CHARACTERS

1287 FONTS

#9735 or #4470 on 1287 mdls 001 through 004, or #4900 on 1287 mdl 005.
IBM 1428 Font (16)
0 through 9, C N S T X Z (4), Vertical Field Mark (1), slash minus (2), blank (3).

#9736 or #4470 on 1287 mdls 001 through 004, or #4900 on 1287 mdl 005.
ANSCS OCR Sizes A & C
0 through 9 (6), C N S T X Z (5), Long Vertical Mark (1), hook, fork, chair, blank (3).

#5300 on 1287 mdls 002 or 004.
NOF (17)
0 through 9, "tee over o", p, d, fork, "skew H", HO dipthong, blank.

#3945 on 1287 mdls 001 through 004, or #4900 on 1287 mdl 005.
7B (18)
0 through 9, blank (3).

1287 MDL 3 OR 4 ONLY
ANSCS OCR SIZE A) (10), (11).

IBM Selectric Typewriter (19)
Basic 1287:
0 through 9, fork, hook, chair, A through Z, colon, semi-colon, period, comma, slash, short dash, asterisk, dollars sign, ampersand, long vertical mark (7), long dash (8), Character erase (9), blank.

With #3850:
All characters as for Basic 1287 (above), and in addition: plus, equals, left curly bracket, right curly bracket, per cent, query, quote, double quote.

3211 (14), 1403 mdls 2, 3, 7, N1, 3203 (all mdls), or 3800 (15).
0 through 9, fork, hook, chair, A through Z, period, comma, slash, short dash, asterisk, dollars sign, ampersand, blank.

1287 MDL 5 OR #5370 ON 1287 MDLS 1 THROUGH 4

Handprinted Character Set (13) 0 through 9, C S T X Z (12), blank.

Notes:
(1) Recognized and transmitted in document mode only.
(2) Recognized and transmitted in tape mode only (1428 font.)
(3) No blanks are transmitted in ANSCS OCR Size C, Farrington 7B, or 1428 fonts.
(4) In 1428 font the characters C, N, S, T, X and Z may only occupy the units position of the field or line.
(5) In ANSCS OCR Size A font, the characters C, N, S, T, X and Z may only occupy the units position of the lines in journal mode (mdls 002 and 004).
(6) Only the characters 0 through 9 are available in ANSCS OCR Size C font.
(7) For machine printed fields a pre-printed long vertical mark is permitted.
(8) Group Erase permits ignoring a line or field. Symbol must be at least .300" long overstriking at least one standard height character. It must overstrike the first character on that end of the line on which scanning is initiated.
(9) Character erase not in the ANSCS OCR Size A character set. Available to ignore a character and its space for typewriters.
(10) Two reading modes are available:

Numeric Defined Mode:
The following characters are available in numeric defined mode: 0 through 9, period, comma, slash, short dash, dollars sign, asterisk, fork, hook, chair, long vertical mark, character erase, and with #3850 plus, equals, per cent.

Alphameric Intermixed Mode:
The following characters are available in alphameric intermixed mode: All numeric defined characters except fork. In addition, A through Z, ampersand, colon, semi-colon, and with #3850 plus, equals, left curly bracket, right curly bracket, per cent, query, quote, double quote.

(11) See note 5 above for journal mode characters on mdl 004.
(12) C, S, T and Z must be in the units position. X may be anywhere.
(13) See #5370 under "Special Features" for further details.
(14) The OCR Print Package (#5450) on the 3211, is a pre-requisite for OCR applications. 20 - 24 lb bond is recommended for optimum performance. When other papers are used, customer testing should be performed to assure reading performance. Group or character erase feature should be inactive when reading 3211 generated documents.
(15) Minimum paper weight for documents produced on 3800 is 20 lb.
(16) Digits 0 through 9 only available 1428 E (Elongated) for imprinting.
(17) National Optical Font by permission of National Cash Register Co.
(18) 7B by permission of Farrington Manufacturing Co.
(19) Or equivalent.

1288 OPTICAL PAGE READER

PURPOSE

Optically reads printed alphabetic and numeric characters and specified symbols on up to page size documents (max. 9" x 14") into a S/360 model 22, 25, 30, 40, 50, 65, 65MP, 67 (in 65 mode), 75, all S/370 processors (except 115, 125, 3081, 3083 Or 3084), or all 4300 processors. With Numeric Handwriting (#5370) it can also read handprinted numeric digits and certain alphabetic characters.

MODELS

Model 1 001

Prerequisites: Multiple 1288s can be attached to a system ... each 1288 contains its own control unit and requires a channel control unit position.

S/360 mdl 25 -- special feature on 2025: Multiplexer channel or selector channel. If the 1288 is equipped with Numeric Handwriting (#5370), the 2025 must be at EC level 132845 and the 1288 at EC level 815210B.

S/360 mdl 22, 30, 40, 50 -- multiplexer channel (standard) or selector channels (special features, except on 2022 one selector channel is standard). For attachment to a S/360 mdl 30, a 2030 mdl D or larger is required.

S/360 mdl 65, 65MP, 67 (in 65 mode), 75 or S/370 mdl 165, 168 -- basic multiplexer channel of 2870, selector subchannels on 2870 ... see M2870 pages.

S/370 mdl 135 -- byte multiplexer channel (standard), selector channels (special features), block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3 -- byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138 -- byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145 -- byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channel (special feature) ... see M3145 pages.

S/370 mdl 145-3 -- byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148 -- byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158 -- byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

3031, 3032 Processor -- byte multiplexer channels (one is standard), block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor -- byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

4300 Processor -- byte multiplexer channel or block multiplexer channel.

HIGHLIGHTS

The basic machine includes an input hopper with a capacity for up to a 10" stack of documents, a document separator and aligner station, an optical read station, a document transport, and two output stackers each with a capacity of up to 4.5" of documents. Documents are fed, one at a time, under program control to the read station where each document is held stationary while it is scanned and read by an electronic flying spot optical scanner. Multiple lines of printed data can be read on documents which range in size from 3" x 6.5" to 9" x 14".

The digits 0-9, twenty-six alphabetic characters and certain special symbols printed by the devices noted in the "List of Acceptable Characters and Printing Devices." below in the American National Character Set for Optical Character Recognition (ANSCS OCR) font, , plus the character erase symbol, can be recognized by the base unit.

Format control flexibility, called the formatted mode, is provided under S/360 or S/370 or 4300 processor program control to allow reading variable-length fields in any sequence. Fields may contain machine printed, typewritten or handprinted (with #5370) characters, oriented in either of two directions on the same document. The stored program directs the beam, a field at a time, to the data to be read. Information is scanned from right to left (units to high order) and fed serially, a character at a time, to the system channel.

Unformatted mode permits multiple and continuous variable-length alphameric lines, up to 6 lines/inch, right- or left-justified, to be read in the "normal" direction only. Preprinted reference marks are not required, however, a clear margin of at least 1" at the top and 1/2" on the other three sides must be provided.

Multi-line field mode allows the mixture of both formatted and unformatted reading on a document. See GA21-9081 for details on this capability and document design limitations when using this mode of operation on the 1288.

Unreadable handprinted and Gothic characters are automatically rescanned. Unrecognizable characters are transmitted to the processor as the standard EBCDIC substitute character code (use of "at" symbol available on RPQ for possible programmed correction or reconstruction). The document remains in the read station until ejected into one of two stackers (A or R) under control of the processor program. Stacker R is normally used for selecting documents with unrecognizable characters.

Speed: Maximum document throughput depends upon document size, the number of characters and fields to be read (machine printed, typewritten, handprinted, mark read), and the processor program. For throughput for both formatted and unformatted documents, see formulae in GA21-9081.

Documents and Printing: For optimum operation, print quality must conform to quality specifications established for the 1288 described in GA21-9081. Document sizes and weights must conform to those specified in GA21-9081.

Additional document considerations relating to the printing device, recommended ribbons and type styles can be found in GA21-9081.

Bibliography: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Expanded Symbol Set (#3850): To recognize the following eight special symbols when they are created by an IBM Selectric® typewriter, or equivalent: plus, equals, left curly bracket, right curly bracket, per cent, query, quote, double quote.

Numeric Handwriting (#5370): [Plant installation only] For reading handprinted numeric digits 0-9 and handprinted alphabetic characters C, S, T, X, Z from documents (N is not available) ... C, S, T, Z must be in the units position of a field ... X can be anywhere. For optimum operation, character shapes and spacing must conform to the basic rules of handwriting as outlined in GA21-9064. Information should be handprinted with ordinary #2 pencils or grade HB fine lead for mechanical pencils. Includes the ability to read numbers preprinted on documents by the forms supplier in Gothic 3/16" font.
Prerequisites: For attachment to a S/360 mdl 25, this feature requires that the 1288 be at EC level 815210B and the 2025 be at EC level 132845.

Optical Mark Reading (#5479): For reading marks that have been either handmarked or machine-printed onto documents. The feature is format-compatible (except for horizontal marking) with the similar feature (#5479) on the 1287 Optical Reader, with the basic capability for reading ten- or twelve-position mark-read columns. On the 1288, flexibility is increased by allowing these 1287-type mark-read fields to be located anywhere in the scannable area and in either +90° or normal rotation. A further innovation provides the ability to select, by programming, any number of positions from 1 to 12 to be read from a column or group of columns. A timing mark is required for each mark-read column whether 1, 2, 3, etc., up to 12 positions. Hand-marked data should be recorded with ordinary #2 pencils. Marks may be parallel to the timing mark or in any orientation up to 45 degrees in either direction from parallel to the timing mark.

Serial Numbering (#6550): For serial numbering the front side of documents after reading. A ten-position numbering head is provided ... 5 digits are manually set ... 5 are unit-advanced for each document read. A control switch provides either selective serial numbering based on stacker selection or a 10-digit batch number without unit advancing.
Ribbons: The feature uses a black ribbon (1136843) or purple ribbon (1136844), or equivalent.

MODEL CONVERSIONS (None)

ACCESSORIES

None required with machine order.

SUPPLIES

None required with machine order.

1288 Optical Page Reader (cont'd)

LIST OF ACCEPTABLE CHARACTERS

ANSCS OCR Font Size A Application Only

IBM Selectric Typewriter mdls 71, 72, 82. (6)

Basic 1288:
0 through 9, fork, hook, chair, A through Z, period, comma, slash, short dash, asterisk, dollars sign, ampersand, long vertical mark (1), long dash (2), character erase (3).

With #3850:
All characters available with Basic 1288 (as above) and in addition: plus, equals, quote, double quote, query, left curly bracket, right curly bracket, per cent.

1403 mdls 2, 3, 7, N1, 3203 all mdls, 3211 (4) (6), 3800 (5) (6).
0 through 9, fork, hook, chair, A through Z, period, comma, slash, short dash, asterisk, dollars sign, ampersand, blank.

Notes:
(1) Lithograph printing approved.
(2) Group Erase permits ignoring a line or field. Symbol must be at least 0.300" long, overstriking at least one standard height character. It must overstrike the first character on that end of the line on which scanning is initiated.
(3) Character Erase is not available in the ANSCS OCR Size A character set. Available to ignore a character and its space for typewriters.
(4) The OCR Print Package (#5450) on the 3211 is a prerequisite for OCR applications. 20-24 lb. bond is recommended for optimum performance. When other papers are used, customer testing should be performed to assure adequate reading performance. Group or Character Erase feature should be inactive when reading 3211-generated documents.
(5) Minimum paper weight for documents produced on the 3800 is 20 lb.
(6) Or equivalent.

1403 PRINTER

PURPOSE

Printed output unit for S/360, S/370, 30XX, and 4300 systems.

MODELS

Model		Print Pos.	Speed (max. lpm)	For Use With
N1	N01	132	1,100	S/360 models 22, 25, 30, 40, 44, 50, 65, 67, 75, 85, 195; all S/370 processors; all 4300 processors

Limitations:

1. Forms set used on 1403 mdls 1, 2, 4, 5, 6 or 7 (chain printers) may not produce acceptable results when used on the 1403 mdl N1 (train printer). A 6-part set which gave satisfactory results on a chain printer may show a decrease in the print quality of the last copies when used on an 1,100 lpm train printer. For details, see GA24-3041.
2. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use single-part forms for OCR printing.

Prerequisites:

A 1416 Interchangeable Train Cartridge is required on each 1403 (see M1416 pages).

For S/360 mdl 25: One 1403 can be attached via an Integrated 1403 Attachment (#4590) and an 1,100 lpm Printer Adapter (#3615) on the 2025. For these attachments, an appropriate adapter is also required on the 1403 itself ... see "Specify". The 1403 can also be attached to a system via a 2821 Control Unit mdls 1, 2, 3 or 5 attached to a S/360 mdl 25 Multiplexer or Selector Channel. See M2821 pages for 1403 attachment details.

For S/360 mdls 22, 30, 40, 44, 50, 65, 67, 75; S/370 or 4300 Processor, and 3031, 3032, 3033, 3081, 3083, 3084 Processors: The 1403 is attached via a 2821 Control Unit mdls 1, 2, 3, or 5. See M2821 pages for attachment details.

For S/370 mdls 135, 135-3, 138: A 1403 can be attached to the 3135, 3135-3, 3138 via an appropriate Integrated Printer Adapter. See "Special Features" in M3125, 3135, 3135-3, 3138 pages. **Note:** An appropriate voltage conversion adapter is required on the 1403 itself ... see "Specify".

For S/360 mdls 85 and 195: The 1403 is attached via a 2821 mdls 1, 2, 3 or 5. See M2821 pages for attachment details.

HIGHLIGHTS

Actual speeds depend upon the operation. The system's processing unit performs all format and analysis control. A line of printing is presented to the printer in the arrangement in which it is to be printed. All data printed is checked against data received from core storage.

Each print position can print any one of 48 characters: Alphabetic, numeric, and 12 special characters. Characters are spaced 10 per inch. Line spacing is 6 or 8 lines/inch, under operator control. Continuous marginally-punched forms from 3.5 in. to 18.75 in. in overall width are fed by an automatic carriage. Minimum form depth is 1.0 in.; maximum is 22.0 in. at 6 lines/inch, or 16.5 in. at 8 lines/inch. Forms spacing and skipping are governed by the stored program. Standard skipping is approximately 33 inches/second. The standard carriage on printers used with all systems is dual-speed. The dual-speed carriage permits skipping at approximately 75 inches/second on skips over 8 lines long. **Note:** Under certain unique conditions, the 75 inches/second skip is turned off and skipping continues at approximately 33 inches/second. See GA24-3073 for details. The printer and carriage open for easy loading and alignment of forms. The 1403 has sound-absorbent covers extending to the floor for reduced noise level. A motorized cover facilitates operator handling. The acoustical cover design incorporates platforms for feeding and stacking of forms. A forms cart may be purchased (see "Accessories").

Program Compatibility: The 1403 mdl N1 is program-compatible with the 1403 mdls 2 or 3 used in S/360 mdls 25, 30, 40, 44, 50, 65, 67, 75, and the 1403 mdl 2 used in S/360 mdls 22, 85, 195, any S/370 processor, or any 4300 processor. Existing programs for mdls 2 and 3 need not be changed for a mdl N1, except in those cases where, because of the reduced time required to print a line, the overall I/O scheduling must be re-optimized.

Printed Output for Optical Character Reading: 1403 and 1416 print trains can be equipped for printing on documents to be read by the following optical character readers:

1230 Optical Mark Scoring Reader
1231/1232 Optical Mark Page Reader
1270 Optical Reader Sorter
1275 Optical Reader Sorter
1282 Optical Reader Card Punch
1287 Optical Reader
1288 Optical Page Reader
1418 Optical Character Reader
1428 Alphameric Optical Reader
3881 Optical Mark Reader
3886 Optical Character Reader

Depending upon the system with which the 1403 will be used and the optical character reader involved, see appropriate section of "Type Catalog" for feature number(s) to be specified for the required 1403 print arrangement. The ribbons used on the 1403 must be capable of producing printed characters suitable for recognition by the optical reader used. Recommended ribbons and document specifications are included in the optical reader "Machines" pages or in the appropriate optical reader publications.

Publications: S/360 -- GC20-0360; S/370 -- GC20-0001; 4300 -- GC20-0001.

SPECIFY

- Power (AC, 3-phase, 50 or 60 Hz): Must be consistent with system voltage.
- Attachment of 2025 via Integrated 1403 Attachment (#4590): The 1,100 lpm Voltage Conversion Adapter (**#9726**), which can be field-installed, is required on the 1403.
- Print Train Arrangement: With S/360, S/370 or 4300 processor, see "S/360, S/370, 4300 processor - 1403 and 1404 Printers" in "Type Catalog". Universal Character Set Feature (#8640) is required or Multiple Character Set Feature (#5111) on a 1403 for any arrangement other than the 48-character set composed of identical arrays of standard sequence (AN, HN, ODA, ONA or OAZ). See "Special Features".
- Attachment of a S/370 mdl 125 via an Integrated Printer Adapter (#4662, #4667, #4668), or a S/370 mdl 135, 135-3, 138 via an Integrated Printer Adapter Basic Control (#4670), with the 1403 Printer Mdl N1 Attachment (#4672). 1,100 lpm Voltage Conversion Adapter (**#9726**), which can be field-installed, is required. See above.
- 1416 Interchangeable Train Cartridge: At least one 1416 is required with each 1403. See M1416 pages. Cross reference Branch/Plant Order number of 1416(s) which will be used with the 1403.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Tape Punch: Order P/N 120910 if the 1403 is for a "New Name Account".
  One punch is furnished at no charge.
- Machine Nomenclature: **#2927** for English .
- Kickstrips: **#9350**, if desired. Also available on MES. When kickstrips are installed, the open area underneath the machine is enclosed. They reduce the amount of "toe-room" and may be inconvenient to the user if the power outlet is located beneath the machine.

SPECIAL FEATURES

Auxiliary Ribbon Feeding Feature (#1376): [Standard] Recommended for satisfactory utilization of polyester film ribbons. Can also be used for conventional fabric ribbons. The polyester film ribbon (P/N 424325), or equivalent, provides improved print quality for both optical character recognition and other quality printing applications. Contact IBM. **Note:** For specific details for optical character recognition covering printing unit, document types, recommended ribbons, and type style, see M1270, 1275 and 3886 pages or the appropriate manuals.

Multiple Character Set Feature (#5111): [1403 natively attached to a S/360 mdl 25] Required for use of any print arrangement other than 48-character set composed of identical arrays of standard character sequence. Arrangements with identical repeatable sets will achieve the same printing speed as with the Universal Character Set Feature. Preferred arrangements in non-repeatable sets will result in speed degradation from those speeds specified for the UCS feature. **Limitations:** Cannot be installed with UCS Feature (#8640). **Prerequisites:** #4590 and #5100 on the 2025, plus Utility Load Program 360-P-UT-048. In addition, the following are required: 1,100 lpm Printer Adapter (#3615) on the 2025, and 1,100 lpm Voltage Conversion Adapter (**#9726**) on the 1403 itself, see "Specify".

Selective Tape Listing Feature (#6420): [S/360 mdls 22, 25, 30, 40 or 50] Permits preparation of eight 1.5 in. or four 3.1 in. fanfold tapes; up to 13 characters per 1.5 in. tape, up to 29 per 3.1 in. tape. Combinations of 3.1 in. and 1.5 in. tapes are possible. However, each 3.1 in. tape requires one of the following pairs of 1.5 in. tape positions: 1 and 2, 3 and 4, 5 and 6, or 7 and 8. Each tape is individually spaced or skipped under program control. Skipping is CE-adjustable between 3 and 22 inches. Five manual skip buttons control the four master tape positions; the fifth button manually skips all tapes. Top front stacker

1403 Printer (cont'd)

and access window provide for front loading and unloading of tapes. Detection is provided for failure to line-space. Easily interchangeable by operator between tape listing and standard forms printing. Improved operation with all covers closed -- low acoustical level. Can be used with an alphameric train or Universal Character Set Feature (#8640). **Limitations:** Cannot be installed on a 1403 attached to a S/360 mdl 25 via the Integrated 1403 Attachment (#4590). **Prerequisites:** #6425 on the 2821.

Universal Character Set Feature (#8640): [S/360 mdls 22 through 85; S/370 mdls 115 through 195; 4300] Required on the 1403 for any print arrangement other than AN, HN, OAZ, ODA or ONA. Any set of 240 codes can be loaded from cards into a special storage unit in the 2821 Control Unit mdls 1, 2, 3 or 5. The 240 codes must correspond in sequence to codes assigned to the graphics on the train selected. This includes any announced print arrangement for S/360 systems, or any arrangement of characters selected/designed by the customer for optimization of his application requirements. See "Type Catalog". Charges for artwork, matrix, etc., for special slugs are to be added if applicable. **Limitations:** [1] Printing speed of the 1403 is limited to 1,400 lpm. [2] The allowable code/graphic selection is restricted to the 256 code positions of the EBCDIC code. See GA24-3312. [3] This feature cannot be installed on a 1403 attached to a 2025 via the Integrated 1403 Attachment (#4590). For this function, see #5111 above. **Prerequisites:** For each 1403 with #8640, the appropriate Universal Character Set Adapter (#8637, #8638, #8639) on the 2821; each different train arrangement requires its own 1416 Interchangeable Train Cartridge; for S/360 mdls 22 through 195, S/370 mdls 115 through 195 and the 4300 processor, Utility Load Program 360-P-UT-048. If a customer desires to retain the former arrangement and to receive an additional one, the fixed cartridge will be modified for interchangeability and an additional interchangeable cartridge with selected print arrangement will be furnished.

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Cart (P/N 838300 or #3910): The acoustical cover design of the 1403 incorporates platforms for the feeding and stacking of forms. The forms cart, specially designed for transporting forms, facilitates transfer of the forms to and from the printer platforms.

SUPPLIES

Contact IBM.

1412 MAGNETIC CHARACTER READER

[NO LONGER AVAILABLE]

SPECIFY

The following specifications can be changed in the field.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, or **#9904** for 230V.
- Field Lengths: Two feature numbers, one for Account Number, one for Process Control, from table below. Field lengths can be changed in the field by MES.

Length	1	2	3	4	5	6	7	8	9	10
Acct. No.					#9210	#9211	#9212	#9213	#9214	#9215
Process Control	#9190	#9191	#9192	#9193	#9194	#9195				

- Color: Color Accent -- **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray. Extended Color -- **#9031** for red, **#9032** for yellow, **#9033** for blue.
- Kickstrips **#9431** ... field installable. When kickstrips are installed, the open area underneath the machine is enclosed. This reduces the amount of "toe-room" for operator and may be inconvenient to customer if the power outlet is located under machine.
- Isolation Feature: May be required on units shipped prior to December 29, 1967 for attachment to S/360 mdl 30 ... see "Special Features" below.

SPECIAL FEATURES

The following special features are on an "as available" basis for field installation.

Document Counter (#2385): Six-position counter which counts all documents passing through machine. On and Off Control and Reset provided on operator's panel. **Maximum:** One.

Dash Symbol Transmission (#3215): [Units serial number 10058 or above only] Transmits the E13B dash symbol from transit field to storage ... with symbol in storage, program can distinguish between duplicate Canadian and U.S. transit numbers. **Maximum:** One.

Isolation, Control Unit (#4700): [Field installation only on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 1412 without generating spurious signals. Thus, a CPU program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** #7720 ... since in all cases there are compatible EC level requirements, the concurrence of the Branch FE Manager is required for any order for this feature.

Multiple Column Select - Sort Suppress (#5215): Operator's panel controls all operations of the feature. Multiple Column Select -- selects documents with specific numbers in four or less columns of any field. The numbers can be in a field other than that being sorted and the four columns need not be adjacent. Sort Supress -- suppresses sorting on specific digits in any single column and selects those documents into a specific pocket. All other documents are sorted manually. Overflow stacking eliminates stoppage due to filled pockets. **Limitations:** Multiple column select and sort suppress cannot be simultaneous. **Maximum:** One.

Self-Checking Number (#7061, #7062): A self-checking number has two parts, the basic identifying number and its check digit. The check digit, derived from the identifying number by one of two techniques, is always the units digit of a self-checking number. The feature assures that all digits in the self-checking number have been correctly recorded. The field is verified as it is read during any pass. **Limitations:** Self-checking numbers for Modulus 10 are not compatible with those of Modulus 11.

#7061 - Modulus 10 -- has weighting factor of 1, 2, 1, 2, 1, 2. Will not detect following types of errors: 09 to 90 transposition ... interchange of digits between alternate columns, e.g., 32647 for 34627 ... substitution of one self-checking number for another ... in some instances, transpositions having the formula "BAB" for "ABA", e.g., 121 for 212 ... in some instances, random errors, e.g., 23 printed as 56.

#7062 - Modulus 11 -- has weighting factor 7, 6, 5, 4, 3, 2. When the self-checking number is greater than six digits, weighting factor is repeated. In some instances, random type errors will not be detected, nor can a basic number requiring a check digit of 10 be used.

S/360 Adapter (#7720): [Units serial number 10085 or above only] Permits operation with a S/360 mdl 25 or 30. **Limitations:** Once this feature is intalled, the 1412 cannot be used with a 1400 series processor. **Prerequisites:** In order to operate with DOS or BPS, #3274 or #3895 is required on the processing unit ... to operate with DOS, the 1412 must have EC 131182. **Note:** Inter-system attachment via Direct Control is limited when the 1412 uses the external interrupt lines. Signal-in lines used by 1412s cannot be shared with the second processing unit.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

1416 INTERCHANGEABLE TRAIN CARTRIDGE

PURPOSE

A cartridge and print train which provides interchangeability of type font for the 1403 Printer model 3 or N1, and 3203 Printer (all models).

MODELS

Model 1 001

Prerequisites: The 1416 functions only when mounted in a 1403 mdl 3 or N1, or a 3203 (all mdls). At least one 1416 is required with each 1403 mdl 3 or N1 or 3203 (all mdls).

HIGHLIGHTS

Interchangeability: When multiple 1416s are available, they may be interchanged by the operator, providing flexibility for printing different type fonts, type styles, or character arrangements. This flexibility opens new application areas with unique printing requirements such as form-letter writing, engineering and scientific data, chemical abstracts, and text printing.

Publications: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001, 1410/7010 -- GA22-6826, 1440 -- GA24-3005, 1460 -- GA24-1495, 7070/7074 -- GA28-6288

SPECIFY

- Print Train Arrangement: See "Type Catalog" for characters in each available arrangement and feature numbers to be specified.
- A rental 1416 must be capacity replaced (unless customer desires to order an additional 1416) when the following are to be field installed: [1] Preferred Character Set Feature (#5523) on 1403 mdl 3 in 1400 series system ... [2] Universal Character Set Feature (#8640) on 1403 mdl 3 or N1 in S/360, S/370, 4300 processors ... [3] Any UCS train arrangement to replace AN or AH arrangement on a 3203 (all mdls), or a 1403 mdl 3 or N1 already equipped with Universal Character Set Feature (#8640) ... [4] A change in type size or style. If a purchased 1416 is involved, contact IBM, unless customer desires to order an additional 1416.

  unless customer desires to order an additional 1416.
- When a Voltage Adapter (**#9709**) is field installed on a 1403 mdl 3, the standard configuration train previously used will be modified to an AN or HN arrangement; a PCS-A arrangement will be modified to a PCS-AN; or PCS-H will be modified to PCS-HN. Any of these changes is restricted to the same type size (style). See "Type Catalog - S/360, S/370 and 4300 Processors - 1403 and 1404 Printers" for feature number to which train is to be modified. Submit MES on 1416, specifying "Change installed train #_____ to #_____"
- Except as stated above, order type slug substitutions whenever changes between the following train arrangements are to be made in the field: A and H ... AN and HN ... PCS-A and PCS-H ... PCS-AN and PCS-HN. See "Type Catalog".
- A separate 1416 is required for each print train.
- Depending upon the system involved, see appropriate section of "Type Catalog" for feature numbers of desired OCR arrangements and associated sales manual "Reader" description pages to assure compatibility of printer/reader recognition ability. **Note:** The ribbons used on the 1403 and 3203 must be capable of producing printed characters suitable for recognition by the optical reader used. Recommended ribbons and document specifications are referenced in the optical reader "Machines" pages.
- Storage Container: **#9668**, if needed for the 1416. [Recommended for use when multiple 1416s are ordered for a single printer.]

Inspection: Field inspection of damaged 1416s will be at no charge (except for travel time and expense, if applicable).

Repair: Purchased 1416s which become damaged or inoperable may be returned to the IBM plant (Endicott) for repair. Transportation charges to and from the plant are to be paid by the customer. The following repairs will be performed at the prices indicated per 1416:

Disassemble, inspect, test, clean, replace idler gear and drive gear, and reassemble	$360††
Replace cams on original base plate assembly	230
Replace base plate assembly (856186)	745
Replace standard type slugs †	21 per slug

† When a character is replaced, all identical characters should be replaced to ensure consistent print-out of identical characters. Unless otherwise specified, the plant will replace these slugs at the stated price per type slug. See "Type Catalog".

When replacement of special characters (special slugs) is required, the original charges (excluding artwork and matrix charges) for those special characters will apply for this replacement.

†† If the customer chooses not to authorize IBM to repair the 1416 after receiving an estimate, the customer will be billed the charges for disassembly, inspection, testing, cleaning, replacement of idler and drive gears, and/or the reassembly of the 1416

In the event a 1416 is damaged to the point where, in the opinion of IBM, repair is not possible, the 1416 will be returned to the customer. In this case, none of the prices will apply.

Note: An emergency replacement procedure for damaged 1416s is available from IBM .

1416s for temporary installation are available at a daily rental, based on the regular monthly charge, until the repaired 1416 is returned. Shipping charges for the temporary 1416 will be charged to the customer.

IBM will bear the transportation and repair charges when the damage to a purchased 1416 is categorized as "IBM responsibility" by the branch manager, e.g., 1416 received in damaged condition, IBM employee drops a 1416, etc. In cases of IBM responsibility, a temporary replacement 1416 will be supplied at no charge.

IBM guarantees that the repaired 1416 will be returned to the customer in operable condition.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

1419 MAGNETIC CHARACTER READER

PURPOSE

Reads magnetically inscribed data from card and paper documents into a 1401, 1410, 1460, System/3 model 12 or 15, S/360 model 22, 25, 30, 40, 50, 65, 67, any S/370 processor (except 3081, 3083 or 3084), or a 4300 Processor. Can be used for offline sorting.

MODELS

Model 1 001 — E13B type font, codeline arrangement as designated by the American Bankers Association Technical Committee on Mechanization of Check Handling. Intermixed paper and card documents within the following specifications can be processed: Width -- 2-3/4" to 3-2/3" ... Length 6" to 8-3/4" ... Thickness -- 0.003" to 0.007" ... Paper Stock -- 20 lb. short grain to 44 lb. card stock. 51-column card stock can be fed at a rate of approximately 1,960 cards a minute. **Note:** For sorting 51-column cards, see 51-column Card Sorting (#4380) under "Special Features".

Prerequisites

System/3 mdls 12 and 15: One 1419 can be attached. It requires the Mdl 20 Attachment (**#9710**) and RPQs WB1253 and S00382. All mdls of the System/3 must be equipped with a Serial I/O Channel (#7081). **Note:** RPQ WB1253 only must be approved by Special Product Marketing in Rochester. **Note:** RPQ S00382 is required to process checks with 9-digit routing/transit number.

S/360 mdl 22, 25, 30, 40, 50, 65, 67, any S/370 (except 3081, 3083 or 3084), or 4300 processor: Up to six 1419s can be attached to a system. Each 1419 requires a S/360 Single Address Adapter (#7720) or S/360 Dual Address Adapter (#7730) ... see "Special Features" below. Each 1419 requires a channel control unit position.

S/360 mdl 25: Special feature on 2025: Multiplexer channel, or selector channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 65, 67: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on a 2870 ... see M2860, 2870 pages.

S/370 mdl 115, 125: Byte multiplexer channel (special feature), External Signal (#3898) ... See M3115, 3125 pages. On a 3115-0, **#9336** is required.

S/370 mdl 135: Multiplexer channel (standard), selector channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

S/370 mdl 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor: Byte multiplexer channels, block multiplexer channels ... see M3033 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel (optional), External Signals (#3898) ... required on 4331.

Note: Before ordering, read descriptions of #7720 and #7730 under "Special Features" below for further prerequisites and limitations.

1401/1460: One 1419 can be attached. A Serial I/O Adapter (#7080) is required on the 1401 or 1441 Processing Unit. **Note:** For optimum operation, Processing Overlap (#5730) is recommended on the 1401 or 1461 I/O Control. Without it, a maximum of 9.5 milliseconds are available for processing of data from the 1419. **Limitations:** A 1419 cannot be installed with 1401 A, G or H mdls ... on a 1401, diagnostic programs require a minimum of 4,000 positions of storage.

1410: One 1419 can be attached to each channel ... simultaneous use of two 1419s increases the number of documents converted up to 90%, exclusive of operator handling time. A Magnetic Character Reader Adapter (#4900, #4902, #4903) is required on the 1411 Processing Unit. **Limitations:** Can be installed only on 1411 mdls A1 through A5.

Limitations

S/360 mdl 25, 30: Operation of 1419s is not included under 1401/1440/1460 Compatibility features.

S/360 mdl 40: Operation of 1419s is not included under 1401/1460 Compatibility (#4457) or 1410/7010 Compatibility (#4478).

S/360 mdl 50: Operation of 1419s is not included under 1410/7010 Compatibility (#4478).

S/360 mdl 67: Only when operating in mdl 65 mode.

S/370 mdl 115: Operation of 1419s is not included under S/360 Mdl 20 Compatibility (#7520).

S/370 mdl 125: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457) or S/360 Mdl 20 Compatibility (#7520).

S/370 mdl 135, 135-3, 138: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457).

S/370 mdl 145, 145-3, 148: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457) or 1401/1440/1460, 1410/7010 Compatibility (#4458).

S/370 mdl 155, 158: Operation of 1419s is not included under 1401/1440/1460, 1410/7010 Compatibility (#3950).

4331 Processor: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#3950).

HIGHLIGHTS

Documents read at a maximum rate of 1,600 documents a minute. Actual speed depends upon length of document and stored program. Pocket selection may be controlled by the 1419 or system's program. Feeding is controlled by the system. Can also be used for offline sorting. Processing Overlap (#5730) is required on the 1401 or 1461 (1460) to take full advantage of the 1419's speed. Individual fields can be processed immediately after they are read. Document reading can be overlapped with processing. Minimum processing time, including pocket selection, is 32.2 milliseconds ... more than ample for sophisticated applications.

Checking: Readability of each magnetic character, including special symbols, in each field processed can be verified each time a document is read and/or sorted. A field length check may be made on all fixed-length fields being processed in offline mode to assure that all numeric digits in the field have been encoded. When the 1419 is under control of the system's program, the 1419 sends control signals to the processor so that the program may determine document distribution. Documents not satisfying checking conditions may be rejected. Fixed-field lengths provide a powerful technique for controlling accuracy of processing.

Programming Compatibility: Reprogramming is required whenever: [1] A 1419 replaces a 1412 in an existing 1400 series installation ... [2] a S/360, S/370, or 4300 processor replaces a 1400 series installation ... [3] a S/360 mdl 22, 25, 30, 40, 50, 65, any S/370 (except 3081, 3083 or 3084), or 4300 processor replaces a S/360 mdl 20 ... [4] a conversion is made from one programming system to another.

Publications: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001, 1401/1460 -- GA24-1495, 1410 -- GA22-6826 ... *IBM 1419 Magnetic Character Reader Reference Manual* -- GA24-1499 ... *IBM System/3 1255 and 1419 Magnetic Character Readers Reference and Program Logic Manual* -- GC21-5132

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V, **#9904** for 230V ... must be consistent with system voltage.
- Color: Color Accent -- **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray. Extended Color -- **#9031** for red, **#9032** for yellow, **#9033** for blue.
- Field Lengths: Specify two feature numbers, one for Account Number, one for Process Control ... see table below. Fixed-field lengths assure maximum processing accuracy. Variable-length fields may be specified in lieu of fixed lengths. Field lengths on installed machines may be changed by MES.

1419 Magnetic Character Reader (cont'd)

Fixed-Field Length (position)	Account Number	Process Control
1	----	#9190
2	----	#9191
3	----	#9192
4	----	#9193
5	#9210	#9194
6	#9211	#9195
7	#9212	----
8	#9213	----
9	#9214	----
10	#9215	----
Variable-Field Length	#9219	#9189

- Shipping Instructions: **#9691** for stackers assembled (sorter section 76.27cm/35-3/4" deep), **#9692** for stackers disassembled (sorter section approximately 81.28cm/32" deep).
- Up-Ending Kit (sorter section only): **#9840**, if required ... loan basis on initial machine order only, remains property of IBM. **Note:** Also see "Crane/Hoist Cable" specify below.
- S/360 Mdl 20 Attachment: **#9710**, if desired. Required to attach the 1419 to a System/3 and must be modified by RPQs WB1253 and S00382. For field installation, the 1419 must have EC 127384 or above ... can be removed in the field.

  With **#9710** installed, the 1419 cannot be used interchangeably with a 1400 series processor or a S/360 mdl 22, 25, 30, 40, 50, 65 or 67, any S/370 processor or any 4300 processor.
- Kickstrips: **#9431**, if desired ... also available on MES. When kickstrips are installed, the open area under the machine is enclosed. This reduces the amount of "toe-room" for the operator and may be inconvenient to the customer if the power outlet is located under the machine.
- Isolation Feature: May be required on units shipped prior to December 29, 1967 for attachment to a S/360 ... see "Special Features".
- Crane/Hoist Cable: **#9070** ... specify only if delivery of machine requires lifting by crane or hoist. Loan basis on initial machine order only, remains property of IBM. **Prerequisites: #9840.**

SPECIAL FEATURES

Batch Numbering (#1445): Provides an automatic means of advancing a batch number document identification under program control. Consists of a 6-position impact printer which prints up to 999,999. The five low-order digits are advanced under processor control ... the high-order digit is set manually. The batch number can be printed in any one of six locations on the back of the document. **Limitations:** [1] Batch number advance instructions given more often than once in a given 3-second period will cause suspension of feeding for the remainder of the period. Minimum batch size that can be processed without restriction is influenced by those factors affecting throughput. Refer to *Reference Manual* ... [2] Legibility of batch numbers is influenced by the quantity of reverse side printing, the color and density of the ink used in reverse side printing, and surface irregularities caused by the printing process used. Typical examples of documents with one or more surface irregularities are Traveler's and Certified Checks. Customers must be advised that on these types of documents reduced ribbon life can be expected ... [3] When 51-column cards are processed, print location 6 cannot be used ... [4] This feature is not available for use in 1410 systems ... [5] Cannot be installed with Endorser (#3791). Uses purple ribbon (413193), or equivalent. See GA24-3342 for details. **Prerequisites:** For field installation, 1419 must have EC 127244 or above.

Dash Symbol Transmission (#3215): Transmits the E13B dash symbol from transit field to storage. With symbol in storage, program can distinguish between duplicate Canadian and U.S. transit numbers. **Maximum:** One.

Electronic Accumulator and Sequence Checking (#3610): [Plant installation only] Accumulating -- amounts read from documents and accumulated total printed on paper tape. Maximum accumulation is ten digits. Rejected documents not accumulated. Sequence Checking -- selected positions in a field compared with same positions in preceding documents to assure that all documents are in proper order. Maximum of ten positions can be sequence checked in single pass. **Limitations:** This feature does not function when the 1419 operates in online mode with any S/360, S/370 or 4300 processor. **Note:** This feature is a separate unit, cable connected to 1419 ... 43cm (17") x 52cm (20-1/2") x 98cm (38-1/2") ... weight 48kg (105 lbs). **Prerequisites:** #5201.

Endorser (#3791): [Plant installation only] Imprints full endorsement at speed of 1419. Operator can select one of six endorsing positions in accordance with ABA specifications. With this feature, documents can be endorsed with date, identification number and bank's legal endorsement. The Endorser Plate is made to the customer's specifications. See "Accessories" below. A Blank Endorser Plate is also available if only partial endorsements are required. **Limitations:** Cannot be installed with Batch Numbering (#1445) or Endorse Only (#3795).

Endorse Only (#3795): [Plant installation only ... if Endorser (#3791) is installed, it can be changed in the field to #3795.] Imprints full endorsement at speed of 1419. Vertical location of endorsement is specified by customer and set at plant. A left or right printing position can be selected by operator. Identification number printing is not provided. The date printing unit is at trailing end of endorsing device. With this feature, documents can be endorsed with date, identification number and bank's legal endorsement. The Endorser Plate is made to the customer's specifications. See "Accessories" below. A Blank Endorser Plate is also available if only partial endorsements are required. **Specify: #9167** for endorsement at top, **#9168** for center or **#9169** for bottom. **Limitations:** Cannot be installed with Endorser (#3791).

Expanded Capability (#3800): Provides a command for operation under OS. When in OS mode, stacker select time available using the Dual Address Adapter (#7730) is reduced by 2 ms. Exposure to data overruns caused by 1419s interfering with other 1419s operating on the same channel is eliminated. Overrun exposure and maximum number of 1419s per channel are configuration- and application-dependent ... refer to GC21-5006. Compatibility with DOS Dual Address Support is provided for conversion to OS. OS or DOS mode of operation is established by a field modification to the feature by FE. **Prerequisites:** Each 1419 requires #7730 ... EC259399 is required on a S/360 mdl 50, and EC 712822 is required on a 2870 for operation on a S/360 mdl 65 or S/370 mdl 165.

51-Column Card Sorting (#4380): For sorting 51-column card documents offline, which may be intermixed with documents and cards within the specifications listed under "Models" above. When installed, machine speed is reduced. Formula for calculating feeding rate is:

15,720 + (L + 0.725L) ... where L is document length in inches.

For 51-column cards, speed is approximately 1,875 documents/minute ... for 6-inch documents, approximately 1,515 documents/minute. Decks containing 51-column cards must be mechanically joggled prior to each pass.

Isolation, Control Unit (#4700): [Field installation on units shipped prior to December 29, 1967 only ... standard on units shipped after that] To turn power on or off the 1419 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** #7720 or #7730 ... since in all cases there are compatible EC level requirements, the concurrence of the Branch FE Manager is required for any order for this feature.

Multiple Column Control (#5201): Permits selection of documents with a specific number in four or less columns in any field.

Program Control for Pocket Lights (#5739): To facilitate control of output batches in the transit application. On 1419s attached to a System/3, S/360, S/370, 4300 processor, 1401 or 1460, the program stops the 1419 when a predetermined number of documents has entered one of six pockets designated by the program and turns on the appropriate pocket light(s) [A-3]. **Limitations:** Not available for use in a 1410 system.

Program Control for Pocket Lights 7-12 (#5741): Facilitates control of output batches in the transit application when more than six pockets are being filled. Provides lights for pockets 4-9, enabling program to turn on a light(s) for any of the first 12 pockets designated. **Limitations:** Not available for use in a 1410 system. **Prerequisites:** #5739, plus EC 125358A, or, for field conversion, FBM 488231.

Self-Checking Number (#7061, #7062): A self-checking number consists of two parts, the basic identifying number and its check digit. The check digit, derived from the basic identifying number by one of two techniques, is always the units digit of a self-checking number. The feature assures that all digits in a self-checking number have been correctly recorded. The field is verified as it is read during any pass. **Limitations:** Self-checking numbers for Modulus 10 (#7061) are not compatible with those for Modulus 11 (#7062).

#7061 - Modulus 10: Has weighting factor of 1, 2, 1, 2, 1, 2. Will not detect the following types of errors: 09 or 90 transpositions ... interchange of digits between alternate columns, e.g., 32647 for 34627 ... substitution of one self-checking number for another ... in some instances, transpositions having the formula "BAB" for "ABA", e.g., 121 for 212 ... in some instances, random errors, e.g., 23 printed as 56.

#7062 - Modulus 11: Has weighting factor of 7, 6, 5, 4, 3, 2 ... when self-checking number is greater than six digits, weighting factor is repeated. In some instances, random type errors will not be detected, nor can a basic number requiring a digit of 10 be used.

1419 Magnetic Character Reader (cont'd)

Split Field (#7440): The first ABA dash symbol following a digit (e.g., a dash in units position of a field is ignored) will separate any field into two elements. Each of the elements may vary in length. With this feature, either element can be treated as a separate field. **Specify:** First Element (**#9180**)... required when Self-checking Number (#7061, #7062) is ordered and is to operate only on the first element of the split field.

S/360 ADAPTER (#7220 for Single Address, #7730 for Dual Address): One of these adapters is required on each 1419 attached to a S/360 mdl 22, 25, 30, 40, 50, 65 or 67, any S/370 processor or any 4300 processor. **Limitations:** Once #7720 or #7730 has been installed, the 1419 cannot be used with a 1400 series processor without submission of an RPQ. **Maximum:** One per 1419, #7720 or one #7730.

S/360 Adapter - Single Address (#7720): Up to six 1419s attached to a system are supported by DOS ... exposure to late stacker selects should be considered in determining the maximum number of 1419s that may effectively operate on a system, in addition to those factors outlined under DOS in "Programming". **Limitations:** Programming support precludes concurrent operation of 1419s equipped with #7720 and those equipped with #7730. **Prerequisites:** In order to operate with DOS or BPS, #3274 or #3895 is required on the processing unit. **Note:** Intersystem attachment via Direct Control is limited when the 1419 uses external interrupt lines. Signal-in lines used by 1419s cannot be shared with the second processing unit. To operate with DOS, the 1419 must have EC 131182. When equipped with #7720, it is recommended that 1419s be attached to a multiplexer channel and they should normally be the highest priority devices on the channel.

S/360 Adapter - Dual Address (#7730): With this feature more stacker select time is available than with #7720. Available stacker select time is based on the last field selected for reading; account number -- 27 ms, transit number -- 21 ms, serial number -- 15 ms. In order for these times to be valid, document field placement must be within the standards and specifications of the ABA Common Machine Language Specifications. The feature includes two distinct control units ... each with a separate address, its own set of executable commands, status and sense indicators. **Prerequisites:** If the 1419 is attached to a 2022 or 2030 multiplexer channel via #7730, **#9185** must be specified on the 2022 or 2030. If #7720 is changed to #7730 by MES, **#9185** must be added to the 2022 or 2030.

----------DOS---------

Up to six 1419s attached to a system are supported by DOS. The limiting factors concerning the number of 1419s that may be attached to a system are stacker select time requirements and channel capacity. Since these factors are application- and configuration-dependent, consult the appropriate channel loading and DOS SRLs to determine the maximum number that may be operated effectively. **Limitations:** DOS support precludes concurrent operation of 1419s equipped with #7730 and those equipped with #7720 ... 1419s equipped with #7730 can be attached only to a multiplexer channel and should normally be the highest priority devices on the channel. **Prerequisites:** #3274 or #3895 or #3898 is required on the processing unit (except the 4361 and 4381 Processor). **Note:** Intersystem attachment via Direct Control is limited when the 1419 uses the external interrupt lines. Signal-in lines used by 1419s cannot be shared with the second processing unit. For field installation of #7730, the 1419 must have EC 131196 or above.

----------OS----------

Limitations: 1419s equipped with #7730 (required for OS) can be attached only to a multiplexer channel, must be physically cabled last on the channel, and should be the highest priority devices on the channel. **Prerequisites:** For operation under OS, each 1419 must be equipped with #3800.

MODEL CONVERSIONS (None)

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the desired feature number indicated.

Endorser Plate (#3792): Made to customer's specifications ... for use with #3791 or #3795. Documents can be endorsed with date, identification number, and bank's legal endorsement. For further information, see Endorser Plate Specification Sheets, Z120-0563. It is recommended that the customer stock at least one spare endorser plate for each group of machines with identical plates, since plates cannot be immediately replaced. When ordering **#3792** for shipment with a machine, specify color of ink to be used: **#9145** for black, **#9146** for green, **#9147** for purple, or **#9148** for red. **Note:** 1419 endorser plates are not interchangeable with other machine types. An additional charge will be made for an endorser plate that requires art and layout work which cannot be accomplished by straight-line typesetting. This additional charge applies to single plate orders and the first plate of multiple plate orders. Art and layout work, if required, additional, specify **#3796**. The endorser plate on a displaced machine is to be left with the machine, but defaced and rendered unusable. The normal plate charge will apply whenever replacement of a worn or damaged plate is required. Charges for art and layout work are to be added, if applicable. **Field Installation:** Order **#3792** via the AAS Order Transaction. In all cases, if art and layout work is required for **#3792**, also order **#3796**. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine. If available, a sample endorsement should be attached to each Spec Sheet.

Blank Endorser Plate (#3793): For use with #3791 or #3795. Documents can be endorsed with date, identification number, and bank's legal endorsement. For further information, see Endorser Plate Specification Sheets, Z120-0563. When ordering **#3793** for shipment with a machine, specify color of ink to be used: **#9145** for black, **#9146** for green, **#9147** for purple, or **#9148** for red. **Note:** 1419 endorser plates are not interchangeable with other machine types. The endorser plate on a displaced machine is to be left with the machine, but defaced and rendered unusable. The normal plate charge will apply whenever replacement of a worn or damaged plate is required. **Field Installation:** Order **#3793** via the AAS Order Transaction. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine.

Endorser Plate for Mechanical or Replacement Machine (#9140): 1419 replaced by 1419 ... made to customer's specifications ... for use with #3791 or #3795. A replacement endorser plate will be shipped with each replacement machine at no charge when the machine being replaced has an endorser. If any change in plate design is desired, there is a charge only for art and layout work (**#3796**), if applicable. Attach sample endorsement to the Endorser Plate Specification Sheet (Z120-0563) and forward to the plant. For further information, see Endorser Plate Spec Sheet. When ordering **#9140** for shipment with a machine, specify color of ink to be used: **#9145** for black, **#9146** for green, **#9147** for purple, or **#9148** for red. **Note:** 1419 endorser plates are not interchangeable with other machine types. An additional charge will be made for an endorser plate that requires art and layout work which cannot be accomplished by straight-line typesetting. The endorser plate on a displaced machine is to be left with the machine, but defaced and rendered unusable. **Field Installation:** Order **#9140** via the AAS Order Transaction. In all cases, if art and layout work is required for **#3792**, also order **#3796**. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine. If available, a sample endorsement should be attached to each Spec Sheet.

SUPPLIES (None)

1442 CARD READ PUNCH MDLS 1, 2, N1

PURPOSE

A combination punched card I/O unit for a 1240, 1440, 1450, S/360 model 22 through 85 and 195, any S/370 processor (except 3081, 3083 or 3084), and 4300 Processor.

MODELS

Model 1 001 [NO LONGER AVAILABLE] For 1240, 1440 or 1450 ... reads at rated speed of 300 cards/minute ... punches at rated speed of 80 columns/second ... has one stacker.

Model 2 002 [NO LONGER AVAILABLE] For 1240, 1440 or 1450 ... reads at rated speed of 400 cards/minute ... punches at rated speed of 160 columns/second ... has two stackers.

Model N1 N01 For S/360, S/370 (except 3081, 3083, or 3084), 4300 Processor ... reads at rated speed of 400 cards/minute ... punches at rated speed of 160 columns/second ... has two stackers.

Maximum: S/360, S/370 or 4300 processor -- the 1442 mdl N1 includes its own control unit. The number attachable depends upon the total complement of I/O control units in the system. There is a natural limit of eight control units on each channel ... in a S/360 mdl 44, up to two control units can be attached to each high speed multiplexer channel subchannel.

Prerequisites: For S/360, S/370, or 4300 Processors: A control unit position on a system channel.

S/360 mdl 25: Special feature on 2025: Multiplexer channel or selector channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), or selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 44: Special features on 2044: Multiplexer channel, high speed multiplexer channel, add'l high speed multiplexer subchannels.

S/360 mdl 65, 67, 75: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/370 mdl 85, 195 or S/370 mdl 165, 168, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, or shared subchannel of a 2880 ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector or block multiplexer channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), or block multiplexer channel (first two are standard) ... see M3155, 3158 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor: Byte multiplexer channels, block multiplexer channels ... see M3033 pages.

4331 Processor: Byte multiplexer channel, block multiplexer channel ... see M4331 pages.

4341 Processor: Byte multiplexer channel, block multiplexer channels ... see M4341 pages.

4381 Processor: Byte multiplexer channel, block multiplexer channels ... see M4381 pages.

HIGHLIGHTS

Format control and analysis are controlled by the system's processing unit. Mdl N1 reads and punches the 256 codes of the Extended BCD Interchange Code. Hopper capacity is 1,200 cards ... stacker capacity is 1,300 cards. In mdl N1, cards go to stacker 1 unless program directed to stacker 2. Mdl N1 contains its own control unit.

Input Section: Invalid codes and mispositioned cards are detected. The light-sensing mechanism is checked for proper functioning in every read cycle.

Output Section: Cards are punched serially after passing through the light-sensing station. Cards can be either blank or pre-punched. Actual punching speed depends upon the number of columns punched, including interspersed blank columns. Rated speed for punching columns 1-10 is 265 cards/minute for mdl N1 ... for punching columns 1-80 is 91 cards/minute for mdl N1. Punching is checked.

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores (before separation): S-1, ID-1, ID-2, and for a maximum of three passes, M-4 and M-5.

External Scores (after separation): For reading and punching: On column 80 end -- M-3, M-7, M-11 (with round corners) and CF-11 (with round corners); On column 1 end -- M-7, M-11 (with round corners), CF-11 (with round corners) score may be used on a mdl N1 with serial number 40044 or above, or a machine having punch unit serial number 2638 or above stamped on the back of the tie bar. For reading without punching: On column 80 end, M-6; and for a maximum of three passes, M-5, OM-2 and CF-4.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

Bibliography: S/360 -- GC20-0360, S/370, 4300 --GC20-0001

SPECIFY

The following specify features can be changed in the field (also applies to mdls 1 and 2).

- Voltage (AC, 60 Hz): Mdls 1 and 2 (3-phase, 4-wire) -- **#9903** for 208V, **#9905** for 230V ... mdl N1 (1-phase, 3-wire) -- **#9902** for 208V, **#9904** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or (mdl N1 only) **#9046** for white.
- 1442 N1 Compatibility Attachment: [Mdl N1] May be required ... see "Special Features".
- Isolation, Control Unit: [Mdl N1] May be required on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

On a 1442 mdl 1 or 2, the following features, as appropriate, are on an "as available" basis for field installation.

Card Image (#1531, #1532): In any system -- permits processing of cards with multiple punching in a single card column. In 1240, 1440 or 1450 -- converts binary coded cards into BCD codes, and vice versa ... approved scored cards can be read without suspending validity checking on other than scored columns ... cards with interspersed conventional codes and binary coded data can be read.

#1531 -- for mdl 1 or 2 ... #1532 -- for mdl N1.

When reading in card image mode, the validity check is suspended because all characters are considered valid. When installed on the first 1442 attached to a 1240, 1440 or 1450, this feature also functions on a second 1442. **Prerequisites:** For mdl 1 or 2 -- **#9035** on the 1241 or 1441.

1442-N1 Compatibility Attachment (#4445): [Mdl N1] Required if the 1442 mdl N1 is to be used with 1440 Compatibility (#4442) on a 2025, or with 1442/1443 Attachment (#4464) or 1620 Compatibility (#7190) on a 2030. Required only for operation in compatibility mode, not required for normal S/360 operation of the 1442 mdl N1. **Limitations:** Cannot be installed on a unit with serial number under 40100.

Isolation, Control Unit (#4700): [Mdl N1 ... for field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 1442 mdl N1 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Limitations:** Cannot be installed on a unit with serial number under 40068. **Prerequisites:** Since in all cases there are compatible EC level requirements, the concurrence of the Branch FE Manager is required for any order for this feature.

Punch Column Skip (#5880): [Mdls 1, 2] Increases system throughput by allowing the punch to space over card columns without interlocking the system ... a "Punch Column Skip" instruction specifies the number of card columns to be spaced through by the punch. If two 1442 mdl 1s or 2s, in any combination, are installed, each may be equipped with this feature. **Prerequisites:** #5881 on the 1241 or 1441 ... only one #5881 is required if #5880 is installed on two 1442s.

Selective Stacker (#6406): [Mdl 1] Provides a second stacker ... cards can be selected into this stacker under program control.

1442 Card Read Punch Mdl 1, 2, N1 (cont'd)

MODEL CONVERSIONS

Can be made between model 1 and 2 ... a model 1 or 2 can also be changed to a model 4, but not vice versa ... no changes can be made to or from a model N1.

ACCESSORIES (None)

SUPPLIES (None)

1442 CARD READER MDLS 3, 4

[NO LONGER AVAILABLE]

PURPOSE

Punched card input unit for a 1240, 1410, 1440 or 7010 system.

MODELS

Model 3 003 For 1410 or 7010 ... has one stacker.

Model 4 004 For 1240 or 1440 ... has two stackers.

Maximum: Up to two 1442 mdl 3s can be attached to a 1410 or 7010 system, one on channel 1 and one on channel 2 ... up to two 1442 mdl 4s can be attached to a 1240 or 1440 system.

Limitations: On a 1240 or 1440, if a 1442 mdl 1 or 2 or a 1444 is used, only one 1442 mdl 4 can be installed ... if two 1442 mdl 1s and 2s in any combination or both a 1442 mdl 1 or 2 and a 1444 are used, a 1442 mdl 4 cannot be installed.

Prerequisites

For 1410 or 7010: #4659 or #4660 on the 1411 or 7114 (#4660 requires a 1411 mdl A1-A5).

For 1240 or 1440: The first 1442 (mdl 1, 2 or 4) attached must have #1632 ... see " Special Features".

HIGHLIGHTS

Provides high-speed, low-cost punched card input. Cards are read by a light-sensing unit at speeds up to 400 cards/minute. The 64 codes of the BCD Code can be read. Invalid codes and mispositioned cards are detected. The light-sensing mechanism is checked for proper functioning in every read cycle. Has a 1,200-card capacity hopper. Mdl 3 has one 1,300-card capacity radial stacker ... mdl 4 has two.

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores (before separation) -- S-1, ID-1, ID-2, and for a maximum of three passes, M-4 and M-5.

External Scores (after separation) -- column 1 end: OM-2, M-3, M-4, M-5, M-7, M-11 (with round corners), CF-4 and CF-11 (with round corners) ... column 80 end: M-3, M-6, M-7, M-11 (with round corners), CF-11 (with round corners), and for a maximum of three passes, M-5, OM-2, CF-4.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

Bibliography: 1240/1440 -- GA22-3005, 1410/7010 -- GA11-6826

SPECIFY

The following specify features can be changed in the field.

- Voltage (AC, 60 Hz): Mdl 3 (1-phase, 3-wire) -- **#9902** for 208V, **#9904** for 230V ... mdl 4 (3-phase, 4-wire) -- **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

SPECIAL FEATURES

The following features, as appropriate, are on an "as available" basis for field installation.

Card Image (#1531): [Mdl 4] To convert binary coded cards into BCD codes ... also permits processing of cards with multiple punching in a single card column. Approved scored cards can be read without suspending validity checking in other than the scored columns. When reading in card image mode, the validity check is suspended because all characters are considered valid. Cards with interspersed conventional punching codes and binary coded data can be read. When installed on the first 1442 attached to a system, this feature also functions on a second 1442 in the system. **Prerequisites: #9035** on the 1241 or 1441.

Card Read Punch Adapter (#1632): [Mdl 4] Required on the first 1442 attached to a system ... the second 1442 does not require this feature. When a 1442 mdl 1 or 2 and a 1442 mdl 4 are both attached to a system, the 1442 mdl 1 or 2 must be the first unit attached and must be equipped with this feature.

Input/Output Adapter (#4661): [Mdl 3] To attach a 1414 I/O Synchronizer mdl 5 or 8 with the teleprocessing units or printer it controls to the 1442 mdl 3.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

1442 CARD PUNCH MDL N2

PURPOSE

Punched card output unit for a S/360 model 22 through 75, any S/370 processor (except 3081, 3083 or 3084), or 4300 Processor ... punches cards at a rated speed of 160 columns/second.

MODELS

Model N2 N02 Includes its own controls.

Maximum: The number of mdl N2s that can be attached depends upon the number of available system channel control unit positions.

Prerequisites: An available control unit position on a system channel.

S/360 mdl 25: Special feature of 2025: Multiplexer or selector channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), or selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 44: Special features on 2044: Multiplexer channel, high speed multiplexer channels, or add'l high speed multiplexer subchannels.

S/360 mdl 65, 67, 75: Selector channel of 2860, basic multiplexer channel of 2870, or selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channels or block multiplexer channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 3145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

S/370 mdl 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) of 2870, or the shared subchannel of 2880 ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels, block multiplexer channels ... see M3033 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel.

HIGHLIGHTS

Format control and analysis are performed by the system's processing unit. Blank or prepunched cards are punched serially. Actual speed depends upon the number of columns punched, including interspersed blank columns. Rated speed for punching columns 1-10 is 265 cards/minute ... for punching columns 1-80 is 91 cards/minute. Punching is checked. The unit has a 1,200-card capacity hopper and a 1,300-card capacity stacker. The Extended BCD Interchange Code (256 codes) is punched. Card Image (#1531) is required to punch binary codes ... see "Special Features".

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores (before separation): M-4, M-5, S-1, ID-1.

External Scores (after separation): M-7, M-11 (with round corners), CF-11 (with round corners) on either end, M-3 on column 80 end only.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

Bibliography: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V, **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Isolation, Control Unit: May be required on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

Card Image (#1531): Permits punching of cards with multiple punching in a single column.

Isolation, Control Unit (#4700): [For field installation on units shipped prior to December 29, 1967 ... standard on unit shipped after that] To turn power on or off the 1442 mdl N2 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** Since in all case there are compatible EC level requirements, the concurrence of the Branch FE Manager is required for any order for this feature.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

2314 DIRECT ACCESS STORAGE FACILITY - MDL 1

[NO LONGER AVAILABLE]

PURPOSE

Large capacity high-speed direct access storage and control for a S/360 mdl 30, 40, 50, 65, 75, 85, 195, or any S/370 processor except 3115, 3125, 3081, 3083 or 3084.

MODELS

Model 1 001

Limitations:

S/360 mdl 30 -- the 2314 requires a 1.5 microsecond 2030 and can be attached only to the first selector channel. Further, when the 2314 is attached, the second channel is restricted as to devices that may be attached ... see "Channel Control Capabilities" in M2030 pages. When a 2841 Control Unit and a 2314 are both attached to a 2030, both must be attached to the first selector channel. Because of the high data rate of the 2314 and the cycle-stealing concept of the selector channel, available program processing time is reduced during 2314 operations. This is of particular concern when handling time-dependent I/O devices, i.e., 1412, 1418, 1419, 1428. To determine the 2314 loading effect, refer to SRL, *S/360 Model 30 Channel Characteristics and Functional Evaluations* (GA24-3411).

S/360 mdl 40 -- the 2314 may be attached to either the first or second selector channel. However, 2314s may not be attached to both selector channels.

S/360 mdl 50 -- if the 2314 is to be used with a 2050 having 1410/7010 Compatibility (#4478), consult

Prerequisites: A control unit position on a system channel.

S/360 mdl 30, 40, 50 -- a special feature, selector channel ... see M2030, 2040, 2050 pages.

S/360 mdl 65, 75 -- a selector channel of 2860 ... see M2860 pages.

S/360 mdl 85, 195 or S/370 mdl 165, 168, 195 -- a selector channel of 2860, or a shared subchannel of a 2880 ... see M2860, 2880 pages.

S/370 mdl 135 -- selector channel (special feature) ... see M3135 pages.

S/370 mdl 135-3 -- block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138 -- block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145 -- selector channel (standard) ... see M3145 pages.

S/370 mdl 145-3 -- block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148 -- block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158 -- block multiplexer channels ... see M3155, M3158 pages.

3031 or 3032 Processor -- block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor -- block multiplexer channels (ten are standard) ... see M3033 pages.

Each disk storage module requires a 2316 Disk Pack ... these must be ordered separately ... see "Supplies".

HIGHLIGHTS

Has eight independent modules, each storing up to 29.17 million 8-bit bytes or 58.35 million packed decimal digits in a 2316 Disk Pack.

The eight removable and interchangeable 2316s provide a total of 233.4 million bytes of online storage and virtually unlimited offline storage. Minimum access is 25 milliseconds; average is 75 milliseconds; maximum is 135 milliseconds.

Standard features include:

File Scan -- for performing a comparison on selected bytes of file organization.

Record Overflow -- for greater utilization of storage. Enhanced system reliability and performance are achieved by provision of a ninth "spare" module for customer use should one of the eight normally addressed modules become inoperable.

Cylinder Concept: Retained in the 2314. One cylinder has 20 tracks. Up to 7,294 bytes (or 14,588 packed decimal digits) on each track, provide 145,880 bytes (or 291,760 packed decimal digits) per cylinder, available under each of the eight access mechanisms.

Data transmission is at the rate of 312,000 bytes/second ... with packed decimal, the rate is 624,000 digits/second.

An advanced method of utilizing disk storage. Self-formatting tracks allow variable length identifiers and records to be easily handled.

Command Chaining: Multiple records within a cylinder can be read/written by a sequence of channel commands without rotational delays between records ... permits index and directory searches without processor intervention. The command structure is optimized to yield efficient random or sequential processing with either randomly or sequentially organized data files. The ability to protect "logical" files is provided by the combination of commands in the 2314 and checks within the control programs servicing the file system. Cyclic code and bit count checking are used to assure the integrity of stored data. The controls necessary to attach the unit to a system channel are included in the 2314.

Publications: Bibliographies; S/360 (GC20-0360), S/370 (GC20-0001)

SPECIFY

- Each 2314 DASF mdl 1 is to be specified on AAS as follows: [1] One 2314 mdl 001, [2] One 2312 mdl 001, and [3] Two 2313 mdl 001s ... on one of the 2313s also specify **#9140** (to indicate the 2313 at the end of the 2314 DASF).

  Note: The 2312 and 2313 type numbers and their associated feature codes are to be specified at no charge and are to be used only for internal IBM ordering and control purposes. List each type and mdl (2314, 2312, 2313) separately with all its associated feature codes. The 2312 and 2313 type numbers should never appear on any agreement.

- Voltage (AC, 3-phase, 60 Hz): Specify the same code for the 2314, the 2312 and each 2313 ... **#9903** for 208V, **#9905** for 230V.

- Color: [2314 only] **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

- Additional Codes: On the 2312 and 2313s, additional codes are required depending upon special features on the 2314 and 2844 Auxiliary Storage Control ... see "Special Features" below.

- 2316 Disk Packs: 2316s are required and must be ordered separately ... see M2316 pages.

- Isolation Feature: May be required on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

The following special features are on an "as available" basis for field installation.

Isolation, Control Unit (#4700): [For field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2314 without generating spurious signals. Thus, if the 2314 can be logically disconnected from the system, the CPU program can continue operating. **Prerequisites:** Because in all cases there are compatible EC level requirements, the concurrence of the branch FE manager is required for any order for this feature.

Remote Switch Attachment (#6148): To attach the Two Channel Switch (#8170) to a 2167 Configuration Control Unit in a S/360 mdl 67-2, or to a S/360 mdl 65MP which has the Configuration Control Panel (#1505) installed, or to a S/370 mdl 158MP or 168MP. **Prerequisites:** Specify **#9500** on the 2312. **#9500** can be field installed.

2844 Attachment (#7949): To attach a 2844 Auxiliary Storage Control. **Note:** Order this feature only when a 2844 is to be attached. Installation of the feature without concurrent installation of the 2844 renders the 2314 inoperative. **Maximum:** One. **Prerequisites:** Specify **#9750** on the 2312 and each 2313 ... if the 2844 has a Two Channel Switch (#8171), also specify **#9765** on the 2312 ... if the 2844 has a Remote Switch Attachment (#6150) also specify **#9510** on the 2312. **#9750**, **#9765** and **#9510** can be field installed.

Two Channel Switch (#8170): To attach the 2314 to a second channel. Switching is under program control. Includes partitioning. **Prerequisites:** Specify **#9760** on the 2312 ... **#9760** can be field installed. If the two channel switch is routed through the Configuration Control Panel (#1505) of a multiprocessing S/360 mdl 65, #6148 is required. Also, in a S/360 mdl 67-2, a S/370 mdl 158MP or 168MP, #6148 is required. See #6148 above.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Disk Packs: Contact IBM. See M2316 pages.

2501 CARD READER

PURPOSE

Models A1 and A2 are punched card input units for a S/360 model 20, an 1130 Computing System, or a System/3 model 15. Models B1 and B2 are punched card input units for a S/360 model 20 through 85 and 195, any S/370 models 115-195 or 4300 processor.

MODELS

Model A1	A01	[NO LONGER AVAILABLE] 600 cards/minute rated 80-column card speed.*
Model A2	A02	[NO LONGER AVAILABLE] 1000 cards/minute rated 80-column card speed.*
Model B1	B01	600 cards/minute rated 80-column card speed.**
Model B2	B02	1000 cards/minute rated 80-column card speed.**

* Models A1 and A2 are punched card input units for a S/360 model 20, an 1130 Computing System, submodels 1, 2, or 3, or a System/3 model 15.

** Models B1 and B2 are punched card input units for a S/360 models 22 through 85 and 195, any S/370, 4300 processor.

Maximum:

System/3 mdl 15: One 2501 mdl A1 or A2 can be attached.

S/1130: One 2501 mdl A1 or A2 can be attached to any 1131 mdl except 1A or 1B.

S/360 mdl 20: One 2501 mdl A1 or A2 can be attached to a 2020 submodel 1, 2, 5, or 6 (only).

S/360 mdl 22 through 85, 195, any S/370 Processor, or a 4300 processor. The number of 2501 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available. **Caution:** When attaching to a S/370 mdl 115, 125, 135, 135-3 or 138, see "Performance Limitations".

Prerequisites: An available control unit position on a system channel .

Mdls A1 and A2:

On System 1130. A 2501 Attachment (#8042) on the 1131 ... in addition, a 2501 Coupling (#3630) is required on the 2501. See "Special Features" below.

Note: A 2501 cannot be installed with an 1131 mdl 1A or 1B ... in addition, the 1130 system must have 208V or 230V power.

On System/3 mdl 15. A 2501 Attachment (#8090) on the 5415 ... 2501 Coupling (#3630) on the 2501. In addition, a 5424 MFCU or a 2560 MFCM or a 1442 mdl 6 or 7 is required on the System/3 mdl 15, except when Channel Terminator Feature #1601 is installed. **Note:** When a 2501 is retained from a S/360 mdl 20 to be attached to a 5415 Processing Unit, new cables must be ordered.

On a S/360 mdl 20. A 2020 submodel 1, 2, 5, or 6 with a 2501 Attachment (#8090) ... if the installed 2020 has a serial number under 20000, a Cable Adapter (#9099) is required on the 2501. See "Specify" below.

Mdls B1 and B2:

S/360 mdl 22 through 85, 195, any S/370 Processor, or a 4300 processor.

S/360 mdl 25: Special features on 2025: Multiplexer channel or selector channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel standard, selector channels (special features, except 2022 one selector channel is standard).

S/360 mdl 44: (special features) on 2044 Multiplexer channel, high speed multiplexer channel, add'l high speed multiplexer subchannels.

S/360 mdl 65, 67, 75: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/360 mdl 85, 195 or S/370 mdl 165, 168, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, or shared subchannel of 2880 ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channels (special features), or block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... M3033 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels ... see M3081, 3083, 3084 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel.

HIGHLIGHTS

The system's processing unit performs all format control and analysis. The unit provides high-speed, low-cost card input. Cards are read serially by a light-sensing mechanism which is checked for proper functioning in every card cycle. The Extended BCD Interchange Code (256 codes) can be read ... invalid codes, off-punching and mispositioned cards are detected. Mdls B1 and B2 include their own control unit. Mdls A1 and A2, when used with an 1130, all codes are considered valid.

Binary Codes: A mdl B1 or B2 must be equipped with Card Image (#1531) to read binary codes ... see "Special Features". Mdls A1 and A2 - when attached to a 2020 Processing Unit submodel 2, 5, or 6, or an 1130 Central Processing Unit, or a 5415 Processing Unit can read binary codes.

All mdls have a 1,200-card capacity hopper and a 1,300-card capacity stacker.

Performance Limitations:

1. The 2501 is an unbuffered time-dependent machine. If the CPU does not reissue a new card read command within 19.4ms for the 2501 mdl B1, or 3.5ms for the 2501 mdl B2, the card reader performance will be reduced to one half the rated speed; or less if the processing time exceeds 100ms, or 60ms, respectively.
2. For S/370 mdl 115 operating under DOS/VS, special precautions must be taken in order to operate the 2501 mdl B2 near rated speed. Some methods for achieving this are to use either the POWER/VS option or to use programs employing chained card read commands.
3. For S/370 mdl 125, 135, 135-3 or 138 operating under DOS/VS, special precautions must be taken in order to operate the 2501 mdl B2 at or near rated speed. Some methods for achieving this are to use either the POWER/VS option or to use programs employing chained card read commands.

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores: (before separation) M-4, M-5, OM-2, OM-3, S-1 and ID-3 (2" x 3-1/4" or 2-3/16" x 3-3/4" sizes only). **Note:** When using OM-2 or OM-3, reading must be terminated prior to the column that is scored.

External Scores: (after separation) M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. OM-3 may be used if the score is on the column 1 end. **Note:** Upper left corner cut required when the M-11 or CF-11 is used on column 1 end.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult Special Product Marketing. Aqua cards and C-4 corner cut cards cannot be used.

Publications: S/360 -- GC20-0360, S/360 mdl 20--GA26-3565, S/370 -- GC20-0001, 1130 -- GA26-5916, S/3 -- GC20-8080.

2501 Card Reader (cont'd)

SPECIFY

- Voltage (must be consistent with system voltage): Mdl A1 or A2 (AC, 60 Hz, power provided by system) - with S/360 mdl 20 or System/3 mdl 15, **#9903** for 208V, or **#9905** for 230V; with 1130 **#9902** for 208V, or **#9904** for 230V ... mdl B1 or B2 (AC, 1-phase, 3-wire, 60 Hz) - **#9902** for 208V, or **#9904** for 230V.
- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Cable Adapter (mdl A1 or A2 with S/360 mdl 20 only): #9099. Required on a 2501 being attached to an installed 2020 which has a serial number under 20,000. Plant installable only, but can be removed in the field.
- Use with 1130 (mdl A1 or A2 only): A 2501 Coupling (#3630) is required ... see "Special Features" below.
- Isolation, Control Unit (mdl B1 or B2 only): May be required on units shipped prior to December 29, 1967 ... see "Special Features" below.
- If the 2501 mdl A1 or A2 is to be used as an emulation unit in a S/360 mdl 20 with 1401/1440 Compatibility (#3901), the micro-program deck must be tailored for the 2501.

SPECIAL FEATURES

2501 Coupling (#3630): [Mdls A1, A2] Required to attach a 2501 to an 1130 system or a System/3 mdl 15. **Prerequisites:** For 1130 - 2501 Attachment (#8042) on the 1131. Also requires a 208V or 230V power source. For System/3 mdl 15 - 2501 Attachment (#8090) on the 5415.

Card Image (#1531): Permits reading of cards with multiple punches in a single card column. When reading in card image mode (Data Mode 2), the validity check is suspended because all characters are considered valid.

Isolation, Control Unit (#4700): [For field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2501 mdl B1 or B2 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** Since in all cases there are compatible EC level requirements, the concurrent of the Branch FE Manager is required for any order for this feature.

MODEL CONVERSIONS

Can be made only between model A1 and A2 or B1 and B2.

ACCESSORIES (None)

SUPPLIES (None)

2502 CARD READER

PURPOSE

Punched card input unit for a System/7 (5024), a 3770 Data Communication System, or an 8100 Information System via 3289 Printer mdl 3.

MODELS

	Rated 80-column Card Speed
Model A1 A01	150/minute (not available on System/7)
Model A2 A02	300/minute (not with 8100)
Model A3 A03	400/minute (3776-3, 3776-4, 3777 only)

Maximum: One 2502 can be attached to a 3289 Printer mdl 3 or 3770 System.

Prerequisites:

Mdl A1: 3782/2502 Card Reader Attachment (#8149) on the 3289 mdl 3, 3774, 3775 or 3776 and a 3782 Card Attachment Unit mdl 2 ... 2502 Card Reader Attachment (#8002) on the 3777.

Mdl A2: 5024 model 2 or 3 with System/7. 3782/2502 Card Reader Attachment (#8149) on the 3774, 3775 or 3776 and a 3782 Card Attachment Unit mdl 2 ... 2502 Card Reader Attachment (#8002) on the 3777.

Mdl A3: 3782/2502 Card Reader Attachment (#8149) on the 3776 mdl 3 or 4 and a 3782 Card Attachment Unit mdl 2 ... 2502 Card Reader Attachment (#8002) on the 3777.

HIGHLIGHTS

Used on the 3289 mdl 3, 3774, 3775, 3776 or 3777 for automatic entry of punched card data to the transmission line or the offline operating units. The 3289 Printer mdl 3 or 3774, 3775, 3776 or 3777 Communication Terminal performs all format control and analysis.

Cards are read serially by a sensing mechanism which is checked for proper functioning in every card cycle. EBCDIC code (256 codes) or ASCII (128 codes) can be read, depending upon the transmission code specified for the 3774, 3775, 3776 or 3777. EBCDIC code (256 codes) can be read and transmitted by the 3289 mdl 3. ASCII is not applicable to the 3777 mdl 2. Invalid codes, off-punching and mispositioned cards are checked.

On the System/7, used for automatic entry of punched card data to the system. The 5024 I/O Attachment Enclosure (mdls 2 or 3) performs all format control and analysis.

Hopper capacity is 700 cards ... stacker capacity is 600 cards.

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores: M-4, M-5, S-1, S-2, ID-1, ID-2 and ID-3.

External Scores: Column 1 end -- M-3, M-4, M-5, M-6, M-7, M-11, OM-2, OM-3, CF-4 and CF-11. Column 80 end -- M-5, M-7, M-11, CF-4 and CF-11.

All other scores may result in unsatisfactory performance. C-4 corner cut cards cannot be used.

Publications: GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9901** for 115V ... must be consistent with system voltage.
- Color: **#9046** for white.
- Documentation: [one must be specified] **#9101** for use with a 3289 mdl 3, 3774, 3775 or 3776 ... **#9102** for use with a 3777 ... **#9103** for use with a System/7.
- Cabling: Fixed-length cables are supplied as standard.

SPECIAL FEATURES

Note: No special features are available when used on the System/7.

Interchangeable Feed, 51/80-Column (#4650): Permits reading of 51- or 80-column cards. Operator can readily set up machine to read 51-column cards and reconvert it to read 80-column cards. **Limitations:** Cannot be installed with Interchangeable Feed, 66/80-Column (#4651).

Interchangeable Feed, 66/80-Column (#4651): Permits reading of 66- or 80-column cards. Operator can readily set up machine to read 66-column cards and reconvert it to read 80-column cards. **Limitations:** Cannot be installed with Interchangeable Feed, 51/80-Column (#4650).

Optical Mark Read (#5450): Permits reading of up to 40 columns of marked data. Either marked and/or punched hole data can be read from the same card. Cards on which a mark was unacceptable are offset-stacked and the reader continues operation when in line mode. **Limitations:** Cannot be installed with a 3289 mdl 3, 3776 mdl 3 or 4, or a 3777. **Prerequisites:** #5455 on a 3782 mdl 2 attached to a 3774, 3775 or 3776 mdl 1 or 2.

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

TERMINOLOGY:

In these pages, the term "Data Terminal Equipment" and its abbreviation "DTE" will mean any business machine which has a telecommunications capability, be it a terminal, a multiplexer or a processor with an integrated communications adapter.

Also, the term "Data Circuit-terminating Equipment" and its abbreviation "DCE" will mean any equipment whose function it is to convert DTE signals into a form suitable for transmission over a communication facility, and to convert signals received from a communications facility into a form suitable for transfer to a DTE. This DCE may be a modem (a MOdulator/DEModulator), a telegraph line adapter or another type of signal conversion equipment.

Finally, the term "Automatic Calling Equipment" and its abbreviation "ACE" will mean that equipment which will accept dial digits from a DTE and present them to the telephone central office for the purpose of effecting a switched network connection.

ORGANIZATION:

These pages are organized into intercommunication charts, which are:

Chart 1 - IBM Start/stop DTE Intercommunication Capability Table

Chart 2 - IBM Binary Synchronous DTE Intercommunication Capability Table

Chart 3 - IBM Synchronous Data Link Control DTE Intercommunication Capability Table

and communication facility charts, which are:

Chart A - Nonswitched Telegraph Lines

Chart C - The Public Switched Telephone Network

Chart D - Nonswitched Voice Grade Lines

Chart E - Nonswitched Wideband Channels

Chart G - Nonswitched Limited Distance Baseband Channels (including Customer Owned and Maintained, COAM, lines)

Chart L - Public Switched Data Networks Providing an "X" Series Interface

Chart M - Nonswitched Data Networks Providing a "V" Series Interface

Chart N - Nonswitched Data Networks Providing an "X" Series Interface

Chart P - Public Packet Switched Networks Providing a CCITT X.21bis (EIA RS-232-C) Interface

Chart Q - Public Packet Switched Networks Providing a CCITT X.21 Interface

UTILIZATION:

To use these pages:

Refer to the appropriate intercommunication chart to find the desired DTEs and to determine if they are capable of intercommunication. If they are so capable, read the alphabetic designations for the classes of facility over which they may communicate.

Refer to the charts for the facility classes indicated to find the particular facility and the required feature codes for the DTEs that will allow their intercommunication.

Refer to the individual machine sales pages for the DTEs to determine prerequisites, restrictions, etc.

For example, assume that communication between a 3101 and a 3705-II is desired. Since this would be in start/stop mode, the first reference would be to Chart 1. In Chart 1, the 3101 entry shows that communication between a 3101 and a 3705-II is possible over Facility classes C and D. The 3705-II entry confirms that communication with a 3101 over these facility classes is possible.

Reference to the C and D Facility Charts shows that, since feature codes are entered for both the 3101 and the 3705-II, communication between them is possible over Facilities C1M, C2M, D1M, D2M and D3M .

Further, the C and D Facility Charts show, for both the 3101 and the 3705-II, the feature codes required on each to allow this intercommunication.

Finally, reference should be made to the M3101 and M3705 pages to assure that any restrictions, prerequisites, etc., to the installation of the indicated features are satisfied.

STAND-ALONE DCEs:

The only stand-alone DCEs listed in the Facility Charts herein are:

The IBM standard product line modems available, and

Those Common Carrier services in which the use of a Common Carrier provided modem is mandatory.

Standalone DCEs other than these may be attached to IBM DTEs, but such attachment (other than that of the IBM Special Product Modems) is always under the provisions of the IBM Multiple Supplier Systems Policy (see IBM for information on this Policy).

REFERENCE MATERIAL:

Refer to IBM for information on IBM Special Product DCEs and non-IBM DCEs.

CUSTOMER RESPONSIBILITIES:

The customer must be advised in writing that the customer's responsibilities include:

Making arrangements for price quotations, installation and initial and recurring costs of the Common Carrier supplied communication facility/service appropriate to his desired speed of operation.

When operation is planned on the public switched telephone network, obtaining, prior to the processing of the machine orders, assurance from the Common Carrier that facilities of the proper quality to support data transmission will be available between the proposed locations.

Toll charges incurred in the installation and maintenance of the IBM equipment.

Relinquishing the system for service in those cases in which servicing aids and/or available error printouts do not permit localization of the malfunction to the communication facility or terminal location.

The DTE/DCE compatibility and the DTE/ACE compatibility when the DCE and/or ACE is not specifically listed as supported in the Facility Charts.

When using IBM Modems, Line Adapters or Integrated Modems, it is recommended that the customer investigate the economics of providing alternate voice service to facilitate installation and maintenance.

Performing the setup procedures for customer setup products. On these products, the customer is also responsible for following the problem determination procedures and recovery routines furnished by IBM should a problem arise in the setup.

The security of customer data is a customer responsibility. The customer is responsible for the selection, implementation, and adequacy of these products in the protection of his data. For applications in which sensitive data is sent over external communication facilities, the customer may wish to apply cryptography.

Due to the nature of the teleprocessing environment, it is possible that the throughput anticipated on the specified network configuration with recommended channel conditioning will not be achieved. The probability of this is slight, though it is more likely at the higher data rates. Some actions the customer may take if anticipated throughput is not achieved are:

Redialing the connection if operating on the public switched telephone network.

Adjusting, where possible, the block size to optimize throughput, based on the error characteristics of the particular channel.

Requesting the Common Carrier to provide alternate routing or line improvements. This is normally provided at extra cost. The Common Carrier should be contacted for further details.

However, it is possible that, at a particular location, only lower speed speed operation is obtainable.

The costumer should be informed that his local IBM representative is available to assist him in analyzing and planning for these alternatives.

Finally, the Marketing Representative must have the customer obtain a firm installation date for the start of transmission service prior to processing the OC card.

MULTIPOINT OPERATION:

Duplex communication facilities are required for multipoint systems in which:

The DCE at the control station is a 1200 bps integrated modem, or

It is desired that a continuous carrier be maintained from the control station to eliminate the control station "Ready For Sending" delays.

The use of duplex facilities and operation in the continuous carrier mode is strongly recommended, since operation in a non-continuous carrier mode (by the control station) will subject the system to inordinate delays, particularly in the polling and addressing sequences.

IBM DATA TERMINAL AND DATA CIRCUIT-TERMINATING EQUIPMENT:

The following is a list, by machine type number, of the IBM DTEs and DCEs covered in these pages. This list includes, for the DTEs, a reference to the applicable Intercommunication Chart (1, 2 or 3), and, for both the DTEs and DCEs, a reference to the responsible Marketing divisions.

2701 Data Adapter Unit

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE) (cont'd)

Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
3101 Display Terminal
Chart 1, Mkted by ISG, E/ME/A, A/FE
3138 Processing Unit (System/370 Model 138)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
3232-1 Keyboard Printer Terminal
Chart 3, Mkted by ISG, A/FE (except Japan)
3232-51 Keyboard-Printer Terminal
Chart 1, Mkted by DPMG (Marketing Channels Department)
3274 Control Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3276 Control Unit Display Station
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE

3602 Finance Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3603 Terminal Attachment Unit
Chart 3, Mkted by ISG, E/ME/A, A/FE

3624 Consumer Transaction Facility
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3631 Plant Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3632 Plant Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3651 Store Controller
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3659 Remote Communication Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3669 Store Communication Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3684 Point Of Sale - Control Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3689 Store Communications Unit
Charts 2 and 3, Mkted by ISG, A/FE (in Canada only)
3694 Document Processor
Chart 3, Mkted by ISG, A/FE (in Canada and Japan)
3704 Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3705-II Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3705-80 Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3725-1, 2 Communication Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3726 Communication Controller Expansion
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3741 Data Station/Programmable Work Station
Chart 2, Mkted by ISG, E/ME/A, A/FE
3747 Data Converter
Chart 2, Mkted by ISG, E/ME/A, A/FE
3767 Communication Terminal
Charts 1, 3 Mkted by ISG, E/ME/A, A/FE
3771 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3774 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3775 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3776 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3777 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3791 Controller (3790 Communication System)
Chart 3, Mkted by ISG, E/ME/A, A/FE
3843 Loop Control Unit
Chart 3, Mkted by ISG, E/ME/A, A/FE
3845 Data Encryption Device
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3846 Data Encryption Device
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3863 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3864 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3865 Modem
Chart D, Mkted by ISG, E/ME/A, A/FE
3872 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3874 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3945 Telegraph Line Termination
Chart A, Mkted by E/ME/A, A/FE
3976 Modem
Charts C, D, Mkted by E/ME/A, A/FE
3977 Modem
Chart D, Mkted by E/ME/A, A/FE
4331 Processor
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4701-1,2 Finance Communication Controller
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
4952 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4954 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4955 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4959 Input/Output Expansion Unit (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4965 Diskette Drive and I/O Expansion Unit (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4975-1R, 2R Printer (Series/1)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
4987 Programmable Communication Subsystem (Series/1)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5010 Processor Module (System/7)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5110 Computer
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5150 IBM Personal Computer
Chart 3, Mkted by ISG, E/ME/A, A/FE (Canada only)
5231 Controller (5230 Data Collection System)
Chart 2, Mkted by ISG, E/ME/A, A/FE
5251 Display Station
Chart 3, Mkted by ISG, E/ME/A, A/FE
5265 Point Of Sale Terminal
Chart 2, Mkted by ISG, E/ME/A, A/FE
5285 Programmable Data Station (5280 Distributed Data System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5288 Programmable Control Unit (5280 Distributed Data System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5340 System Unit (System/34)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5360 System Unit (System/36)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5381 System Unit (System/38)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5525 System Unit (5520 Administrative System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
6360 Diskette Unit (Displaywriter)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
6580 Display Station (Displaywriter)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
6670 Information Distributor
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
6733 Typewriter Communication Module
Chart 1, Mkted by ISG, A/FE (Canada only)
7426 Terminal Interface Unit
Charts 1, 3, Mkted by ISG, E/ME/A, A/FE
8101 Storage and I/O Unit (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8130 Processor (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8140 Processor (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8775 Display Terminal
Chart 3, Mkted by ISG, E/ME/A, A/FE
8815 Scanmaster I
Chart 3, Mkted by ISG, E/ME/A, A/FE

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART 1

START/STOP INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
2701	3767, 4952, 4954, 4955, 4959, 4965, 4987, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35	C
3101	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955 4959, 4965	C, D
	7426	C, D
	8101, 8130, 8140	D
3138	3232-51, 3767, 4952, 4954, 4955, 4959, 4965, 4987, 5010, 5110 6360, 6580, 6733	C, D
	TWX 33/35	C
3232-51	3138, 3704, 3705-II, 3725-1,2, 3726, 4331	C, D
	8101, 8130, 8140	D
3704	3101, 3232-51, 3767, 4952, 4954, 4955, 4959, 4965, 4987, 5110, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3705-II	3101 3232-51, 3767, 4952, 4954, 4955, 4959, 4965, 4987, 5110, 6360, 6580, 6733	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3705-80	3101, 3767, 4952, 4954, 4955, 4959, 4965, 4987, 5110, 6360, 6580 , 6733	C, D
	5010	C, D, G
	TWX 33/35/37	C
3725-1, 2, 3726	3101, 3767 3232-51, 4952, 4954, 4955, 4959, 4965, 4987, 5100, 5110, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3767	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D
	8101, 8130, 8140	D
3845, 3846	3845, 3846	C, D
4331	3232-51 3767, 5110, 6360, 6580, 6733	C, D
4952, 4954, 4955, 4959, 4965	2701, 3101, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 37266733	C, D
	4975-1R, 2R	D
4975-1R, 2R	4952, 4954, 4955, 4959, 4965	D
4987	3725-1,2, 3726	C, D
	2701, 3138, 3704, 3705-II, 3705-80,	A, C, D
	6733	C, D
5010	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726	C, D, G
	3138	C, D
5110	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D
6360, 6580	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 6360, 6580 , 6733	C, D
	TWX 33/35	C
6733	3138, 3705-II, 3705-80, 4331, 4952, 4954, 4955, 4959, 4987, 6360, 6580, 6733	C, D
7426	3101	C, D
8101, 8130, 8140	3101, 3232-51, 3767	D
TTY (2)	2701, 3704, 3705-II, 3725-1,2, 3726	A
TWX 33/35	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726 6360, 6580	C
TWX 37	3704, 3705-II, 3705-80, 3725-1,2, 3726	C

NOTES FOR CHART 1:

1. The 5110 will communicate in point-to-point mode only.
2. The TTY terminals referred to are Telco 83B2 or 83B3 terminals or Western Union Plan 115 terminals.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART 2
BSC INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
2701	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4987, 5010, 5231, 5285, 5288, 5360, 5381, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276	D, G, M
	6360, 6580	C, D, G
3138	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4701-1,2, 4952, 4954, 4955, 4959, 4965, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 8101, 8130, 8140	D, G, M
	3689	C
	6360, 6580	C, D, G
3274-1C, 3274-21C, 31C, 51C, 3276-1,4	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	D, G, M
3624	3704, 3705-II, 3705-80, 3725-1,2, 3726	D, G, M
3651-25, 3651-50	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3651-60	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C
3651-75	3651-75, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3684	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3689	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C
3704	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 3624, 8101, 8130, 8140	D, G, M
	3651-60	C
	3689	C
	6360, 6580	C, D, G

The	Will Communicate with the	Over Facility Classes
3705-II	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 3624, 8101, 8130, 8140	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3705-80	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1, 4331, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 3624, 8101, 8130, 8140	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3725-1,2, 3726	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4701-1,2 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276-1,2,3,4, 3624, 8101, 8130, 8140	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3741	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4331, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
3747	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4331, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
3771, 3774, 3775, 3777-2	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3776-1,2, 3777-1	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5381	C, D, G, M
3845, 3846	3845, 3846	C, D

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart 2 - BSC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
4331	2701, 3138, 3651-25, 3651-50, 3651-75, 3684, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4331, 4701-1,2, 4952, 4954, 4955, 4959, 4965, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 8101, 8130, 8140	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
4701-1,2	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
4952, 4954, 4955, 4959, 4965	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 4331, 4987, 5265, 5285, 5288, 5360, 5381	C, D, G, M
	4975-1R, 2R	D
4975-1R, 2R	4952, 4954, 4955, 4959, 4965, 4987	D
4987	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 4952, 4954, 4955, 4959, 4965, 4987, 5340, 5360	C, D, G, M
5010	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5010, 5340, 5360	C, D, G, M
5110	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4331, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5231	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4331, 5110, 5340, 5360, 5381	C, D, G, M
5265	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4331, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5285, 5288	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4331, 4952, 4954, 4955, 4959, 4965, 5110, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5340	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4959, 4965, 5340	C, D, E, G, M
	3138, 3741, 3747, 4331, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381	C, D, G, M
5360	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726 3741, 3747, 4321, 4331, 4952, 4954, 4955, 4959, 4965, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525, 6670	C, D, G, K, M
	6360, 6580	C, D, G
5381	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3776-1,2, 3777-1, 4331, 4952, 4954, 4955, 4959, 4965, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5525	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5360, 6670	C, D, G, M
	6360, 6580	C, D, G
6360, 6580	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5360, 5525, 6360, 6580	C, D, G
6670	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5360, 5525, 6670	C, D, G, M
8101, 8130, 8140	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	D, G, M

CHART 3

SNA/SDLC INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
3232-1	3704, 3705-II, 3725-1,2, 3726, 4331	C, D, G
	8101, 8130, 8140	D, G
3274-1C	3704	D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	D, G, M, P
3274-21C, 31C	3704	D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	D, G, M, N
3274-51C	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	4331	C, D, G, M, N, P
	8101, 8130, 8140	D, G, M, N
3276-1,4	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, M, P
	3791	D, G, M
	4331	C, D, G, M, P
	8101, 8130, 8140	D, G, M,
3276-11, 14	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	3791	D, G, M
	4331	C, D, G, M, N, P
	8101, 8130, 8140	D, G, M, N
3602	3603*	D, G
	3624*, 8101, 8130, 8140	D, G, M
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	* This communication is not SNA/SDLC, but via a "B-LOOP"	
3603	3602*, 4701-1,2*	D, G
	* This communication is not SNA/SDLC, but via a Banking Loop	
3624	3602*, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 4701-1,2*	D, G, M
	* This communication is not SNA/SDLC, but via a Banking Loop	
3631, 3632	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
	3843	D,G
	8101, 8130, 8140	D, G, M
3651-25	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	8101, 8130, 8140	D, G, M
3651-50	3659**	D, G
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	** This communication is not SNA/SDLC, but via an "S-LOOP"	
3651-60	3669**, 3704	C
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, P
	** This communication is not SNA/SDLC, but via an "S-LOOP"	
3651-75	3651-75, 3704	C, D, G, M
	3659**	D, G
	3669**, 3689**	C
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	8101, 8130, 8140	D, G, M
	** This communication is not SNA/SDLC, but via an "S-LOOP"	
3659	3651-50**, 3651-75**	D, G
	** This communication is not SNA/SDLC, but via an "S-LOOP"	
3669	3651-60**, 3651-75**, 3669**, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C
	** This communication is not SNA/SDLC, but via an "S-LOOP"	
3684	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	8101, 8130, 8140	D, G, M
3689	3651-75**, 3689**, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C
	** This communication is not SNA/SDLC, but via an "R-LOOP"	
3694	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3704	3232-1	C, D, G
	3274-1C,21C,31C, 3624	D, G, M
	3274-51C, 3276, 3602, 3631, 3632, 3651-25, 3651-50 3651-75, 3684, 3694, 3767, 3771, 3774, 3775, 3776-1,2, 3791, 4331, 4701-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5360, 5381, 5525, 6360, 6580, 6670, 8130, 8775	C, D, G, M
	3651-60, 3669, 3689	C
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 3776-3,4, 3777-1,3,4, 8101, 8140	C, D, E, G, M
3705-II	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11, 12, 13, 14, 8130	C, D, G, L, M, N, P
	3276-1, 2, 3, 4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5381	C, D, G, M, P
	3624	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4331	C, D, G, M, N, P
	5360	C, D, G, L, M, N
	5360	C, D, G, L, M, N
	8101, 8140	C, D, E, G, L, M, N, P
	8775, 8815	C, D, G, M, N
3705-80	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N

Chart 3 - SNA/SDLC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
	3274-51C, 3276-11, 12, 13, 14, 8130	C, D, G, L, M, N, P
	3276-1, 2, 3, 4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5381,	C, D, G, M, P
	3624	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4331	C, D, G, M, N, P
	5360	C, D, G, L, M, N
	5360	C, D, G, L, M, N
	8101, 8140	C, D, E, G, L, M, N, P
	8775, 8815	C, D, G, M, N
3725-1,2, 3726	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11, 12, 13, 14, 8130	C, D, G, L, M, N, P
	3276-1, 2, 3, 4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5381, 6360, 6580	C, D, G, M, P
	3624	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4331	C, D, G, M, N, P
	5360	C, D, G, L, M, N
	5360	C, D, G, L, M, N
	8101, 8140	C, D, E, G, L, M, N, P
	8775	C, D, G, M, N
3767	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
	8101, 8130, 8140	D, G, M
3771, 3774, 3775,	3704	
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3776-1,2		C, D, G, M, P
3776-3,4, 3777-1, 3,4	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, M, P
	4331	C, D, G, M, P
3791	3276	D, G, M
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
3843	3631, 3632, 8101, 8130, 8140	D, G
3845, 3846	3845, 3846	C, D
4331	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11, 12, 13, 14, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 8101, 8130, 8140	C, D, G, M, N, P
	3276-1, 2, 3, 4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776, 3777, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 5340, 5360, 5381	C, D, G, M, P
	3624	D, G, M
	3631, 3632, 3694, 3704, 3767, 3791, 4701-1,2, 5360, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	7426	D, M
	8775, 8815	C, D, G, M, N
4701-1,2	3603*	D, G
	3624*, 8101, 8130, 8140	D, G, M
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5340, 5360	C, D, G, M
	* This communication is not SNA/SDLC, but via a Banking Loop	
4952, 4954, 4955, 4959, 4965	3704	
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M
	8101, 8130, 8140	C, D, G, M, P
5150	8101, 8130, 8140	D, M
5251-2,12	5340, 5381	C, D, G, M, P
	5360*	C, D, G, M
	* Supports 5251-12 only	
5285, 5288	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, P
	8101, 8130, 8140	D, G, M
5340	3704, 4701-1,2, 5360	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331, 5251-2,12, 5340	C, D, G, M, P
5360	3704, 4701	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 5360	C, D, G, L, M, N
	4331, 5251-12, 5340	C, D, G, M
5381	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331, 5251-2,12	C, D, G, M, P
5525	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 5525	C, D, G, M
6360, 6580	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 6360, 6580	C, D, G, M
	8101, 8130, 8140	D, G, M
6670	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 6670	C, D, G, M
	8101, 8130, 8140	D, G, M
7426-2	4331, 8101, 8130, 8140	D, G, M

Chart 3 - SNA/SDLC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
8101, 8140	3232-1, 3843	D, G
	3274-51C, 3276-11, 12, 13, 14, 8775	D, G, M, N
	3276-1, 2, 3, 4, 3602, 3631, 3632, 3651-25,75, 3684, 3767, 4701-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 6360, 6580, 6670, 7426-2	D, G, M
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, L, M, N, P
	4331	C, D, G, M, N, P
	5150	D, M
	8101, 8140	D, E, G, M, N, P
	8130	D, G, M, N, P
8130	3232-1, 3843	D,G
	3274-51C, 3276-11, 12, 13, 14, 8775	D, G, M, N
	3276-1, 2, 3, 4, 3602, 3631, 3632, 3651-25,75, 3684, 3767, 4701-1,2, 4952, 4954, 4955, 4959, 4965, 5285, 5288, 6360, 6580, 6670, 7426-2	D, G, M
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	4331	C, D, G, M, N, P
	5150	D, M
	8101, 8130, 8140	D, G, M, N, P
8775	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4331	C, D, G, M, N
	8101, 8130, 8140	D, G, M, N
8815	3705-II, 3705-80, 3725-1,2, 3726, 4331, 8815	C, D, G, M, N

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART A
NONSWITCHED TELEGRAPH LINES

FACILITY A1: Point-to-point start/stop operation at 45.5, 56.9 or 74.2 bps on a Type 1002 Channel or 75 bps on a Type 1005 Channel via an integrated telegraph line adapter (1, 2)

Machine Types	Special Features Required for Attachment
2701	#7860 (at 45.5 bps), #7861 (at 56.9 bps) or #7862 (at 75 bps)
3704, 3705	#4721 and #9601 (at 45.5 bps), #9602 (at 56.9 bps), #9603 (at 74.2 bps) or #9604 (at 75 bps)

FACILITY A2: Point-to-point start/stop operation at 134.5 bps on a telegraph line via a stand-alone DCE providing an EIA RS-232-C interface (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581
3704, 3705	#9606 and #4711 or #4714
3725-1, 2, 3726	#4911 and #4666 (5)
3845, 3846	(4)

NOTES FOR CHART A:

1. See IBM for more information on these facilities including attachable DCEs.
2. Communication over this facility is with a Telco Type 83B2 or 83B3 teleprinter or a Western Union Plan 115 terminal
3. The "X" in the **#968X** specify code denotes the line position on the 4331 to which this protocol will be assigned. See the M4331 pages for details.
4. No special feature is required to attach the 3845 or 3846 on this facility. The DCEs must be in compliance with EIA RS-232-C. The 3845 and 3846 will operate with DTEs at speeds of 110 or 134.5 bps.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART C

THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

FACILITY CA1: Start/stop operation at 300 bps on the PSTN via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4782 and #9612 or, for Interrupt, #4786 and #9612
3767	#5502, #9540 and #7111 or #7113 or, for Interrupt, #5506, #7113 and #9540
4987	#4746 or #4747

FACILITY C1M: Start/stop operation at 134.5 or 300 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581 (at 134.5 bps only)
3101	(5)
3138	#4640 and #9721 (3)
3232-51	(at 300 bps only) (5)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps, #1413 (at 300 bps)
3725-1, 2, 3726	#4911 and #4666 (20)
3767	#3719, #9619, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(5, 15)
4331	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4959, 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2154 (at 134.5 bps only)
5110	#1525 (at 134.5 bps only)
6360	#3704 or #3705 or #3707
6580	#3705
6733	at 300 bps only (5)
7426	(5)

FACILITY CA2: Synchronous operation at 600/1200 bps on the PSTN via an integrated modem (1, 2, 8))

Machine Types	Special Features Required for Attachment
2701	#4782 (7)
3274-51C	#6301, #9112 and #5501 or #5502
3276-11, 14	#5501 and #6301
3651-25	#9512
3684	#5530 and #9481
3704, 3705-II	#4782 or, with Interrupt, #4786 (9) and #9607 (at 600 bps) or #9608 (at 1200 bps)
3741	#5501
3767	#5502 or, with Interrupt, #5506 and #9531 (at 600 bps) or #9532 (at 1200 bps)
3771, 3774, 3775	#1482 and #5501 or #5502
3791	#5501 and #6301 (6)
4331	#1601, #4696, #4781 and #967X or #969X (4)
4987	#4751 or #4752
5010	#5501
5110-1, 2	#5501
5231	#5501
5251-2, 12	#5502
5265	#5501
5285, 5288	#5501
5340	#5501 (10)
5360	#5501
5381	#5501 or #5502
5525	#1750 and #5501 or #1751 and #5503
6670	#5501
8101, 8130 A, 8140 A, B	#5501 and #1601

FACILITY C2M: Start/stop or synchronous operation at 600/1200 bps via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2, 8)

S/S Machine Types	Special Features Required for Attachment
3101	(5)
3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps or #9615 (at 600/1200 bps)
3725-1, 2, 3726	#4911 and #4666 (11, 19, 20) or #4911 (12, 19)
4952, 4954 4955, 4959, 4965	#1610 or #2096 or #1310 (1200 bps only)
4987	#4730
6733	(at 1200 bps only--Start/Stop) (5)

Sync Machine Types	Special Features Required for Attachment
2701	#7692 and #7698 (11)
3138	#4640 and #9649 (3, 11) or #4640, #9609 and #9649 (3, 12)
3232-1	(5)
3232-51	(5)
3274-51C	#3701, #6301, and #9112
3276-11, 14	#3701 and #6301 (11) or #3701 and #6302 (12)
3602	#3701 and #4501 or #6301 (11) or #3701 and #4502 or #6302 (12)
3631, 3632	#3701 and #6301 (11) or #3701 and #4502 or #6302 (12)
3651-25	#9150
3651-50	9121 (11)
3651-60	(5, 11)
3651-75	#9121 or #6185 (11)
3684	#3701 and #9695 (11) or #3701 and #9820 (12)
3694	#3701 and #4501 (11) or #3701 and #4502 or (12)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (9, 11) or #4714 (9, 12)
3705-80	#1415 (11) or no special feature required (12)
3725-1, 2, 3726	#4911 and #4666 (11, 19, 20) or #4911 (12, 19)
3741	#9123 (11)
3747	#1660 and #9123 (11)

Chart C - PSTN (cont'd)

3767	#3719, #9619 and #9532 (11) or #3718, #9619 and #9532 (12)
3771, 3774, 3775	#1482 and #3701 (11) or #1481 and #3701 (12)
3791	#3701 and #6301 (6, 11) or #3701 and #6302 or #6303 (6, 12)
3845, 3846	(5)
4331	#1601, #3701, #4696 and #967X or #969X (4, 11) or #1601, #3701, #4695 and #967X or #969X (4, 12)
4701-1, 2	(17)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310 (1200 bps only)
4987	#4730
5010	#2074 and #4703 (11) or #2074 (12)
5110	#2074 and #3701
5231	#2074, #4780, #9334, #9483 and #9751 (11) or #2074, #4780, #9483 and #9751 (12)
5251-2, 12	#3701 and #4703 (11) or #3701 (12)
5265	#3701
5285, 5288	#3701
5340	#3701 and #4703 (10, 11) or #3701 (10, 12)
5360	#3701 and #5321 (11) or #3701 (12)
5381	#3701
5525	#1750 and #3701 or #1751 and #3702 (11) or #3701 or #3702 (12)
6360	#3704 or #3705 or #3707 (11)
6580	#3701 (11)
6670	#3701 (11)
7426	(5)
8101, 8130 A	#1601 and #3701 (11) or #1602 and #3701 (12)
8130 B	#1602 and #3701 (12)
8140 A, B	#1601 and #3701 (11) or #1602 and #3701 (12)
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630 (12)
8775	#1488, #3701 and #9493 (11) or #3701 and #9493 (12)

FACILITY CA3: Synchronous operation at 2400 bps on the PSTN via an integrated modem (1, 2, 13)

Machine Types	Special Features Required for Attachment
3669	(5, 13)
3704, 3705-II	#4761 (9)
3774, 3775, 3776-1, 2	#5610
5251-2, 12	#5641
5340	#5610 (10)
5381	#5641

FACILITY C3: Synchronous operation at 2400 bps on the PSTN via an IBM 3863 Model 2 Modem or an IBM 3872 Modem (1, 2, 14)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701, #6302 and #9490
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9120
3651-75	#9120 and/or #6185
3684	#3701 and #9822
3694	#3701 and #4502
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3741	#9121
3747	#1660 and #9121
3767	#3718, #9533, and #9619
3771, 3774 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9753
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
6360	#3704 or #3705 or #3707
6580	#3705
6670	#3701
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8775	#3701 and #9493
8815-1	#3701

FACILITY C3M: Synchronous operation at 2400 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart C - PSTN (cont'd)

3276-11, 14	#3701, #6302 and #9490
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9120
3651-75	#9120 and/or #6185
3684	#3701 and #9822
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3741	#9121
3747	#1660 and #9121
3767	#3718, #9533 and #9619
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9753
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
6360	#3704 or #3705 or #3707
6580	#3705
6670	#3701
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8775	#3701 and #9493
8815-1	#3701 (23)

FACILITY CA4: Synchronous operation at 4800 bps on the PSTN via an integrated modem (1, 2, 16)

Machine Types	Special Features Required for Attachment
3689	(5, 16)
5251-2, 12	#5741
5340	#5361 (10)
5381	#5741
8815-3	(23)

FACILITY C4: Synchronous operation at 4800 bps on the PSTN via an IBM 3864 Model 2 Modem or an IBM 3874 Modem (1, 2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701 and #6302
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-50	#9126
3684	#3701 and #9823
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#3701
5231	#4780, #9483 and #9754
5251-2, 12	#3701
5285, 5288	#3701, #9483 and #9754
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8775	#3701 and #9493
8815-1	#3701 (18)

FACILITY C4M: Synchronous operation at 4800 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701 and #6302

Chart C - PSTN (cont'd)

3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50, 75	#9126
3684	#3701 and #9823
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9754
5251-2, 12	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8775	#3701 and #9493
8815-1	#3701 (18)

AUTOMATIC CALLING ON THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

On FACILITY C1M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1302
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743

On FACILITY CA2: via an integrated automatic call originate feature

Machine Types	Special Features Required for Auto Calling
2701	#4791
3704	#4709
3705-II	#4791

On FACILITY C2M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5314
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C3: via the Automatic Call Originate feature, #1091, of the IBM 3872 Modem

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C3M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart C - PSTN (cont'd)

On FACILITY C4: via the Automatic Call Originate feature, #1091, of the IBM 3874 Modem

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C4M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4331	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

NOTES FOR CHART C:

1. Attachment of these modems to the public switched telephone network will be via FCC registered circuitry. The IBM 3863 Model 2 Modem and the IBM 3864 Model 2 Modem provide such circuitry and may be directly connected to the PSTN. The 2400 and 4800 bps integrated modems, #5641 and #5741 only, also provide such circuitry and may also be directly connected to the PSTN. All other modems must be connected to the PSTN via a customer-supplied FCC registered coupler equivalent to either the USOC CBS Data Coupler (for manual or automatic answering), or the USOC CDT Data Access Arrangement (for manual only answering). The customer will be responsible for the installation of the proper type of coupler for the mode of operation he desires. See the "Accessories" section of this Manual or the specific machine pages for information on the IBM Protective Coupler.
2. See IBM for information on these services, including the attachable ACEs and DCEs, required options, etc.
3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
4. Specify codes **#967X, #968X** and **#969X** on the 4331 stipulate in which protocol the 4331 is to communicate and to which line position on the 4331 that protocol is to be assigned, with the "X" in each case being the line position. See the M4331 pages for details.
5. No special feature is required to attach this DTE to this facility.
6. 3791 switched network operation is supported at the 3704, 3705 or 3725-1, 2, 3726 nonswitched programming. Special procedures are required to establish and disconnect the link. Refer to VTAM and 3790 operation instructions for the appropriate procedures.
7. The 2701 feature code listed is for the attachment of a single synchronous communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
8. The 3602 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on this facility is determined by:
   - a customer accessible switch on the 2701, 3138, 3274, 3276, 3651, 3684, 3741, 3747, 3767, 3771, 3774, 3775, 4952, 4955, 4959, 4987, 5110, 5251, 5265, and 5340
   - the installation of a CE strap on the 5010
   - the installation of a "Speed specify" on the 3704, 3705, 5381, 8101, 8130 and 8140
   - a customer initiated keyboard request on the 3791, 4331 and 5231
   - an Operator Command Language (OCL) instruction on the 6670.
   - the options chosen at the generation of the control program of the 3725-1, 2.
9. A 3705, equipped with the "Remote Program Loader" feature, may serve as a "Remote" and communicate with a "Local" 3704 or 3705. Their primary communication link must be a nonswitched line, and, therefore, communication over this facility between a "Remote" and a "Local" 3704 or 3705 can only be as a secondary, alternate, path to the primary nonswitched communication link.
10. The listed 5340 feature codes are for the attachment of a single communication line. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
11. These feature codes are for the attachment of a modem which does *not* provide its own clocking. This class of modem should always be used on international connections.
12. These feature codes are for the attachment of a modem which *does* provide its own clocking. This class of modem may only be used on intranational connections.
13. There are two types of 2400 bps Integrated Modems that are *not* compatible with each other. The first type, #4761 and #5610 are line compatible and suitable for communication with each other and with an IBM 3872 Modem equipped with #7941 or #7942. The second type, #5641, is line compatible and suitable for communication with another #5641 or with an IBM 3863 Model 2 Modem.
14. CCITT V.23 modems providing modem clocking and CCITT V.26 modems using Alternative B coding are not truly data transparent, in that the transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI coding must be used in the SDLC protocol, and transparent mode may *not* be used in the BSC protocol. See Your PTT coordinator for details.
15. The 3845 and 3846 are data encryption/decryption devices inserted between the DTE and the DCE. The DCE must satisfy the requirements of EIA RS-232-C to allow this insertion.
16. The 4800 bps Integrated Modems, #536X and #5741, are line compatible and suitable for communication with each other and with the IBM 3864 Model 2 Modem. The "X" in the #536X feature code is the line position on the 5340 in which this modem will be mounted. See the M5340 pages for details. The 3689 provides a 4800 bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another 3689 or with an IBM 3864 Model 2 Modem.
17. For communication in SNA/SDLC protocol, no special feature is required on the 4701. For communication in BSC protocol, #1422 is required. In either protocol, the 4701 requires that clocking be provided by the attached stand-alone DCE.
18. The 8815 mdl 3 provides a 4800 bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another IBM 8815-3 or IBM 8815-1 equipped with an IBM 3864 mdl 2.

Chart C - PSTN (cont'd)

19. A 3725-1, 2 or 3726 may serve as a "Remote" and communicate with a "Local" 3704, 3705, 3725-1, 2, or 3726. Their primary communication link must be a nonswitched line and, therefore, communication over this facility between a "Remote" and a "Local" 3704, 3705 or 3725-1,2, 3726 can only be as a secondary, alternate path to the primary nonswitched communication link.

20. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART D
NONSWITCHED VOICE GRADE LINES

FACILITY DA1

Point-to-point or multipoint start/stop operation at 134.5, 200, or 300 bps on a half-duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4742 (on 2 wires) or #4743 (on 4 wires) and #9606 (at 134.5 bps only) or #4781 or #4785 and #9612 (at 300 bps only)
3767	#5500 or #5505, #9540 and #7111 or #7113 (at 300 bps only)
3792	#5400 (at 134.5 bps only)
4331	#1601, #4696, #4781 and #968X (4) (at 300 bps only)
5010	#4751 (on 2 wires) or #4752 (on 4 wires) (both at 134.5 bps only)

FACILITY D1M

Point-to-point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581 (at 134.5 bps only)
3101	(6)
3138	#4640 and #9721 (3)
3232-51	(Point-to-point only) (6)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps or #1413 (at 300 bps)
3725-1, 2, 3726	#4911 and #4666 (29)
3767	#3719, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(6, 16)
4331	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4959, 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2165 (at 134.5 bps only)
5110	#1525 (point-to-point only)
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6733	(at 300 bps only) (point-to-point only) (6)
8101, 8130 A, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY DA2

Point-to-point or multipoint start/stop operation at 600 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4742 (on 2 wires) or #4743 (on 4 wires) and #9607
3767	#5500, #7112 and #9541
4331	#1601, #4696, #4781 and #968X (4)
4987	#4748
5010	#4751 (on 2 wires) or #4752 (on 4 wires)

FACILITY D2M

Point-to-point or multipoint start/stop operation at 600 bps on a duplex nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9582 or #4648
3101	(6)
3138	#4640 and #9721 (3)
3232-51	(Point-to-point only) (6)
3704, 3705-II	#4711 or #4714 and #9607
3705-80	#1414
3725-1, 2, 3726	#4911 and #4666 (29)
3767	#3719, #7112 and #9541
3845, 3846	(6, 16)
4331	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4959, 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2165
8101, 8140 A, B	#1603 and #3701 (point-to-point only) (23)

FACILITY DA3

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 7)

S/S Machine Types	Special Features Required for Attachment
3704, 3705-II	#4781 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps)
3767	#5500, #7112 and #9541 (at 600 bps) or #9542 (at 1200 bps)
3791	#5500 and #6301 (14) or #3210 and #4781 (9)
4331	#1601, #4696, #4781 and #968X (4)
Sync Machine Types	**Special Features Required for Attachment**
2701	#4781, #7698 and #7692 (at 1200 bps) or #7401 at 600/1200 bps) (8)
3274-51C	#5500 and #6301
3276-1, 4	#5500 and #6301
3276-11, 14	#5500 and #6301 (14)
3602	#5500 and #4501 or #6301 (14) or #8001 (5)
3603-1	(5, 6) **3624**#5500 and #1421 or #6301 (7, 14) or #8001 (5, 7)
3684	#5530 and #9482 (14)
3704, 3705-II	#4781 or #4784 and #9607 (at 600 bps), #9608 (at 1200 bps or #9615 (at 600/1200 bps) (14)
3741	#5500
3747	#5500
3767	#5500 and #9531 (at 600 bps) or #9532 (at 1200 bps) (14)
3771, 3774, 3775	#1482 and #5500Y(14)
3791	#5500 and #6301 (14) or #3210 and #4781 (9)
4331	#1601, #4696, #4781 and #967X or #969X (4)

Chart D - Nonswitched Voice Grade Lines (cont'd)

4987	#4748
5010	#4703 and #5500
5110-1, 2	#5500
5231	#5500 and #9334
5251-2, 12	#5500
5285, 5288	#9751 and #9481 or #9482 (14)
5340	#5500 (11, 14)
5360	#5500 (14)
5381	#5500 (14)
5525	#1750 and #5500 or #1751 and #5502
6670	#5510
8101, 8130 A, 8140 A, B	#5500 and #1601 or #1603 (14)
8775	#1488 and #5500

FACILITY DAB3

Point-to-point or multipoint synchronous operation at 600/1200 bps on a Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 7, 21)

Machine Types	Special Features Required for Attachment
3274-51C	#5507 or #5508 and #6301
3276-1, 4	#5507 or #5508
3276-11, 14	#5507 or #5508 (14)
5110-1, 2	#5508
5285, 5288	#5508 (14)
5381	#5508 (14)
6670	#5508

FACILITY D3M

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1, 7)

S/S Machine Types	Special Features Required for Attachment
3101	(6)
3232-51	(Point-to-point and start/stop only) (6)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12)
3705-80	#1415 (10) or no special feature required (11)
3725-1, 2, 3726	#4911 and #4666 (12, 29)
3767	#3719, #7112 and #9541 (at 600 bps) or #9542 (at 1200 bps)
3845, 3846	(6, 16)
4331	#1601, #3701, #4696 and #968X (4, 12)
4952, 4954 4955, 4959, 4965	#1610 or #2092 or #2096 (12) or #1310 (1200 bps only)
4975-1R, 2R	(1200 bps only) (7)
4987	#4730 or #4731 (12)
6733	(at 1200 bps only) (point-to-point only) (6)

Sync Machine Types	Special Features Required for Attachment
2701	#7698 and #7692 (at 1200 bps) or #7401 (at 600/1200 bps) (8, 12)
3138	#4640 and #9649 (3), 12) or #4640, #9609 and #9649 (3), 13)
3232-1	(6)
3274-51C	#3701 and #6301
3276-1, 4	#3701, #6301 and #9491 (12) or #3701, #6302 and #9491 (13)
3276-11, 14	#3701, #6301 and #9491 (12, 14) or #3701, #6302 and #9491 (13, 14)
3602	#3701 and #4501 or #6301 (5, 13, 14) or #3701 and #4502 or #6302 (5, 13, 14)
3603-2	(6, 12) or #6352 (5, 13)
3624	#3701 and #1421 or #6301 (7, 13, 14) or #3701 and #1422 or #6302 (7, 13, 14)
3631, 3632	#3701 and #6301 (12, 14) or #3701 and #4502 or #6302 (13, 14)
3684	#3701 and #9695 (12, 14) or #3701 and #9820 (13, 14)
3694	#3701 and #4501 (12, 14) or #3701 and #4502 (13, 14)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12, 14) or #4714 (13, 14)
3705-80	#1415 (10) or no special feature required (11)
3725-1, 2, 3726	#4911 and #4666 (12, 14, 29) or #4911 (13, 14)
3741	#7705 and #9122 (12)
3747	#1660, #7705 and #9122 (12)
3767	#3719 and #9531 (at 600 bps) or #9532 (at 1200 bps) (12, 14) or #3718 and #9532 (13, 14)
3771, 3774, 3775	#1482 and #3701 (12, 14) or #1481 and #3701 (13, 15)
3791	#3701 and #6301 (12, 14) or #3701 and #6302 or #6303 (13, 14) or #3703 and #3210 (9, 12) or #3703 and #3211 (9, 13)
3845, 3846	(6, 16)
4331	#1601, #3701, #4696 and #967X or #969X (4, 12) or #1601, #3701, #4695 and #967X or #969X (4, 13)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310 (1200 bps only)
4975-1R, 2R	(1200 bps only) (7)
4987	#4730 or #4731 (14)
5010	#2074, #4703 and #4800 (12) or #2074 and #4800 (13)
5110	#2074 and #3701
5150	(6, 13)
5231	#2074, #4780, #9334, #9751 and #9481 or #9482 (12) or #2074, #4780, #9751 and #9481 or #9482 (13)
5251-2, 12	#3701 and #4703 (12) or #3701 (13)
5265	#3701
5285, 5288	#3701 (14)
5340	#3701 and #4703 (11, 13, 14) or #3701 (11, 13, 14)
5360	#3701 and #5321 (12, 14) or #3701 (13, 14)
5381	#3701 (14)
5525	#1750 and #3701 or #1751 and #3702 (12) or #3701 or #3702 (13)
6360	#3704 or #3705 or #3707 (12) (point-to-point only)
6580	#3705 (12) (point-to-point only)
6670	#3701 (12, 14)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1601 or #1603 (12, 14) or #3701 and #1602 or #1604 (13, 14) or #3701 and #1605 (12, 13)

Chart D - Nonswitched Voice Grade Lines (cont'd)

8140 C	#1610, #1611, #1620, #1621 or #1630 (13, 14) or #1622 or #1623 (12, 13, 14)
8775	#1488, #3701 and #9494 (12) or #3701 and #9494 (13)

FACILITY D4M

Point-to-point or multipoint synchronous operation at 2000 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 17)
3705-80	No special feature required
3741	#9120
3747	#1660 and #9120
3771, 3774 3775	#1481 and #3701 (14)
3776-1, 2	#1481 and #3701 (14)
3845, 3846	(6, 16)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730 or #4731
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#2074, #4780 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (13, 14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY DA5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 18)

Machine Types	Special Features Required for Attachment
3274-31C	#5640, #9112 and #6302 or #6303
3659	(6)
3669	(6)
3704, 3705-II	#4751 or #4752 or #4754 or #4755 (14, 17)
3774, 3775, 3776-1, 2	#5600 or #5602 (14)
3842	(6, 10)
5251-2, 12	#5640
5340	#5600 or #5601 or #5602 (14)
5381	#5640 (14)

FACILITY DAB5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 19, 20)

Machine Types	Special Features Required for Attachment
3774, 3775, 3776-1, 2	#7951 and #5600 or #5602 (14)
3842	#7951 (10)
5340	#7951 and #5600 or #5601 or #5602 (11, 14)

FACILITY D5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an IBM 3863 Model 1 Modem or an IBM 3872 Modem (1, 19, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 and/or #3211 and #3703 (14)
3651-25, 50	#9121 or #9122 (14, 22)
3651-75	#9121 or #9122 or #6185 (14, 22)
3684	#3701 and #9822 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3741	#9121
3747	#1660 and #9121

Chart D - Nonswitched Voice Grade Lines (cont'd)

3767	#3718 and #9533 (14)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-1R, 2R	(7)
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D5M

Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 and/or #3211 and #3703 (14)
3651-25, 50	#9121 or #9122 (14, 22)
3651-75	#9121 or #9122 (14) or #6185 (22)
3684	#3701 and #9822 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3741	#9121
3747	#1660 and #9121
3767	#3718 and #9533
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-1R, 2R	(8)
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D5SB

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an IBM 3863 Model 1 Modem equipped with #7953 or an IBM 3872 Modem equipped with #7951 or #7952 (1, 20, 23)

Chart D - Nonswitched Voice Grade Lines (cont'd)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9121 or #9122 (14)
3651-75	#9121 or #9122 (14)
3684	#3701 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 and/or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5110	#2074 and #3701
5150	(6, 13)
5251-2, 12	#3701 and #9492
5285, 5288	#3701, #9753 and #9481 or #9482 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130, 8140 A, B	#3701 and #1602 or #1604 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14)
8775	#3701 and #9494
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8815-1	#3701 (14)

FACILITY DA6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 21)

Machine Types	Special Features Required for Attachment
3274-31C	#5740 or #9112 and #6302 or #6303 (14)
3776-1, 2	#5700 or #5702 (14)
5251-2, 12	#5740
5340	#5351 (11, 14)
5381	#5740 (14)
8815-4	(14, 26)

FACILITY DAB6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel with C1 Conditioning (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 20, 21)

Machine Types	Special Features Required for Attachment
3776-1, 2	#9752 and #5700 or #5702 (14)

FACILITY D6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) via an IBM 3864 Model 1 Modem or, on a Type 3002 Channel with CI Conditioning (or equivalent), via an IBM 3874 Modem (1, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C,	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart D - Nonswitched Voice Grade Lines (cont'd)

4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-2R (7)	
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D6M

Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-2R	(7)
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D6SB

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an IBM 3864 Model 1 Modem equipped with #7953 or, on a duplex Type 3002 Channel with CI Conditioning, via an IBM 3874 Modem equipped with #7951 or #7952 (1, 20, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 (14, 16, 17)
3705-80	No special feature required
3725-1, 2,	#4911 (14, 27, 28)

Chart D - Nonswitched Voice Grade Lines (cont'd)

3726	
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2 3777-1, 2,	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14)
3791	#3701 and #6302 or #6303 and/or #3211 and #3703 (14)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5110	#2074 and #3701
5150	(6, 13)
5251-2, 12	#3701 and #9492
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D7M

Point-to-point or multipoint synchronous operation at 7200 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3776-3, 4, 3777-3, 4	#3701 (14, 17)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5010	#4800
5150	(6, 13)
5251-2, 12	#3701
5340	#3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY DA8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1)

Machine Types	Special Features Required for Attachment
3274-31C	#5840 or #5842, #9112 and #6302 or #6303 (14)

FACILITY D8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) via an IBM 3865 Modem

Machine Types	Special Features Required for Attachment
3232-1	(6)
3274-1C, 21C, 31C	#370l and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 or #6302 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart D - Nonswitched Voice Grade Lines (cont'd)

4952, 4955, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D8M

Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D8SB

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an IBM 3865 Modem equipped with #7953 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4331	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701 and #9492
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3705 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8775	#3701 and #9494
8815-1	#3701 (14)

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart D - Nonswitched Voice Grade Lines (cont'd)

NOTES FOR CHART D:

1. See IBM for information on these facilities, including attachable DCEs, required options, etc.

2. Integrated modems perform the modulation/demodulation function on a communication facility at speeds up to 4800 bps. When they are used, standalone DCEs are not required. GA24-3435 provides descriptions of these modems and definitions of the communication facilities on which they may be used.

3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.

4. Specify codes **#967X**, **#968X** and **#969X** stipulate in which protocol the 4331 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See the M4331 pages for details.

5. The 3603 Model 1 and the 3624, when equipped with #8001, will communicate with a 3602 over a normal "3600 System Loop". When more than one 3603 and/or 3624 are on the loop, point-to-point, half-duplex, 2-wire terminated links are required from the 3602 to the first station on the loop, between successive stations on the loop, and from the last station on the loop back to the 3602. When there is only one 3603 or 3624 on the loop, a point-to-point, duplex, 4-wire terminated link is required between that station and the 3602.

   The 3602 and 3624, when equipped with either #3701 or #5500, will communicate over a nonswitched voice grade line with a 3704, 3705, 3725-1, 2, or 3726 in either point-to-point or multipoint mode.

6. No special feature is required to attach this DTE to to this facility.

7. The 3602 and 3624 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on the facility is determined by:
   - a customer accessible switch on the 2701, 3138, 3274, 3276, 3624, 3631, 3632, 3651, 3741, 3747, 3771, 3774, 3775, 5110, 5251, 5265, 5340, and 5381
   - the installation of a speed specify on the 3704, 3705, 5010, 8101, 8130, 8140 and 8775. (Please note that, in Emulation mode, the reassignment of a line on the 3704 or 3705 to a different speed will require the re-IPL of the 3704/3705. In NCP mode, this reassignment can be accomplished through a customer initiated message to the access method.)
   - a customer accessible switch on the 3767 when #2834 is installed, otherwise, through the installation of a speed specify
   - a customer initiated keyboard request on the 3791 and 4331
   - a customer initiated console request on the 4952, 4955, 4959, 4987 and 5231
   - an Operator Control Language (OCL) instruction on the 6670.
   - the options chosen at the generation of the control program of the 3725-1, 2. (Please note that in Emulation mode, the reassignment of a line on the 3725-1, 2, 3726 to a different speed will require the re-IPL of the 3725-1, 2. In NCP mode, this reassignment can be accomplished through a customer-initiated message to the access method.

8. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.

9. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter #3210 or #3211. All stations on such a link must operate at the same line speed and use the same clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.

10. The 3631, 3632, 8101, 8130 and 8140 support communication with down line 3843 Loop Control Units. The 3843 provides an EIA/CCITT interface to a standalone DCE and can be utilized with any synchronous modem at a speed of 2400, 4800 or 9600 bps.

11. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.

12. These feature codes are for the attachment of a modem which does *not* provide its own clocking. This class of modem should always be used where the network is international.

13. These feature codes are for the attachment of a modem which *does* provide its own clocking. This class of modem should only be used on an intranational network.

14. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4952, 4954, 4955, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704 or 3705 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704, 3705, 3725-1, 2, or 3726 equipped with:
   - #4784 for communication with tributary stations with 1200 bps integrated modems
   - #4755 for communication with tributary stations with 2400 bps integrated modems (#5602) or attaching IBM 3872 Modems
   - #4718 for communication with tributary stations via standalone DCEs.

   or a 3725-1, 2, 3726 equipped with:
   - #4911 for communication with tributary stations via standalone DCEs.

15. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This type communication requires full-duplex communication facilities.

16. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs, and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of EIA RS-232-C

17. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714, #4751 and #4781 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718, #4754 and #4784 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.

18. There are two types of 2400 bps integrated modems, which are *not* compatible with each other. The first type, #4751, #4752, #4754, #4755, #5600 and #5602 are line compatible and suitable for communication with each other and with a properly equipped IBM 3872 Modem. The second type, #5640, is line compatible and suitable for communication with another #5640 or with an IBM 3863 Model 1 Modem.

19. CCITT V.23 modems that provide modem clocking and CCITT V.26 modems that use Alternative B coding are not truly data transparent, in that transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI encoding should be used in SDLC (when the 3845 or 3846 are *not* to be installed), and transparent mode should *not* be used in BSC. See your PTT coordinator for details.

20. On switched network backup facilities, the IBM standalone or integrated modem must be equipped as shown for operation on the backup link. However, a control station may elect to operate on this type service via two separate ports, one of which is dedicated to the primary nonswitched link, and the other of which is dedicated to the backup switched link. Each of these ports must be equipped with a modem compatible with the standalone or integrated modem with which it is to communicate.

21. There are two type of 4800 bps integrated modems, which are *not* compatible with each other. The first type, #5700 and #5702, is line compatible and suitable for communication with each other and with a properly equipped IBM 3874 Modem. The second type, #5740, is line compatible and suitable for communication with another #5740 and with an IBM 3864 Model 1 Modem.

22. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2 or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both type communications. See the M3659 pages for the requirements on that unit for the remote store communications.

23. Refer to the M3863, 3864 and 3865 pages for the DTE attachment codes required for each attaching DTE.

23. The 8101 can only be attached to an 8140.

25. For communication in the SNA/SDLC protocol, no special feature is required on the 4701. For communication in the BSC protocol, *which is limited to a speed of no greater than 4800 bps,* #1422 is required. Communication in either protocol requires that clocking be provided by the attached DCE.

Chart D - Nonswitched Voice Grade Lines (cont'd)

26. The IBM 8815 mdl 4 provides a 4800-bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another IBM 8815-4 or with an IBM 8815-1 equipped with an IBM 3864 mdl 1.

27. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.

28. The 3725-1, 2, 3726 equipped with #4911 can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.

29. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART E
NONSWITCHED WIDEBAND CHANNELS

FACILITY E1: Point-to-point synchronous operation at 19.2K bps on a Type 8803 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717
3705-II	#4717 or #4725 (2, 3)
3705-80	#6713
3725-1, 2, 3726	#4921 or #4931 (8, 9)
3776-3, 4, 3777-3, 4	#4501 (3)
3777-1, 2	#1481 and #4501
4952, 4954, 4955, 4959, 4965	#2075
5340	#5401 or #5402 or #5403 or #5404

FACILITY E2: Point-to-point synchronous operation at 40.8K bps on a Type 8801 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717(2)
3705-II	#4717 or #4725 (2)
3705-80	#6713
4952, 4954, 4955, 4959, 4965	#2075
5010	#2074 and #4805
5340	#5401 or #5402 or #5403 or #5404

FACILITY E3: Point-to-point synchronous operation at 50K bps on a Type 8801 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717 (2)
3705-II	#4717 or #4725 (2)
3705-80	#6713
3725-1, 2, 3726	#4921 or #4931 (8)
4952, 4954, 4955, 4959, 4965	#2075
5340	#5401 or #5402 or #5403 or #5404

FACILITY E4: Point-to-point synchronous operation at 230.4K bps on a Type 8751 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3705-II	#4722 or #4723 (2)
3725-1, 2, 3726	#4921 (8)

NOTES FOR CHART E:

1. See IBM for additional information on these services.
2. 3704/3705 "Remotes" may communicate over this facility with 3704/3705 "Locals" as their primary communication link. #4717 and #4722 will support the normal data-half-duplex operational mode, while #4725 will support a data-full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
3. The 3705, using #4725 can communicate in a data-full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 Model 3, 3776 Model 4 or a 3777 Model 3.
4. This feature code is for the attachment of a single communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
5. A communication line attached to the ICA via this feature presents a 100% load factor to the ICA, and must not be operated simultaneously with any other line on the ICA.
6. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614.
7. IBM DTEs normally provide cables terminating with #16 pins. In those countries where #20 pins are required, an adapter cable is available. This is supplied as Cable Group #1393 on the 3704 and 3705, and as specify **#2723** on the 4952, 4955, 4959, 4987, 8101 and 8140.
8. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4921 will support the normal data half-duplex operational mode and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
9. The 3725-1, 2, 3726 using #4921 can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl 3.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART G
NONSWITCHED BASEBAND LINES

FACILITY G1: Point-to-point or multipoint start/stop operation at 134.5 bps via an integrated Type 1A (half-duplex) or Type 1B (duplex) limited distance line adapter (1)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#9606 and #4731 (Ty 1A) or #4732 (Ty 1B)

FACILITY G2: Point-to-point or multipoint start/stop operation at 134.5 or 600 bps via an integrated Type 2A (half-duplex) or Type 2B (duplex) limited distance line adapter (1)

Machine Types	Special Features Required for Attachment
2701	#4636 (Ty 2A) or #4637 (Ty 2B)
3704, 3705-II	#4741 and #9606 (at 134.5 bps) or #9607 (at 600 bps)
5010	#4750

FACILITY G3M: Point-to-point or multipoint synchronous operation at 2400, 4800 or 9600 bps via a stand-alone baseband modem attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (3)
3138	#4640, #9609 and #9649 (3, 4)
3232-1	(5)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (6)
3274-51C	#3701 and #6302 or #6303 (6)
3276-1,4	#3701, #6302 and #9491 (3)
3276-11,14	#3701, #6302 and #9491 (6)
3602	#3701 and #4502 or #6302
3603-2	2400 bps, point-to-point only (5)
3624	#3701 and #1422 or #6302 (3, 6)
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9121 or #9122 (6, 7) or #9124 or #9125 (6, 8)
3651-75	#9121 or #9122 (6, 7) or #9124 or #9125 (6, 8) or #6185 (7)
3684	#3701 and #9822 (6, 7) or #3701 and #9823 (6, 8)
3694	#3701 or #3701 and #4502 (6)
3704, 3705-II	#4714 or #4718 (6, 9, 10)
3705-80	No special feature required
3705-80	No special feature required
3725-1, 2, 3726	#4911 (6, 16, 17)
3741	#9121 (7)
3747	#1660 and #9121 (7)
3767	#3718 and #9533 (6, 7)
3771, 3774, 3775	#1481 and #3701 (3, 6)
3776-1,2	#1481 and #3701 (3, 6)
3776-3,4; 3777-3,4	#3701 (6)
3777-1,2	#1481 and #3701 (6)
3791	#3701 and #6302 or #6303 (6) or #3211 and #3703 (11)
4331	#1601, #3701, #4695 and #967X or #969X (12)
4701-1,2	(6, 15)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (6) or #1310
4987	#4731 or #4731 (6)
5010	#2074 and #4800 (3)
5110	#2074 and #3701 (3)
5150	(5)
5231	#4780, #9753 or #9754 and #9481 or #9482 (3)
5251-2,12	#3701
5265	#3701 (7)
5285, 5288	#3701 (3, 6)
5340	#2500 and #3701 (6, 13)
5360	#3701 (6)
5381	#3701 (6)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (6, 7)
7426	(5)
8101, 8130 A	#3701 and #1602 or #1604 (6) or #3701 and #1605
8130 B	#3701 and #1602 (6)
8140 A, B	#3701 and #1602 or #1604 (6) or #3701 and #1605
8140 C	#1610, #1611, #1620, #1621, #1622, #1623, or #1630 (6)
8775	#3701 and #9494
8815-1	#3701 (6)

NOTES FOR CHART G:

1. The Limited Distance Line Adapters, Types 1A and 1B, are limited to a link of no more than 7.65km (4.75 miles). The Limited Distance Line Adapters, Types 2A and 2B, are limited to a link of no more than 13.25km (8 miles). See GA24-3435 for detailed descriptions of these adapters and the communication links over which they may operate.
2. See IBM for more information on these services, including attachable DCEs, required options, etc.
3. These feature codes will support communication on this facility at 2400 or 4800 bps only.
4. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
5. No special feature is required to attach this DTE to this facility.
6. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4952, 4954, 4955, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2 or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911. SDLC also supports the normal data-half-duplex mode of operation over half-duplex or duplex facilities.
7. These feature codes will support communication on this facility at 2400 bps only.
8. These feature codes will support communication on this facility at 4800 bps only.
9. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex facilities. #4718 will support

Chart G - Nonswitched Baseband Lines (cont'd)

a data-full-duplex (i.e., simultaneous data transmission in both directions) on duplex communication lines.

10. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex (i.e., simultaneous data transmission in both directions) mode with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This mode of operation requires duplex communication facilities.

11. The 3276 may be attached as a tributary station on a multipoint line where the control station is a 3791 equipped with the Data Link Adapter, #3211.

12. Specify codes **#967X** and **#969X** on the 4331 stipulate in which protocol the 4331 is to communicate, and to which line position on the 4331 that protocol is to be assigned, with the "X" in each case denoting the line position. See the M4331 pages for details.

13. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.

14. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614.

15. Communication in the SNA/SDLC protocol requires no special feature on the 4701. Communication in the BSC protocol, *which is limited to a speed no greater than 4800 bps,* requires #1422.

16. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication lines.

17. The 3725-1, 2, 3726, equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART L

CIRCUIT SWITCHED PUBLIC DATA NETWORKS PROVIDING A CCITT "X" SERIES INTERFACE

FACILITY L3: Synchronous operation at 2400 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)

FACILITY L4: Synchronous operation at 4800 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)

FACILITY L5: Synchronous operation at 9600 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)

FACILITY L6: Synchronous operation at 48K bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112
3705-II	#5656 and #9841 (3)
3705-81, 3705-82	#5658 and #9776 (3)
3725-1, 2, 3726	#4942
5360	#5655 (2)
8101 A2X, 8130 B, 8140 B	#1602 and #5656 (2, 4)
8140 C	#1612 (2)

NOTES FOR CHART L:

1. See the *Data Communications Handbook,* ZZ20-1939, IBM for more information on attachable DCE, services, etc.
2. When attached to a Network via the CCITT X.21 interface feature (as noted), these DTEs may communicate with other DTEs attached to this network via a CCITT X.21bis interface.
3. 3705-II X.21 switched operation requires the use of a Type 2 Communication Scanner. Switched X.21 operation on the 3705-II and the 3705-80 is supported by ACF/NCP/VS Release 3, ACF/VTAM Release 3 and ACF/TCAM Version 2 Release 3. User Facilities as defined in CCITT Recommendation X.2 are supported as follows:
   - Automatic Answering.
   - Address Calling and Abbreviated Address Calling Only address blocks, consisting of a single address signal are supported, and abbreviated address calling is supported on a per-call basis only.
   - Direct Call is supported on a contractual or a per-call basis.
   - Closed User Groups are supported on a contractual basis only, with both Preferred and Nonpreferred Groups included. The Facility Request Block used to select the Closed User Group (CUG) may only consist of a single Facility Request Signal, to be followed by an Address Block as described under Address Calling above. Please note that the Facility Request Codes for a CUG may vary from country to country. Your local teleprocessing coordinator should be contacted for details.
   - Call Progress Signalling is reported via an operator message containing the Call Progress Signal (CPS) code and a brief message of its significance. Those CPSs defined in Annex 6 of Recommendation X.21 are recognized, with the exception of CPSs 82 and 83, which are related to a currently unsupported user facility. Any unrecognized CPS that is received is reported via an operator message that states that this is an "Unrecognized CPS."
4. The 8101 A2X cannot attach to an 8130 or 8140 C containing #1610-#1614.
5. The 3274 and 3276 X.21 switched interface features will support the following network facilities as defined in CCITT Recommendation X.2:
   - Abbreviated address call
   - Direct call
   - Call progress signalling
   - Closed user groups

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART M

NONSWITCHED PUBLIC DATA NETWORKS PROVIDING AN EIA RS-232-C OR CCITT V.35 INTERFACE

FACILITY M1M: Point-to point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3101	(4)
3138	#4640 and #9721 (2)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps or #1413 at (300 bps)
3725-1, 2, 3726	#4911 and #4666 (17)
3767	#3719, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(4, 10)
4331	#1601, #3701, #4696 and #968X (3)
4952, 4954, 4955, 4959, 4965	#1610 or #2092 or #2096
4987	#4730 or #4731
5110	#1525 (point-to-point only)
8101, 8130 A, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY M2M: Point-to-point or multipoint start/stop operation at 600 or 1200 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3101	(4)
3138	#4640 and #9721 (2)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps) or #9608 (at 1200 bps)
3705-80	#1415
3725-1, 2, 3726	#4911 and #4666 (17)
3767	#3719, #7112 and #9541 (at 600 bps only)
3845, 3846	(4, 10)
4331	#1601, #3701, #4696 and #968X (3)
4387	#4730 or #4731
8101, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY MA3: Point-to-point or multipoint synchronous operation at 2400 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9822 (8)
3274-51C	#5650 or #5651, #6302 and #9822 (8)
3276-1, 4	#5650 or #5651, #6302 and #9822
3276-11, 14	#5650 or #5651, #6302 and #9822 (8)
3776-3, 4, 3777-3, 4	#5650 or #5651 and #9822 (8)
4331	#1601, #4695, #5650 and #967X or #969X (3)
5110-1, 2	#5650 or #5651
5251-2, 12	#5650 or #5651
5340	#5650 or #5651 (7, 8)
5360	#5650 (8)
8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
8775	#5650 or #5651 and #9822
8815-1	#5650 and #9822 (8)

FACILITY M3M: Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (5)
3138	#4640, #9609 and #9649 (2)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
3602	#3701 and #4502 or #6302 (8)
3624	#3701 and #1422 or #6302 (8)
3631, 3632	#3701 and #4502 or #6302 (8)
3651-25, 50	#9121 or #9122 (8, 12)
3651-75	#9121 or #9122 (8) or #6185 (12)
3684	#3701 and #9822 (8)
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (8, 14)
3741	#9121
3747	#1660 and #9121
3767	#3718, 9404 and #9533
3771, 3774, 3775	#1481 and #3701 (8)
3776-1, 2, 3777-1, 2	#1481 and #3701 (8)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4331	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5010	#2074
5110	#2074 and #3701
5150	(4)

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart M - Nonswitched Public Data Networks (cont'd)

5231	#2074, #4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701, #9753 and #9481 or #9482
5340	#2500 and #3701 (7, 8)
5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
6670	#3701 (8)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
8130 B	#3701 and #1602 (8)
8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA4: Point-to-point or multipoint synchronous operation at 4800 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9823 (8)
3274-51C	#5650 or #5651, #6302 and #9823 (8)
3276-1, 4	#5650 or #5651, #6302 and #9823
3276-11, 14	#5650 or #5651, #6302 and #9823 (8)
3776-3, 4, 3777-3, 4	#5650 or #5651 and #9823 (8)
4331	#1601, #4695, #5650 and #967X or #969X (3)
5110-1, 2	#5650 or #5651
5251-2, 12	#5650 or #5651
5340	#5650 or #5651 (7, 8)
5360	#5650 (8)
5381	#5650 or #5651 (8)
8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
8130 B	#3701 and #1602 (8)
8775	#5650 or #5651 and #9823
8815-1	#5650 and #9823 (8)

FACILITY M4M: Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (5)
3138	#4640, #9609 and #9649 (2)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
3602	#3701 and #4502 or #6302 (8)
3624	#3701 and #1422 or #6302 (8)
3631, 3632	#3701 and #4502 or #6302 (8)
3651-25, 50	#9124 or #9125 (8)
3651-75	#9124 or #9125 (8)
3684	#3701 and #9823
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (8, 14)
3771, 3774, 3775	#1481 and #3701 (8)
3776-1, 2, 3777-1, 2	#1481 and #3701 (8)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4331	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(4)
5231	#2074, #4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5285, 5288	#3701, #9754 and #9481 or #9482 (8)
5340	#2500 and #3701 (7, 8)
5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(4)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
8130 B	#3701 and #1602 (8)
8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA5: Point-to-point or multipoint synchronous operation at 9600 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9825 (8)
3274-51C	#5650 or #5651, #6302 and #9825 (8)
3276-11, 14	#5650 or #5651, #6302 and #9825 (8)
3776-3, 4,	#5650 or #5651 and #9825 (8)

Chart M - Nonswitched Public Data Networks (cont'd)

3777-3, 4	
4331	#1601, #4695, #5650 and #967X or #969X (3)
5251-2, 12	#5650 or #5651
5340	#5650 or #5651 (7, 8)
|5360	#5650 (8)
5381	#5650 or #5651 (8)
|8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
|8130 B	#3701 and #1602 (8)
8775	#5650 or #5651, #9494 and #9825
8815-1	#5650 and #9825 (8)

FACILITY M5M: Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
|3602	#3701 and #4502 (8)
3631, 3632	#3701 and #4502 (8)
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
|3725-1, 2, 3726	#4911 (8, 14)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3777-1, 2	#1481 and #3701 (8)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4331	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5150	(4)
5251-2, 12	#3701
5340	#2500 and #3701 (7, 8)
|5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(4)
|8101, 8130 A, |8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
|8130 B	#3701 and #1602 (8)
|8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA6: Point-to-point or multipoint synchronous operation at 56K bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#6302, #9833 and #5650 or #5651
4331	#1601, #4695, #5650 and #967X or #969X (3)
5340	#5391 (7)
|5360	#5650 (8)
8101, 8140, A, B	#5660 and #1602 (13)

FACILITY M6M: Point-to-point or multipoint synchronous operation at 56K bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#1550 and #6303 (point-to-point only)
3705-II	#4720 or #4726
3705-80	#6712
|3725-1, 2, 3726	#4931
4331	#1601, #4695, #4720 and #967X or #969X (3)
4952, 4954, 4955, 4959, 4965	#2075, #2780
8101, 8140 A, B	#1550 and #1602 (13)
8140 C	#1614

NOTES FOR CHART M:

1. See IBM for information on these facilities, including attachable DCEs, required options, etc.
2. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
3. Specify codes **#967X**, **#968X** and **#969X** stipulate in which protocol the 4331 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See the M4331 pages for details.
4. No special feature is required to attach this DTE to this facility.
5. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.
6. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter, #3210 or #3211. All stations on such a line must operate at the same line speed and use the same type clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.
7. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 and equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

Chart M - Nonswitched Public Data Networks (cont'd)

8. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4952, 4954, 4955, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2, or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities, and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911.

9. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This type communication requires duplex communication facilities.

10. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of EIA RS-232-C.

11. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.

12. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2, or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both communications types. See the M3659 pages for the requirements on that unit for the remote store communications.

13. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614.

14. Communication in the SNA/SDLC protocol requires no special feature on the 4701. Communication in the BSC protocol, *which is limited to a speed no greater than 4800 bps,* requires #1422.

15. 3525-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.

16. The 3525-1, 2, 3726 equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.

17. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART N

NONSWITCHED PUBLIC DATA NETWORKS PROVIDING A CCITT "X" SERIES INTERFACE

FACILITY N3: Point-to-point or multipoint synchronous operation at 2400 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4331	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4959, 4965	#2080
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8775	#5655 and #9822 (2)
8815	#5655 (2)

FACILITY N4: Point-to-point or multipoint synchronous operation at 4800 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4331	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4959, 4965	#2080
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8775	#5655 and #9823 (2)
8815	#5655 (2)

FACILITY N5: Point-to-point or multipoint synchronous operation at 9600 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4331	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4959, 4965	#2080
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8775	#5655 and #9825 (2)
8815	#5655 (2)

FACILITY N6: Point-to-point or multipoint synchronous operation at 48K bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6303
3705-II	#5655 and #9843
3705-81, 3705-82	#5658 and #9778
3725-1, 2, 3726	#4942
4331	#1601, #4695, #5655 and #969X (3)
4952, 4954, 4955, 4959, 4965	#2080
5360	#5655
8101, 8130 B 8140 A, B	#1602 and #5655 (4)
8140 C	#1613

NOTES FOR CHART N:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. The 3274, 3276, 8101, 8130, 8140, 8775 and 8815 will communicate as tributary stations with a control station 3705-II or 3725-1, 2, 3726, or 4331 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires a control station equipped for "data-full-duplex" operation. SDLC also supports the normal "data-half-duplex" mode of operation.

   The 8101, 8130 or 8140 will communicate as a control station to 3274-51C, 3276, and 8775 tributary stations in "data-half-duplex" mode.

   Finally, these SDLC DTEs, when attached to a network via the CCITT X.21 interface (as noted), will communicate with other SDLC DTEs attached to the same network via a CCITT X.21bis (EIA RS-232-C) interface feature. See Facilities M3, M4 and M5 in Chart M for information on DTEs attachable via a CCITT X.21bis interface feature.
3. The "X" in the **#969X** specify code denotes the line position on the 4331 to which the SDLC protocol will be assigned. See the M4331 pages for details.

Chart N - Nonswitched Public Data Networks Providing a CCITT "X" Series Interface (cont'd)

4. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or when the 8140 C does not contain #1610-#1614.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART P

PUBLIC PACKET SWITCHED NETWORKS PROVIDING A CCITT X.21bis (EIA RS-232-C OR CCITT V.35) INTERFACE

FACILITY P3: Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 51C	#3701 and #6302 or #6303 (2)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 or #6302 (2)
3651-25, 50, 75	#9121 or #9122 (2)
3651-60	No special feature required (2)
3684	#3701 and #9822 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3771, 3774 3775	#1481 and #3701 (2)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4331	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5285, 5288	#3701, #9753 and #9482 (2)
5340	#2500 and #3701 (2, 5)
5381	#3701 and #922X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P4: Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 51C	#3701 and #6302 or #6303 (2)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 or #6302 (2)
3651-25, 50, 75	#9124 or #9125 (2)
3651-60	No special feature required (2)
3684	#3701 and #9823 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3771, 3774 3775	#1481 and #3701 (2)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4331	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5285, 5288	#3701, #9754, and #9482 (2)
5340	#2500 and #3701 (2, 5)
5381	#3701 and #923X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P5: Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 51C	#3701 and #6302 or #6303 (2)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4331	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5340	#2500 and #3701 (2, 5)
5381	#3701 and #925X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P6: Synchronous operation at speeds up to 56K bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#4726 (3)
3705-80	#6712 and #9713 (3)
3725-1, 2, 3726	#4931 (3)

NOTES FOR CHART P:

1. See IBM for information on these facilities, including attachable DCEs, required options, etc.
2. Attachment of these DTEs to this facility is via a 5973 L02 Network Interface Adapter. For more information on this adapter, see RPQ Y96635.
3. The 3705-II, the 3705-80, and the 3725-1,2, 3726 require either the Program Product 5668-981 or the 5973-L02 Network Interface Adapter for operation on this facility.

Chart P - Public Packet Switched Networks Providing a CCITT X.21bis(an EIA RS-232-C or CCITT V.35) Interface (cont'd)

4. The "X" in the specify code **#969X** specifies in which line position on the 4331 this protocol is to be installed. See the M4331 pages for details.
5. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. See the M5340 pages for details.
6. The "X" in the 5381 specify code denotes the line position to which this speed will be assigned. See the M5381 pages for details.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART Q

PUBLIC PACKET SWITCHED NETWORKS PROVIDING A CCITT X.21 INTERFACE

FACILITY Q3: Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)

FACILITY Q4: Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)

FACILITY Q5: Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)

NOTES FOR CHART Q:

1. See IBM for information on these facilities, including attachable DCEs, required options, etc.
2. The 3705 and the 3725-1, 2, 3726 require Program Product 5668-981 for operation on this facility. A 3705 or a 3725-1, 2, 3726 attached to a network via a CCITT X.21 interface (as noted) may communicate with other DTEs attached to the same network via a CCITT X.21bis interface. See facilities P3, P4, P5 and P6 in Chart P for information on the attachment of DTEs to a network via the CCITT X.21bis interface.
3. No special feature is required. Specify **#9777** for nonswitched operation at 2400 bps, 4800 bps or 9600 bps. Specify **#9778** for nonswitched operation at 48K bps.

2701 DATA ADAPTER

PURPOSE

Attaches to a S/360 model 25 through 85, 195, or any S/370 or 4300 processor for communications with remote and local I/O devices operating via various customer or common carrier facilities.

MODELS

Model 1 001

Maximum Configuration: As an aid in determining allowable and maximum adapter configurations, the 2701 adapters have been categorized as belonging to Category I or Category II.

If more than two adapters from Category I, more than one adapter from Category II, or at least one adapter from each of the two Categories are to be installed, Expanded Capability (#3815) is required.

Category I

IBM Terminal Adapter Type I, Mod II (#4640)
IBM Terminal Adapter Type II (#4648)
Telegraph Adapter Type I (#7860, #7861, #7862)
Telegraph Adapter Type II (#7885)
Parallel Data Adapter (#5500), with two or less Parallel Data Extensions (#5505)

Category II

Parallel Data Adapter (#5500), with more than two Parallel Data Extensions (#5505)
Synchronous Data Adapter Type I (#7695, #7696)
Synchronous Data Adapter Type II (#7697, #7698)
IBM Terminal Adapter Type III (#4656, #4657)

Maximum Basic 2701 (w/o Expanded Capability, #3815):

Two adapters from Category I ... or one from Category II.

Maximum 2701 (w #3815):

Four adapters from Category I ... or two from Category II ... or two from Category I and one from Category II.

Notes: [1] An Expansion Feature (#3855) is required for each adapter after the first. [2] Channel Interface, 2nd (#1860) requires Expanded Capability (#3815). [3] Unless otherwise stated, an adapter as listed in the above categories includes the adapter and all its features.

Prerequisites: The 2701 requires a control unit position on a system channel.

S/360 mdl 25: Multiplexer channel (special feature).

S/360 mdl 30, 40, 50: Multiplexer channel (standard), or selector channels (special features).

S/360 mdl 44: Multiplexer channel, high-speed multiplexer channels, or additional high-speed multiplexer subchannels (special features).

S/360 mdl 65, 75: Selector channel of 2860, basic multiplexer channel of 2870, or selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/360 mdl 67: Selector channel of 2860, or basic multiplexer channel of 2870 ... see M2860, 2870 pages.

S/360 mdl 85, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, or shared subchannel of 2880 ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) -- see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), Block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel, selector channels (standard) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channel ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages. **Limitations:** Each SD-II attached to a block multiplexer channel operating in block multiplexing mode must be assigned to a unique shared subchannel and, if the 2701 is to be field installed, it must be at EC level 309060 or above.

S/370 mdl 165, 168, 195: Selector channel of 2860, multiplexer channel of 2870, selector subchannels (special features) of 2870, shared subchannel of 2880 ... see M2860, 2870, 2880 pages.

3031 or 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 or 3032 pages. See "3031, 3032, 3033 Limitations" below.

3033 Processor: Byte multiplexer channels (2 are standard), block multiplexer channels (10 are standard) ... see M3033 pages. See "3031, 3032, 3033, 3081, 3083 Limitations" below.

3081 or 3083 Processor Unit: Byte multiplexer channels, block multiplexer channels ... see M3081, 3083 pages. See "3031, 3032, 3033, 3081, 3083 Limitations" below.

3031, 3032, 3033, 3081, 3083 Limitations: Each SD-II attached to a block multiplexer channel operating in block multiplexing mode must be assigned to a unique shared subchannel and, if the 2701 is to be field installed, it must be at EC level 309060 or above.

4300 Processor: Byte multiplexer channel, block multiplexer channel.

HIGHLIGHTS

A modular unit which greatly expands the data communications and data acquisition I/O capabilities of S/360 and S/370. Provides for attachment of up to four half-duplex start/stop communications lines with line speeds up to 600 bps ... or up to four (maximum of two operating simultaneously) half-duplex synchronous communications lines with line speeds up to 230,400 bps* ... or up to four parallel data acquisition devices (word width -- 16 to 48 bits). Various combinations of the terminal devices are possible with any 2701.

* The number and speeds of attachable lines is also a function of the attached processor, the channels assigned, and the characteristics of other devices attached to those channels.

Communications Facilities: The 2701 operates in half-duplex mode ... for information concerning applicable communications facilities, see M2700 pages. The alphameric communications facility references indicated below correspond to those shown on the charts on those pages.

Terminal Devices: The 2701 can communicate with the following terminals over the facilities and in the modes and speeds indicated ... for further information about the adapters required on the 2701, see "Special Features" below.

Start/Stop Terminals:

Terminals	Speed (bps)	2701 Adapter Required
1030 Systems	600	#4648
1060 Systems	134.5	#4640 w/**#9581**
1070 Systems	134.5	#4640 w/**#9581**
	600	#4640 w/**#9582**
2740 mdl 1s, 2741s, or	134.5	#4640 w/**#9581**
5010 mdl As (3)	134.5	#4640 w/**#9581**
2740 mdl 2s, or	134.5	#4640 w/**#9581**
5010 mdl As	600	#4640 w/**#9582**
2845/2265s,2848/2260s	1200	#4656
	2400	#4657
3767 (as a 2740-2)	600	#4640 w/**#9582**
AT&T 83B2/83B3s	45.5	#7860
WU 115As	56.9	#7861
	74.2	#7862
TWX 33/35s (3)	110.0	#7885

Fixed 4-out-of-8 Code Terminals:

Note: Orders for Synchronous Data Adapter Type I (#7695, #7696) are on an "as available" basis ... customer-initiated deferrals of orders on 2701s which include either feature will subject the 2701 to an "as available" basis.

Terminals	Speed (bps)	2701 Adptr Req'd	Second Interface
1009,1013,7701,7702 7710,7711,7740,7750 S/360 mdl 20 w #2703 1130 w #7690	1200	#7696	#3462
1009,1013,7702,7710 7711,7740,S/360 mdl 20 w #2073, 1130 w #7690	2000	#7696	#3462
1009,1013,7702,7710 7711,7740,S/360 mdl 20 w #2073, 1130 w #7690	2400	#7696	#3462
7710,7711	19.2K	#7695	#3461
	40.8K	#7695	#3461

Parallel Data Services: For each data path, a Parallel Data Adapter (#5500) is required.

(1) Appropriate transmission code, **#9060** for EBCDIC, **#9061** for ASCII, or **#9062** for 6-bit Transcode, must be specified.

2701 Data Adapter (cont'd)

(2) Appropriate transmission code, **#9060** for EBCDIC, or **#9061** for ASCII, must be specified.

(3) Transparency (#8029) is also required.

(4) EDBDIC (**#9060**) must be specified on 2701.

Binary Synchronous Terminals:

Terminals	Speed (bps)	2701 Adapter Req'd		Second Interface
Another S/360 or S/370 via a 2701 with #7698, a 2703 with #7710, or 3704/3705	1200	#7698	(1)	#3464
	2000	#7698	(1)	#3464
	2400	#7698	(1)	#3464
	4800	#7698	(1)	#3464
	7200	#7698	(2)	#3464
2701 w #7697, or 3705 w #4717 (except for 230.4K bps which is not available on the 3705)	19.2K	#7697	(1)	#3463
	40.8K	#7697	(1)	#3463
	50.0K	#7697	(1)	
	230.4K	#7697	(1)	
2701	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
Series/1 w #2094 or #2074	1200	#7698		#3464
	2000	#7698		#3464
	2400	#7698		#3464
	4800	#7698		#3464
	7200	#7698		#3464
	9600	#7698		#3464
Series/1 w #2075	19.2K	#7698		#3463
	40.8K	#7698		#3463
	50.0K	#7698		#3463
System/3 w #2074	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
	19.2K	#7697	(2)	#3463
	40.8K	#7697	(2)	#3463
	50.0K	#7697	(2)	#3463
System/7 w #2074	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
	19.2K	#7697	(2)	#3463
	40.8K	#7697	(2)	#3463
	50.0K	#7697	(2)	#3463
System/32 w #2074	600	#7698	(2)	#3464
	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
System/34 w #2500	600	#7698	(2)	#3464
	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
System/36 w #3701	600	#7698	(2)	#3464
	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
S/360 mdl 20 w #2074	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
	19.2K	#7697	(2)	#3463
	40.8K	#7697	(2)	#3463
	50.0K	#7697	(2)	#3463
S/360 mdl 25 w #4580 and #7551 or #7552	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
S/370 mdl 115, 125 w #4640 and appropriate BSC features	1200	#7698		#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
	19.2K	#7697	(2)	#3463
	40.8K	#7697	(2)	#3463
	50.0K	#7697	(2)	#3463
S/370 mdl 135, 135-3, 138 w #4640 and **#9649-#9656**	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
1130 System w #7690	1200	#7698	(1)	#3464
	2000	#7698	(1)	#3464
	2400	#7698	(1)	#3464
	4800	#7698	(1)	#3464
1131	2400	#7698	(1)	#3464
	4800	#7698	(1)	#3464
1800 System w #7550	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
1826	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
2715 mdl 2	1200	#7698	(2,3)	#3464
	2000	#7698	(2,3)	#3464
	2400	#7698	(2,3)	#3464
	4800	#7698	(2,3)	#3464
2770 System	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
2772	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
2780	1200	#7698	(1)	#3464
	2000	#7698	(1)	#3464
	2400	#7698	(1)	#3464
	4800	#7698	(1)	#3464
3271/3277	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
3271 mdls 1, 2	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3275	600	#7698	(2)	#3464
	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
3275 mdls 1, 2	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3704	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3705	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3725	600	#7698	(2)	#3464
	1200	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	9600	#7698	(2)	#3464
3741 mdl 2, 3747	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
3771,3773,3774,3775 (w #1460, #1461 or #1462)	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3776 (w #1460, #1461 or #1462)	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
3777 mdl 1 (w #1460, #1461 or #1462)	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
3777 mdl 2	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
3780	1200	#7698	(2)	#3464
	2000	#7698	(2)	#3464
	2400	#7698	(2)	#3464
	4800	#7698	(2)	#3464
	7200	#7698	(2)	#3464
5231 mdl 2	1200	#7698	(4)	#3464
	2000	#7698	(4)	#3464
	2400	#7698	(4)	#3464

Modems: Up to two of the following IBM Modems may be attached to the 2701:

2701 Data Adapter (cont'd)

Modem	Speed (bps)	2701 Adapter Required		
3863 mdl 1 or 2	2400	#7698	(2)	
3868 mdl 1	2400	#7698	(2)	
3872 mdl 1	2400	#7698	(2)	#4657
3864 mdl 1 or 2	4800	#7698	(2)	
3868 mdl 2	4800	#7698	(2)	
3865 mdl 1 or 2	9600	#7698	(2)	
3868 mdl 3 or 4	9600	#7698	(2)	

Customer Responsibilities: See M2700 pages. The customer is also responsible for furnishing signal levels and impedance matching in accordance with specifications outlined in *OEMI Manual* (GA22-6844) for the Parallel Data Adapter (#5500) or any of the synchronous or start/stop adapters if he provides the modems, telegraph terminations, or privately-owned communications facilities.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9904** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Isolation, Control Unit: May be required on units shipped prior to December 29, 1967 ... see #4700 under "Special Features".
- A Cable Order must be submitted for: (1) Each new machine order, (2) Each MES order where the added feature requires external cable ... see *S/370 Installation Manual, Physical Planning,* GC22-7004, for cabling instructions.

SPECIAL FEATURES

Before ordering special features, consult feature descriptions and "Maximum Configuration" above. A completed, revised *2701 Specification Sheet,* Z120-1379, and copy of the latest preceding specifications sheet must be submitted with each MES for special features.

Autocall (#1302, #1303, #1314): Provides automatic dialing capabilities on Public Switched Networks. One of these features is required for each line equipped to automatically originate calls on switched networks. For the appropriate Automatic Calling Units, see Chart 3B in M2700 pages.

#1302 -- requires either an IBM Terminal Adapter Type I, Mod II (#4640 with Speed Selection **#9581**), or Telegraph Adapter Type II (#7885). **Note:** When ordering #1302 for field installation, a new #4640 with **#9581** must be ordered to replace an installed #4640/**#9851** [or the superseded IBM Terminal Adapter Type I (#4645)].

#1303 -- requires Synchronous Adapter Type I (#7696) and Internal Clock (#4703).

#1314 -- requires Synchronous Adapter Type II (#7698).

Maximum: One per adapter ... two #1302s or one #1303 or #1314 per 2701 without Expanded Capability (#3815) ... four #1302s, two #1303s or #1314s, or two #1302s and one #1303 or #1314 if #3815 is installed.

Channel Interface, 2nd (#1860): Provides the ability to attach the adapter(s) housed in the Expanded Capability (#3815) gate to a channel interface other than the one provided with the basic 2701. **Maximum:** One. **Prerequisites:** #3815 and #3855.

Dual Code (#3455): Permits a second code type, optional under program-controlled selection, for the Synchronous Data Adapter Type II (#7697, #7698). **Maximum:** One per Synchronous Data Adapter Type II. **Prerequisites:** #7697 or #7698 ... also see Station Selection (#7477) and Transparency (#8029) for applicability. **Specify:** **#9070** for EBCDIC, **#9071** for ASCII, or **#9072** for 6-bit Transcode.

Dual Communication Interface (#3461-#3464): Provides the Synchronous Data Adapter Type I (#7695, #7696) or Type II (#7697, #7698) with capability to interface with an additional facility ... determination of which interface is operational is under program control.

For #7695 or #7696:

#3461 -- for operation on Common Carrier Type 5701, 5703, 8801 or 8803 Wideband Services.

#3462 -- for operation on the Public Switched Telephone Network or a nonswitched Voice Grade Line.

Limitations: Autocall (#1303) is not operational on the Dual Communication Interface.

For #7697 or #7698:

#3463 -- for operation with facility E1, E2, or E3.

#3464 -- for operation with facility C4, C5, C6, D3, D4, D5 or D6.

Limitations: Autocall (#1314) is not operable on the Dual Communication Interface. The 2701 does not permit simultaneous operation of two lines attached to the same Synchronous Data Adapter. **Prerequisites:** Either #7695 or #7696 ... or #7697 or #7698 ... also see Internal Clock (#4703) or Synchronous Clock (#7692, #7693) for applicability.

Expanded Capability (#3815): Provides an additional gate that allows additional combinations of adapters ... allows for one additional adapter from Category II, or up to two adapters from Category I ... see "Maximum Configuration" below. Specify #3815 if: [1] Channel Interface, Second (#1860) is ordered ... [2] Adapters from two different categories are required ... [3] More than two adapters from Category I or more than one from Category II are required. **Maximum:** One.

Expansion Feature (#3855): Provides the 2701 with the capability of operating with an additional adapter. The number required per 2701 equals one less than the number of adapters specified ... see "Maximum Configuration" above. **Maximum:** One without Expanded Capability (#3815) ... three with #3815.

† **IBM Line Adapter (#4636, #4637):** A modem for 2-wire limited distance use (up to 8 wire-miles) ... see Limited Distance Line Adapter Type II in GA24-3435†† for specifications and restrictions. For operation of 1030/1060/1070/2740/2741/5010 over facilities which conform to the specifications in the manual referenced above.

#4636 -- for operation at 134.5 bps over facility G2.

#4637 -- for operation at 600 bps over facility G2.

Prerequisites: Each #4636 requires an IBM Terminal Adapter Type I, Mod II (#4640 with Speed Selection **#9581**) [or the replaced IBM Terminal Adapter Type I (#4645)] ... each #4637 requires a #4640 with Speed Selection **#9582** (or the replaced #4646), or an IBM Terminal Adapter Type II (#4648).

† **IBM Terminal Adapter Type I, Mod II (#4640):** Controls data transfers between S/360, S/370, 4331 or 4341 and 1060/1070/2741/5010 over facility C1, C2, D1, D2 or G2. Includes vertical and longitudinal redundancy checking for 1060, 1070 terminals. **Speed Selection:** One of the following must be specified: **#9581**, for operation at 134.5 bps to 1060/1070/2741/5010 ... **#9582**, for operation at 600 bps to 1070/5010s. **#9581** can be changed in the field to **#9582**, or vice versa.

If the facility is G2 conforming to the line requirements for Limited Distance Line Adapter Type 2 in GA24-3435††, #4640 may be used with an appropriate IBM Line Adapter (#4636, #4637) in lieu of a data set. **Limitations:** See "Maximum Configuration" above. **Maximum:** One without Expansion Feature (#3855) ... two with one #3855 ... three with two #3855s and Expanded Capability (#3815) ... four with three #3855s and #3815. **Prerequisites:** See Autocall (#1302) for applicability. **Note:** #4640 with **#9581** or **#9582** replaces the withdrawn IBM Terminal Adapter Type I (#4645, #4646).

† **IBM Terminal Adapter Type II (#4648):** Controls data transfers between S/360 or S/370 and 1030 terminals operating at 600 bps over facility G2, if the facility conforms to the line requirements for Limited Distance Line Adapter Type 2 in GA24-3435††. #4648 may be used with an IBM Line Adapter (#4637) in lieu of a data set. **Limitations:** See "Maximum Configuration" above. **Maximum:** One without Expansion Feature (#3855) ... two with one #3855 ... three with two #3855s and Expanded Capability (#3815) ... four with three #3855s and #3815.

† **IBM Terminal Adapter Type III (#4656, #4657):**

#4656 -- controls data transfers between a S/360 or S/370 and either remote 2845 Display Controls and/or 2848 Display Controls operating at 1200 bps over facility D3.

#4657 -- permits operation with 2845s and/or 2848s at 2400 bps over facility D4, if the data set provides clock pulses.

Limitations: See "Maximum Configuration" above. **Maximum:** One without Expanded Capability (#3815) ... two with #3815 and an Expansion Feature (#3855). **Prerequisites:** This feature requires a CPU with 16K bytes of main storage or larger.

Isolation, Control Unit (#4700): To turn power on or off the 2701 without generating spurious signals. Thus, a CPU program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Field Installation:** Yes, on units shipped prior to December 29, 1967 ... standard on units shipped after that. **Prerequisites:** Since in all cases there are compatible EC level requirements, the concurrence of IBM is required for any order for this feature.

Internal Clock (#4703): Required for Synchronous Data Adapter Type I (#7696) or Dual Communication Interface (#3462) if at least one data set does not provide clock pulses. Provides clocking, under program selection, for 1200, 2000 or 2400 bps operation. **Maximum:** One per #7695 or #7696.

---

† For further information, see M2700 pages.

†† See GA24-3435-2, or subsequent revisions.

2701 Data Adapter (cont'd)

IBM Line Adapter Base (#4708): Provides for mounting of up to two IBM 1200 bps Line Adapters and their associated Automatic Call Origination features. **Limitations**: Cannot be installed when any one of the following features is installed: IBM Line Adapter (#4636 or #4637), Telegraph Adapter, Type I (#7860, #7861 or #7862). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #7698 and #7692.

IBM 1200 bps Line Adapter, Leased (#4781): Provides one IBM 1200 bps Line Adapter which is suitable for communications over facility D3 with a similar line adapter. **Maximum**: Two. **Field Installation**: Yes. **Prerequisites**: #4708.

IBM 1200 bps Line Adapter, Switched (#4782): Provides one IBM 1200 bps Line Adapter which is suitable for communications over facility C4 with a similar line adapter. Attachment of this line adapter to the switched telephone network requires the use of FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. This line adapter includes the automatic answering capability. **Maximum**: Two per 2701. **Field Installation**: Yes. **Prerequisites**: #4708.

Automatic Call Origination (#4791): Provides the capability of automatically (under program control) dialing over the switched telephone network to a remote terminal. **Limitations**: This feature can be used on rotary dial systems only. Cannot be installed with Selectable Synchronous Clock (#7401). **Maximum**: One per IBM 1200 Bps Line Adapter, Switched (#4782). **Prerequisites**: #4782 and #1314.

Parallel Data Adapter (#5500): Provides a 16-bit wide path to customer devices ... odd parity and redundancy checking ... can be expanded to 48 bits [see Parallel Data Expansion (#5505) below]. Mode of operation is half-duplex at speeds limited only by channel and system configuration. A maximum of eight customer devices can be connected to the interface. However, there is but one data path shared by all devices. **Limitations**: See "Maximum Configuration" above. **Maximum**: One without Expansion Feature (#3855) ... two with one #3855 [neither #5500 can have more than two Parallel Data Expansions (#5505)] ... two with one #3855 and Expanded Capability (#3815) (either or both #5500s may have more than two #5505s) ... three with two #3855s and #3815 (only one of the three #5500s may have more than two #5505s) ... four with three #3855s and #3815 (none of the #5500s may have more than two #5505s).

Parallel Data Timeout (#5501): Provides a 2-second timeout of the external device responses to data transfer requests from a Parallel Data Adapter (#5500). **Maximum**: One per #5500.

Parallel Data Extension (#5505): Provides an additional 8-data-bit extension to the parallel data customer interface. **Limitations**: See #5500 above and "Maximum Configuration" above. **Maximum**: Four per #5500.

2nd Channel Enable/Disable Switch (#6301): Provides ability to disable 2701 functions to either CPU when the 2nd Channel Interface (#1860) is being used with two-different CPUs. **Field Installation**: Yes, on units with #1860s installed prior to December 29, 1967 ... standard on #1860s shipped after that. **Prerequisites**: #1860 ... 2701 must be at EC level 306675.

Selectable Synchronous Clock (#7401): Provides a synchronous clock which is capable of operation at 600 bps or at 1200 bps and provides a manual switch to allow the operator to select one of these two speeds. **Limitations**: Cannot be installed with any other synchronous clock or with Automatic Call Origination (#4791) ... when the Dual Communication Interface is installed, and this clock is to operate on both the basic and dual interface, both interfaces must operate at the same speed. **Maximum**: One per Synchronous Data Adapter, Type II (#7698). **Prerequisites**: #7698.

Station Selection (#7477): Required when a Synchronous Data Adapter Type II (#7697, #7698) and/or Dual Code (#3455) is functioning on a leased communications line as a tributary (terminal) station. **Maximum**: One per #7697 or #7698. **Prerequisites**: #7697 or #7698.

Synchronous Clock (#7692, #7693):

#7692 -- required for a Synchronous Data Adapter Type II (#7698) or Dual Communication Interface (#3464) if at least one data set attached requires external clocking at 1200 bps.

#7693 -- required for the same combinations above if at least one data set attached requires external clocking at 2400 bps.

Limitations: If #7692 or #7693 is required for both lines when using Dual Communication Interface (#3464), both lines must operate at the same speed. **Maximum**: One per #7697 or #7698.

Synchronous Data Adapter Type I (#7695, #7696): Provides control of data transfers between S/360 or S/370 and 4-out-of-8 code synchronous terminals (1009s, 1013s, 7701s, 7702s, 7710, 7711, 7740s, 7750s, S/360 mdl 20s with #2073s, 1130s with #7690s).

#7695 -- permits operation on common carrier Type 5701, 5703, 8801 or 8803 Wideband Services.

#7696 -- permits operation on the Public Switched Telephone Network or a nonswitched Voice Grade Line.

Limitations: See "Maximum Configuration" above. **Maximum**: One without Expanded Capability (#3815) ... two with #3815 and one Expansion Feature (#3855). **Field Installation**: No. **Prerequisites**: See Autocall (#1303) and Internal Clock (#4703) for applicability. Note: Orders for #7695 or #7696 are on an "as available" basis. Customer-initiated deferrals or orders for 2701s which include either feature will subject the 2701 orders to an "as available" basis.

† **Synchronous Data Adapter Type II (#7697, #7698)**: Provides control of data transfers between S/360 or S/370 and binary synchronous terminals ... see "Terminal Devices" above.

#7697 -- permits operation with high-speed digital facilities.

#7698 -- permits operation with voice grade facilities.

Limitations: **#9062** cannot be used to communicate with a System/32 with #2074, a S/360 mdl 20 with #2074, a S/360 mdl 25 with #4580, a 2703 with #7703 or #7706, an 1800 system with #7550, a 2770 system, a 3735, 3741 mdl 2 or 4, 3747, 3780 or 2715 mdl 2 ... also see "Maximum Configuration" above. Neither **#9061** nor **#9062** can be used to communicate with a 3671 Shared Terminal Control Unit or a 5231 mdl 2. **Maximum**: One per 2701 without Expanded Capability (#3815) ... two with #3815 and one Expansion Feature (#3855) ... for added line capability per adapter, see Dual Communication Interface (#3463, #3464). **Field Installation**: Yes. When ordering #7697 or #7698 for field installation in adapter position No. 1, all features in position No. 1 and No. 2 must be removed ... for field installation in position No. 3, all adapter features in position No. 3 and all features in position No. 4 must be removed. **Prerequisites**: See Autocall (#1314), Dual Code (#3455) Station Selection (#7477), Synchronous Clock (#7692, #7693) and Transparency (#8029) for applicability. **Specify**: For each adapter one of the following is required: **#9060** for EBCDIC code, **#9061** for ASCII code, or **#9062** for 6-bit Transcode.

† **Telegraph Adapter Type I (#7860-#7862)**: Controls data transfers between S/360 or S/370 and various teletypewriter terminals ... line control must be identical to AT&T Selective Calling Terminals Type 83B2/83B3 or WU Plan 115A Terminals ... a 62.6 mA neutral DC Loop is required ... both types of terminals cannot be mixed on the same line.

#7860 -- for operation at 45.5 bps with facility A1.

#7861 -- for operation at 56.9 bps with facility A2.

#7862 -- for operation at 74.2 bps with facility A3.

Limitations: See "Maximum Configuration" above. **Maximum**: One per 2701 without Expansion Feature (#3855) ... two with one #3855 ... three with two #3855s and Expanded Capability (#3815) ... four with three #3855s and #3815.

† **Telegraph Adapter Type II (#7885)**: Controls data transfers between S/360 or S/370 and Mdl 33/35 TTY Terminals (8-level code at 110 bps only) with facility C2. **Limitations**: See "Maximum Configuration" above. **Maximum**: One per 2701 without Expansion Feature (#3855) ... two with one #3855 ... three with two #3855s and Expanded Capability (#3815) ... four with three #3855s and #3815. **Prerequisites**: See Autocall (#1302) for applicability.

Transparency (#8029): Provides a Synchronous Data Adapter Type II (#7697, #7698) and/or Dual Code (#3455) with the ability to transmit and receive 8-bit binary data as well as EBCDIC or ASCII codes ... or 6-bit binary data as well as 6-bit Transcode. ASCII Transparency modifies VRC/LRC checking to VRC/CRC checking. **Limitations**: ASCII code transparency is not available on the 2780 Data Transmission Terminal, 3780 Data Communications Terminal, System/3 or System/32. Therefore a 2780 or System/3 with ASCII code will not operate with a 2701 equipped with #8029 when the #8029 is assigned to the ASCII code. To communicate with a 2701 in transparent mode, the 2780 must be equipped with EBCDIC Transparency (#8030), the 3780 with EBCDIC Transparency (#3601), or the System/3 with Text Transparency (#7850). On System/32, ASCII, EBCDIC and EBCDIC Transparency are standard and one is selected by programming. The 5231 mdl 2 does not support transparent mode. **Maximum**: One per #7697 or #7698. **Prerequisites**: #7697 or #7698 ... when this feature is ordered, there are additional restrictions and limitations to the facility and operation. For details, see GA27-3004. **Specify**: Either or both of the following -- **#9700** for use with **#9060, #9061** or **#9062** on Synchronous Data Adapter Type II (#7697, #7698) ... or **#9701** for use with **#9070, #9071** or **#9072** on Dual Code (#3455).

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

† For further information, see M2700 pages.

† For further information, see M2700 pages.
†† See GA24-3435-2, or subsequent revisions.

2702 TRANSMISSION CONTROL

[NO LONGER AVAILABLE]

SPECIFY

- Communication Cable Order: A Cable Order must be submitted for each MES order where the added feature requires external cable. See *S/370 Installation Manual - Physical Planning* (GC22-7004), for cabling information.

SPECIAL FEATURES

Special features are on an "as available" basis for field installation.

Limitations:

- Up to three of the four available terminal controls #4615, #4616, #7911, #7912 can be installed.
- Up to four selective speeds can be specified.
  (a) With each #4615 or #7911, one selective speed must be specified.
  (b) With each Add'l Selective Speed (#1065), another selective speed other than that specified for #4615 or #7911 must be specified.
- The combined total number of terminal controls [maximum, three], Add'l Selective Speed (#1065) [maximum, two], 2741 Break (#8055) [maximum, one], and Type I Terminal Interrupt (#8200) [maximum, one] cannot exceed four.
- #4616 cannot be used when 2741 Break (#8055) or Type I Terminal Interrupt (#8200) is installed.

Ordering Information: Before ordering features, consult "Limitations" above and individual feature descriptions. A completed, revised *2702 Specification Sheet* (Z120-1374), and a copy of the latest preceding specification sheet must be submitted with each MES order for special features.

Add'l Selective Speed (#1065): To add an additional different selective speed with terminal controls (#4615 or #7911). Permits attachment of terminals/facilities of more than one speed to the same terminal control. **Maximum:** Two ... one with #4615, the other with #7911 ... also see "Limitations" above. **Prerequisites:** #4615 or #7911 ... **#9685** requires #7387. **Specify:** With #4615 -- **#9683** for 75 bps, **#9684** for 134.5 bps or **#9685** for 600 bps. With #7911 -- **#9680** for 45.5 bps, **#9681** for 56.9 bps or **#9682** for 74.2 bps.

Autocall Adapter (#1290): For attachment to an automatic calling unit. **Maximum:** Eight ... 16 with Autocall Expansion (#1311). **Prerequisites:** #1310, and, for each line, #3233.

Autocall (#1310): Provides automatic dialing capabilities on facilities C1 and C2 for up to eight lines. **Maximum:** One.

Autocall Expansion (#1311): Expands the automatic dialing capability to sixteen line attachments. **Maximum:** One. **Prerequisites:** #1310.

Auto Poll (#1319): Operates in conjunction with IBM Terminal Control-Type I (#4615) and/or IBM Terminal Control-Type II (#4616) to allow continuation of polling after negative responses on all of the lines served by those terminal controls without having program interruptions. **Maximum:** One. **Prerequisites:** #4615 or #4616.

Data Set Line Adapter (#3233): To attach an external data set for operation -- at 110 bps over facility C2 -- at 134.5 bps over facility C1, C2 or D1 -- at 600 bps over facility D2 ... or to attach a line to a Line Adapter Unit (#2711). For more information, see M2700 pages. **Maximum:** 15 ... 31 with #7955.

Expansion Base (#3853): Required if an IBM Line Adapter (#4634, #4635) is to be installed. **Maximum:** One.

IBM Line Adapter (#4612, #4613): A modem for 2-wire, limited distance use up to 8 wire-miles. See "Limited Distance Line Adapter, Type 2" in *Line Adapter for Data Communication Equipment* (GA24-3435), for specifications and restrictions.

#4612 - for use with 1060 or 1070 systems, or 2741 terminals or 5010 operating at 134.5 bps over facility G2.

#4613 - for use with 1030, 1070 systems or 5010 operating at 600 bps over facility G2.

Limitations: #4612 and #4613 may not be installed if both 1032 Attachment (#7918) and IBM Line Adapters (#4634 or #4635) are to be installed. Only 15 #4612s/#4613s may be installed if #7918 is installed. If maximums are exceeded, investigate possible use of a 2711 Line Adapter Unit. See M2700 pages for more information. **Maximum:** #4612 and #4613 are assigned a weight of three each, where the total weight of IBM Line Adapters (#4612, #4613 #4634 and #4635) may not exceed 50. **Prerequisites:** For either -- #4615, #4616 ... #7387 for #4613 ... #7955 for more than 15 #4612s.

IBM Terminal Control - Type I (#4615): Controls for attachment of 1060s, 1070s, 2741s, 5010. Includes vertical and longitudinal redundancy checking for 1060s, 1070s, 5010. **Maximum:** One ... also see "Limitations" above. **Prerequisites:** **#9696**. **#9685** also requires #7387. **Specify:** Selective Speed -- **#9683** for 75 bps, **#9684** for 134.5 bps, or **#9685** for 600 bps ... for more than one speed, see Add'l Selective Speed (#1065).

IBM Terminal Control - Type II (#4616): Controls for attachment of 1031 Input Station mdl As and the 1032 Digital Time Unit ... includes vertical redundancy checking. **Limitations:** Not available if 2741 Break (#8055) is installed. **Maximum:** One ... also see "Limitations" above. **Prerequisites:** #7387, **#9696**.

IBM Line Adapter (#4634, #4635): [#4634 for 2-wire, #4635 for 4-wire] A modem for local use up to 4.75 wire-miles over facility G2. See "Limited Distance Line Adapter, Type I" in *Line Adapter for Data Communications Equipment* (GA24-3435), for specifications and restrictions ... also M2700 pages. **Limitations:** #4634 and #4635 may not be installed if both 1032 Attachment (#7918) and IBM Line Adapters (#4612, #4613) are to be installed. Only 21 #4634s/#4635s may be installed if #7918 is installed. **Maximum:** #4634 and #4635 are assigned a weight of two each, where the total weight of IBM Line Adapters (#4612, #4613, #4634, #4635) may not exceed 50. **Prerequisites:** #4615 and #3853, and for more than 15, #7955.

Isolation, Control Unit (#4700): [for field installation only on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn 2702 power on or off without generating spurious signals. Thus, a CPU program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** Because in all cases there are compatible EC level requirements, the concurrence of the Branch FE Manager is required for any order for this feature.

Remote Switch Attachment (#6148): Provides partitioning and the ability to attach the Two-Processor Switch (#8110) to a S/360 mdl 65MP which has the Configuration Control Panel (#1505) installed or to a 2167 Configuration Unit ... for use in a multiprocessor S/360 mdl 65 or a S/360 mdl 67-2 only. **Prerequisites:** #8110.

Speed Extension (#7387): Increase line speed capability to 600 bps on all (15) lines of the basic 2702. **Limitations:** Cannot be installed with 31-Line Expansion (#7955). **Maximum:** One. **Prerequisites:** #4615 or #4616.

Telegraph Line Adapter (#7895): For attachment to the A1 facility at 45.5 bps, the A2 facility at 56.9 bps or the A3 facility at 74.2 bps. A 62.5 milliamp neutral DC Loop is required. See M2700 pages for more information. **Maximum:** 15 ... 31 with #7955.

Telegraph Terminal Control - Type I (#7911): Controls for attachment of AT&T 83B2/83B3 or WU Plan 115A terminals. **Maximum:** One ... also see "Limitations" above. **Prerequisites:** **#9697**. **Specify:** **#9680** for 45.5 bps operation, **#9681** for 56.9 bps or **#9682** for 74.2 bps ... for more than one speed, see Add'l Selective Speed (#1065). Automatic Downshift on Space Character -- **#9100**. When specified, it governs for all lines using #7911 ... used with this type terminal control only.

Telegraph Terminal Control - Type II (#7912): Controls for attachment of TWX stations using 8 level code at 110 bps. **Maximum:** One ... also see "Limitations" above. **Prerequisites:** **#9697** ... see "Specify".

1032 Attachment (#7918): To attach a 1032 Digital Time Unit via a 6m (20 foot) cable supplied with the 1032. **Limitations:** Must go on Line Address Number 1 ... unavailable if more than 15 IBM Line Adapters (#4612, #4613) or 21 IBM Line Adapters (#4634, #4635) are installed, or if both an IBM Line Adapter (#4612, #4613) and an IBM Line Adapter (#4634, #4635) are installed. **Maximum:** One. **Note:** Other 1030 terminals may operate remotely on the same line. **Prerequisites:** #4616 and #7387 ... if not to be attached to a line previously specified for Line Address Number 1, a Data Set Line Adapter (#3233) or IBM Line Adapter (#4613) specified for Line Address Number 1 is also required ... #3273 is required on the 1032.

Terminal Control Expansion (#7935): Required if both IBM and telegraph terminals are to be attached to the same 2702. **Maximum:** One. **Prerequisites:** **#9696** and **#9697**.

31-Line Expansion (#7955): Increase the line attachment capability to 31 half-duplex communication lines operating at speeds up to 200 bps. **Limitations:** Cannot be installed with Speed Expansion (#7387). **Maximum:** One.

2741 Break (#8055): Allows the IBM Terminal Control-Type I (#4615) to operate with a 2741 equipped with Receive Interrupt (#4708). #4615 may be used independently of this feature even though #8055 is installed. **Limitations:** Not available if IBM Terminal Control-Type II (#4616) or Type I Terminal Interrupt (#8200) is installed. **Maximum:** One. **Prerequisites:** #4615 with **#9684** ... if IBM Line Adapters are used they must be 4-wire version ... if #4615 is to control other non-interrupt 134.5 bps terminals, two **#9684**s are required, one associated solely with the interrupt terminals, the other solely with the non-interrupt terminals.

Two-Processor Switch (#8110): For switching the 2702 between two S/360 or S/370 multiplexer channels via program control. **Maximum:** One. **Prerequisites:** In a S/360 mdl 67-2, #6148. If the Two-Processor Switch is routed through the Configuration Control Panel (#1505) of a S/360 mdl 65MP system, #6148 is required.

2702 Transmission Control (cont'd)

Type I Terminal Interrupt (#8200): Allows the IBM Terminal Control-Type I (#4615) to operate in a bidirectional interrupt mode with 2741s with Transmit Interrupt (#7900) and Receive Interrupt (#4708). #4615 may be used with non-interrupt equipped terminals even though #8200 is installed. **Limitations**: Not available if IBM Terminal Control-Type II (#4616) or 2741 Break (#8055) is installed. **Maximum**: One. **Prerequisites**: #4615 and **#9684** ... if #4615 is to communicate with 2741s with Transmit Interrupt and any other non-interrupt 134.5 bps terminal, two **#9684**s are required, one associated solely with the interrupt terminals, and the other associated solely with the non-interrupt terminals. **Note**: Special Product Marketing Support must be contacted to verify compatibility when #8200 is to be added to a 2702 with an installed or on-order RPQ.

2703 TRANSMISSION CONTROL

[NO LONGER AVAILABLE]

SPECIFY

- Communication Cable Order: A Cable Order must be submitted for each MES order where the added feature requires external cable. See *S/370 Installation Manual - Physical Planning* (GC22-7004), for cabling information.

SPECIAL FEATURES

Special features are on an ''as available'' basis for field installation.

Autocall (#1340 for first, #1341 for second): Each provides up to eight line appearances of a given Data Line Set (#3205) or Data Line Set Expander (#3206), or two Synchronous Line Sets (#7710), with automatic calling capability. For attachment to facilities C4, C5 or C6. See IBM for appropriate Automatic Calling Units. When using #1340 or #1341 with a Synchronous Line Set, a first or second autocall feature may be associated with two Synchronous Line Sets (eight BSC lines) if both #7710s are the same Synchronous Base, have consecutive addresses, and the first begins on a base address boundary which is a multiple of eight. **Maximum:** One of each. **Prerequisites:** One #3205 or #3206 for each #1340 or #1341 ... or one or two #7710s for each #1340 or #1341 ... #1341 requires #1340.

Base Expansion (#1440): Required to attach a Synchronous Attachment (#7702), or more than one Start/Stop Base Type I (#7505) or Type II (#7506). **Maximum:** One.

IBM Terminal Control Base (#4619): To attach an IBM Terminal Control Type I (#4696) and/or Type II (#4697). **Maximum:** One. **Prerequisites:** #7505 or #7506.

IBM Terminal Control Type I (#4696): Controls for attachment of 1060s, 1070s, 2741s and 5010 . Includes vertical and longitudinal redundancy checking for 1060, 1070, 5010. **Maximum:** One. **Prerequisites:** #4619.

IBM Terminal Control Type II (#4697): To communicate with 1030 systems. **Maximum:** One. **Prerequisites:** #4619.

Isolation, Control Unit (#4700): [For field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2703 without generating spurious signals. Thus, a CPU program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** Because there are compatible EC level requirements, in all cases, the concurrence of IBM is required for any order for this feature.

Line Speed Option (#4873-#4875, #4877-#4879): Defines the line speed available for asynchronous features on the 2703. **Maximum:** Six, one of each of the following:

- #4873 - 45.5 bps for common carrier half-duplex telegraph service
- #4874 - 56.9 bps for common carrier half-duplex telegraph service
- #4875 - 74.2 bps for common carrier half-duplex telegraph service
- #4877 - 110 bps for TWX
- #4878 - 134.5 bps for 1060 systems, 2741 terminals, 1070 systems or 5010 not requiring 600 bps
- #4879 - 600 bps for 1030 systems, 1070 systems or 5010 requiring 600 bps.

Station Selection (#7473): Required when one or more lines are assigned to a Synchronous Terminal Control (#7715, #7716, #7717) which is functioning on a leased communications line as a tributary (terminal) station. **Maximum:** One per #7715, #7716, #7717. **Prerequisites:** #7715, #7716, #7717.

Start/Stop Base Type I (#7505): To attach up to 88 half-duplex line appearances (11 Line Set Features) operating up to 165 bps. May be intermixed with Start/Stop Base Type IIs (#7506) and/or Synchronous Base Type 1A (#7703), Type 1B (#7704) or Type 2A (#7706). **Maximum:** Three ... but total half-duplex line appearances per 2703 cannot exceed 176. **Prerequisites:** The second #7505 installed requires #1440.

Start/Stop Base Type II (#7506): To attach up to 24 half-duplex line appearances (3 Line Set Features) operating up to 600 bps. May be intermixed with Start/Stop Base Type I (#7505) and/or Synchronous Base Type 1A (#7703), Type 1B (#7704) or Type 2A (#7706). **Maximum:** Three. **Note:** #7506 may be used to attach features normally attached via #7505, although the limitations for #7506 remain unchanged. **Prerequisites:** The second #7506 installed requires #1440.

Synchronous Attachment (#7702): To attach any synchronous lines. **Maximum:** One. **Prerequisites:** #1440.

Synchronous Base Type 1A (#7703), Type 1B (#7704), Type 2A (#7706):

- #7703 - to attach up to 24 half-duplex lines (6 synchronous line sets) at bit rates up to 2400 bps using Synchronous Terminal Control (#7715 for EBCDIC or #7716 for ASCII).
- #7704 - to attach up to 16 half-duplex lines (4 synchronous line sets) at bit rates up to 2400 bps using Synchronous Terminal Control (#7717 for 6-bit Transcode), either by itself, or in combination with #7715 or #7716.
- #7706 - to attach up to 12 half-duplex lines (3 synchronous line sets) at bit rates up to 4800 bps using Synchronous Terminal Control (#7715 for EBCDIC or #7716 for ASCII).

May be intermixed with Start/Stop Base Type I (#7505) and/or Type II (#7506). **Limitations:** No more than two Synchronous Terminal Controls can be associated with one Synchronous Base. **Maximum:** Two. **Prerequisites:** #7702.

Synchronous Line Speed Option (#7711): Defines the 1200 bps synchronous line speed for Synchronous Clock(s) (#7705). **Note:** This option may not be used with any Synchronous Line Set on which a data set clocked line appears. **Maximum:** One per 2703.

Synchronous Terminal Control (#7715, #7716, #7717): To communicate with synchronous terminals.

- #7715 - for terminals communicating in EBCDIC code.
- #7716 - for terminals communicating in non-transparent ASCII code.
- #7716/**#9100** - for terminals communicating in transparent ASCII code. *

- #7717 - for terminals communicating in 6-bit Transcode.

* **Note:** Transparency (**#9100**) modifies the VRC/LRC check to a CRC check, making the #7716/**#9100** a fourth synchronous terminal control type. Transparency capability is included in the #7715 and #7717 Synchronous Terminal Controls. When transparency is used with any of these codes, there are additional restrictions and limitations ... see *Bisynchronous Communications - General Information* (GA27-3004).

Maximum: One of each ... three if no IBM Terminal Control Type I (#4696) or Type II (#4697), Telegraph Terminal Control Type I (#7911) or Type II (#7912) is installed ... otherwise, only two. **Prerequisites:** For #7715 or #7716 -- #7703, #7704 or #7706. For #7717 -- #7704. #7473 may also be required.

Telegraph Attachment (#7876): To attach Telegraph Line Sets (#7897) ... required when one or more 83B2/83B3 or 115A lines are attached via Telegraph Line Sets (#7897) ... *Not* required when 83B2/83B3 and 115A lines are attached via 2712 Remote Multiplexer mdl 2s. **Maximum:** One.

Telegraph Terminal Control Base (#7905): To attach a Telegraph Terminal Control, Type I (#7911) and/or Type II (#7912). **Maximum:** One.

Telegraph Terminal Control Type I (#7911): To communicate with AT&T 83B2/83B3 or WU 115A terminals. **Maximum:** One. **Specify: #9129** for downshift on space, if desired. **Prerequisites:** #7905.

Telegraph Terminal Control Type II (#7912): To communicate with TWX Mdl 33/35 terminals. **Maximum:** One. **Prerequisites:** #7905.

2741 Break (#8055): Allows the IBM Terminal Control-Type I (#4696) to operate with a 2741 equipped with Receive Interrupt (#4708). #4696 may be used independently of this feature even though #8055 is installed. **Note:** All lines on any Line Set or Line Set Expander to which this feature is applied must operate with this feature. **Limitations:** Not available if Type I Terminal Interrupt (#8200) is installed. **Maximum:** One. **Prerequisites:** #4696 ... If IBM Line Adapters are used, they must be the 4-wire version.

Two-Processor Switch (#8110): For switching the 2703 channel interface between two S/360 or S/370 multiplexer channels under program control. **Maximum:** One. **Prerequisites:** Emergency Power-Off Control on attached processing units.

Type I Terminal Interrupt (#8200): Allows the IBM Terminal Control Type I (#4696) to operate in a bidirectional interrupt mode with 2741s equipped with Transmit Interrupt (#7900) and Receive Interrupt (#4708). #4696 may be used with non-interrupt equipped terminals even though #8200 is installed. **Limitations:** Not available if 2741 Break (#8055) is installed. **Maximum:** One. **Prerequisites:** #4696 ... if IBM Line Adapters are used they must be the 4-wire version. **Note:** Special Product Marketing Support must be contacted to verify compatibility when #8200 is to be added to a 2703 with an installed or on-order RPQ.

Line Set Special Features

All lines in a given line set or line set expander must operate at the same speed (unless clocking is supplied by the data set) over the same type communications facilities (e.g., all lines connecting to a given line set or line set expander must be either switched network or leased. All lines must be 2-wire or 4-wire) with terminals employing the same type of line control, with either business machine or data set clocking, but not a combination (also see #8055 limitations).

2703 Transmission Control (cont'd)

Data Line Set (#3205): For attachment of up to eight line appearances of asynchronous terminals (1030, 1060, 1070, 2741, 5010 and TWX Mdl 33/35 type) over facilities C1, C2, D1 or D2 ... or for attachment of up to eight line appearances to a Line Adapter Unit (#2711). See M2700 pages for further information. **Maximum:** 12. **Prerequisites:** #7505 or #7506 ... #4877, #4878 or #4879 as appropriate ... either #4619, or for TWX, #7905 ... one of the following: #4696 or #4697, or for TWX, #7912.

Data Line Set Expander (#3206): Permits attachment of up to eight additional lines to a Data Line Set (#3205). **Maximum:** One per #3205 ... ten per 2703. **Prerequisites:** One #3205 per #3206.

IBM Line Set 1A (#4686): Eight IBM limited distance line adapters Type I for 2-wire local use (up to 4.75 wire-miles each) over facility G1. See "Limited Distance Line Adapter Type I" in *Line Adapter for Data Communications Equipment* (GA24-3435), for specifications and restrictions. To attach up to eight half-duplex line appearances accommodating 2741 terminals. See M2700 pages for further information. **Limitations:** Cannot be installed if any IBM Line Set 2s (#4688) are installed. **Maximum:** Total number of #4686s and IBM Line Adapter 1Bs (#4687) cannot exceed 12. **Prerequisites:** #7505 or #7506 ... #4878 for 134.5 bps ... #4619 ... #4696 ... for more than nine #4686s, an additional #7505 or #7506 and its prerequisites.

IBM Line Set 1B (#4687): Eight IBM limited distance line adapters Type I for 4-wire local use (up to 4.75 wire-miles each) over facility G1. See "Limited Distance Line Adapter Type I" in *Line Adapter for Data Communication Equipment* (GA24-3435), for specifications and restrictions. To attach up to eight line appearances accommodating 2741 terminals. See M2700 pages for further information. **Limitations:** Cannot be installed if any IBM Line Set 2s (#4688) are installed. **Maximum:** Total number of #4687s and IBM Line Set 1As (#4686) installed cannot exceed 12. **Prerequisites:** #7505 or #7506 ... #4878 for 134.5 bps ... #4619 ... #4696 ... for more than nine #4687s, an additional #7505 or #7506 and its prerequisites.

IBM Line Set 2 (#4688): Eight IBM limited distance line adapters Type II for 2-wire local use (up to 8 wire-miles each) over facility G2. See "Limited Distance Line Adapter Type II" in *Line Adapter for Data Communications Equipment* (GA24-3435), for specifications and restrictions. To attach up to eight half-duplex line appearances accommodating 1030, 1060, 1070, 2741, 5010 systems and terminals. **Limitations:** Cannot be installed if any IBM Line Set 1As (#4686) or 1Bs (#4687) are installed. **Maximum:** Four. **Prerequisites:** #7505 or #7506 ... #4878 or #4879 ... #4619 ... #4696 or #4697.

Telegraph Line Set (#7897): For attachment of up to eight line appearances via facilities A1, A2 or A3 ... interfaces AT&T 83B2/83B3 and WU Plan 115A terminals. See M2700 pages for further information. **Maximum:** 12. **Caution:** When operating *two* 2703s with #7897s in series on the same telegraph current loop, RPQ S30017 (no-charge) must be applied to one 2703 and RPQ S30018 (no-charge) must be applied to the other 2703. These RPQs are *not* required for a single 2703 operating two telegraph line appearances on the same telegraph current loop. **Prerequisites:** #7505 or #7506 ... #4873, #4874, #4875 or #4876 as appropriate ... #7905 ... #7911 ... #7876.

Telegraph Line Set Expander (#7898): For attachment of up to eight additional lines to a Telegraph Line Set (#7897). See M2700 pages for further information. **Maximum:** One #7898 per #7897 ... ten per 2703. **Prerequisites:** One #7897 for each #7898.

Synchronous Clock (#7705): Provides clocking for up to four synchronous line appearances. Required for attachment of facilities C4, D3 ... each #7705 permits attachment of up to four such facilities. See M2700 pages for modems requiring this feature. **Limitations:** The maximum number of Synchronous Line Sets (#7710) is reduced when any #7705s are installed ... see "General Limitations" below. **Maximum:** One per each #7710 ... three per Synchronous Base Type 1A (#7703), Type 1B (#7704) or Type 2A (#7706) ... six per 2703. **Prerequisites:** #7710 ... #7711.

Synchronous Line Set (#7710): For attachment of up to four synchronous line appearances via facilities C4, C5, C6, D3, D4, D4SB, D5 or D5SB ... accommodates 2701s and 2703s with S/360/370s, System/3s and S/360 mdl 20s with #2074, S/360 mdl 25s with #4580 and #7551 or #7552, 2715 mdl 2s, 2780s and 3780s. See M2700 pages for further information. **Limitations:** See Synchronous Clock (#7705). **Maximum:** Six per Synchronous Base Type 1A (#7703) ... four per Type 1B (#7704) ... three per Type 2A (#7706) ... 12 per 2703. **Prerequisites:** #1440 ... #7702 ... #7703, #7704 or #7706 ... #7715, #7716 or #7717 ... #7705 may be required.

General Limitations

Combinations of the following features may not exceed a total assigned weight of nine per Start/Stop Base-Type I (#7505) or Type II (#7506) and six per Synchronous Base Type 1A (#7703), Type 1B (#7704) or Type 2A (#7706). Due to this limitation, it may be necessary to order three Start/Stop Base-Type Is (#7505) with some unusual configurations.

Feature	Assigned Weight
Data Line Set (#3205)	1
Data Line Set Expander (#3206)	0
Telegraph Line Set (#7897)	1
Telegraph Line Set Expander (#7898)	0
IBM Line Set 1A (#4686)	1
IBM Line Set 1B (#4687)	1
IBM Line Set 2 (#4688)	2
Synchronous Line Set (#7710)	1
Synchronous Clock (#7705)	1

2715 TRANSMISSION CONTROL UNIT

[NO LONGER AVAILABLE]

PURPOSE

The Transmission Control Unit for a 2790 Data Communications System. Controls data transfer between 2790 system components and S/360 models 22-85 (except mdl 44), and 195, any S/370 processor and the 4331 Processor.

MODELS

Model 1 001
Model 2 002

Modems: One IBM Modem can be attached to a 2715 mdl 2 only. Two IBM Modems can be attached with Dual Communications Interface (#3460) installed. Modem 3872 mdl 1, 2400 bps. **Note:** For communications capabilities, product utilization and special features, see M2700 and 3872 pages.

SPECIFY

The following specifys can be changed in the field.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): With locking plug, **#9884** for 208V, **#9886** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below-floor, or **#9081** for on-floor.
- Extended Distance Repeater, Receive/Send (#3874/#3875):
  - If #3874 or #3875 is ordered, **#9486** must be specified for 2715s having serial number 10071 or below.
  - If any #3874 or #3875 features are used in the 2790 system, Oscillator Change (**#9548**) must be specified on each 2791 mdl 1 or 2 or 2793 in the system.

  See feature description in M2791 or 2793 pages for prerequisites.

SPECIAL FEATURES

Special features are on an ''as available'' basis for field installation.

Dual Communications Interface (#3460): [Mdl 2] Provides a switched interface which allows the BSC adapter to be manually switched between two types of communications lines for backup purposes. **Limitations:** This feature does not provide the capability to operate two lines simultaneously. **Maximum:** One.

Expanded Capability (#3801): Provides the system with an additional 16K of control storage for a system total of 32K. Required for a maximum of device configuration on a 2715, for control of the External Alarm Contacts (#3690) feature on attached 2791/2793 Area Stations, 2798 Guidance Display Units, or 2792 Remote Communications Controllers, and for message routing independent of host CPU intervention. **Maximum:** One.

Extended Distance Repeater, Receive (#3874): Provides for operation with a 2791, or 2793 Area Station equipped with Extended Distance Repeater, Send (#3875) located up to 6,000 wire-feet away. See *Physical Planning Manual* (GA27-3017), for cable specifications. **Maximum:** Four. **Limitations:** See "Limitations" for Extended Distance Repeater, Send (#3875) below. **Prerequisites:** #3875 on the "up-line" 2791/2793. Also see "Specify".

Extended Distance Repeater, Send (#3875): Provides for operation with a 2791/2793 Area Station equipped with Extended Distance Repeater, Receive (#3874) located up to 6,000 wire-feet away. See *Physical Planning Manual* (GA27-3017), for cable specifications. **Limitations:** [1] The use of two pairs of Extended Distance Repeaters, Receive/Send (#3874, #3875) in tandem is not recommended. If the Area Station having both receive and send repeater features should fail, the entire segment would be inactive. [2] Maximum of eight pairs per transmission line attached to the 2715. Maximum of two pairs may be used on a secondary loop attached to a 2792. [3] In the 2715, each of the four segments may include (a) EDR, Send (#3875) only, or, (b) EDR, Send (#3875) and EDR, Receive (#3874); EDR, Receive (#3874) only is not available. **Maximum:** Four. **Prerequisites:** #3874 on the "down-line" 2791/2793. Also see "Specify".

Line Transfer Switch (#4750): To manually switch the 2790 transmission lines between two adjacent 2715s acting as backup for each other. All terminals must be defined identically in the user tables of both 2715s affected. **Limitations:** When switching from one system to another, the total number of terminals allowed cannot exceed the maximum number allowable on one 2715. **Maximum:** One. **Note:** This feature is required on only one of the two 2715s.

Line Transfer Switch - Third Unit (#4751): To use a third 2715 as backup for either of two other 2715s. All terminals must be defined identically in the user tables of both 2715s affected. **Limitations:** When switching from one system to another, the total number of terminals allowed cannot exceed the maximum number allowable on one 2715. **Maximum:** One. **Prerequisites:** The two primary 2715s must each be equipped with #4750 ... the third (backup) 2715 requires only #4751.

Synchronous Clock (#7705): [Mdl 2] An internal clock for use with data sets which do not provide clocks. See M2700 pages for facilities that require this feature. **Maximum:** One.

Two Processor Switch (#8110): [Mdl 1] To switch the 2715 mdl 1 between two S/360 or S/370 multiplexer channels. **Maximum:** One.

2821 CONTROL UNIT

PURPOSE

Control and buffer storage unit for a card read punch and/or one or more printers in a S/360 mdl 22 through 85 and 195, or any S/370 or 4300 processor.

MODELS

Model 1	001	Controls a 2540 Card Read Punch and one printer.
Model 2	002	Controls one printer.
Model 3	003	Controls two printers ... with Third Printer Control (#7945) controls three printers.
Model 4	004	[NO LONGER AVAILABLE] Controls a 2540 Card Read Punch and one 1404 Printer.
Model 5	005	Controls a 2540 Card Read Punch and two printers ... with Third Printer Control (#7945) controls three printers.
Model 6	006	Controls a 2540 Card Read Punch.

Limitations: **1403s** -- for mdls available for each S/360, S/370 mdl or any 4300 processor, see "Models" under 1403 ... **1404s** -- cannot be attached to a S/360 mdl 22, 44, 65, 67, 75, 85, 195, or any S/370 or 4300 processor.

Prerequisites: A control unit position on a system channel.

S/360 mdl 25: Special feature on 2025: Multiplexer channel, or selector channels.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 44: Special features on 2044: Multiplexer channel, high speed multiplexer channels, add'l high speed multiplexer subchannels.

S/360 mdl 65, 75: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/360 mdl 67: Basic multiplexer channel of 2870 ... see M2870 pages.

S/360 mdl 85, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, shared or unshared subchannels of 2880 (non-shared is recommended) ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channel block multiplexer channel ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 and 3158-3 pages.

S/370 mdl 165, 168, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) of 2870, shared or unshared subchannels of 2880 (non-shared are recommended) ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, M3083, 3084 pages.

4331 Processor: Byte multiplexer channel (special feature), block multiplexer channel (special feature) ... see M4331 pages.

4341 Processor: Byte multiplexer channel (standard), block multiplexer channels (two are standard) ... see M4341 pages.

HIGHLIGHTS

Mdls 1 and 2: The printer may be a 1403 mdl 2, 3, 7 or N1 ... for attachment for a 1403 mdl 2 or 7, see "Specify" ... for attachment of a 1403 mdl 3 or N1, see 1100 lpm Printer Adapter (#3615) under "Special Features".

Mdls 3 and 5: Two printers, or with Third Printer Control (#7945), three printers can be attached. They may be in any combination of 1403 mdls 2, 3, 7 and N1 ... for attachment of 1403 mdls 2s and 7s, see "Specify" ... for attachment of 1403 mdls 3s or N1s, see 1100 lpm Printer Adapter (#3615) under "Special Features". Program priority for multiple printers on these mdls is:

1st Priority	**Printer Control No. 1**
2nd Priority	**Printer Control No. 2**
3rd Priority	**Printer Control No. 3**

Bibliography: S/360 -- GC20-0360, S/370 -- GC20-0001.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- 1403 Mdl 2 Attachment -- for each 1403 mdl 2 to be attached to a 2821 mdl 1, 2, 3 or 5, specify one of the following: **#9241** -- to attach a 1403 mdl 2 to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9242** -- to attach a 1403 mdl 2 to Printer Control No. 2 on a 2821 mdl 3 or 5 ... **#9243** -- to attach a 1403 mdl 2 to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) also required ... see "Special Features".
- 1403 Mdl 7 Attachment -- for each 1403 mdl 7 to be attached to a 2821 mdl 1, 2, 3 or 5, specify one of the following: **#9246** -- to attach a 1403 mdl 7 to a 2821 mdl 1 or 2, or to attach Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9247** -- to attach a 1403 mdl 7 to Printer Control No. 2 on a 2821 mdl 3 or 4 ... **#9248** -- to attach a 1403 mdl 7 to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) also required ... see "Special Features".
- 1403 Mdl 3 or N1 Attachment: Each 1403 mdl 3 or N1 requires the appropriate 1100 lpm Printer Adapter (#3615) ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1403 Attachment (#4463) with 1401/1440/1460 Basic Compatibility (#4456) or 1620 Compatibility (#7190) on a 2030, or with 1401/1460 Compatibility (#4457) on a 2040, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1440/1460 Compatibility (#4457) on a 3115, 3125, 3135, 3135-3, 3138, 3145, 3145-3 or 3148, or with 1401/1440/1460, 1410/7010 Compatibility (#4458) on a 3145, 3145-3 or 3148, or 1401/1440/1460, 1410/7010 Compatibility (#3950) on a 3155, 3158 or 3158-3, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1440/1460 Compatibility (#3950) on a 4331 Processor, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Isolation Feature: May be required on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

Column Binary (#1990): [Mdls 1, 5, 6] Cards with multiple significant digit punching in a single card column can be processed by the 2540 ... the Extended BCD Interchange Code used by S/360 assemblers and compilers does not required this feature on the 2821. **Prerequisites:** Column Binary (#1990) on the 2030 Processing Unit if column binary cards are to be processed on the 2540 when the S/360 mdl 30 is operating in 1401/1440/1460 compatibility mode.

1100 lpm Printer Adapter (#3615): [Mdls 1, 2, 3, 5] To attach a 1403 Printer mdl 3 or N1. One #3615 is required for each 1100 lpm printer attached. **Specify:** With each #3615, one of the following, depending upon the control position to which the printer is to be attached: **#9262** -- to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9263** -- to Printer Control No. 2 on a 2821 mdl 3 or 5 ... **#9264** -- to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) is also required.

Isolation, Control Unit (#4701-#4705): [for field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2821 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating.

2821 Control Unit (cont'd)

#4702: For a 2821 mdl 1, 2, 3 or 5 with neither Two-Channel Switch (#8100) nor Universal Character Set Adapter (#8637, #8638, #8639).
#4703: For a 2821 mdl 1, 2, 3 or 5 with #8637, #8638 or #8639 but not #8100.
#4704: For a 2821 mdl 1, 2, 3 or 5 with #8100 but not with #8637, #8638 or #8639.
#4705: For a 2821 mdl 1, 2, 3 or 5 with both #8100 and #8637, #8638 or #8639.

Prerequisites: Since in all cases there are compatible EC level requirements, the concurrence of IBM is required for any orders for these features ... #4703 requires #8637, #8638 or #8639 ... #4704 requires #8100 ... #4705 requires both #8100 and #8637, #8638 or #8639.

Punch Feed Read Control (#5895): [Mdls 1, 5, 6] Required for Punch Feed Read (#5890) on a 2540.

Remote Switch Attachment (#6148): [Mdls 1, 2, 3, 5] To attach the Two-Channel Switch (#8100) to a 2167 Configuration Unit in a S/360 mdl 67-2, to a S/360 mdl 65MP which has the Configuration Control Panel (#1505) installed, or to a S/370 mdl 158MP or 168MP.

Selective Tape Listing Control (#6412): Required for Selective Tape Listing (#6410, #6411) on a 1403 mdl 2, 3 or N1. One #6412 is required for each printer equipped with #6410 or #6411. **Specify**: With each #6412, one of the following, depending upon the control position to which the printer with #6410 or #6411 is to be attached:

#9761: To a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#9762: To Printer Control No. 2 on a 2821 mdl 3 or 5.
#9763: To Printer No. 3 on a 2821 mdl 3 or 5 ... **#9745** is also required.

Note: Orders for this feature for a 1403 mdl N1 equipped with Selective Tape Listing (#6410) are no longer accepted ... for 1403 mdl N1s equipped with the new Selective Tape Listing (#6420), see #6425 below.

Selective Tape Listing Control (#6425): [Mdls 1, 2, 3, 5] [for use in S/360 mdls 22, 25, 30, 40, 50 only] Required for the Selective Tape Listing (#6420) on a 1403 mdl N1. One #6425 is required for each printer equipped with #6420. **Specify**: With each #6425, one of the following, depending upon the control position to which the printer with #6420 is to be attached:

#9765: To a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#9766: To Printer Control No. 2 on a 2821 mdl 3 or 5.
#9767: To Printer Control No. 3 on a 2821 mdl 3 or 5 ... #7945 is also required.

Third Printer Control (#7945): [Mdls 3, 5] To attach a third printer, any combination of three 1403s, mdls 2, 3, 7, N1 can be used. An 1100 lpm Printer Adapter (#3615) is required for each 1403 mdl 3 or N1 attached. **Field Installation**: No.

2540 Compatibility Attachment (#8065): [Mdls 1, 5, 6] Required if the 1402/1403 Attachment (#4463) with 1401/1440/1460 Basic Compatibility (#4456) or 1620 Compatibility (#7190) is used on a 2030 Processing Unit, or 1401/1460 Compatibility (#4457) is used on a 2040 Processing Unit ... not required for normal S/360 operation of the 2540. Required if 1401/1440/1460 Compatibility (#4457) is used on a 3115. 3125, 3135, 3135-3, 3145, 3145-3 or 3148 Processing Unit, or if 1401/1440/1460, 1410/7010 Compatibility (#4458) is used on a 3145, 3145-3 or 3148 Processing Unit, or if 1401/1440/1460, 1410/7010 Compatibility (#3950) is used on a 3155, 3158 or 3158-3 Processing Unit ... not required for normal S/370 operation of the 2540. Required if 1401/1440/1460 Compatibility (#3950) is used on a 4331 ... not required for normal 4300 processor operation of the 2540.

Two-Channel Switch (#8100): [Mdls 1, 2, 3, 5] To attach the 2821 to a second channel. Switching is under program control. Includes partitioning. For use in a S/360 mdl 67, a multiprocessor S/360 mdl 65, or a S/370 mdl 158MP or 168MP only. **Field Installation**: No. **Prerequisites**: If the Two-Channel Switch is routed through the Configuration Control Panel (#1505) of a multiprocessing S/360 mdl 65, Remote Control Switch Attachment (#6148) is required. #6148 is also required in a S/360 mdl 67-2, or a S/370 mdl 158MP or 168MP. See above. For a 2821 mdl 1 or 5, a Two-Channel Switch Adapter (#8102) is required on the attached 2540.

Universal Character Set Adapter (#8637-#8639): [Mdls 1, 2, 3, 5] Required for Universal Character Set (#8641 on 1403 mdl 2, #8640 on 1403 mdl 3 or N1) ... one adapter is required for each printer so equipped. Note: A 1403 previously equipped with a Multiple Character Set (#5110 on 1403 mdl 2, #5111 on N1) can be attached to the 2821. The MCS feature provides the same function as the UCS feature on the printer.

#8637: To attach such a printer to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#8638: To attach such a printer to Printer Control No. 2 on a 2821 mdl 3 or 5.
#8639: To attach such a printer to Printer Control No. 3 on a 2821 mdl 3 or 5 ... #7945 is also required.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

2860 SELECTOR CHANNEL

[NO LONGER AVAILABLE]

(New RPQs will not be accepted.)

PURPOSE

Selector channel(s) for attachment and control of a wide variety of I/O control units for a S/360 mdl 65 through 195, or a S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1	001	Has one selector channel
Model 2	002	Has two selector channels
Model 3	003	Has three selector channels

Maximum

S/360 mdl 65, 67-1 (2067 mdl 1), 75 -- up to two 2860s in any combination of mdls can be attached. Up to two 2870 Multiplexer Channels can also be attached. Total channels (both 2860 and 2870) cannot exceed seven per CPU.

Limitations: On either a 65MP system with eight 2365 mdl 13 frames, or on a system with four 2361 mdl 2s, only three channel frames or seven logical channels, whichever occurs first, can be attached. The 2860 may only use channel addresses 1 through 6. If no 2870s are attached, only up to six logical channels can be attached per CPU.

S/360 mdl 67-2 (one or two 2067 mdl 2s) -- up to two 2860s in any combination of mdls can be attached to each 2846 Channel Controller. A 2870 Multiplexer Channel can also be attached to each 2846.

S/360 mdl 85, 195, or S/370 mdl 165, 168, 168-3, 195 -- up to two 2860s in any combination of mdls can be attached. 2870 Multiplexer Channels and 2880 Block Multiplexer Channels can also be attached. For combinations possible, see M3165, 3168, 3168-3 or 3195 pages. For 2085, consult IBM.

Prerequisites:

With 2065 or 2067 mdl 1 -- Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required in addition to **#9065** to attach channels addressed 5 and 6. See "Specify" in M2065 and 2067 pages.

With 2067 mdl 2 -- a 2846 Channel Controller is required.

With 2075 -- a 2075 Attachment (**#9820**) is required on each 2860 ... see "Specify".

With 2085 -- a 2085 Attachment (**#9821**) is required on each 2860 ... see "Specify". On the 2085, Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required in addition to **#9065** to attach channels addressed 5 and 6. Consult IBM.

With 3195 -- a 3195 Attachment (**#9828**) is required on each 2860 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2860 ... see "Specify". When attaching this channel to a S/370 mdl 165, the 3165 must have sufficient addressing capability ... see "Channel Attachment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing feature is required for a system operating in EC mode ... see "Special Features".

Isolation: Appropriate features are required on any 2860 shipped prior to September 7, 1967 ... see "Special Features".

HIGHLIGHTS

Channels permit data rates up to 1.3 million bytes/second. A full set of channel control and buffer registers permit each channel to operate with minimal interference. Up to eight I/O control units can be attached to each channel, permitting a wide variety of attached devices. I/O operations are overlapped with processing and, depending upon the data rate, all channels can operate simultaneously.

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2860 will **not** be installed on a raised floor.
- 2075 Attachment: **#9820** required for attachment to a 2075.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3.
- Unit Position: Required on 2860s when more than one unit, either 2860 or 2870, is attached to a 2065, 2067 mdl 1, 2075, 2085, 2846, or 3165. Specify **#9501** on each 2860 that is not attached last on the channel bus. If the 2860 is to be last (only when there is no 2870) no code is required. When field installing an additional 2860 which will be last on the bus, order **#9501** for the installed 2860 that is currently last on the bus. All MES orders for **#9501** must give the model, serial number and special features on the installed 2860. On the 3168, 3168-3 or 3195, the bus is two cable strings to which the channels are attached. Therefore, for each string, specify **#9501** for each 2860 that is not attached last on that string. If the 2860 is last on either string, no code is required. When field installing an additional 2860 which is to be last on the string, order **#9501** by MES for the installed 2860 that is currently last on the string.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Two-processor System: A 2860 that is to be used in a S/360 mdl 67-2 with two 2067 mdl 2s requires Address Prefixing (#1095) ... see "Special Features".
- 2301 Drum Storage: In a S/360 mdl 67-2 or 85, or a S/370 mdl 165, High Speed Direct Access Storage Priority (#4597) is required on the selector channel to which the 2820 Storage Control for the 2301 is to be attached ... see "Special Features".
- Isolation Features: Appropriate features must be ordered for field installation on units shipped prior to September 7, 1967 ... see "Special Features".

SPECIAL FEATURES

Address Prefixing (#1095): [S/360 mdl 67-2] One is required on each selector channel in a two-processor system ... provides prefixing to identify the processing unit that has initiated an I/O operation. **Specify: #9026** for first channel of 2860 ... **#9047** for second ... **#9048** for third. **Maximum:** One per 2860 mdl 1, two per 2860 mdl 2, three per 2860 mdl 3.

Channel-To-Channel Adapter (#1850): To interconnect two system channels ... only one of the two connected channels requires this feature. The feature uses one control unit position on each of the channels. The plant must know on which of the three possible 2860 channel gates the adapter is to be installed. **Specify: #9095** for installation on first gate ... **#9096** for second gate ... **#9097** for third gate. **Maximum:** One per gate.

Channel Indirect Data Addressing (#1861-#1863): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] One is required on each selector channel to provide indirect address for data transfer. Required for a system operating in EC mode. #1861 -- for 2860 mdl 1 ... #1862 for 2860 mdl 2 ... #1863 for 2860 mdl 3. **Maximum:** One per 2860.

High Speed Direct Access Storage Priority (#4597): [S/360 mdl 67-2 or 85, or S/370 mdl 165] Gives storage priority to a 2301 Drum over all other devices in the system. Required on a 2860 channel to which a 2301 is attached in the above systems. **Specify: #9171** for installation on first channel ... **#9172** on second channel. **Maximum:** In a S/360 mdl 67-2, only one #4597 may be attached to a 2860, regardless of mdl. Although two 2860s may be attached to a 2846, only one may have this feature. In a S/360 mdl 85 or S/370 mdl 165, up to two features may be used, but they must be located on the first 2860 in the system. **Prerequisite:** #7516 on the 2820 associated with the 2301.

3803 Mdl 2 Attachment (#7850): One is required for each 2860 channel to which 3803 mdl 2s are attached. **Specify:** #9181 for first channel of a 2860 ... #9182 for second channel ... #9183 for third channel. **Maximum:** One for 2860 mdl 1 ... two for 2860 mdl 2 ... three for 2860 mdl 3.

Isolation Features

The following features, as appropriate, must be ordered for field installation on each 2860 installed or shipped prior to September 7, 1967.

Isolation, 2860 Channel (#4611-#4613): Permits power to be turned off or on the 2860 without introducing transient noise signals on the I/O interface bus during the powering operation. #4611 -- for 2860 mdl 1 ... #4612 -- for 2860 mdl 2 ... #4613 -- for 2860 mdl 3. **Maximum:** One per 2860.

Isolation, On Channel-To-Channel Adapter (#4621-#4623): Permits power to be turned on or off the 2860 without introducing transient noise signals on units attached via Channel-to-channel Adapter(s) (#1850) during the powering operation. #4621 -- if there is only one #1850 on the 2860 frame ... #4622 -- if there are two #1850s ... #4623 -- if there are three #1850s. **Maximum:** One #4621, #4622 or #4623. **Prerequisites:** For #4621, one #1850 ... for #4622, two #1850s ... for #4623, three #1850s.

2860 Selector Channel (cont'd)

MODEL CHANGES

Available at time of manufacture only.

2870 MULTIPLEXER CHANNEL

[NO LONGER AVAILABLE]

(New RPQS will not be accepted.)

PURPOSE

For attachment of a wide variety of low to medium speed I/O control units and devices to a S/360 mdl 65, 67, 75, 85, 195, or S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1 001

Maximum

S/360 mdl 65, 67-1 (2067 mdl 1), 75 -- two 2870s can be attached ... up to two 2860 Selector Channels in any combination of mdls can also be attached. The total number of channels (both 2870s and 2860s) cannot exceed seven per CPU. **Limitations:** On either a 65MP system with eight 2365 mdl 13 frames or on a system with four 2361 mdl 2s, only three channel frames or seven logical channels, whichever occurs first, can be attached. If no 2870s are attached, only up to six logical channels can be attached per CPU. The first 2870 address must be zero and the second is assigned an available address from 1 to 6.

S/360 mdl 67-2 (one or two 2067 mdl 2s) -- one 2870 can be attached to each 2846 Channel Controller ... up to two 2860 Selector Channels in any combination of mdls can also be attached to each 2846.

S/360 mdl 85, 195 and S/370 mdl 165, 168, 168-3, 195 -- two 2870s can be attached. 2860 Selector Channels and 2880 Block Multiplexer Channels can also be attached. For combinations possible, see M3165, 3168, 3168-3 or 3195 pages. For 2085, consult IBM.

Note: The 2870 may be connected to another system channel for channel-to-channel interconnection of two system channels. However, the Channel-to-channel Adapter required for this interconnection must be installed on the other channel, not the 2870 ... unbuffered devices precede buffered devices. A 2821 Control Unit should normally be last in priority because of the high instantaneous data rates.

Prerequisites

With 2065 or 2067 mdl 1 -- Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required for channels addressed 5 and 6. See "Specify" in M2065 or 2067 pages.

With 2067 mdl 2 -- a 2846 Channel Controller is required.

With 2075 -- a 2075 Attachment (**#9820**) is required on each 2870 ... see "Specify".

With 2085 -- a 2085 Attachment (**#9821**) is required on each 2870 ... see "Specify". On the 2085, Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required for channels addressed 5 and 6. Consult IBM.

With 3195 -- a 3195 Attachment (**#9828**) is required on each 2870 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2870 ... see "Specify". When attaching this channel to a S/370 mdl 165, the 3165 must have sufficient channel addressing capability ... see "Channel Attactment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing (#1861) is required for a system operating in EC mode ... see "Special Features".

Isolation Feature: An appropriate Isolation Feature is required on any 2870 shipped prior to December 29, 1967 ... see "Special Features".

HIGHLIGHTS

Provides up to 196 subchannels ... including four selector subchannels. See "Special Features". Aggregate data rates range from 110KB to 670KB, depending upon the features installed.

The basic channel can attach up to eight I/O control units and can address up to 192 I/O devices. Up to four selector subchannels can be added, each of which can operate one device simultaneously with the basic channel. Up to eight I/O control units can be attached to each selector subchannel. If one 2841 is attached, no other control unit can be attached to that selector subchannel. A maximum of sixteen devices can be attached to each selector subchannel. The first 2870 attached to a system must be assigned address zero. The second 2870 may be assigned any address 1 through 6, depending upon the total number of channels installed and the priority desired ... see Functional Characteristics SRL for the using system.

Maximum aggregate data rates are shown in the following table. These are machine rates for the 2870 ... for S/360 mdl 65, 67-1, 75 and 85, or S/370 mdl 165, 168, 168-3 or 195, information on system data rates may be found in the appropriate Functional Characteristics SRL.

SELECTOR SUBCHANNELS

Basic Channel	1st #6990	2nd #6991	3rd #6992	4th #6993
110KB	*	*	*	*
88KB	180KB	*	*	*
66KB	180KB	180KB	*	*
44KB	180KB	180KB	180KB	*
30KB	180KB	180KB	180KB	100KB

* Not installed

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2870 will **not** be installed on a raised floor.
- 2075 Attachment: **#9820** required for attachment to a 2075.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195. **Note:** 2870s serial numbers 70000 to 79999 must be used with a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3. **Note:** 2870s serial numbers 70000 to 79999 must be used with a 3165, 3168 or 3168-3.
- Unit Position: The 2870 is normally last on the channel bus of a 2065, 2067 mdl 1, 2075, 2085, 2846 or 3165. If two 2870s are installed, one should be last and the other next to last on the channel bus. **#9501** must be specified for the 2870 which is next to last. The 2870 which is last does not require a code. All MES orders to add **#9501** to an installed 2870 must specify the serial number and special features on the installed unit. On the 3168, 3168-3 or 3195, the bus is two cable strings to which the channels are attached. Therefore, when one or two 2870s are installed, they should be last on separate strings. If on the same string, one should be last and the other next to last. **#9501** must be specified for the 2870 which is next to last on the string. The 2870 which is last on either string does not require a code. **Note:** 2870s with serial numbers 60002 through 69999 must be installed as the first 2870 with channel address of zero on all systems except the S/360 mdl 195 or S/370 mdl 165.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Two-processor System: A 2870 which is to be used in a S/360 mdl 67-2 with two 2067 mdl 2s requires Address Prefixing (#1095) ... see "Special Features".
- Isolation Feature: The appropriate Isolation Feature must be ordered for field installation on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

Address Prefixing (#1095): [S/360 mdl 67-2] One required on each 2870 in a two-processor system ... provides prefixing to identify the processing unit that has initiated an I/O operation. **Maximum:** One per 2870.

Channel Indirect Data Addressing (#1861): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] Provides indirect address for data transfer. Required for a system operating in EC mode.

Selector Subchannel (#6990-#6993): Each selector subchannel permits attachment of up to eight I/O control units for devices with a data rate not exceeding 180KB ... see aggregate data rates possible under "Highlights". Each selector subchannel operates simultaneously with devices on the basic 2870 channel. **Limitation:** Regardless of the number of control units attached, a maximum of sixteen I/O devices can be attached to a selector subchannel. #6990 -- for first selector subchannel ... #6991 -- for second ... #6992 -- for third ... #6993 -- for fourth. **Maximum:** Four on the first or only 2870 (channel address 0) ... two (#6990 and #6991) on the second 2870 (channel address 1 through 6, depending on the number of 2860 and 2880 logical channels also attached). On a 65MP, the maximums are: Four on the first 2870 ... none on the second. **Prerequisites:** #6991 requires #6990 ... #6992 requires #6991 ... #6993 requires #6992.

Isolation Features

One of the following features, as appropriate, must be ordered for field installation on each 2870 shipped prior to December 29, 1967 ... see DP Letter 267-41 for ordering.

Isolation, Channel-Control Unit (#4600, #4601): To turn power on or off the 2870 without introducing noise signals on the I/O interface bus. #4600 -- for a 2870 with no selector subchannels ... #4601 -- for a 2870 with one or more selector subchannels (#6990, 6993). **Maximum:** One per 2870. **Prerequisite:** #4601 requires at least #6990.

MODEL CONVERSIONS: None

2880 BLOCK MULTIPLEXER CHANNEL

[NO LONGER AVAILABLE]

(New RPQs will not be accepted.)

PURPOSE

Block multiplexer channel(s) for attachment and control of a wide variety of I/O control units in a S/360 mdl 85, 195, or S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1	001	Has one block multiplexer channel
Model 2	002	Has two block multiplexer channels

Maximum

Up to three 2880s (six channels), in any combination of mdls can be attached. With Extended Channels (#3850 on the 2085, #3851 on the 3195, #3850 on the 3165, or #3855 on the 3168 or 3168-3) up to six 2880s (twelve channels) may be attached to a 2085, up to seven 2880s (thirteen channels) may be attached to a 3195, or up to six 2880s (eleven channels) may be attached to a 3165, 3168 or 3168-3. See M3195, 3165, 3168 or 3168-3 pages for allowable channel combinations. For 2085, consult IBM.

Limitations: A 2820 Storage Control equipped with Storage Priority (#7516) cannot be attached to a 2880.

Prerequisites

With 2085 -- 2085 Attachment (**#9821**) is required on each 2880 ... see "Specify". On the 2085, an appropriate Channel Attachment (**#9065-#9069**) may be required. Consult IBM.

With 3195 -- 3195 Attachment (**#9828**) is required on each 2880 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2880 ... see "Specify". When attaching the channel to a S/370 mdl 165, the 3165 must have sufficient channel addressing capability ... see "Channel Attachment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing feature is required for a system operating in EC mode ... see "Special Features".

HIGHLIGHTS

Channels permit data rates up to 1.5 million bytes/second. With Two Byte Interface (#7850, #7851), data rates up to 3.0 million bytes/second are possible ... see "Special Features".

Provides up to 56 non-shared (block multiplex mode operation) subchannels per block multiplexer channel, allowing up to 56 block multiplex devices to operate concurrently in a burst interleaved mode on the single data path of the channel. Thus, although only one device may actually be transmitting data at any given instant, multiple channel programs may be concurrently active for up to 56 block multiplex devices at one time. Up to eight control units, of which seven may be block multiplexed, can be attached to each channel, permitting a wide variety of attached devices. There will always be one shared (non-block multiplex mode operation) subchannel having all addresses not assigned to non-shared subchannels. Subsequently, the shared channel will always have at least 200 unit addresses and may have up to 256 unit addresses, depending on the number of non-shared subchannels plugged during installation. With the Extended UCW feature installed, the capability of the channel to operate non-shared subchannels is extended from 56 to 256.

All block multiplex devices must be assigned to a non-shared subchannel. All non-block multiplex devices must be assigned to the shared subchannel. (Exception: The 2821 and 3811 control units may be attached to either type of subchannel, but non-shared subchannel attachment is recommended.)

Can be connected to a S/360 or S/370 selector channel via a Channel-to-channel Adapter (#1850) on the selector channel. Can be connected to a 4341 Processor block multiplexer channel via a Channel-to-channel Adapter (#1850) of the block multiplexer channel of the 4341 Processor.

I/O operations are overlapped with processing and, depending upon system considerations and upon data rate, all channels can operate simultaneously.

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2880 will **not** be installed on a raised floor.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Unit Position: **#9505**. For the mdl 165, **#9505** must be specified on the 2880 which is last on the channel bus. For a mdl 168, 168-3 or 195, where there are two cable strings, each 2880 which is last on a string must have **#9505** specified. All MES orders to add **#9505** to an installed 2880 must specify the serial number and special features on the installed unit.

SPECIAL FEATURES

Channel Indirect Data Addressing (#1861, #1862): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] One is required on each channel to provide indirect address for data transfer. Required for a system operating in EC mode. #1861 -- for 2880 mdl 1 ... #1862 -- for 2880 mdl 2. **Maximum**: One per 2880.

Extended Unit Control Words (#3851, #3852): Extends channel storage to 256 unit control words. May be installed on either or both channels of a 2880 mdl 2. #3851 -- for mdl 1 or first channel of a mdl 2 ... #3852 -- for second channel of a mdl 2. **Limitations**: Cannot be installed on the same channel with #7850 or #7851, RPQ WE4259 channel-to-channel adapter and specify feature 2085 Attachment (**#9821**). **Field Installation**: Yes.

Two Byte Interface (#7850, #7851): One is required on each channel attaching a 2835 Storage Control mdl 1 for 2305 Fixed Head Storage(s). #7850 -- for a 2880 mdl 1 or the first channel of a 2880 mdl 2 ... #7851 -- for the second channel of a 2880 mdl 2. **Limitations**: Cannot be installed on the same channel with #3851 or #3852. **Field Installation**: Yes.

MODEL CONVERSIONS

Not recommended for field installation .

3017 POWER UNIT

PURPOSE

Provides power for a 3031 Processor or Attached Processor Complex.

MODELS

Model 1 001

HIGHLIGHTS

One 3017 Power Unit is required with each 3031 Processor. Two Units are required in an Attached Processor Complex.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, or **#9066** for pearl white. **Note:** End panels are pebble gray on **#9066**.
- Unit Emergency Power Off: See *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None

3027 POWER AND COOLANT DISTRIBUTION UNIT

PURPOSE

Provides power and coolant distribution required by a 3032 Processor Complex.

MODELS

Model 1 001

HIGHLIGHTS

One 3027 is required with each 3032 Processor.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9061** for garnet red, **#9063** for classic blue, **#9062** for sunrise yellow, **#9060** for willow green, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white.
- Extended Channels: Specify **#9145** if Extended Channels feature is installed on the 3032 Processor.
- Unit Emergency Power Off: See *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.

SPECIAL FEATURES

Extended Storage (#3870): Required for attachment to a 3032 Processor mdl 8. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3031 PROCESSOR

PURPOSE

Performs arithmetic, logic, processor storage, channel, and control functions for a 3031 Processor or Attached Processor Complex. 3031 A models are used with a 3041 Attached Processor.

MODELS

		Bytes of Processor Storage
Model 2 or A2	002 or A02	2,097,152
Model 3 or A3	003 or A03	3,145,728
Model 4 or A4	004 or A04	4,194,304
Model 5 or A5	005 or A05	5,242,880
Model 6 or A6	006 or A06	6,291,456
Model 7 or A7	007 or A07	7,340,032
Model 8 or A8	008 or A08	8,388,608

Prerequisites: Each 3031 requires one 3036 Console and one 3017 Power Unit. Two 3017 Power Units, a 3036 Console, a 3041 Attached Processor, and a 3031 Processor mdl A are required in an Attached Processor Complex. See *S/370 Installation Manual - Physical Planning,* GC22-7004.

HIGHLIGHTS

Depending on the mdl, contains up to 8,388,608 bytes of monolithic processor storage ... processor cycle time of 115 nanoseconds ... 8-byte parallel data flow with 4-way interleaving ... 128-word instruction buffer ... processor functions are controlled by reloadable control storage ... includes 32,768 bytes of buffer storage which is transparent to the programmer and reduces the effective cycle time of processor storage ... 16 general purpose and four floating point registers are implemented in high speed internal circuits with a four byte data flow to the I/E function.

Standard Features: S/370 Universal Instruction Set ... extended precision floating point ... interval timer ... store and fetch protect ... byte-oriented operand feature ... main storage error checking and correction ... instruction retry ... dynamic address translation ... extended control mode ... program event recording ... one microsecond time-of-day clock with clock comparator ... one microsecond processor timer ... buffer storage (32,768 bytes) ... reloadable control storage ... integrated channels ... VMA and OS/VS1 ECPS ... S/370 Extended Facility ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O ... storage configuration control ... Unit Emergency Power Off.

Channels: Six channels are standard, one byte multiplexer and five block multiplexer channels. The byte multiplexer channel is capable of a data rate of 40-75 KB/second. A block multiplexer channel is capable of a data rate of up to 1.5 MB/second standard, or up to 3.0 MB/second in data streaming mode with Data Streaming (#4850). 256 subchannels per channel, of which up to eight subchannels/channel may be shared. Channel Indirect Addressing is standard. One optional channel-to-channel adapter.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, or **#9066** for pearl white.
- RETAIN/370: The capability of using remote service/logout analysis facility is standard. Customer must provide interface for this facility to the telephone line if he desires the feature to be utilized. For details on ordering and customer responsibilities, contact IBM.
- Unit Emergency Power Off: See *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.

SPECIAL FEATURES

Channel-To-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 Processor). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Maximum:** One. **Field Installation:** Yes.

Direct Control (#3274): Provides two instructions, "Read Direct" and "Write Direct" and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processors or a cable-connected processor and external devices. The read and write instructions must use real addresses only. **Maximum:** One. **Prerequisites:** External devices must meet the interface specifications outlined in *S/370-Direct Control Feature-OEMI,* GA22-6845. **Cable Order:** Required. **Field Installation:** Yes.

Data Streaming (#4850): Modifies the first two block multiplexer channels to permit each to operate at up to 3.0MB/second with data streaming mode control units. **Maximum:** One.

MODEL CONVERSIONS

Field Installable.

ACCESSORIES (None)

SUPPLIES (None)

3032 PROCESSOR

PURPOSE

Provides arithmetic, logic, processor storage, channels and control functions for a 3032 Processor Complex.

MODELS

		Bytes of Processor Storage
Model 2	002	2,097,152
Model 4	004	4,194,304
Model 6	006	6,291,456
Model 8	008	8,388,608

Prerequisites: Each 3032 requires one 3027 Power and Coolant Distribution Unit, one 3036 Console, and an appropriate 415 Hz power input. A 3032 mdl 8 requires the Extended Storage Feature **(#3870)** on the 3027 Power and Coolant Distribution Unit and an additional cable between the 3027 and 3032. Customer-supplied chilled water is required for cooling the system. See *IBM System/370 Installation Manual-Physical Planning,* GC22-7004.

HIGHLIGHTS

Depending upon the mdl, can contain up to 8,388,608 bytes of monolithic processor storage ... double-word storage accesses are four-way interleaved ... 8-byte parallel data flow ... includes 32,768 bytes of buffer storage which is transparent to the program and significantly reduces the effective access time of storage ... buffer storage does not increase the amount of addressable storage ... 80 nanosecond processor cycle ... overlapped operation of instruction pre-processing and execution functions ... extensive data checking is coupled with increased availability and serviceability. Improved instruction execution rates over the 3158-3. Improved availability and serviceability through dual console and main storage reconfiguration functions.

Standard Features: Universal Instruction Set ... extended precision floating point ... one microsecond time-of-day clock with clock comparator ... one microsecond processor timer ... dynamic address translation ... channel indirect data addressing ... extended control mode ... program event recording ... monitoring ... byte-oriented operand feature ... buffer storage (32,768 bytes) ... fetch and store protection ... direct control feature ... six channels ... S/370 Extended Facility ... remote log analysis and remote support facilities ... storage configuration control ... reloadable control storage ... interval timer ... processor storage error checking and correction ... instruction retry ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O ... Unit Emergency Power Off.

Channels: Six functionally independent channels in one group are standard. A group consists of one byte multiplexer channel and five block multiplexer channels. Single block multiplexer channel speed of up to 1.5 MB/second is standard and up to 3 MB/second with the Two-Byte Interface (#7850) ... or in a data streaming mode with Data Streaming (#4850). Each byte multiplexer channel will generally operate in the range of 40-75 KB/second. Each channel has 256 subchannels, of which up to eight subchannels/channel may be shared. One optional Channel-to-Channel Adapter per processor is available. See "Special Features".

With the addition of Extended Channels (#3850), a group of five additional block multiplexer channels and one byte multiplexer channel may be added. Availability and serviceability are improved with the addition of this second group through the independent maintenance capability of each channel group.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Motor Generator Set and Starter: If desired, see "Accessories".
- Color: **#9061** for garnet red, **#9062** for sunrise yellow, **#9060** for willow green, **#9064** for charcoal brown, **#9063** for classic blue, **#9065** for pebble gray, **#9066** for pearl white.
- Unit Emergency Power Off: See *IBM System/370 Installation Planning Manual-Physical Planning,* GC22-7004, for details.

SPECIAL FEATURES

Channel-To-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 Processor). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Limitations:** Cannot be installed on extended channels. **Maximum:** One. **Field Installation:** Yes.

Extended Channels (#3850): To provide an additional group of five block multiplexer channels and one byte multiplexer channel. **Maximum:** One. **Prerequisites:** Specify **#9145** for the 3027 Power and Coolant Distribution Unit. **Cabling:** Additional cables are required. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, for required cables. **Field Installation:** Yes.

Data Streaming (#4850): Modifies the first two block multiplexer channels of a channel group to permit each to operate at up to 3.0MB/second with data streaming mode control units. **Limitations:** Mutually exclusive with #7850 on the same channel group. **Maximum:** One per channel group. **Prerequisites:** Second feature requires #3850. **Specify: #9301** for standard channel group, **#9302** for extended channel group. **Field Installation:** Yes.

Two-Byte Interface (#7850): One is required on each channel attaching a 3838 Array Processor in 2-byte mode or 2305 Fixed Head Storage mdl 1. **Limitations:** Mutually exclusive with #4850 on the same channel group. **Maximum:** One per channel group on the first block multiplexer channel of the group. **Prerequisites:** Second Two-Byte Interface feature requires #3850. **Specify: #9201** for standard channel group, **#9202** for Extended Channel group. **Field Installation:** Yes.

Note: Customer price quotations and order acknowledgement letter for purchases MES must state, "Installation of this feature involves removal of parts which become the property of IBM."

MODEL CONVERSIONS

Field installable.

ACCESSORIES

Motor Generator Set: These units are not manufactured by IBM and are available on a purchase-only basis. Manufacturer's warranty will be extended to the purchaser. Installation, check-out and maintenance will not be provided by IBM and any expenses involved must be borne by the customer.
Units must be ordered one year in advance of installation.

For 3032 Processor: If a motor generator set is chosen as the power source, then one Motor Generator Set (with internally mounted starter) is required for each 3032 Processor. **Specify:** Feature number for Motor Generator Set on 3032 machine order .

	Feature
208/230V AC, 3-phase, 60 Hz-Motor Generator Set	**#9447**
440V AC, 3-phase, 60 Hz-Motor Generator Set	**#9449**

Note: If more than one MG set is desired on initial order, specify quantity.

If additional MG set is to be ordered for delivery after system, order as follows:

	P/N
Motor Generator Set ... 208/230V AC	**2574790**
Motor Generator Set ... 440V AC	**2574290**

SUPPLIES (None)

3033 PROCESSOR

PURPOSE

Provides arithmetic, logic, control functions, processor storage and channels for a 3033 Processor Complex. A and M models provide multiprocessing function.

MODELS

Models S	N	U	A	M	Bytes of Processor Storage
S4	N4	U4	A4	M4	4,194,304
		U6*	A6*	M6*	6,291,456
S8	N8	U8	A8	M8	8,388,608
S12	N12	U12	A12	M12	12,582,912
S16	N16	U16	A16	M16	16,777,216
		U24	A24		25,165,824

* Models U6, A6 and M6 are no longer available. Model changes between the U6, A6 and M6 are field installable.

Prerequisites: Each 3033 requires one 3037 Power and Coolant Distribution Unit, one 3036 Console, and an appropriate 415 Hz power input. **Note:** With Mdl Group S, **#9701** is required on the 3037 ... see "Specify" under 3037. Customer-supplied chilled water is required for cooling the system. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004.

If the 3033 is a mdl U24, #3832 and its associated prerequisites are required on the 3033. Also, the 3037 requires #3824.

The 3033 Attached Processor Complex requires a 3033 mdl A processor, a 3042 Attached Processor, a 3038 Multiprocessor Communication Unit, two 3036 Consoles, and two 3037 Power and Coolant Distribution Units (each equipped with #5050).

If the Attached Processor Complex consists of a 3033 mdl A24, then #3832 and its associated prerequisites are required on the 3033, as well as on the 3042 Attached Processor and on the 3038 Multiprocessor Communication Unit. Also required is #3824 on the 3037 Power and Coolant Distribution Unit attached to the 3033 mdl A24.

A 3033 Multiprocessor Complex requires two 3033 mdl M processors, a 3038 Multiprocessor Communication Unit, two 3036 Consoles, and two 3037 Power and Coolant Distribution Units (each equipped with #5050).

HIGHLIGHTS

Depending upon the mdl, can contain up to 25,165,824 bytes of monolithic processor storage... double-words are 8-way interleaved on U, A and M mdls: 4-way interleaved on Mdl Groups N and S ... 8-byte parallel data flow ... 57 nanosecond cycle buffer storage which is transparent to the program and significantly reduces the effective access time of storage: 65,536 bytes on U, A and M mdls -- 16,384 bytes on Mdl Group N -- 1,024 bytes on Mdl Group S ... buffer storage does not increase the amount of addressable storage ... 57 nanosecond processor cycle ... overlapped operation of instruction and execution functions ... extensive data checking.

A mdls are basically identical to M mdls ... A or M designates whether the mdl is used in an Attached Processor or Multiprocessor Complex. N designates that the mdl is used in a 3033 Processor Complex Mdl Group N. S designates that the mdl is used in a 3033 Processor Mdl Group S.

Standard Features: Universal Instruction Set ... extended precision floating point ... one microsecond time-of-day clock with clock comparator ... one microsecond processor timer ... dynamic address translation ... extended control mode ... program event recording ... byte-oriented operand feature ... buffer storage (65,536 bytes on U, A and M mdls ... 16,384 bytes on Mdl Group N ... 1,024 bytes on Mdl Group S) ... fetch and store protection ... direct control feature ... integrated channels ... S/370 Extended Facility ... storage configuration control ... reloadable control storage ... interval timer ... storage error checking and correction ... instruction retry ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O.

In addition to the above, A and M mdls provide channel-set switching and four additional instructions: signal processor ... set prefix ... store prefix ... store CPU address.

Channels: On U, A and M mdls, 12 integrated channels in two groups are standard. Each group consists of one byte multiplexer and five block multiplexer channels. A third group containing four block multiplexer channels or three block multiplexer and one byte multiplexer channels is optional. See #3850.

On Mdl Group N, six integrated channels in one group are standard. Two additional groups are optional. The standard channel group and the first optional channel group each consist of one byte multiplexer and five block multiplexer channels. The second optional group contains four block multiplexer channels, or three block multiplexer and one byte multiplexer channels. See #3850 and #3851.

On Mdl Group S, six integrated channels in one group are standard. A second group is optional. Each group consists of one byte multiplexer and five block multiplexer channels. See #3851.

On all mdls, two channel-to-channel adapters are optional. On Mdl Group N or S, the second channel-to-channel adapter requires #3851.

On all mdls, single block multiplexer channel speed of up to 1.5MB/second is standard and up to 3MB/second with #7850 or in data streaming mode with #4850. 256 subchannels per channel, of which up to eight subchannels/channel may be shared.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Motor Generator Set and Starter: If desired, see "Accessories".
- Unit Emergency Power Off: See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, for details.
- 3038 Attachment: [A or M mdls] **#9751** if the processor is to be installed without a 3038 Multiprocessor Communication Unit for operation in uniprocessor mode. **Limitations:** Plant only. An optional function similar to #9751 is included in the field upgrade of a U mdl to an A or M mdl ... #9752 if the processor is to be installed with a 3038. **Limitation:** Plant only. Also see #5050 in M3037 pages.

  Field conversion from **#9751** to **#9752** ... Specify code **#9751** must be converted to **#9752** when installing the 3038. Conversion RPQ **8P0870** is required.

  Field conversion from **#9752** to **#9751** ... RPQ **8P0869** provides for field conversion of a 3033 A or M mdl from specify code **#9752** to **#9751** or from a 3033 A or M mdl without **#9752** to **#9751**. This permits a 3033 A or M mdl to operate as a uniprocessor without a 3038.

  An end cover is also required for the 3033 and is ordered by RPQ 8P0868. Contact IBM for lease and purchase prices of the above RPQs.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white.
- RETAIN/370: The capability of using remote support/logout analysis facility is standard. Customer must provide interface for this facility to the telephone line if he desires to utilize this feature. For details on ordering and customer responsibilities contact IBM.

SPECIAL FEATURES

Channel-to-Channel Adapter (#1850 for first, #1851 for second): To interconnect two channels (either S/360, S/370, or 4300 Processor). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Limitations:** Cannot be installed on #3850 on any mdl ... can be installed on #3851 on Mdl Group N or S. **Maximum:** Two; one #1850 and one #1851. **Prerequisites:** #1851 requires #3851 on Mdl Group N or S. **Field Installation:** Yes.

Extended Addressing (#3832): [U, A, M Mdls] Provides for addressing of up to 32 megabytes of real processor storage. #3832 is required on 3033 mdls U24 and A24. **Maximum:** One. **Prerequisites:** [1] #6850 and #3868 on each 3033 channel group [2] #3832 on the 3038 MCU [3] Both processors in an MP complex must have #3832 [4] In an AP complex both the host 3033 Processor and the 3042 Attached Processor must have #3832. **Specify:** **#9321** for a U mdl, **#9322** for an M mdl, or **#9323** for A mdl. **Note:** Customer price quotations and order acknowledgement letters for purchase MES must state: "Installation of this feature involves removal of parts which become the property of IBM." **Field Installation:** Yes.

Extended Channels (#3850): [U, A, M, N mdls] Provides four additional block multiplexer channels, or three block multiplexer and one byte multiplexer channels. **Maximum:** One. **Prerequisites:** [1] **#9145** on the 3037 Power and Coolant Distribution Unit. See "Specify" under 3037. [2] #3868 is required if #6850 is installed. [3] On Mdl Group N, #3851. **Specify:** **#9150** for four block multiplexer channels, or **#9151** for three block multiplexer and one byte multiplexer channels. **Field Installation:** Yes. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, for required cables.

Extended Channels (#3851): [Mdl Group N or S] Provides an additional group of five block multiplexer channels and one byte multiplexer channel. **Maximum:** One. **Prerequisites:** #3868 is required if #6850 is installed. **Note:** Field change from a Mdl Group N processor to a 3033 mdl U processor requires installation of this feature on the Mdl Group N processor. **Field Installation:** Yes. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, for required cables.

3033 Processor (cont'd)

Extended Control Storage (#3868): Provides extended control storage for one channel group when #6850 is installed. One #3868 is required for each channel group in the processor. **Maximum:** U, A, M and N mdls -- three ... S mdls -- two. **Prerequisites:** [1] #6850. [2] On U, A or M mdls, third #3868 requires #3850. [3] On Mdl Group N, second #3868 requires #3851, third #3868 requires #3850. [4] On Mdl Group S, second #3868 requires #3851. **Maximum:** U, A, M and N mdls -- three ... S mdls -- two. **Field Installation:** Yes.

Data Streaming (#4850): Modifies the first two block multiplexer channels of a channel group to permit each to operate at up to 3.0MB/second with data streaming mode control units. **Limitation:** Cannot be installed on the same channel group with #7850. **Maximum:** One per channel group. **Prerequisites:** [1] On U, A or M mdls, third #4850 requires #3850. [2] On Mdl Group N, second #4850 requires #3851, third #4850 requires #3850. [3] On Mdl Group S, second #4850 requires #3851. **Specify: #9301** for first channel group, **#9302** for second channel group, **#9303** for third channel group. **Field Installation:** Yes.

3033 Extension (#6850): An architectural extension to the processor which enhances the MVS/System Product. Also provides extended control storage for Virtual Machine Assist, RPQ EJ1156. **Limitations:** The RPQ for Extended Control Storage, RPQ S20587, cannot co-reside with #6850. **Maximum:** One. **Prerequisities:** [1] #3868 ... one #3868 is required for each channel group in the processor. [2] For A mdls, #6850 on the 3042 Attached Processor; for M mdls, #6850 on each processor. **Field Installation:** Yes.

Two-Byte Interface (#7850): One is required on each channel attaching a 3838 Array Processor in 2-byte mode or a 2305 Fixed Head Storage mdl 1. **Limitations:** Cannot be installed on the same channel group with #4850. **Maximum:** One per channel group. **Prerequisites:** [1] On U, A or M mdls, third #7850 requires #3850. [2] On Mdl Group N, second #7850 requires #3851, third #7850 requires #3850. [3] On Mdl Group S, second #7850 requires #3851. **Specify: #9201** for first channel group, **#9202** for second channel group, **#9203** for third channel group. **Note:** Customer price quotations and order acknowledgement letters for purchase MES must state: "Installation of this feature involves removal of parts which become the property of IBM." **Field Installation:** Yes.

Planning For Feature Changes: When a customer requires a combination of features, an order for #3832 or orders for #4850 for installed channel groups must be entered on an individual MES. Also, #6850 must not be ordered on the same MES with #3850 or #3851. Finally, special features must not be consolidated on the same MES with an order for a model conversion or a model (storage) upgrade. Also see Notes under "Model Conversions".

MODEL CONVERSIONS

Model changes are field installable, except field changes from U, A or M models to Model Group N are not recommended ... field changes from U, A, M or N models to S models are not recommended. **Note:** Field change from a Model Group S or N model to a U model requires installation of Extended Channels (#3851) on the Model Group S or N processor.

3033 to 3033 Model Upgrade: Parts removed or replaced in upgrades from models U4/M4/A4, U6/M6/A6, U8/M8/A8, to models U12/M12/A12 or U16/M16/A16 become the property of IBM and must be returned.

ACCESSORIES

Motor Generator Set: These units are not manufactured by IBM and are available on a purchase-only basis. Manufacturer's warranty will be extended to the purchaser. Installation, check-out and maintenance will not be provided by IBM and any expenses involved must be borne by the customer. Units must be ordered one year in advance of installation.

For 3033 Processor: If a motor generator set is chosen as the power source, then one Motor Generator Set (with internally mounted starter) is required for each 3033 Processor or 3042 Attached Processor. Two are required for a 3033 AP or MP complex, one for each MP CPU. **Specify:** Feature number for Motor Generator Set on 3033 machine order .

	Feature
208/230V AC, 3-phase, 60 Hz-Motor Generator Set	**#9447**
440V AC, 3-phase, 60 Hz-Motor Generator Set	**#9449**

Note: If more than one MG set is desired on initial order, specify quantity.

If additional MG set is to be ordered for delivery after system, order as follows:

	P/N
Motor Generator Set ... 208/230V AC	**2574790**
Motor Generator Set ... 440V AC	**2574290**

SUPPLIES (None)

3036 CONSOLE

PURPOSE

Provides the switches, lights, displays, and control function for a 3031, 3032 or 3033 Processor; or 3031 Attached Processor Complex; or 3042 Attached Processor.

HIGHLIGHTS

One 3036 is used with each Processor, or 3031 Attached Processor Complex. Two 3036 Consoles are used in a 3033 AP or MP Complex. Data can be entered into processor storage or into internal registers by means of the keyboard. Contents of storage or internal registers of the processor can be displayed.

Basic diagnostic tests of the processor complex, including processor, storage, channels, and console can be operated from the console. Dual displays, individually addressable, with their associated input keyboards and control logic, combine to provide a complete console I/O function. Either display may be used by the customer as an operator console or by the customer engineer as a service support console. Both displays may be used as operator consoles or service support consoles if desired.

Also included is a device for loading the control store from a diskette drive and a modem for the remote service facility. A systems activity monitor is provided for the 3031, 3032, and 3033 Processors and the 3042 Attached Processor.

Prerequisites: Requires two control unit positions and four device addresses on a channel, or preferably on two channels if a second channel group is installed (3032 and 3033 only). A fifth device address is required if the remote service option is elected.

Bibliography: GC20-0001.

SPECIFY

- RETAIN/370: May be used with the 3031, 3032, or 3033 complex; however, it is not required. The RETAIN/370 specify option provides a physical interface (and internal modem to the telephone switched network for the Remote Support Facility (RSF), an optional service available to enhance customer engineering field serviceability. When the option is selected, the customer must provide the telephone lines required for the Remote Support Facility Modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on ordering and customer responsibilities, see BOM, Orders and Movements.
- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Unit Emergency Power Off: See *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.

3037 POWER AND COOLANT DISTRIBUTION UNIT

PURPOSE

Provides power and coolant distribution required by a 3033 Processor or a 3042 Attached Processor.

HIGHLIGHTS

One 3037 is used with each 3033 Processoror 3042 Attached Processor. Two 3037s are used in a 3033 AP or MP complex.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white.
- Processor: Specify **#9701** for use with the 3033 Processor Model Group S.
- Unit Emergency Power Off: See *S/370 Installation Manual - Physical Planning,* GC22-7004 for details.
- Extended Channels: Specify **#9145** if Extended Channels feature #3850 is installed on the 3033 Processor.

SPECIAL FEATURES

Extended Power (#3824): Provides additional power for 3033 Model U24 or A24. This feature is required on the 3037 attached to the 3033 Model U24 or A24. **Maximum:** One. **Field Installation:** Yes.

Multiprocessing (#5050): Provides functions for operation in 3033 AP or MP complex. The #5050 feature is required on a 3037 whenever the associated processor is attached to a 3038 MCU (3033 or 3042 in an MP or AP Complex). The #5050 feature can be installed on a 3037 used with a 3033 mdl U, but will not be functional. Similarly, the #5050 feature can be installed on a 3037 used with a 3033 mdl A or M containing specify feature **#9751**. **Maximum:** One. **Field Installation:** Yes.

3038 MULTIPROCESSOR COMMUNICATIONS UNIT

PURPOSE

Control unit used in configuring a 3033 Multiprocessor or Attached Processor Complex. One is required for each complex.

MODELS

Model 1 001

HIGHLIGHTS

Contains hardware for communications between two processors, or between a processor and an attached processor.

Prerequisites: Multiprocessing feature (**#5050**) on each 3037 Power and Coolant Distribution Unit in the complex, and specify code **#9752** on the 3033 A mdl, or **#9752** on each 3033 M mdl (see "Specify" under 3033), plus:

In a 3033 MP Complex: Two 3033 Processors mdl M.
In a 3033 AP Complex: A 3033 Processor mdl A and a 3042 Attached Processor.

Field Installation: Yes.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white. English **#2924**

SPECIAL FEATURES

Extended Addressing (#3832): Provides for addressing up to 32 megabytes of real processor storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** On 3033 Processors: (1) Extended Addressing (#3832) and 3033 Extension (#6850) (2) Extended Control Storage (#3868) on all channel groups, (3) Both 3033 Processors in an MP complex must have Extended Addressing (#3832), (4) In a 3033 AP Complex, both the host 3033 Processor and the 3042 Attached Processor must have Extended Addressing (#3832). **Specify: #9322** for MP Complex, **#9323** for AP Complex.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3041 ATTACHED PROCESSOR

PURPOSE

Provides instruction/execution function, buffer control function, and communication logic for a 3031 Attached Processor Complex.

MODELS

Model 1 001

HIGHLIGHTS

Can access up to 8 megabytes of monolithic processor storage on the host 3031 Processor mdl A ... 115 nanosecond processor cycle ... includes 32K bytes of high speed buffer storage ... instruction/execution function similar to the 3031 Processor ... buffer control function similar to the 3031 Processor ... controlled by reloadable control storage.

Standard Features: Universal instruction set ... interval timer ... store and fetch protect ... byte-oriented operand feature ... instruction retry ... dynamic address translation ... control mode ... program event recording ... time-of-day clock with clock comparator ... CPU timer ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... extended precision floating point ... Virtual Machine Assist (VMA) and OS/VS1 Extended Control Program Support (ECPS) when operating under VM/370 ... S/370 Extended Facility.

Prerequisites: The 3041 Attached Processor mdl 1 requires (1) a 3031 Processor mdl A ... (2) a second 3017 Power Unit.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9061** for garnet red, **#9062** for sunrise yellow, **#9060** for willow green, **#9064** for charcoal brown, **#9063** for classic blue, **#9065** for pebble gray, **#9066** for pearl white.

SPECIAL FEATURES

Direct Control (#3274): Provides two instructions: "Read Direct" and "Write Direct", and six distinct external interrupt lines which are independent of data and channel operations. The read and write instructions provide timing signals and transfer a single byte between two cable-connected processing units, or a cable-connected processing unit and external devices. The read and write instructions must use real addresses only. **Maximum:** One. **Cable order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/370 - Direct Control Feature - OEMI,* GA22-6845.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None

3042 ATTACHED PROCESSOR

PURPOSE

Provides arithmetic, logic, and control functions in a 3033 Attached Processor Complex. 3042 AP model 2 also provides channels.

MODELS

	Channels
Model 001	None
Model 002	6 standard, 6 optional

Prerequisites: The 3033 Attached Processor Complex requires a 3042 Attached Processor, a 3033 Processor mdl A, a 3038 Multiprocessor Communication Unit, two 3036 Consoles, two 3037 PCDUs each with Multiprocessing feature **#5050**, and an approximate 415 Hz power input.Customer-supplied chilled water is required for cooling the system. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004.

If the AP Complex consists of a 3033 mdl A24, then the Extended Addressing feature **(#3832)** and its associated prerequisites are required on the 3033, as well as on the 3042 Attached Processor and on the 3038 Multiprocessor Communication Unit. Also required is the Extended Power feature **(#3824)** on the 3037 attached to the 3033 mdl A24.

HIGHLIGHTS

Can access up to 25,165,824 bytes of processor storage on the host 3033 Processor mdl A ... double-words are 8-way interleaved ... 8-byte parallel data flow ... includes 65,536 bytes of 57 nanosecond cycle buffer storage which is transparent to the program and significantly reduces the effective access time of storage ... buffer storage does not increase the amount of addressable storage ... 57 nanosecond processor cycle ... overlapped operation of instruction and execution functions ... extensive data checking.

Standard Features: Universal Instruction Set ... extended precision floating point ... one microsecond time-of-day clock with clock comparator ... one microsecond processor timer ... dynamic address translation ... extended control mode ... program event recording ... byte-oriented operand feature ... buffer storage (65,536 bytes) ... fetch and store protection ... direct control feature ... S/370 Extended Facility ... reloadable control storage ... interval timer ... instruction retry ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... channel-set switching and four instructions: signal processor, set prefix, store prefix, store CPU address ... 3042 AP mdl 2 includes: Integrated channels ... clear I/O.

Channels: On the 3042 AP mdl 2 ... Six integrated channels in one group are standard. A second group of six is optional. Each group consists of 1 byte multiplexer channel and 5 block multiplexer channels. Single channel block transfer rate of up to 1.5 million bytes/second is standard and up to 3 million bytes/second with the Two-Byte Interface optional feature (#7850) or in data streaming mode with the Data Streaming optional feature (#4850) installed on block multiplexer channels. 256 subchannels per channel, of which up to 8 subchannels per channel may be shared. Two optional channel-to-channel adapters per attached processor are available.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz):**#9903** for 208V, **#9905** for 230V.
- Motor Generator Set and Starter: If desired, see "Accessories".
- Unit Emergency Power Off: See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, for details.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white.
- RETAIN/370: The capability of using remote support/logout analysis facility is standard. Customer must provide interface for this facility to the telephone line if he desires to utilize this feature. For details on ordering and customer responsibilities, see BOM, Orders and Movements.

SPECIAL FEATURES

Channel-to-Channel Adapter (#1850 for first, #1851 for second): To interconnect two channels (either S/360 or S/370). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Limitations:** Mdl 2 only. **Maximum:** Two, one #1850 and one #1851. **Field Installation:** Yes. **Prerequisites:** #1851 requires #3851.

Extended Addressing (#3832): Provides for addressing of up to 32 megabytes of real processor storage. Customer price quotations and order acknowledgement letters for purchase MES must state: "Installation of this feature involves removal of parts which become the property of IBM." **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) On the 3042 mdl 1 or 2, 3033 Extension feature (#6850). (2) On the 3042 mdl 2, Extended Control Storage (#3868) on each channel group. (3) In a 3033 AP complex, the Extended Addressing Feature (#3832) is required on the 3033 Processor mdl A, on the 3042 Attached Processor mdl 1 or 2, and on the 3038 MCU.

Extended Channels (#3851): Provides an additional group of five block multiplexer channels and one byte multiplexer channel. **Prerequisites:** #3868 is required if 3033 Extension (#6850) is installed. **Limitations:** Mdl 2 only. **Maximum:** One. **Field Installation:** Yes.

Extended Control Storage (#3868): Provides extended control storage for one channel group when 3033 Extension (#6850) is installed. **Corequisite:** 3033 Extension (#6850). One #3868 is required on each channel group. **Prerequisites:** Second #3868 requires #3851. **Limitations:** Mdl 2 only. **Field Installation:** Yes.

Data Streaming (#4850): Modifies the first two block multiplexer channels of a channel group to permit each to operate at up to 3 megabytes per second with data streaming mode control units. **Limitations:** Mdl 2 only. Mutually exclusive with Two-Byte Interface (#7850) on the same channel group. **Maximum:** One per channel group. **Field Installation:** Yes. **Prerequisites:** Second #4850 requires #3851. **Specify:** **#9301** for standard channel group, **#9302** for Extended Channels (#3851).

3033 Extension (#6850): An architectural extension to the processor which will enhance the MVS/System Product. Also provides extended control storage for Virtual Machine Assist, RPQ EJ1156. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For 3042 AP mdl 2, #3868 is required on each channel group ... #6850 on host 3033 Processor. **Limitations:** The RPQ for Extended Control Storage, RPQ S20587, cannot coreside with 3033 Extension (#6850).

Two-Byte Interface (#7850): One is required on each channel attaching a 3838 Array Processor in 2-byte mode or 2305 Fixed Head Storage mdl 1. **Prerequisite:** Second Two-Byte Interface Feature requires Extended Channels (#3851). **Limitations:** Mutually exclusive with Data Streaming (#4850) on the same channel group. **Maximum:** One per channel group and installed on the first block multiplexer channel of the group. **Field Installation:** Yes. **Specify:** **#9201** for standard channel group, **#9202** for extended channel group.

Note: Planning for Feature Changes: When a customer requires a combination of features, an order for Extended Addressing (#3832) must be entered on a individual MES. Also, orders for Data Streaming (#4850) for *installed* channel groups must not be consolidated on an MES with another Special Feature. Finally, 3033 Extension (#6850) must not be ordered on the same MES with Extended Channels (#3851).

MODEL CONVERSIONS

Model 1 to model 2 is field installable. If the 3033 Extension feature (#6850) is on the 3042 Attached Processor, each channel group on the model 2 must have Extended Control Store feature (#3868). Parts removed or replaced in upgrades from model 1 to model 2 become the property of IBM and must be returned. Field changes from model 2 to model 1 are not recommended.

ACCESSORIES

See M3033 pages.

SUPPLIES (None)

3046 POWER UNIT

[*NO LONGER AVAILABLE ... features and model conversions can be ordered on an ''as available'' basis.*]

PURPOSE

Provides power for a 3135, 3135-3 or 3138 Processing Unit, or for a 3345 Storage and Control Frame model 1, 2, 4 or 5 with a 3145 Processing Unit model HG or I.

MODELS

Model 1 001

Limitations: Can be used with a 3145 mdl HG or I only when a 3345 mdl 1, 2, 4 or 5 is attached.

Publications: GC20-0001

HIGHLIGHTS (None)

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below floor, **#9081** for on floor. If not specified, below floor is assumed.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3047 POWER UNIT

[NO LONGER AVAILABLE ... features and model conversions can be ordered on an "as available" basis.]

PURPOSE

Provides power for a 3145 Processing Unit model H2, HG2, I2, IH2, J2, JI2 or K2, or for a 3145-3 or 3148 Processing Unit.

MODELS

Model 1 001

Model 2 002 See "Field Conversion" under Specify.

HIGHLIGHTS (None)

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below floor, **#9081** for on floor.
- Field Conversion of a 3145 mdl FED, GE, GFD, H, HG or I to a 3145 mdl H2, HG2, I2, IH2, J2, JI2 or K2, requires a 3047 mdl 2. Conversion from a mdl FED, GE, GFD, H, HG or I to a mdl JI2 or K2 will be made via RPQ. (The 3047 mdl 2 is to be used for IBM internal ordering and control purposes only, and is to be ordered at no charge. It is not to appear on any agreement.) MES for the 3145 mdl change must also include conversion of the 3047 mdl 2 to mdl 1 with the Plant Order No. of the 3047 mdl 2 indicated. The plant will indicate the serial number of the 3047 mdl 2 on the MES when it is shipped. The 3047 mdl change is to be reported installed on the same date as the CPU mdl change. (For purchase customers, there will be no charge for the 3047 mdl change.) **Note**: The 3047 mdl 2 order is to be entered to displace the 3345 (any mdl) and the 3046.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3052 ATTACHED PROCESSING UNIT (APU)

[NO LONGER AVAILABLE]

PURPOSE

Provides arithmetic, logic, control, and communication function for an Attached Processor System.

MODELS

Model 1 001

HIGHLIGHTS

- Can access up to 6,291,456 bytes of monolithic processor storage on the host 3158 or 3158-3.
- 115-nanosecond processor cycle.
- Includes 16,384 bytes of buffer storage which is transparent to the programmer and reduces the effective cycle time accessing the host storage. Sixteen general purpose and four floating point registers are implemented in high-speed internal circuits with a four-byte data flow. The APU functions are controlled by reloadable control storage.

Standard features include:

- Universal instruction set.
- Interval timer.
- Store and fetch protect.
- Byte-oriented operand feature.
- Instruction retry.
- Dynamic address translation.
- Extended control mode.
- Program event recording.
- Time-of-day clock with clock comparator.
- CPU timer.
- Compare and swap.
- Compare double and swap.
- Insert PSW key.
- Set PSW key from address.

Prerequisites: The 3052 APU mdl 1 requires:

- A 3158 or 3158-3 A-Series processing unit.
- A 3056 Remote System Console.

Publications: *IBM System/370 and 4300 Processors Bibliography* (GC20-0001).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Cabling: **#9080** for below floor, or **#9081** for on floor.
- If two processors are installed and the 3052 is additional and emergency power-off capability is required on the systems, then the expanded Emergency Power-Off Control (#3622) should be ordered for the host processor.

SPECIAL FEATURES

Direct Control (#3274): Provides two instructions, "Read Direct" and "Write Direct", and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte between two cable-connected processing units, or a cable-connected processing unit and external devices. Cable order is required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/370 - Direct Control Feature - OEMI* (GA22-6845).

Extended Precision Floating Point (#3700): Provides instructions to handle extended precision (28-hexadecimal digit fraction) floating point operands. Extended precision operands may also be rounded to long-precision format, which in turn may be rounded to short-precision format. **Field Installation:** Yes.

1401/1440/1460, 1410/7010 Compatibility (#3950): Provides the system with the ability to execute 1401/1440/1460 and 1410/7010 instructions under specific conditions of minimum and matching configurations. See P360N pages for DOS and P360C pages for OS. **Limitations:** This feature cannot be loaded at IMPL time concurrently with System/370 Extended (#7730). **Field Installation:** Yes.

OS/DOS Compatibility (#5450): Provides the system with the ability to execute DOS programs under specific conditions. See P360C pages. **Limitations:** This feature cannot be loaded at IMPL time concurrently with System/370 Extended (#7730). **Field Installation:** Yes.

Processor Attach (#5552): Provides additional storage protect capability required when the APU is attached to a mdl A-Series processing unit whose storage size is over one megabyte. One feature is required for each megabyte of storage in the A-Series processor above one megabyte, e.g.:

A-Series Processor Mdl	No. of Processor Attach Features
AP3 or AP4, A33 or A34	1
AP5, A35	2
AP6, A36	3
AP7, A37	4
AP8, A38	5

Maximum: Five. **Field Installation:** Yes.

7070/7074 Compatibility (#7117): Provides the system with the ability to execute 7070/7074 instructions under specific conditions. See P360C pages. **Limitations:** This feature cannot be loaded at IMPL time concurrently with System/370 Extended (#7730). **Field Installation:** Yes.

System/370 Extended (#7730): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Limitations:** This feature cannot be loaded at IMPL time concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), or 7070/7074 Compatibility (#7117). **Field Installation:** Yes. **Prerequisites:** #7730 and #7731 on the A-Series processor.

Virtual Machine Assist (#8740): Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3058 MULTISYSTEM UNIT

[NO LONGER AVAILABLE]

PURPOSE

Control unit used in configuring a System/370 model 158 or 158-3 Multiprocessor System. One is required for each MP system containing one or two 3158/3158-3 multiprocessor models.

MODELS

Model 1 001

HIGHLIGHTS

Permits two 3158/3158-3 multiprocessing units to be interconnected to form a multiprocessing system. Contains configuration control facilities for mode of operation (MP/UP), storage address assignment, and attachment of I/O control units having the remote switch attachment feature.

Field Installation: Yes.

Prerequisites: One or two 3158/3158-3 multiprocessing mdls. I/O control units which are to be connected to the I/O assignment switches on the configuration control panel must have the two-channel switch feature and the remote switch attachment feature.

Publications: *IBM System/370 and 4300 Processors Bibliography* (GC20-0001).

SPECIFY

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Processor Mdls: Must be specified.

Symmetrical Processors

MP1 or M31	**#9501**
MP2 or M32	**#9502**
MP3 or M33	**#9503**
MP4 or M34	**#9504**
MP5 or M35	**#9505**
MP6 or M36	**#9506**

Asymmetrical Processors

Left Processor	Feature	Right Processor	Feature
M32	**#9181**	M32	**#9182**
M34	**#9183**	M34	**#9184**
M35	**#9185**	M35	**#9186**
M36	**#9187**	M36	**#9188**
M37	**#9189**	M37	**#9190**
M38	**#9191**	M38	**#9192**

SPECIAL FEATURES

I/O Assignment Switch Expansion (#4600): Adds an additional 14 assignment switches to the basic 14 on the configuration panel of the 3058. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3060 SYSTEM CONSOLE

[NO LONGER AVAILABLE]

PURPOSE

Provides the switches and lights necessary to operate the System/360 model 195 or System/370 model 195.

MODELS

Model 1 001

HIGHLIGHTS

One unit is used with each 3195 Processing Unit. Data can be entered into processor storage or into internal registers by keys and switches. Contents of storage or internal registers of the mdl 195 can be displayed. Basic maintenance tests of the processor, including storage, can be operated from the console. A display console is included which is functionally equivalent to a 2250 mdl 1 with the following features: Alphameric keyboard, 8K buffer (4K is maintenance only), character generator, light pen, and OCP-First. The display console and operator console panel which are included may be used as an operator's console.

Prerequisites: A control unit position on a 2860 or 2870 with Selector Subchannel (special feature), or a non-shared subchannel of a 2880.

Publications: *IBM System/360 Bibliography* (GC20-0360) and *IBM System/370 and 4300 Processors Bibliography* (GC20-0001).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V.

SPECIAL FEATURES

Operator Control Panel - Second (#5476): Provides a duplicate of the on/off and program load facilities (OCP) of a second processing unit. **Maximum:** One. **Field Installation:** On an "as available" basis.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3062 ATTACHED PROCESSING UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides arithmetic, logic, control, and communication function for a 3168-3 Attached Processor System.

MODELS

Model 1 001

HIGHLIGHTS

- Can access up to 8,388,608 bytes of monolithic processor storage on the host 3168-3.
- Eight-byte parallel data flow.
- Includes up to 32,768 bytes of 80-nanosecond cycle buffer storage which is transparent to the program and significantly reduces the effective cycle time of storage.
- Buffer storage does not increase the amount of addressable storage.
- 80-nanosecond processor cycle.
- Double-words are four-way interleaved.
- Overlapped operation of instruction and execution units.
- Extensive data checking is coupled with 3168-3 reliability, availability, and serviceability.
- Improved availability and serviceability through a service processor.

Standard Features:

- Universal instruction set.
- Extended precision.
- One-microsecond time-of-day clock with clock comparator.
- One-microsecond CPU timer.
- Dynamic address translation.
- Extended control mode.
- Program event recording.
- Additional variable field length instructions.
- Control registers, expanding the functions of PSWs.
- Byte-oriented operand feature.
- Buffer storage (32,768 bytes).
- Fetch and store protection.
- Writable control storage.
- Interval timer.
- Storage error checking and correction.
- Instruction retry.
- Compare and swap.
- Compare double and swap.
- Insert PSW key.
- Set PSW key from address.
- Store CPU ID, additional instructions on the APU signal processor.
- Set prefix.
- Store prefix.
- Store CPU address.

Prerequisites: The 3062 APU mdl 1 requires:

- A 3168 mdl A-Series processor.
- A 3066 System Console mdl 3 (shared with 3168-3).
- A 3067 mdl 5 for the APU.
- A 3062 mdl 1 Attached Processing Unit Support (#7901) on the CPU 3067 mdl 3.
- An appropriate 415 Hz power input.
- Customer-supplied chilled water is required for cooling the system. See *S/370 Installation Manual - Physical Planning* (GC22-7004).
- Special features on the 3062 must match those on the 3168 for a normal installation. When special features do not match, RPQ 8P0810 must be ordered for the 3168.

Publications: *IBM System/370 and 4300 Processors Bibliography*, GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Motor Generator Set and Starter (if desired): See "Accessories" for ordering instructions.
- If two processors are installed and the 3062 is added and emergency power-off ability is required on the systems, then the expanded Emergency Power-Off Control (#3624) should be ordered for the host processor.

SPECIAL FEATURES

High-Speed Multiply (#4525): Improves APU speed in both fixed and floating point multiply operations. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3066 mdl 3 and the 3067 mdl 5.

System/370 Extended (#7730): Provides System/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Field Installation:** Yes. **Prerequisites:** #7730 on the A-Series processor or on a 3168 with RPQs S20579 and S20580.

MODEL CONVERSIONS (None)

ACCESSORIES

Motor Generator Set: These units are not manufactured by IBM and are available on a purchase-only basis. Manufacturer's warranty will be extended to the purchaser. Installation, check-out and maintenance will not be provided by IBM and any expenses involved must be borne by the customer.
Units must be ordered one year in advance of installation. Contact installation planning representative for installation requirements.

If a motor generator set is chosen as the power source, then one Motor Generator Set (with internally mounted starter) is required for each 3062 Attached Processing Unit. **Specify:** Feature number for Motor Generator Set on 3062 machine order (AAS). **Note:** If more than one MG set is desired on initial order, specify quantity.

	Feature
208/230V AC, 3-phase, 60 Hz-Motor Generator Set	**#9447**
440V AC, 3-phase, 60 Hz-Motor Generator Set	**#9449**

If additional MG set is to be ordered for delivery after system, order as follows:

	P/N
Motor Generator Set ... 208/230V AC	**2574790**
Motor Generator Set ... 440V AC	**2574290**

SUPPLIES (None)

3066 SYSTEM CONSOLE MDL 2, 3

The 3066 model 2 is no longer available ... features and model changes can be ordered on an ''as available'' basis.

PURPOSE:

Provides the switches, lights, display and control functions for a S/370 model 168 or 168-3.

MODELS:

Model 2	002	[NO LONGER AVAILABLE] For each 3168/3168-3 Processing Unit.
Model 3	003	For each 3168-3 A-Series to support a 3062-1 APU.

Prerequisites: A control unit position on a 2860 Selector Channel, 2870 Basic Multiplexer Channel, 2870 Selector Subchannel (special feature), or a non-shared subchannel of a 2880 Block Multiplexer Channel ... see M2860, 2870, 2880 pages.

HIGHLIGHTS:

One 3066 mdl 2 is used with each 3168/3168-3 Processing Unit. Data can be entered into processor storage or internal registers by keys and switches. Contents of storage or internal registers of the 3168/3168-3 can be displayed.

Basic maintenance tests of the processor, including storage, can be operated from the console. A display console with a 4K buffer, an input keyboard, and associated control logic combine to provide a complete console I/O function. In normal mode, the CRT and the alphameric keyboard are designed to be used as the operator's console.

Also included is a microfiche projection display, a microfiche document viewer, a main storage configuration plugboard, a systems activity monitor, and a device for inputting microcode from a magnetic disk cartridge to the writeable control storage.

A 3066 mdl 3 is used with each 3168-3 A-Series to support a 3062 APU mdl 1.

Publications: GC20-0001

SPECIFY:

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- 3168-3 Attachment: **#9650** ... required to attach a 3168-3 Processing Unit. **Field Installation:** Yes.

SPECIAL FEATURES:

High Speed Multiply (#4525): Required if feature #4525 is installed on the 3168/3168-3 Processing Unit. **Field Installation:** Yes. **Prerequisites:** #4525 on the 3168/3168-3 and on the 3067 mdl 2, 3 or 5.

Multiprocessing (#5050): [mdl 2] Required if the 3066 mdl 2 is used with a 3168 or 3168-3 multiprocessor model. **Field Installation:** Yes.

Power Warning (#5760): Provides signal to the 3168/3168-3 system when power is outside specified limits. **Prerequisites:** All mdls require customer-supplied uninterruptible power supply with line sensor. Multiprocessing mdls also require special cable ... consult physical planning representative. **Field Installation:** Yes.

7070/7074 Compatibility (#7127): Required if feature #7127 is installed on the 3168/3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7127 on the 3168/3168-3 and on the 3067 mdl 2 or 3.

7080 Compatibility (#7128): Required if feature #7128 is installed on the 3168/3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7128 on the 3168/3168-3 and on the 3067 mdl 2 or 3.

709/7090/7094/7094 II Compatibility (#7129): Required if feature #7129 is installed on the 3168/3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7129 on the 3168/3168-3 and on the 3067 mdl 2 or 3.

MODEL CONVERSIONS:

The model 2 may be field-converted to a model 3.

ACCESSORIES (None)

SUPPLIES: (None)

3067 POWER AND COOLANT DISTRIBUTION UNIT MDL 2

[NO LONGER AVAILABLE]

The 3067 model 2 is no longer available ... features and model changes can be ordered on an ''as available'' basis.

PURPOSE

Provides power and coolant distribution control required by a S/370 model 168.

MODELS

Model 2 002 S/370 model 168

HIGHLIGHTS

One 3067 mdl 2 is used with each 3168 Processing Unit.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Buffer Expansion (#1435): Required if feature #1435 is installed on the 3168 Processing Unit. **Field Installation:** Yes. **Prerequisites:** #1435 on the 3168.

High Speed Multiply (#4525): Required if feature #4525 is installed on the 3168 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3168 and on the 3066 mdl 2.

Multiprocessing (#5050): Required if the 3067 is used with a 3168 mdl MP. **Field Installation:** Yes.

7070/7074 Compatibility (#7127): Required if feature #7127 is installed on the 3168 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7127 on the 3168 and on the 3066 mdl 2.

7080 Compatibility (#7128): Required if feature #7128 is installed on the 3168 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7128 on the 3168 and on the 3066 mdl 2.

709/7090/7094/7094 II Compatibility (#7129): Required if feature #7129 is installed on the 3168 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7129 on the 3168 and on the 3066 mdl 2.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3067 POWER AND COOLANT DISTRIBUTION UNIT MDL 3

[NO LONGER AVAILABLE]

The 3067 model 3 is no longer available ... features and model changes can be ordered on an ''as available'' basis.

PURPOSE

Provides power and coolant distribution control required by a S/370 model 168-3.

MODELS

Model 3 003 S/370 model 168-3

HIGHLIGHTS

One 3067 mdl 3 is used with each 3168-3 Processing Unit.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

High Speed Multiply (#4525): Required if feature #4525 is installed on the 3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3168-3 and on the 3066 mdl 2.

Multiprocessing (#5050): Required if the 3067 is used with a 3168-3 multiprocessing model. **Field Installation:** Yes.

7070/7074 Compatibility #7127): Required if feature #7127 is installed on the 3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7127 on the 3168-3 and on the 3066 mdl 2.

7080 Compatibility (#7128): Required if feature #7128 is installed on the 3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7128 on the 3168-3 and on the 3066 mdl 2.

709/7090/7094/7094 II Compatibility (#7129): Required if feature #7129 is installed on the 3168-3 Processing Unit. **Field Installation:** Not recommended. **Prerequisites:** #7129 on the 3168-3 and on the 3066 mdl 2.

3062 Attached Processing Unit Mdl 1 Support (#7901): Required if a 3062 APU mdl 1 is attached to the 3168. **Field Installation:** Yes. **Corequisites:** 3062 APU mdl 1.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3067 POWER AND COOLANT DISTRIBUTION UNIT MDL 5

[NO LONGER AVAILABLE]

PURPOSE

Provides power and coolant distribution control required by a 3062 Attached Processing Unit model 1.

MODELS

Model 5 005 3062 model 1

Prerequisites: A 3062 Attached Processing Unit mdl 1.

HIGHLIGHTS

One 3067 mdl 5 is used with the 3062 Attached Processing Unit mdl 1.

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

High Speed Multiply (#4525): Required if feature #4525 is installed on the 3062 Attached Processing Unit mdl 1. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3062 and on the 3066 mdl 3.

TERMS and CONDITIONS

Plan Offering: Plan A
Additional Use Charge Percent: 10%
Purchase Option: 55%
Base Term: 48 months
Machine Group: A
Warranty: B
Per Call: 3
Termination Charge Percent: 25%
Termination Charge Months: 6
Upper Limit Percent: 5%
Metering: Base Unit (meter on 3066 mdl 3)
Educational Allowance: Yes
Customer Setup: No
Pre-Installation Test Allowance: No
Non-field Installable Feature/ Model Conversions: Yes
Add'l Charge in lieu of AU Charge: 15%
Repair Center Service: No
Central Facility Maintenance Service: No
Deferred Central Facility Maintenance Service: No
Pilot Test Plan: No

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

3068 MULTISYSTEM COMMUNICATION UNIT

[NO LONGER AVAILABLE]

PURPOSE:

Control unit used in configuring a S/370 model 168 Multiprocessor System. One is required for each system containing one or two 3168/3168-3 multiprocessor models.

MODELS:

Model 1 001 S/370 model 168MP or 168-3MP

Prerequisites: One or two 3168/3168-3 multiprocessor mdls ... I/O control units which are to be connected to the I/O assignment switches on the configuration control panel must have the two-channel switch feature and the remote switch attachment feature. If the 3068 is to be installed with only one of the 3168/3168-3 multiprocessors mdls, order additional end cover via RPQ X66497.

Field Installation: Yes.

HIGHLIGHTS:

Contains hardware for communications between two S/370 mdl multiprocessing processors together with configuration control facilities for mode of operation (MP/UP), storage address assignment, and attachment of I/O control units having the remote switch attachment feature.

Publications: GC20-0001

SPECIFY:

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9904** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES:

Extended Storage Attachment (#3850): Provides for attachment of Extended Storage Control (greater than 4MB) if either processor is a mdl MP5, MP6, MP7, MP8, M35, M36, M37 or M38. **Maximum:** One. **Field Installation:** Yes.

I/O Assignment Switch Expansion (#4600): Adds an additional 14 assignment switches to the basic 14 on the configuration panel of the 3068. **Maximum:** One. **Field Installation:** Yes.

TERMS and CONDITIONS

Plan Offering: Plan A
Additional Use Charge Percent: 10%
Purchase Option: 55%
Base Term: 48 months
Machine Group: A
Warranty: A
Per Call: 3
Termination Charge Percent: 25%
Termination Charge Months: 6
Upper Limit Percent: 5%
Metering: Base Unit

Mdl/Feature Add'l Charge in lieu of AU Charge: 15%
Educational Allowance: Yes
Customer Setup: No
Pre-Installation Test Allowance: Yes
Non-field Installable Feature/Model Conversions: No
Repair Center Service: No
Central Facility Maintenance Service: No
Deferred Central Facility Maintenance Service: No
Pilot Test Plan: No

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

3080 POWER UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides power for the S/360 model 195 or S/370 model 195.

MODELS

Model 1	001	Provides power for the Floating Point Execution Element.
Model 2	002	Provides power for the Fixed Point and Variable Field Length Execution Element.
Model 3	003	Provides power for the Instruction Processor and the Storage Control Unit.

HIGHLIGHTS

One unit of each mdl of the 3080 is used with each 3195 Processing Unit.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

MODEL CONVERSIONS (Not applicable)

ACCESSORIES (None)

SUPPLIES (None)

3081 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through two integrated central processors and houses shared central storage and channels for a 3081 Processor Complex.

MODELS

Models			Bytes of Central Storage
D16	K16	G16	16,777,216
D24	K24	G24	25,165,824
D32	K32	G32	33,554,432
	K48	G48	50,331,648

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. A maximum of 4080 devices is possible.

Limitations: In 370 mode, address translation is limited to 64K byte segments and 4K byte page size (except mdl D16, which translate 2K or 4K byte page size.) In 370 mode, mdl D16 uses 2K storage protect keys, while all other models use 4K storage protect keys.

Prerequisites: Each 3081 Processor Unit requires:

1. One 3082 Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400 Hz power source.

Note: Depending upon the 3081 mdl, **#9491**, **#9492**, or **#9493** must be specified on the 3082 Processor Controller. See "Specify" under 3082.

Those customers using the 3087 mdl 1 CDU to cool their systems, must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

HIGHLIGHTS

Depending upon the mdl, contains up to 50,331,648 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... two integrated central processors having a cycle time of 26 nanoseconds ... eight byte data flow between each processor and storage ... each processor has its own high speed buffer having a cycle time of 26 nanoseconds ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing 16 channels organized in two groups of eight. An additional group of eight channels is available as an optional feature. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, either central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 24 channel paths to which the device is attached.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491**.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572**. Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2500 lbs and may require partial depopulation of 3081 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES

Channel Group Add'l (#1550): Provides an add'l group of eight block multiplexer channels. **Prerequisites:** Every #1550 requires support from a 3082 Processor Controller mdl 24. **Limitations:** #1550 may be configured only as block multiplexer channels. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model upgrades from model Ds and Gs to model Ks or model upgrades increasing storage capacity are field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrade from model Ks to model Ds are not available. Model downgrade from a 3081 model G or K to a 3083 is not recommended.

Note: Any 3081-K upgrades to a 3084-Q requires installation of feature #1550 (Channel Group Add'l) on the 3081-K as a prerequisite to upgrading.

Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

See M3084 pages for 3081-K to 3084-Q upgrade.

ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3081 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3082 PROCESSOR CONTROLLER

PURPOSE

Provides the controlling mechanism for monitoring and supervising either the 3081, 3082, or 3084 Processor Complex and houses the interface adapter elements for each channel. It also contains the adapters for attaching the 3278-2A Display Console, an optional 3287 Printer and an optional 3268-2, a 3230-2 or a 3278-2 Display Station (programming support console). Note: The 3082 Model Q48 is not orderable from the plant and can only be achieved by upgrading a 3082 Model 24.

MODELS

Mdl 8	008	Supports 3083 Processor Units with 8 channels.
Mdl 16	016	Supports 3081 or 3083 Processor Units with 16 channels.
Mdl 24	024	Supports 3081 or 3083 Processor Units with 24 channels.
Mdl Q48	Q48	Supports a 3084 having 24 channels per side.

HIGHLIGHTS

The 3082 provides the machine to human interface for either the 3081, 3083, or 3084 Processor Complex and performs the following: Provides the control unit function for the system console ... provides the control unit function for an integrated service support console ... provides the control unit function for an optional printer and a programming support console ... houses the interface logic and control for each channel ... houses basic switches, lights and indicators ... houses the remote service facility modem used in remote servicing ... contains a diskette drive for maintenance data interchange ... contains fixed media direct access storage for processor data ... monitors power levels and coolant flow ... controls usage configurations and effects reconfiguration ... at initial microcode load, controls microcode loading of distributed control stores ... assist the Processor Unit in error recovery ... provides access to RETAIN for a 3278 Model 2 Display Station with or without Switch Control Unit feature (#1720) ... performs basic diagnostic and failure isolation on a time sharing basis with the above functions and operates concurrently to the processor unit to which it attaches.

One 3082 is required for each 3081, 3083, or 3084 Processor Unit. Each side of a 3082 Model Q48 has the functional attributes of model 24 plus the ability to function in a multiprocessor configuration.

3084 Operation: A 3082-Q48 is required to support any 3084 Processor Complex and contains two Monitoring and System Support Facilities (MSSF). Like the 3084 with which it functions, the 3082-Q48 duplicates most hardware, including two MSSFs. In a single image configuration, one MSSF supervises the 3084 Processor Complex. The second MSSF is capable of automatically assuming supervision of a 3084 Processor Complex for most failures of the primary MSSF.

At the failure of any critical hardware element, the MSSF performs its normal identification of failing componentry but also continues to supervise non-failing elements. This permits the operator to vary-off failing elements and to establish a maintenance configuration so that the failing hardware may be repaired. Using the intercommunication capability between the MSSF and the control program, pages are relocated where necessary and fencing is established between the maintenance configuration and the continuing customer's configuration. Upon verification of repair, the maintenance configuration is eliminated, the operator may vary-on the now repaired hardware and return it to continuing configuration.

When the 3084 if partitioned into two configurations, each side of the processor complex functions independently under the supervision of a dedicated MSSF.

Limitations: Natively attached programming support consoles (3278-2) must have installed a 75-key EBCDIC typewriter keyboard **#4621**.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Processor Unit Attachment:

3081	3083
any Model D = **#9491**	any Model E = **#9497**
any Model K = **#9492**	any Model B = **#9498**
any Model G = **#9493**	any Model J = **#9499**

- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame E and L are 945mm wide by 1778mm long by 1790mm high (37.2" x 70" x 70.5"). Should shipping dimensions need reduction, the side covers may be removed, reducing external dimensions to 858mm wide by 1778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by additionally removing a frame extension which reduces external dimensions to 858mm x 1550mm (33.8" x 61") and is obtainable by specifying **#9573**. Specify **#9571** and **#9573** as required. For additional information, see *IBM System/370 Installation Manual Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Remote Servicing: A customer supplied data communication line with an exclusion key telephoneof the WE503 or 2503 type (or equivalent) and a manual answer Data Protective Coupler (CDT type or equivalent)is necessary in order that higher level support may be received from the Field Support Center. These same facilities may also be used with RETAIN. The capability of using the RETAIN remote service/logout analysis is standard.

  An integrated remote service facility modem is standard on 3082 Connection of the IBM provided telephone interface cable to the telephone network must be arranged for by the customer. Each side of the 3082-Q48 has a remote service facility modem.
- Remote 3278-2A Display Console: The standard cable for interconnecting the 3082 and the 3728-2A (system console) is a fixed length, 15 meter (49 feet) cable. Cables greater than 15 meters (49 feet), up to the maximum length of 1,500 meters (4,921 feet), may be obtained by RPQ.

SPECIAL FEATURES

Channel To Channel Adapter (#1850 For First, #1851 For Second): Provides the controlling element to interconnect two processors via their channels (either S/360 or S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. On Model Q48, the feature is located on the A-side. **Maximum:** Two, one #1850 and one #1851. **Field Installation:** Yes. **Prerequisites:** #1851 requires #1850.

B-side CTC Adapter (#1852 for third, #1853 for fourth): (Mdl Q48 only.) Provides the controlling element to interconnect two processors via their channels (either S/360, S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. Feature is located on the B-side of the 3082. **Limitations:** Mdl Q48 only. **Maximum:** Two, one #1852 and one #1853. **Field Installation:** Yes. **Prerequisites:** #1853 requires #1852.

I/O Power Sequence Control (#4650): The 3082 has a standard capability of associating up to 32 control units to a 3081, 3083, or the A-side of a 3084 Processor Complex for power-on/power-off control purposes. When requirements exceed these 32 power control relays, #4650 provides for power-on/power/off control for the 33rd through 64th control unit. **Maximum:** One. **Field Installation:** Yes.

B-side I/O Power Sequence Control (#4651): (Mdl Q48 only.) The B-side of 3082-Q48 has a standard capability of associating up to 32 control units to the B-side of the 3084 for power sequence purposes. When requirements exceed these 32 power-control relays, #4651 provides for power-on/power-off control for the 33rd through 64th control unit attached to the B-side. **Limitations:** Available only on mdl Q48. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model upgrades are field installable. Upgrade to a Model Q48 may only take place from a Model 24. Model downgrade from a Model Q48 to any other model is not recommended.

ACCESSORIES (None)

SUPPLIES (None)

3083 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through a single central processor and houses shared central storage and channels for a 3083 Processor Complex.

MODELS

Models			Bytes of Central Storage
E8	B8	J8	8,388,608
E16	B16	J16	16,777,216
E24	B24	J24	25,165,824
E32	B32	J32	33,554,432

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K bytes system area is available.

Model Differences: The various models of 3083 are identical in function but vary in instruction execution rate (ranging from the slowest Model E to the fastest Model J).

Prerequisites: Each 3083 Processor Unit requires:

1. One 3082 Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400Hz power source.

Note: See "Specify" under the 3082 for appropriate Processor Unit Attachment Code.

Those customers using the 3087-1 CDU to cool their system must supply chilled water. See *S/370 Installation Manual - Physical Planning,* GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

HIGHLIGHTS

Depending upon the model, contains up to 33,554,432 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... 26 nanosecond central processor cycle ... eight byte data flow between the central processor and storage ... a high speed buffer in the central processor ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and provides for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... storage configuration and control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing eight channels as basic. One optional channel group is available on mdl E, two optional channel groups are available on mdls B and J. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted, and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, physical channels may be given any valid logical designation. In 370-XA mode, the central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the channel paths to which the device is attached.

Limitations: In S/370 mode, address translation of page sizes is limited to 4K bytes and segment sizes to 64K bytes. Only 4K storage protect keys are used.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491**.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard extenal dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572**. Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators have weight limitations of 1,136kg/2,500 lb and may require partial depopulation of 3083 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lb.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES

Channel Group, First Add'l (#1545): Provides the first add'l group of eight channels for any 3083. **Maximum:** One. **Field Installable:** Yes. **Prerequisites:** Every #1545 requires support from the appropriate mdl of a 3082 Processor Controller.

Channel Group, Second Add'l (#1550): Provides the second add'l group of eight channels for any mdl B or J. **Prerequisites:** Every #1550 also requires a #1545. Every #1550 requires support from a 3082 Processor Controller mdl 24. **Limitations:** Not available on mdl E. **Maximum:** One. **Field Installable:** Yes.

MODEL CONVERSIONS

Model upgrade from one 3083 to another is field installable. Parts removed or replaced become the property of IBM and must be returned. Model downgrade from model J to B, or from a model B to E, or from a 3081-K to a 3083-J, or from a 3081-G to a 3083-B, is not recommended.

Model upgrade from a 3083-J to a 3081-K, or from a 3083-B to a 3081-G, is field installable. Parts removed or replaced become the property of IBM and must be returned. Any 3083-J upgrading to a 3081-K, or any 3083-B upgrading to a 3081-G, requires installation of feature #1545 (Channel Group First Add'l) on the 3083 as a prerequisite action.

Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

ACCESSORIES

The following is available on a purchase only basis for shipment with the 3083 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3084 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through four integrated central processors and houses shared central storage and channels for a 3084 Processor Complex. The processor unit may be partitioned and run as two independent dyadic configurations. The 3084 Processor is not orderable from the plant and can only be achieved by upgrading a 3081-K Processor.

MODELS

Models	Bytes of Central Storage
Q32	33,554,432
Q48	50,331,648
Q64	67,108,864
Q96	100,663,296

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB or 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K byte system area is available. A maximum of 4,080 devices is possible.

Limitations: In 370 mode, address translation is limited to 64K byte segments and 4K byte page sizes. Only 4K storage protect keys are used.

Prerequisites: Each 3084 Processor Unit requires:

1. One 3082 mdl Q Processor Controller,
2. Two 3087 mdl 1s or mdl 2s Coolant Distribution Unit,
3. Two 3278 mdl 2A Display Console as the system console, and
4. Two 3089 Power Unit or other appropriate 400 Hz power source.

Those customers using the 3087 mdl 1 CDU to cool their systems must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004 for model upgrade requirements.

HIGHLIGHTS

Depending upon the mdl, contains up to 100,663,296 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... four integrated central processors having a cycle time of 26 nanoseconds ... 8-byte data flow between each processor and storage ... each processor has its own high-speed buffer having a cycle time of 26 nanoseconds ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... concurrent repair of hardware is the normal maintenance procedure ... may operate as a single multiprocessor or partitioned into two dyadic configurations of an A-side and a B-side ... complete duplication of all critical functional elements ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing 24 channels organized in three groups of eight. Two EXDC are integral to each 3084, one per side. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, any central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 48 channel paths to which the device is attached.

3084 Tightly Coupled Multiprocessing: The 3084 duplicates all critical function elements (4 Central Processors, 2 External Data Controllers, 2 System Controllers) and is supported by two of each type of support unit. Its normal method of operation is in 370-XA mode under the control of a single control program through a single operational interface and provides the greatest computational capability of any 308X Processor Complex. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure processor elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without requirement for IPL or IML. The continuing subsystem may consist of either half of the 3084. This provides very high availability of the surviving portion of the processor complex. When run as a 4-way tightly coupled multiprocessor, 3084 may operate only in 370-XA mode.

The 3084 may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491** for the A-side capability (on 3081) and **#9591** for the B-side capability (on MES).
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S and Frame T are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by splitting Frame S and Frame T into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572**. Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning*, GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3084 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model upgrades from 3081-K to a 3084-Q and storage upgrades within 3084-Q are field installable. Parts removed or replaced become the property of IBM and must be returned.

Upgrade Prerequisites: Prior to model upgrading any 3081-K to a 3084-Q, the 3081-K must have installed feature **#1550** and one-half of the storage capacity of 3084-Q. Only symmetrical upgrades are allowed.

Model downgrade from 3084-Q to a 3081-K is not recommended.

ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3084 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone

3084 Processor Unit (cont'd)

lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3085 POWER DISTRIBUTION UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides power control and distribution for a S/360 model 195 or S/370 model 195.

MODELS

Model 1 001 S/360 model 195 or S/370 model 195

HIGHLIGHTS

One unit is used with each 3195 Processing Unit.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

3086 COOLANT DISTRIBUTION UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides distribution control for coolant required by the S/360 model 195 or S/370 model 195.

MODELS

Model 1 001 S/360 model 195 or S/370 model 195

Prerequisites: Customer-supplied chilled water is required for cooling the system. See *S/360 Installation Manual - Physical Planning,* GC22-6820.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

HIGHLIGHTS

One unit is used with each 3195 Processing Unit.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

IBM ISG

MACHINES

3087 COOLANT DISTRIBUTION UNIT

PURPOSE

Provides the coolant distribution required by a 3081, 3083, or 3084 Processor Unit.

MODELS

Model 1 001
Model 2 002

HIGHLIGHTS

Contains the heat exchanger, pumps and controls necessary to cool the liquid cooled portion of the 3081, 3083 or 3084 Processor Unit. The 3087-1 uses the efficiency of water cooling and evacuates its heat to chilled water, while the 3087-2 evacuates its heat to the air of the computer room.

The 3087 supports a 3081, 3083 or 3084 Processor Unit. Two 3087 mdl 1s or two 3087 mdl 2s are required to support a 3084 Processor Unit. They cannot be intermixed.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, or **#9066** for pearl white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3088 MULTISYSTEM CHANNEL COMMUNICATION UNIT MDLS 1, 2

PURPOSE

Provides for interprocessor communications over block multiplexer channels.

MODELS

Model 1	001	Interconnects up to four processors
Model 2	002	Interconnects up to eight processors

Prerequisites: An available control unit position on a block multiplexer channel for each processor connected. A block of modulo 32 or 64 addresses is required on each channel to which the 3088 is attached. Refer to the specific configuration requirements in the *IBM 3088 Multisystem Channel Communication Unit Product Description Manual,* GA22-7081.

HIGHLIGHTS

The 3088 is a stand-alone I/O control unit using a multiple address architecture which operates in a manner similar to current channel-to-channel adapters (CTCA). The mdl 1 supports up to 126 logical CTCAs distributed across four CPU interfaces. The mdl 2 supports up to 252 logical CTCAs distributed across eight interfaces. The 3088 is attached to block multiplexer channels with or without data streaming. Two independent data transfers can be active between two separate pairs of channels in either high-speed transfer mode between 0.7 and 2.1MB/second or in data streaming mode at 3.0MB/second.

Where the 3088 is attached to a low priority block multiplex channel, and where the I/O interface cable lengths are very short (6.1 meters; 20 feet), certain configurations may experience DASD overrun problems with the higher priority block multiplexer channels. In such cases, the 3088 may be configured by service personnel at installation time so that the high-speed transfer mode data rate does not exceed 1.2MB/second.

The early disconnect feature of the 3088 makes possible its coexistence on a channel with other control units through the use of channel command retry. Like the S/370 CTCA feature, each of the 3088 CTCA links can operate in either S/360 compatibility mode or in S/370 extended mode, selectable under program control.

The cable length from the 3088 to the channel can be up to 400 feet, (up to 800 feet of cable between channels) allowing greater configuration flexibility. However, for the maximum distance, the 3088 must be the only control unit on the I/O interface. The number and type of other devices sharing the I/O interface are among the factors which limit the maximum cable length.

System Attachments: The following processor attachments are supported: 4331-2, 4341, 4361, 4381, 3031, 3032, 3033, 3042 Attached Processor mdl 2, 3081, 3083, and 3084 Processor Complexes.

Publications: *IBM 3088 Multisystem Channel Communication Unit Product Description Manual* (GA22-7081).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, or **#9914** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model 1 to model 2 conversion.

ACCESSORIES

Cables: Cables to attach 3088 may be purchased from IBM or from a customer-selected source. See *Installation Manual-Physical Planning,* GC22-7064, for specifications.

All cables must be ordered. Four sets, up to 23 meters (75 feet) each may be ordered without charge at initial installation of the mdl 1; eight sets up 31 meters (100 feet) each, at initial installation of the mdl 2. Unused allowances will not be credited for future use, or added to the allowed length of another cable set. For field upgrades from the mdl 1 to the mdl 2, eight sets, up to 31 meters (100 feet) each may be ordered without charge. Other cable lengths over that provided will be charged for on a per foot basis. For example, if a 125 foot cable is ordered for the mdl 1, the customer is charged for the 50 feet of cable over the 23 meters (75 feet) allowance. This is the only applicable charge for cable lengths beyond the lengths provided. Order cables within the allowance via normal cable ordering procedures. Order cables longer than the allowance via MES.

Assembled cables may be purchased from IBM. Specify cable assembly number.

Item	Number	Description	Max Length
Assm.	2281630	OEMI Cable	121.9m (400 feet)

SUPPLIES (None)

3089 POWER UNIT

PURPOSE

Provides 400 Hz power for a 3081/3083/3084 Processor Complex.

MODELS

Model 1 001

Limitations: Cannot be used with 3081 or 3083 Processor Units equipped with specify feature **#9491** or 3084 Processor Units equipped with specify features **#9491** and **#9591.**

HIGHLIGHTS

The 3089 Power Unit is designed to be the standard source of 400 Hz power for the 3081/3083/3084 Processor Complex. Two 3089s are required to support a 3084 Processing Complex. The unit has the same color coordinated covers as other units in the central complex, meets IBM machine room environmental standards and is suitable for locating within the machine room.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, or **#9066** for pearl white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3101 DISPLAY TERMINAL

PURPOSE

A stand-alone cathode-ray tube (CRT) display terminal used for displaying up to 1,920 alphameric characters, and for entering data into and retrieving data from a host processor. The 3101 provides an asynchronous communication interface using 7-bit ASCII code and an auxiliary interface is provided for direct attachment of an output device with EIA RS-232-C interface, such as a 3102 Printer. A cable-connected keyboard is provided for operator data input.

The use of ASCII code and asynchronous communication interface allows the 3101 to attach to a variety of processors including the Series/1. The 3101 meets both general industry and unique customer information processing requirements.

MODELS

Models 10, 12 and 13 – For use in the character transmission mode.

Model 10 100 — Provides EIA RS-232-C interface. **Note:** If model 10 with a 3.0m (10.0 ft) modem cable is desired, order 110 in AAS.

Model 12 120 — Provides switch-selectable interface for attachment to a 20 mA current loop, in addition to EIA RS-232-C interface.

Model 13 130 — Provides switch-selectable interface that meets EIA RS-422-A characteristics, in addition to EIA RS-232-C interface.

Models 20, 22 and 23 – For use in switch-selectable block transmission mode, in addition to character mode.

Model 20 200 — Provides EIA RS-232-C interface. **Note:** If model 20 with a 3.0m (10.0 ft) modem cable is desired, order 210 in AAS.

Model 22 220 — Provides switch-selectable interface for attachment to a 20 mA current loop, in addition to EIA RS-232-C interface.

Model 23 230 — Provides switch-selectable interface that meets EIA RS-422-A characteristics, in addition to EIA RS-232-C interface.

Prerequisites: The 3101 requires a host processor to which it communicates. Series/1 prerequisites and supported 3101 models are:

Series/1 Mach Type	Series/1 Feature	3101 Mdl	Interface
4952	#7850	12,22	Current Loop*
4953, 4955	#7850	10,12,13,20,22,23	EIA RS-232-C*
4959	#1310	10,12,13,20,22,23	EIA RS-232-C
	#1310	13,23	EIA RS-422-A
	#1610	10,12,13,20,22,23	EIA RS-232-C**
	#2091, #2092	10,12,13,20,22,23	EIA RS-232-C**
	#2095, #2096	10,12,13,20,22,23	EIA RS-232-C**
	#2095, #2096	12,22	Current Loop*
	#2095, D02350	13,23	EIA RS-422-A
4987	#4700	10,12,13,20,22,23	EIA RS-232-C**
	#4701	10,12,13,20,22,23	EIA RS-232-C**
	#4704	12,22	Current Loop*
	#4709	10,12,13,20,22,23	EIA RS-232-C*

* Direct Attach Only. Interface is not intended for use with modems.
** Direct Attach or via modem.

HIGHLIGHTS

Displays up to 1,920 characters, 24 rows of 80 characters each. Each character is represented in a maximum 7x14 dot matrix in the 9x16 contiguous box matrix. Handles the 128 characters of the 7-bit ASCII code. Displays the 95 graphic character set: 52 upper and lower case alphabetics, 10 numerics and 32 special characters plus Space. Can also display the 33 control characters (including Null and Delete) when in the transparent mode. The monocase switch provides automatic conversion of the lower case to the upper case, thus allowing display of the 64 graphic character set (including Space) for input.

The character transmission mode provides the capability to transmit a character over a communication line upon depression of each key. The block transmission mode, switch-selectable on mdls 20, 22 and 23 only, allows buffered transmission of data as well as field manipulation of data by use of the attribute characters.

The 3101 consists of three Workstation Elements (WSEs): The Video, Logic and Keyboard elements.

Communications Flexibility: Use of ASCII code and the asynchronous communication interface allows the 3101 to attach to a variety of processors. This capability is commonly referred to as "Teletype®-compatible" or "TTY-compatible" (TTY is short for teletypewriter). Various communications options, such as line speed and parity bits, can be selected by the customer on the setup switches.

Operator Factors: The 3101 has a contrast enhancement filter. Indicators are displayed on the bottom (25th row) of the data display area, and provide useful operator information. An audible alarm is provided to alert the operator, and its volume can be adjusted by the operator. The video element can be tilted and swiveled to change the screen angle for the operator. The cable-connected keyboard can be moved and has separators to help prevent accidental striking of control keys. Automatic scroll of the screen, the reverse video image and the blinking cursor can be specified at setup time.

Input Editing Capability: Cursor move, backspace, home and extended erase (erase to end-of-line, erase all keyboard input data, erase entire screen and erase to end-of-screen) are all provided. In addition, mdls 20, 22 and 23 provide insert line, delete line, insert character, delete character, and back-tab as well as extended field handling using an attribute character. All alphameric, special character, and cursor move keys have typamatic capability. A twelve-key numeric keypad, eight Program Function keys at alternate positions and print keys are also provided.

Output Device Attachment: An auxiliary interface is provided for attachment of an output device with EIA RS-232-C interface, such as a 3102 Printer.

The 3101 transparent and program modes provide users such as systems programmers with additional capabilities to facilitate debugging of the host communication software.

Communications: The 3101 communicates with a variety of host processors using asynchronous transmission control, over communication facilities. Communications speed can be selected at setup time from 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800 and 9600 bps. Other communications options such as half-duplex/full-duplex, stop bits and parity bits can also be specified by selecting the appropriate setup switches.

When using the EIA RS-232-C interface, the 3101 can communicate, through a modem, to a remote host processor at 110 - 1200 bps; or it can directly (without a modem) attach to a host processor within 12.2m (40.0 ft) at 110 - 9600 bps.

> **Note:** For direct connect to the 8100 system, the 3.0m (10.0 ft) 3101 Modem Cable must be used; and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft), thus the total maximum cable length from the 8100 system to the 3101 being 12.2m (40.0 ft).

When the interface for attachment to a 20 mA current loop is used, line speeds of 110 - 9600 bps are supported up to 12.2m (40.0 ft). The actual line speed possible beyond 12.2m (40.0 ft) is dependent upon the length and the type of communications cable used. A shielded communication cable must be used.

When the interface that meets EIA RS-422-A characteristics is used, the 3101 can communicate with a host processor, without a modem, up to a distance of 1,219m (4,000 ft) at 110 - 9600 bps. When the EIA RS-422-A interface is used, shielded communications cable must be employed.

Communications Facilities: When using EIA RS-232-C interface the 3101 operates in point-to-point mode only. On half-duplex or full-duplex facilities at transmission speeds of 300, 600 and 1200/600 bps on nonswitched facilities. In addition, the 3101 operates on switched facilities at transmission speeds of 110, 150, 200, 300, 600 and 1200/600 bps. For communication capabilities, product utilization and special features, see M2700 pages.

Modems: The 3.0m (10.0 ft) 3101 modem cable or equivalent, is required for attachment to a modem. By ordering 110 or 210 in AAS, the 3101 mdl 10 or 20 respectively with modem cable can be obtained. There are no IBM modems that can be used for the 3101. PTT mandatory modems complying with CCITT Recommendations (1976) V.24, V.28, ISO standard 2110 and either CCITT Recommendations V.21 (for switched or nonswitched lines), or V.23 (for nonswitched lines) may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

Customer Problem Analysis And Resolution: Function has been designed into the 3101 to enhance availability to the customer. This has been done through the use of Customer Problem Analysis and Resolution (CPAR) routines, and procedures that are used by the operator. See "Customer Responsibilities" below.

Customer Setup (CSU): The 3101 is designated a customer setup machine. Set up instructions are included with each machine.

3101 Display Terminal (cont'd)

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Obtaining a communications cable (current loop cable, modem cable or direct connect cable) and auxiliary interface cable if used.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Setup of unit, connection of cables to communication lines, modems, processors, switch settings and checkout.
- Price quotations, installation and cost of common carrier equipment and service.
- Fuse replacement.
- Determination of the required number of spares.
- Performing Customer Problem Analysis and Resolution.
- Returning failing workstation element to repair center with a completed Repair Authorization form..

Each customer must order the *IBM 3101 Display Terminal Description,* GA18-2033, for installation planning work.

Spares: It is recommended that the customer replace a failing 3101 element with a spare 3101 element and that the customer be advised to purchase sufficient spare 3101 units for such use. The number of spare units recommended is dependent upon the number of 3101 units the customer has installed, his application requirements, physical locations, and layouts. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, logic and a video element is shown in the following table:

Recommended Minimum Number of Spare 3101s:

Number of 3101s Installed	Spare 3101s
15	1
30	1
50	1
75	2
100	2
200	3
300	3
500	5
700	6
1000	7

The customer should be advised to test spares for correct operation before putting them on the shelf.

For ordering spare 3101 Display Terminal Workstation Elements (WSEs), see "Accessories".

Warranty Service And Maintenance: The normal procedure will be for the customer to isolate the failure to a WSE and ship it to the designated IBM Repair Center. All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Repair Center. When maintenance is required, it shall be the customer's responsibility to determine the failing WSE, pack the WSE in the designated shipping container and ship it prepaid to the designated Repair Center. During warranty IBM will ship the repaired unit prepaid. There is no regularly scheduled preventive maintenance recommended by IBM on these units.

Repair center service is available during the warranty period, under the IBM Maintenance Agreement and the IBM Repair Center Service Amendment (Z120-2240-5) or on a Time and Material basis.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair. The IBM Machine Repair Authorization Form is to be completed with all shipments to the repair center. Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, estimating of repair charges .

IBM Repair Center Service: The 3101 is eligible for maintenance agreement coverage immediately following expiration of the service and parts warranty for an annual charge.

If maintenance agreement coverage is not contracted for immediately following expiration of the service and parts warranty and the customer subsequently wants maintenance coverage, he must ship the machine(s) to the designated IBM Repair Center for an inspection. If, on the basis of an inspection, the repair center concludes that a machine does not qualify for maintenance agreement coverage, no further work will be performed and the machine will be returned to the customer subject to minimum charge.

In all other cases, a minimum charge per Workstation Element to cover handling, inspection, cleaning, adjustments, testing and return shipping charges will be applied. In addition, all parts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates. The machine will then be eligible for maintenance agreement coverage.

Machine Element Replacement Service: A customer desiring replacement service for a defective Work Station Element, may call the local branch office to have a FE bring a replacement spare to the customer site. The FE will verify the failure, remove the defective element and install and test the replacement element. The defective element becomes the property of IBM. This service is available only under the terms of the IBM Repair Center Maintenance and Machine Element Replacement Service Amendment with annual fee.

Customer responsibility for damaged or altered elements: Determination by IBM that damage to a replaced unit is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at the then current IBM rates and terms.

This service is available during the warranty period only under the IBM Repair Center Maintenance and Machine Element Replacement Service Amendment to the IBM Purchase Agreement for a one-time charge. During the warranty period, this service is available 24 hours-a-day, seven days-a-week. After the warranty period this service is available only under the IBM Repair Center and Machine Element Replacement Amendment to the IBM Maintenance Agreement for an annual charge. This service is available from 8:00 a.m. to 5:00 p.m. Monday through Friday.

On-Site Assistance: If the customer desires assistance to perform CPAR, the local FE branch office may be called for customer engineering assistance. The FE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer-owned spare WSEs will be installed by the FE upon customer request. Shipping of defective WSEs to the repair center is a customer responsibility. FE assistance is billable at the current FE rate.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

- Power: (120V AC, 1-phase, 3-wire, 60 Hz)
- Power Cable: 1.8m (6.0 ft), non-locking plug. No Specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Customers may change between character-mode (models 10, 12, 13) and block-mode (models 20, 22, 23) by purchasing and installing the appropriate logic element.

ACCESSORIES

Workstation Elements: Workstation elements may be ordered to provide individual elements as needed by the customer in the use of the 3101 Display Terminal. Physical planning and setup are the responsibility of the customer. The customer should have on hand, or should order, the *IBM 3101 Display Terminal Description Manual,* GA18-2033, for installation planning work. **Warranty:** Category B. **Maintenance:** Maintenance for workstation elements is available on a Time and Materials basis at an IBM Repair Center.

Workstation elements of the 3101 can be ordered as follows:

Mdl	WSE	Number*
All	Video	5640540
All	Keyboard	5640534
10	Logic	5640410
12	Logic	5640412
13	Logic	5640414
20	Logic	5640411
22	Logic	5640413
23	Logic	5640415

* Same as Bill of Material number.

Modem Cable: This 3m (10 ft) modem cable can also be ordered separately (not required for mdls 11 and 12 [AAS models 110 and 120]). The cable has a male plug on both ends. For direct connect to the 8100 system, this cable *MUST* be used. The length of the 8100 direct connect cable cannot exceed 9.1m (30 ft); thus the total maximum cable length from the 8100 system to the 3101 is 12.2m (40 ft).

Description	P/N
Modem Cable	**5640736**

For connection to IBM modems or PTT modems the above IBM cables or equivalent must be used.

Note: Wrap socket can be ordered separately as P/N **5640724.**

3101 Display Terminal (cont'd)

Field Packaging Materials: The field packaging materials below can be used for shipping the 3101 Display Terminal or the individual Workstation Elements to and from the IBM Repair Center.

Description	B/M Number
For Video element	2655956
For Logic element	2655957
For Keyboard element	2655958
For large packaging material to contain all above three packaging materials	2655959
For obtaining all above four packaging materials 2655956-2655959. This is required to ship the entire 3101 Display Terminal.	2655960

Line Cord: The line cord to the 3101 can be ordered separately as follows:

P/N 5640670

Keyboard Palmrest (P/N 5641369): The keyboard palmrest, which increases the total depth of the front end palmrest area of the 3101 Display Terminal Keyboard from 25mm to approximately 85mm, can be ordered separately.

Description	P/N
Keyboard Palmrest	**5641369**
Can be applied to the following keyboards:	
English US Keyboard	**6827894**
French Keyboard	**5640432**
German Keyboard	**5640433**
Italian Keyboard	**5640434**
English UK Keyboard	**5640435**

Replacement Parts: Replacement parts to the 3101 Display Terminal can be ordered from the designated distribution center as follows:

Description	P/N
Display Filter	**5640517**
Contrast Control Knob	**5640737**
Brightness Control Knob	**5640738**
Fuse	**1176668**

SUPPLIES (None)

3104 DISPLAY TERMINAL

PURPOSE

Cathode ray tube (CRT) display terminal is used for displaying up to 1,920 alphameric characters, and for entering data to or receiving data from the 8100 Information System or the 4331 Processor. A keyboard permits an operator to display and manipulate data on the screen in a flexible and efficient manner. The 3104 Display Terminal meets both general and unique display requirements.

MODELS

Model B1 B01 — Displays 1,920 characters and provides 75-key 3104 Data Entry Keyboard

Model B2 B02 — Displays 1,920 characters and provides 87-key EBCDIC 3104 Typewriter keyboard

Note: For details of keyboards, see "Keyboards" below.

Customer Setup (CSU): The 3104 is designated as a Customer Setup machine. Setup instructions are included with each machine.

HIGHLIGHTS

Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7x14 dot matrix in the 9x16 contiguous box matrix. All 3104 Display Terminals include 62 alphameric and 32 special characters, and the space and null characters. Use of 3270 Field Formatting capability permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphameric/numeric, normal/highlighted intensity, cursor selectable/non-cursor selectable, and displayable/non-displayable.

The 3104 Display Terminal communicates with a 4331, 8130, or 8140 Processor using Synchronous Data Link Control (SDLC) over either a direct or data-link attached loop. The 3104 offers functions equivalent to the 3276 mdl 12, 3278 mdl 2, and 8775 mdl 1 (without the attachment capability of the other displays/printers) displays (960/1,920 characters only) with features/functions of 87-key/75-key keyboard, Keyboard Numeric Lock, Audible Alarm, and Monocase Switch. The 3104 Display Terminal is data-stream-compatible with the 3276, 3278, and 8775.

The 3104 consists of three workstation elements (WSEs): Video, logic, and keyboard elements.

Operator Factors: The 3104 has a contrast enhancement filter. Indicators are displayed on the bottom row of the screen, outside the data display area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underlined type cursor and a rectangular reverse video cursor, with blinking option, are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard is light and thin, and the keyboard surface angle can be adjusted to either 12 degrees by attaching or 6 degrees by detaching the keyboard foot assembly offered as an accessory.

Input Editing Capability: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all provided. All alphameric, special symbols, and cursor move keys have typamatic capability. Double-speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. Ten Program Function (PF) keys are available on the Data Entry Keyboard; 24 PF keys are available on the Typewriter Keyboard.

Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying it on the screen. This capability allows customer-supplied security program routines to control access to data and to record an audit of actions.

Communications: The 3104 is attached to customer-owned loops. A direct attached loop to an 8100 System or 4331 Processor may operate at a data rate of 9600 bps, or 38.4K bps. A data-link attached loop may be connected to an 8100 System and to a 4331 Processor via a 3843 Loop Control Unit. The 3843 provides an interface to a synchronous modem transmitting at 2400, 4800, or 9600 bps. These speeds are switch-selectable on the 3104 at setup time. In support of half-speed operation of the Multiuse Communication Loop, the 3104 is also switch-selectable for 1200 bps. The 3843 Loop Control Unit supports point-to-point or multipoint telecommunication links. Refer to the M3843 pages for more information.

Customer Problem Analysis And Resolution (CPAR): Functions have been designed into the 3104 to enhance the availability to the customer. This has been done through the use of customer problem analysis and resolution (CPAR) routines and procedures that are used by the operator. See "Customer Responsibilities" below.

Communication network management problem determination support for 4331 loop attached 3104 is provided via NCCF/NPDA.

Spares: It is recommended that the customer replace a failing WSE with a spare element and that the customer be advised to purchase sufficient spare 3104 units for such use. The number of spare units recommended is dependent upon the number of the 3104 units the customer has installed, his application requirements, physical locations, and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, a logic element, and a video element is shown in the following table:

Recommended Minimum Number of Spare 3104 Machines

Number Installed	Recommended Spare Machines
1 - 50	1
51 - 100	2
101 - 300	3
301 - 500	5
501 - 700	6
701 - 1000	7

The customer should be advised to test spares for correct operation before putting them on the shelf.

For ordering spare WSEs, see "Machine Elements" below.

Keyboards:

- 75-Key 3104 Data Entry Keyboard: Movable with 35 data keys, 10 PF keys, and 30 control keys.
- 87-Key EBCDIC 3104 Typewriter Keyboard: Typewriter-like layout, movable with 49 alphameric data keys, 26 control keys, and 12 PF keys (total 24 PF keys).

  Notes: Keyboards used on 3101, 3275, 3276, 3277, 3278, 3279, and 8775 machines are not interchangeable with keyboards used on the 3104.

  A 0.9 meter (3 foot) keyboard cable is attached.

  Keyboard foot assembly is offered as an accessory to provide a keyboard surface angle of 12 degrees (6 degrees without the foot assembly).

Customer Responsibilities: The customer is responsible for:

- Adequate site and system preparation.
- Receipt at customer's receiving dock, unpacking, and placement of unit.
- Physical setup, connection of cables, and checkout.
- Fuse and display screen filter replacement.
- Determination of the required number of spares.
- Performing customer problem analysis and resolution.
- Returning failing WSE to the Repair Center with a completed Repair Authorization Form.
- Contacting IBM Branch Office if Machine Element Replacement Service is required.
- Procurement, installation, and maintenance of the loop network
- Each customer must order the *IBM 3104 Display Terminal Description Manual* (GA18-2084) for site planning and preparation work since this is not shipped with each machine.

Warranty Service and Maintenance: The normal procedure will be for the customer to isolate the failure to a WSE and ship to the designated IBM Repair Center. All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Repair Center. When maintenance is required, it shall be the customers responsibility to determine the failing WSE, pack the WSE in the designated shipping container and ship it prepaid to the designated Repair Center. IBM will return the repaired unit prepaid. There is no regularly scheduled preventive maintenance recommended by IBM on these units.

Repair Center Service is available during the warranty period without any charges except customer prepaid shipping charges for machines/elements to the IBM Repair Center, or after the Warranty period under the IBM Maintenance Agreement and the IBM Repair Center Service Amendment (Z120-2240) at an annual charge.

Machine Element Replacement Service is also available under Agreement for the Purchase of IBM Machines and the IBM Repair Center Maintenance and Machine Element Replacement Service Amendement (Z120-2240-6) during the warranty period at a one-time charge of per machine. Center Maintenance and Machine Element Replacement Service Amendment to the IBM Maintenance Agreement for an annual charge. Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair on a time and material basis. The IBM Machine Repair Authorization Form is to be completed with all

3104 Display Terminal (cont'd)

shipments to the repair center. Upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, estimating of repair charges, and return shipping charges.

IBM Repair Center Service: The 3104 is eligible for maintenance agreement coverage at an annual charge immediately following expiration of the service and parts warranty.

If maintenance agreement coverage is not contracted for immediately following expiration of the service and parts warranty and the customer subsequently wants maintenance coverage, the customer must ship the machine(s) to the designated Repair Center for an inspection. A minimum charge per WSE to cover handling, inspection, cleaning, adjustments, testing, and return shipping charges will be applied. In addition, all parts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates. The machine will then be eligible for maintenance agreement coverage.

If, on the basis of an inspection, the Repair Center concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to minimum charge.

Machine Element Replacement Service: This service allows the customer to call the local branch office, after the customer has performed CPAR, and have a representative of the Field Engineering Division bring a replacement element to the customer site, install it, and test the replacement element. The failing element becomes the property of IBM.

This service is available during the warranty period only under the IBM Repair Center Maintenance and Machine Element Replacement Service Amendment to the IBM Purchase Agreement, 24 hours per day, 7 days per week, for a one-time charge. After the warranty period, this service is available only under the IBM Repair Center Maintenance and Machine Element Replacement Amendment to the IBM Maintenance Agreement from 8:00 a.m. to 5:00 p.m. Monday through Friday, for an annual charge.

Customer Responsibility For Damaged Or Altered Elements: Determination by IBM that damage to a replaced unit is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered, or non-IBM parts will be charged for at IBM's then applicable time and material charges.

Customer Engineering On-Site Assistance: If the customer desires assistance in performing CPAR, the local FE Branch Office may be called for their assistance. The CE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer-owned spare WSEs may be installed to replace defective WSEs by the CE upon customer request. Shipping of defective WSEs to the repair center is a customer responsibility. All on-site CE assistance is available on a per-call basis at the applicable hourly rate.

Publications: See *KWIC Index* (G320-1621) or specific system bibliography (GC20-0001 and GC20-8100).

SPECIFY

- Power: 120V AC, 1-phase, 3-wire, 60 Hz.
- Power Cord: 1.8 meters (6 feet), nonlocking plug.
- Communication Cable: A 2.7 meter (9 foot) communication cable is provided for attachment to a direct or data-link-attached loop.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

The following accessories can be ordered. They must be ordered from the FE branch office or parts distribution center.

Field Packaging Materials: The field packaging materials below must be used for shipping the 3104 Display Terminal or the individual workstation elements to and from the IBM Repair Center.

Description	Part Number
For Video Element	**2655956**
For Logic Element	**7310884**
For Keyboard Element	**7310985**

Keyboard Foot Assembly: It provides a keyboard surface angle of 12 degrees.

Description	Part Number
Keyboard Foot Assembly (Consists of 2 pieces)	**5641297**

Display Screen Filter: It provides a contrast enhancing screen. (The Display Screen Filter is provided on all 3104s as a standard offering.)

Description	Part Number
Display Screen Filter	**5640517**

MACHINE ELEMENTS

Workstation elements may be ordered to provide individual elements as needed by the customer in the use of the 3104.

Site Planning and Preparation: These are the responsibility of the customer. The customer should have on hand, or should order, the *IBM 3104 Display Terminal Description Manual,* GA18-2084, for site planning and preparation work.

Maintenance: Maintenance for workstation elements is available on a time-and-material basis at an IBM Repair Center. A minimum charge is applied.

The video, logic and keyboard workstation elements of the 3104 Display Terminal can be ordered as follows:

To Fit Model	Workstation Element	Number*
B1/B2	Video	**5640540**
B1/B2	Logic (Note 1,2)	**5894025**
B1	Keyboard	**5894060**
B2	Keyboard	**5894050**

* Same as Bill of Material number.

Note 1: 2.7 meter (9 foot) Communication Cable is provided with the Logic Element.

Note 2: Power cord with nonlocking plug is provided with the Logic Element.

SUPPLIES

Machine Elements: WSEs may be ordered to provide individual elements as needed by the customer in the use of the 3104 Display Terminal.

3115 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3115 is No Longer Available ... MES orders for model conversions, features, released RPQs and accessories are not affected. No new RPQs will be accepted.

PURPOSE

Provides main and control storage, plus arithmetic and logic circuits for a S/370 model 115 including a direct disk attachment.

MODELS

The 3115-0 and 3115-2 Processing Units are available in the following model groups:

Models

3115-0		3115-2		Processor Storage Size
F	F00	F2	F02	65,536 bytes
FE	FE0	FE2	FE2	98,304 bytes
G	G00	G2	G02	131,072 bytes
GE	GE0	GE2	GE2	163,840 bytes
GF	GF0	GF2	GF2	196,608 bytes
		H2	H02	262,144 bytes
		HG2	HG2	393,216 bytes §

§ **Note:** If 3411 Magnetic Tape and Control is attached, see Magnetic Tape Adapter special feature paragraph for RPQ requirement.

HIGHLIGHTS

Depending upon the mdl, 65,536 to 393,216 bytes of processor storage are available. The basic main memory cycle time is 480 nanoseconds for 2 bytes. Sixteen general, sixteen control and four floating point registers are provided. The system design provides distributed microcoded processors within the Central Processing Unit for the independent handling of programs, input/output processing and diagnostic/maintenance. Direct attachment of the 3340 DASF Subsystem or the 3340/3344 DAS Subsystem (3115-2 only) is provided. Depending on the mdl and feature up to eight drives can be attached. In a 3340 DASF Subsystem, via the string switch capability (**#9315**), the 3340 mdl A2 can be shared with another S/370, except 3115-0 and 3125-0. For details and restrictions refer to the 'Direct Disk Attachment' paragraph.

The 2311 Mdl 1/3340 - Series and the 2314/3340 - Series Compatibility features are available as options. They are mutually exclusive. Emulation is under DOS/VS only. 2311 mdl 1 emulation under DOS/VS requires SYRES on 3340.

Capability to attach the 3803/3420 or 3411/3410 magnetic tape subsystem mdl 1, 2 or 3 via the optional Magnetic Tape Adapter.

Capability to natively attach one of the following card I/O: 2560 mdl A1 or A2, or the 5425 mdl A1 or A2 (96-column card) via the optional integrated Card I/O Attachment features.

Capability to attach a wide variety of I/O devices via the optional Byte Multiplexer Channel. **Note:** The Integrated Card I/O Attachment and the Byte Multiplexer Channel cannot be installed on the same system unless RPQs 7B0132 and 7B0141 are installed.

Capability to natively attach the 5213 Printer mdl 1 (85 cps) is provided with the optional integrated console printer attachment on the 3115. This console printer provides hardcopy output of operator messages presented on the Display Operator Console (DOC).

The optional 1052 Compatibility feature is available to emulate the 1052 Printer keyboard in the S/370 mdl 115. 1052 Compatibility (**#8005**) in combination with the 5213 Printer mdl 1 allows the mdl 115 to be used as a remote workstation with HASP-RMT/360. **Note:** The 1052 compatibility mode is not supported under DOS/VS. With DOS/VS, the 5213 mdl 1 will act as a slave unit to the DOC.

Capability to attach up to 5 synchronous lines, or up to 4 synchronous and up to 8 asynchronous lines is provided by the optional Integrated Communications Adapter with appropiate features.

Capability to attach the 5203 Printer mdl 3 or 3203 Printer mdl 1 or 2 is provided with optional Integrated Printer Attachment features.

The optional S/360 Mdl 20 and 1401/1440/1460 Compatibility features are available to allow execution of the instructions of those programs.

The Display Operator Console (DOC) is an integral part of the S/370 mdl 115 operator-machine communications. Data can be entered into main storage or into internal registers via the keyboard. Contents of storage or internal registers of the S/370 mdl 115 can be shown on the video screen with 16 lines of 56 characters/line. A portion of the screen is reserved to display machine status. The Service Processor (SVP) continously monitors system operation and logs errors on the magnetic IBM Diskette device. The SVP initates recovery on detection of error conditions and provides control for the display, keyboard, console file and optional console printer.

The standard console file is the basic microprogram loading device for the system. It contains a small file device, which reads and writes on a removable magnetic IBM Diskette. The diskettes that will contain the required microcode for the basic system, the optional features ordered for system, and CE diagnostics.

The CE logout of machine and I/O related control checks and errors are recorded on the diskette for CE diagnosis, to enhance the reliability, availability, and serviceability of the S/370 mdl 115.

Dynamic Address Translation (DAT) is a standard facility on the mdl 115. Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the mdl 115.

Standard features include S/370 commercial instruction set, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording (PER), Monitor Call, interval timer, time of day clock, CPU-Timer and Clock Comparator, store and fetch protect, byte oriented operand feature error checking and correction of single bit errors on main storage, and Audible Alarm.

Control Storage: On the 3115-0, reloadable control storage for Service Processor (SVP), and Direct Disk Attachment and the basic part of the Machine Instruction Processor (MIP) is provided as standard on the 3115 Processor Unit. In addition, reloadable control storage is provided with the optional Card I/O Attachment, Printer Attachment, Integrated Communications Adapter (ICA), Byte Mulitplexer Channel. The MIP contains as standard, 20K words of 22 bits of control storage and may be expanded either to 24K words (4K Control Storage Extension, #4101) or to 28K words (8K Control Storage Extension, #4104). #4101 and #4104 are mutually exclusive. See Chart A below for possible feature combinations and control storage requirements.

Note: Customers who elect to purchase the 4K Control Storage Extension and later upgrade to the 8K Control Storage Extension should consider the purchase of the 8K Control Storage Extension initially because this field upgrade requires replacement of the 4K Control Storage Extension and installation of the 8K Control Storage Extension. This is, however, not recommended for customers considering to eventually convert to a 3115-2.

On the 3115-2, the Instruction Processing Unit (IPU) contains as standard, 12K words of control storage. Certain feature combinations can use up to two additional 4K words increments totaling 20K words of control storage. See Chart B for details.

Chart A: Listed below are the valid feature combinations and their respective requirements for additional control storage on the 3115-0.

Optional Features -- Mdl 3115-0	Basic Control Storage			4K Control Storage Extension -- (4101) Required								8K Control Storage Extension -- (#4104) Required						
Floating Point (#3900)**		x	x				x	x		x	x					x	x		x	x	
Floating Point Including Extended Precision (#3910)**			x	x					x	x		x	x					x	x		x	x
1401/1440/1460 Cmpt (#4457)	x					x				x	x	x	x	x	x				x	x	x	
S/360 Mdl 20 Cmpt (#7520)	x			x	x		x	x				x	x			x	x	x	x	x		
2311-1/3340 Series Cmpt (#8060)***					x			x	x		x				x		x		x		x	
2314/3340 Series Cmpt (#8070)***					x		x		x	x						x		x		x		x

* #4101 and #4104 are mutually exclusive.
** #3900 and #3910 are mutually exclusive.
*** #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with specify **#9190.**

Chart B: Listed below are the valid feature combinations and their respective requirements for additional control storage on the 3115-2.

3115 Processing Unit (cont'd)

Optional Features —Mdl 3115-2	Basic Control Storage				First Control Storage Increment ... (#4101) Required								Second Control Storage Increment ... (#4101) & (#4102) Required **				
Floating Point Including Extended Precision (#3910)			X	X		X	X			X		X				X	X
1401/1440/1460 Compatibility (#4457) **	X				X	X	X						X	X			X
S/360 mdl 20 Compatibility (#7520) **		X		X	X		X				X				X	X	
2311-1/3340 Series Compatibility (#8060) *								X		X	X		X		X		X
2314/3340 Series Compatibility (#8070) *									X			X	X	X		X	

* #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with Specify feature **#9190** or 3344 Attachment specify feature **#9317**.

** 1401/1440/1460 Compatibility (#4457) and S/360 Mdl 20 Compatibility (#7250) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed on the 3115-2). **Note:** RPQ SU0002 cannot be installed if the 2311 mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070) is installed. Cannot be installed with 3344 Attachment (**#9317**).

Specify feature **#9315** is mutually exclusive with #4102 and/or #4460.

Input/Output Attachment - Native: The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices. They are designed to interact with their respective I/O devices and should be installed or removed with them since the system is inoperative with only the attachment/adapter installed.

Direct Disk Attachment (standard): This attachment is provided to attach the 3340 mdl A2 dual drive unit and control directly to the S/370 mdl 115. The is addressed as channel 1. This attachment provides block multiplexing.

3340 DASF Subsystem: On the 3115-0 one 3340 mdl A2 and one 3340 mdl B1/B2 can be attached to provide up to four spindles. On the 3115 mdl 2 (w/o 3344 Attachment **#9317**) one 3340 mdl A2 and up to three 3340 mdl B1/B2s can be attached to provide up to eight spindles.

3340/3344 DAS Subsystem: On the 3115-2 with 3344 Attachment **#9317** installed. One 3340 mdl A2 and any combination of up to three 3340 mdl B1/B2s and 3344 mdl B2/B2Fs can be attached. With the String Switch (#8150) installed, the 3340 mdl A2 may be shared with another S/370 except 3115-0 and 3125-0. Specify features, String Switch Capability (**#9315**) and 3344 Attachment (**#9317**) are mutually exclusive. String Switch capability is not supported on a 3344 configuration. 4K DASF Control Storage Extension is required when either **#9315** or **#9317** is installed. Specify Fixed Head Attachment (**#9190**) if Fixed Head Feature on 3340 is installed on 3340 Series drives. See Chart A for control storage requirements.

Magnetic Tape Adapter (optional) -- this feature attaches one of the following tape control units and is addressed as channel 2:

3411 Magnetic Tape Unit and Control mdl 1 -- tape control (20 KB) housing one tape drive. Up to three 3410 Magnetic Tape Unit mdl 1s may be attached to the 3411 mdl 1.

3411 Magntic Tape Unit and Control mdl 2 -- tape control (40 KB) housing one tape drive. Up to five 3410 Magnetic Tape Unit mdl 2s may be attached to the 3411 mdl 2.

3411 Magnetic Tape Unit and Control mdl 3 -- tape control (80 KB) housing one tape drive. Up to five 3410 Magnetic Tape Unit mdl 3s may be attached to the 3411 mdl 3.

3803 Tape Control mdl 3 -- up to eight 3420 mdl 3 (120 KB) or mdl 5 (200 KB) may be attached to the 3803.

Integrated Card I/O Attachments (optional): These features provide native attachment of one of the following:
2560 Multifunction Card Machine mdl A1 or A2
5425 Multifunction Card Unit mdl A1 or A2.

The Integrated Card I/O Attachment uses channel 0. Device address X'00D' is reserved for the 2560 or 5425.

The Integrated Card I/O Attachments and the optional Byte Multiplexer Channel cannot be installed together on the same system unless RPQs 7B0132 and 7B0141 are installed.

Integrated Printer Attachment (optional): Attachment features for the 5203 Printer mdl 3 or the 3203 Printer mdl 1 or 2 are provided. One printer unit may be natively attached. The printer attachment is addressed as channel 0 and the device address is X'00E'. The Universal Character Set (UCS) control is standard on the 3203. On the 5203, UCS control may be specified on Integrated 5203 Mdl 3 Attachment (#4690).

Integrated Console Printer Attachment (optional): Attaches the 5213 Printer mdl 1 to the 3115 to provide hard copy of operator messages presented on the standard Display Operator Console. It uses address X'01F' (same as the Display Operator Console) on Channel 0. When the 1052 Compatibility feature is installed, the 5213 Printer mdl 1 is required.

Integrated Communications Adapter (ICA) (optional): Provides the basic control storage and common circuits for direct attachment of up to five synchronous (BSC) communications lines OR up to eight asynchronous (Start/Stop) lines. See individual ICA features for limitations. The Integrated Communications Adapter Extension (ICAE) provides the capability to attach up to four BSC AND up to eight Start/Stop lines. IBM line adapters are provided within the mdl 115.

Input/Output Channel

Byte Multiplexer Channel (Optional) provides for the attachment of a wide variety of low speed devices. The single channel available on the S/370 mdl 115 is functionally equivalent to the Byte Multiplexer Channel on the S/360 mdls 22, 25, 30 and 40 and provides for a maximum of up to eight control unit positions. 32 subchannels are provided as standard and are divided into 8 shared and 24 unshared subchannels.

The Integrated Card I/O Attachments and the Byte Multiplexer Channel cannot be installed together on the same system unless RPQs 7B0132 and 7B0141 are installed.

Console Function: System control functions are provided by the standard integrated Display Operator Console. It has the switches, keyboard, and lights necessary to operate and control the system. It uses address X'01F' on channel 0. The 5213 mdl 1 console printer (85 cps) may be attached optionally.

Publications: GC20-0001

SPECIFY

- Voltage: (AC, 3-phase, 4 wire, 60 Hz): **#9903** for 208V, **#9905** for 230V
- Color **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Fixed Head Attachment (**#9190**)§ If Fixed Head Feature is installed on 3340 Series drives. **Note:** The Fixed Head Attachment (**#9190**) cannot be installed with 2311-1/3340 Series Compatibility (#8060) or 2314/3340 Series Compatibility (#8070).
- String Switch Capability (**#9315**)§ If String Switch (#8150) is installed on the 3340 mdl A2. **Note:** 4K DASF Control Storage Extension (#4210) is prerequisite. Cannot be installed with #4102 or #4460 or 3344 Attachment **#9317**. When String Switch is installed, an Emergency Power-Off connection between the sharing systems is mandatory. RPQ DC3621 (two system connection) or DC3622 (multiple system connection) must be ordered.

  The 3115-2 uses fixed addresses 160 to 167 for its attached disk drives. In the case of string switch, to avoid confusion in Job Control and Operation, the same addresses should be assigned to shared drives on the other system. In the case of the 3135, 3135-3, 3138 IFA, this requires specify code **#9821** on the 3135 providing addresses 160 through 167 to comply with the fixed addresses of the 3115. If intermixing 3330s and 3340s on the 3135 (**#9315**), no string switching with the 3115-2 is possible.

  Note: The string switch of the DASD hardware function can be operated with the present DOS/VS standard DASD support. DOS/VS does not support the device reserve/release channel commands for program controlled sharing of attached DASD units. Therefore, it is the user's responsibility by appropiate organization and programming procedures to resolve conflicting references to shared files and insure data integrity. One method for controlling potential conflicts involves the use of operator commands DVC UP/DVC DN. For additional information, consult *DOS/VS System Management Guide,* GC33-5371.
- On the 3115-2 ... specify 3344 Attachment (**#9317**)§ when 3344 mdl B2/B2F are installed. 4K DASF Control Storage Extension is required. Cannot be installed with any of the following: String Switch Capability (**#9315**), 231X/3340 Compatibility (#8060/ #8070), S/360 Mdl 20 Compatibility (#7520). 1401/1440/ 1460 Compatibility (#4457), or 1403/3203 Carriage Control Feature (#4460).
- Minimum Configuration: See "Minimum Configuration" in "Systems" for minimum I/O units required on a S/370 mdl 115.
- 1255, 1259 or 1419 Attachment: Specify **#9336** (3115-0 only). External Signal (#3898) is required to attach a 1255, 1259 or 1419.

3115 Processing Unit (cont'd)

- Specify **#9807** for attachment of 3803 mdl 3 on the Magnetic Tape Adapter (#4675).

Note: RETAIN/370 ... CE access is by telephone.

Planning for Mdl Conversions: When a customer requires feature changes and/or memory upgrades in addition to a mdl upgrade, consolidating the several changes into a single MES is not recommended. In these cases a planning session between sales, FE and the customer is required to develop the proper sequence of MES ordering.

SPECIAL FEATURES

Expansion Base (#3860): [3115-2] Provides additional gate and blowers, etc., and is required if RPQs 7B0132 and 7B0141 are not installed:
- for all mdls H2 and HG2
- for mdls F2, FE2, GE2 or GF2 if a Line Adapter Base 2 (#4792) or Line Adapter Base 3 (#4793) is required.

Maximum: One. **Field Installation**: Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum**: One per 3115. **Cable Order**: Required. **Field Installation**: Yes. **Prerequisites**: External devices must meet the interface specifications outlined in *S/360 Direct Control Feature - OEM I*, GA22-6845.

Floating Point (#3900): [3115-0] Adds 44 floating point arithmetic instructions ... these instructions with the standard set make up the Scientific Instruction Set. **Field Installation**: Yes. **Limitations**: Cannot be installed with Floating Point Including Extended Precision (#3910).

Floating Point Including Extended Precision (#3910): Adds 51 floating point arithmetic instructions. Provides for floating point operation including extended precision to 28 hexadecimal digits. **Field Installation**: Yes. **Limitations**: Cannot be installed with Floating Point (#3900). **Prerequisites**: See Charts A/B above for control storage requirements.

4K Control Storage Extension (#4101): Adds 4,096 words (22 bits wide) of control storage to the Machine Instruction Processor (3115-0) or Instruction Processing Unit (3115-2). Required for certain feature combinations ... See Charts A/B above for details. **Limitations**: Cannot be installed with 8K Control Storage Extension (#4104). **Field Installation**: Yes ... see "Note" following "Field Installation" for 8K Control Storage Extension (#4104) below.

4K Control Storage Increment - 2nd (#4102): [3115-2] Expands the IPU control storage by 4,096 words (22 bits wide). Required for certain feature combinations ... see Chart B. **Limitations**: Cannot be installed with #4210 or specify feature **#9315**. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #4101.

8K Control Storage Extension (#4104): [3115-0] Adds 8,192 words (22 bits wide) of control storage to the Machine Instruction Processor. Required for certain feature combinations ... see Chart A above for details. **Limitations**: Cannot be installed with 4K Control Storage Extension (#4101). **Field Installation**: Yes ... **Note**: Customers who may elect to purchase the 4K Control Storage Extension and later upgrade to the 8K Control Storage Extension should consider the purchase of the 8K Control Storage Extension initially because this field upgrade requires replacement of the 4K Control Storage Extension and installation of the 8K Control Storage Extension.

4K DASF Control Storage Extension (#4210): [3115-2] Adds 4,096 words (22 bits wide) to the DDA control storage. Required for string switch capability specify feature (**#9315**) or 3344 Attachment specify feature (**#9317**). **Limitations**: Cannot be installed with #4102 or #4460. **Maximum**: One. **Field Installation**: Yes.

1401/1440/1460 Compatibility (#4457): Microprogram controlled feature which, in combination with an emulator program under DOS/VS, permits the system to execute 1401/1440/1460 instructions. **Field Installation**: Yes. **Prerequisites**: See Charts A/B above for control storage requirements. **Note**: On the 3115-2, #4457 and S/370 Mdl 20 Compatibility (#7250) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed). **Limitations**: Cannot be installed with 3344 Attachment (**#9317**).

1403/3203 Carriage Control Feature (#4460): Allows the 3203 Printer with its tapeless carriage control to emulate the function of a tape controlled carriage and thus run programs written for a 1403 Printer. **Limitations**: The 5203 Printer is not supported by this feature. Cannot be installed with string switch capability (**#9315**) or 3344 Attachment specify feature (**#9317**). **Field Installation**: Yes. **Prerequisites**: 3203 Printer. **Note**: This feature is not required with DOS/VS Release 31 and subsequent releases.

Integrated 3203 Printer Attachment (#4650): Control for attaching the 3203 Printer mdl 1 or 2. The Universal Character Set is standard. **Specify**: **#9770** for mdl 1 or **#9771** for mdl 2. **Limitations**: Cannot be installed with Integrated 5203 Attachment (#4690). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #4653.

Integrated 3203/5203 Printer Prerequisite (#4653): Provides a common control base for attaching either the 3203 or 5203 Printer. Required as a feature for installation of the Integrated 3203 Printer Attachment (#4650), or Integrated 5203 Printer Attachment (#4690). **Maximum**: One. **Field Installation**: Yes.

Integrated 2560 Attachment (#4670): Control for attaching the 2560 Multi-function Card Machine mdl A1 or A2. **Specify**: **#9800**§ for mdl A1, or **#9801**§ for mdl A2. **Limitations**: Cannot be installed with Integrated 5425 Attachment (#4695) or Basic Byte Multiplexer Channel (#5248) ... installation of RPQs 7B0132 and 7B0141 are required to install #4670 with Basic Byte Multiplexer Channel (#5248). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: **#9727** is required on the 2560 MFCM ... see "Specify" in M2560 pages.

2560 Card Print Control (#4674): Provides control for Card Print capability on the 2560 Multi-function Card Machine mdl A1. **Specify**: **#9797**§ for first two print lines, **#9798**§ for second two, **#9799**§ for third two, when corresponding Card Print features (#1575, #1576, #1577) are installed on the 2560 mdl A1. **Field Installation**: Yes. **Prerequisites**: #4670 on the 3115.

Magnetic Tape Adapter (#4675: Provides control for attachment of one 3411 Magnetic Tape Unit and Control mdl 1, 2 or 3 or one 3803 Tape Control mdl 3. See M3420 and 3803 or 3411 and 3410 pages for additional ordering instructions. The Magnetic Tape Adapter is addressed as Channel 2. **Maximum**: One. **Specify**: **#9807** for attachment of 3803 mdl 3. See "Highlights" for additional information. **Field Installation**: Yes. **Limitations**: A 3803 and 3411 cannot coexist on the Magnetic Tape Adapter. **Prerequisites**: #7361 on the 3411, except for 3115 mdl HG2. When attached to 3115 mdl HG2, RPQ 870061 is required on the 3411.

Integrated 5203 Mdl 3 Printer Attachment (#4690): Control for attaching the 5203 Printer mdl 3. **Limitations**: Cannot be installed with Integrated 3203 Printer Attachment (#4650). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #4653 and **#9223** on the 5203 mdl 3. **Specify**: **#9195**§ for 5203 with 120 print positions, or **#9152**§ for 5203 with 132 print positions. Specify Universal Character Set Control (**#9848**)§ when Universal Character Set Attachment (#8639) is specified on the 5203 mdl 3.

Integrated 5213 Printer Mdl 1 Attachment (#4692): Attaches the 5213 Printer mdl 1. Includes a special cable to support the printer. **Maximum**: One. **Field Installation**: Yes.

Integrated 5425 Attachment (#4695): Control for attaching the 5425 Multi-function Card Unit mdl A1 or A2. **Specify**: **#9183**§ for mdl A1, or **#9184** for mdl A2. **Limitations**: Cannot be installed with Integrated 2560 Attachment (#4670) or Basic Byte Multplexer Channel (#5248) ... installation of RPQs 7B0132 and 7B0141 are required to install #4695 with Basic Byte Multiplexer Channel (#5248). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: If the 5425 is attached to 3115 either a 3203 or 5203 Printer is required to provide the necessary power. If however, a separate power supply for the 5425 is desired, IBM will provide it on an RPQ basis.

Basic Byte Multiplexer Channel (#5248): To attach low speed byte multiplex devices ... see "Byte Multiplexer Channel" under "Input/Output Channel". Feature includes control storage necessary for IOP operation. **Limitations**: The basic Byte Multiplexer Channel (#5248) and the Integrated Card I/O Attachments (#4670 or #4695) cannot be installed together on the same system unless RPQs 7B0132 and 7B0141 are installed. On the 3115-2, only the Extended Byte Multiplexer Channel (#5249 with #5248 as a prerequisite) with a data rate up to 25KB is available. **Specify**: On the 3115-0, specify **#9336** when attaching a 1255, 1259 or 1419. **Maximum**: One. **Field Installation**: Yes.

Extended Byte Multiplexer Channel (#5249): [3115-2] Provides the additional circuitry to enable the Basic Byte Multiplexer Channel to operate at an improved byte data rate up to 25KB. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #5248.

S/360 Mdl 20 Compatibility (#7520): Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 instructions. **Field Installation**: Yes. **Note**: On the 3115-2, #7520 and 1401/1440/1460 Compatibility (#4457) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed). **Limitations**: Cannot be installed with 3344 Attachment (**#9317**).

1052 Compatibility (#8005): Operates on the 5213 Printer mdl 1 and standard keyboard as an operator console in S/360 1052 mode only. In this emulation mode of operation the Video/Display acts as a slave unit to the printer. The 1052 Compatibility feature in combination with the 5213 Printer mdl 1 allows running of HASP/360 RMT 360 (stand-alone program) on the S/370 mdl 115. **Note**: The 1052 compatibility mode is not supported under DOS/VS. With DOS/VS the 5213 mdl 1 acts as a slave unit to the DOC. **Field Installation**: Yes. **Prerequisites**: #4692 and the 5213 Printer mdl 1.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3115 Processing Unit (cont'd)

2311 Mdl 1/3340 - Series Compatibility (#8060): Permits the emulation of 2311 mdl 1 files on the 3340 disk storage. The user program may access both the emulated 2311 mdl 1 data as well as the native data set. This provides a "mixed mode" operating environment. **Limitations:** #8060 cannot be installed with #8070, **#9190** or **#9317**. **Field Installation:** Yes. **Prerequisites:** See Charts A/B above for control storage requirements. **Note:** When running DOS Rel. 21 through 26 , 1052 Compatibility (#8005), the 5213 mdl 1 console printer and, if a 3203 Printer is attached, the 1403/3203 Carriage Control Feature (#4460) are prerequisites. The 5203 Printer is not supported by #4460. Emulation under DOS/VS requires SYRES on the 3340 DASF.

2314/3340 - Series Compatibility (#8070): Permits the emulation of 2314 files on the 3340 disk storage. The user program may access both the emulated 2314 data set as well as the native data set. This provides a "mixed mode" operating environment. **Limitations:** #8070 cannot be installed with #8060, **#9190** or **#9317**. **Field Installation:** Yes. **Prerequisites:** See Charts A/B above for control storage requirements. **Note:** When running DOS Rel. 21 through 26, 1052 Compatibility (#8005), the 5213 mdl 1 console printer and if a 3203 Printer is attached, the 1403/3203 Carriage Control Feature (#4460) are prerequistes. The 5203 Printer is not supported by #4460. Emulation under DOS/VS requires SYRES on the 3340 DASF.

COMMUNICATIONS FEATURES

Integrated Communications Adapter (ICA) (#4640): Provides the basic control storage and common circuits for direct attachment of up to five synchronous (BSC) communication lines or up to eight asynchronous (Start/Stop) communication lines depending upon line speed. All combinations of BSC and Start/Stop lines require the Integrated Communications Adapter Extension (#4641). Additional features are required to create appropriate line interfaces for the individual lines. Figures 1A and 1B schematically represent the feature build-up. Figure 1A shows the feature build-up for asynchronous lines or for combinations of asynchronous and synchronous lines. Figure 1B shows the feature build-up when only synchronous lines are required. The ICA provides as a standard:

• Autopoll	Start/Stop and BSC
• Multipoint central station functions	Start/Stop and BSC
• Multipoint tributary station functions	BSC only
• EBCDIC transparent mode	BSC only
• EBCDIC or ASCII code	BSC only

Refer to Figures 2A and 2B for attachable terminals and for configuration requirements prior to ordering features below. The normal procedure requires completion of ICA Specification Form Z120-2499 with each mdl 115 containing feature #4640. Retain this form with the DP Order Guide. Any subsequent MES orders affecting #4640 or its sub-features should follow this procedure.

Note: To configurate the ICA refer to *ICA Configurator Manual,* GA33-1513.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services. **Communications Facilities:** See M2700 pages for communications facility requirements with this feature. **Maximum:** One. **Field Installation:** Yes.

Integrated Communications Adapter Extension (ICAE) (#4641): This feature is required for all combinations of BSC and Start/Stop lines. Extends the communications capability to up to four BSC and up to eight Start/Stop lines depending upon line speed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Asynchronous Line Group (ALG) (#1201): Permits attachment of up to four Medium Speed Asynchronous Lines (AL) (#1231) or up to four Low Speed Asynchronous Lines Pairs (ALP) (#1241) or up to four Telegraph Line Pairs (TLP) (#7881). The lines within the ALG positions A1 through A4, must be installed in ascending order. **Specify:** One line control specify code from Figure 2A. **Limitations:** All lines in the ALG must have the same line speed and control. Different terminals can be attached, provided they use the same speed and line control. See Figure 2A. ALG (#1201) and SLHS (#7121) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Asynchronous Line, Medium Speed (AL) (#1231): Provides for the attachment of one nonswitched 600 bps Start/Stop communications line. The 3767 terminal can be attached to this feature (at EC 380427 plus EC 380628) via switched or nonswitched lines at 300 bps and via nonswitched lines at 600 or 1200 bps. Clocking speed is selected at installation time. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4. **Note:** IBM Line Adapters are tied to specific line positions ... see Figures 4C and 4D. **Limitations:** See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #1201.

Asynchronous Line Pair, Low Speed (ALP) (#1241): Provides for the attachment of two switched 110 bps or two switched or nonswitched 134.5 bps Start/Stop communications lines. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4. **Note:** IBM Line Adapters are tied to specific line positions ... see Figures 4C and 4D. **Limitations:** See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #1201.

Auto Call Adapter (ACA) (#1291, #1292, #1295, #1296): Provides automatic dialing capabilities on switched facilities. One of these features is required for each line equipped to automatically originate calls on switched networks. See Figure 3 for the selection of correct feature code. **Limitations:** The use of Auto Call in a line group precludes the last two lines/line pairs of that group ... see Figure 3. **Maximum:** Two per line group ... maximum total, four. **Field Installation:** Yes. **Prerequisites:** See Figure 3.

IBM Leased Line Adapter (#4743): A modem for Start/Stop data transmission at 134.5 or 600 bps over nonswitched facilities. This line adapter operates with Leased Line Adapters on other IBM products. Selection between 2-wire and 4-wire operation is made at installation time. See Leased Line Adapter in GA24-3435 for specifications and restrictions. **Specify:** See Figures 4C and 4D. **Maximum:** See Figures 4C and 4D. **Field Installation:** Yes. **Prerequisites:** AL (#1231) or ALP (#1241) and a Line Adapter Base (#4792 or #4793) ... also see Figures 4C and 4D.

IBM 1200 bps Line Adapter (#4781, #4782, #4791): A modem for BSC data transmission at up to 1200 bps over nonswitched facilities or switched network. Also for Start/Stop transmission at 300, 600 or 1200 bps over nonswitched facilities to the 3767 terminal. Unclocked and must interface to an SLC (#7141-7144) or AL (#1231).

The Line Adapter is available in three different versions:

#4781 -- nonswitched
#4782 -- switched with auto answer
#4891 -- switched with autocall and auto answer.

Attachment to nonswitched facilities is via an IBM-provided cable directly to the line. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Customer Responsibilities** ... see M2700 pages. **Communciations Facilities** ... see M2700 pages. **Specify:** See Figures 4C and 4D. **Maximum:** See Figures 4C and 4D. **Field Installation:** Yes. **Prerequisites:** #7141-#7144 or #1231 ... #4792 or #4793. Also see Figures 4C and 4D. #1295 or #1296 is required for #4791.

Line Adapter Base 2 (LAB 2) (#4792): Permits attachment of up to two IBM 1200 bps Line Adapters and up to four IBM Leased Line Adapters. The Line Adapters are tied to specific line positions. See Figure 4C for configuration and possible line combinations. **Note:** LAB 2 is required for IBM 1200 bps Line Adapters with Autoanswer (#4782) or with Autocall and Autoanswer (#4782) or with Autocall and Autoanswer (#4791). **Limitations:** LAB 2 (#4792) and LAB 3 (#4793) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** On 3115-2, #3860 unless RPQs 7B0132 and 7B0141 are installed.

Line Adapter Base 3 (LAB 3) (#4793): Provides attachment of up to four IBM 1200 bps Line Adapters and up to eight IBM Leased Line Adapters. The Line Adapters are tied to specific line positions. See Figure 4D for configuration and possible line combinations. **Limitations:** LAB 2 (#4792) and LAB 3 (#4793) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** On 3115-2, LAB 3 requires Expansion Base (#3860) unless RPQs 7B0132 and 7B0141 are installed.

Synchronous Line Group (SLG) (#7100): Permits attachment of up to four medium speed BSC lines, SLC (#7141-#7144) and/or SL (#7151-#7154). Maximum line speed is 1200 and 7200 bps respectively. The lines in this group, positions S1 through S4, must be installed in ascending order. The lines can have different line speeds within the maximum specified. **Specify:** Maximum line speed in the group: **#9751**§ for 1200 bps maximum ... **#9753**§ for 2400 bps maximum ... **#9754**§ for 4800 bps maximum ... **#9757**§ for 7200 bps maximum. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** ICA (#4640).

Synchronous Line High Speed (SLHS) (#7121): Provides for the attachment of one nonswitched BSC line at speeds up to 50K bps. See Figure 1B. This a digital current interface for attachment to facility E1, E2 or E3. **Note:** Only for nonswitched point-to-point lines. **Limitations:** This line has a load factor of 100% and must not be operated simultaneously with any other line in the ICA ... see Figure 1B. SLHS (#7121) and (ALG) (#1201) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Synchronous Line Medium Speed Clock (SLC) (#7141-#7144):

#7141 -- Line position S1
#7142 -- Line position S2
#7143 -- Line position S3
#7144 -- Line Position S4

Line positions S1 through S4 must be installed in ascending order.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3115 Processing Unit (cont'd)

Each feature provides for the attachment of one switched or nonswitched BSC line. The clock can be set by the user for a transmission rate of 600 bps or 1200 bps. Connects to the line via an unclocked modem or IBM Line Adapter. **Notes:** IBM Line Adapters are tied to specific line positions ... see Figures 4C and 4D. SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. **Limitations:** See Figure 5, Max. ICA Configuration. #7141 is mutually exclusive with #7151, #7142 with #7152, #7143 with #7153, and #7144 with #7154. **Maximum:** #7141 through #7144, one each. **Field Installation:** Yes. **Prerequisites:** #7100.

Synchronous Line Medium Speed (SL) (#7151-#7154):

#7151 -- Line position S1
#7152 -- Line position S2
#7153 -- Line position S3
#7154 -- Line position S4

Line positions S1 through S4 must be installed in ascending order.

Each feature provides for the attachment of one switched or nonswitched BSC line. Nonswitched lines are with switched network backup are supported. Maximum line speed on nonswitched line is 7200 bps; on switched backup network 3600 bps; on switched network 4800 bps. See Figure 2B for detailed speed and facility information. Connects to the line via a modem. The modem must provide clocking. Note: SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. **Limitations:** See Figure 5, Max. ICA Configuration. #7151 is mutually exclusive with #7141, #7152 with #7142, #7153 with #7143, and #7154 with #7144. **Maximum:** #7151 through #7154, one each. **Field Installation:** Yes. **Prerequisites:** #7100.

Telegraph Line Pair (TLP) (#7881): Provides for the attachment of two nonswitched single current telegraph lines at 45.5, 56.9, 74.2 or 75 bps. Attachment to the lines is via an IBM-provided external cable. Lines A1 through A4 are installed in ascending order. **Limitations:** See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #1201.

Modems: One of the following modems can be attached to each of the BSC lines of the ICA (#4640). **Prerequisites:** #7151-#7154.

Modem	Speed (bps)
3863 mdl 1	2400
3864 mdl 1	4800
3872 mdl 1	2400/1200
3874 mdl 1	4800/2400
3875 mdl 1	7200/3600/1800

Note: For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872, 3874 and 3875 pages.

FIGURE 1A

Integrated Communications Adapter Schematic Feature Build-Up

ICAE (#4641)	LINE GROUP	LINE INTERFACE	Asynch Line Position	Synch Line Position
ICA (#4640)	ALG (#1201) (2)	AL (#1231), or ALP (#1241), or TLP (#7881)	A1	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A2	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A3 (1)	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A4 (1)	
	SLG (#7100)	SL (#7151), or SLC (#7141)		S1
		SL (#7152), or SLC (#7142)		S2
		SL (#7153), or SLC (#7143)		S3 (1)
		SL (#7154), or SLC (#7144)		S4 (1)

(1) Auto Call Adapter (#1291, #1292, #1295 and #1296) restrict the use of these line positions ... see Figure 3.
(2) ALG (#1201) and SLG (#7121) are mutually exclusive.

FIGURE 1B

	LINE GROUP	LINE INTERFACE	SYNC LINE POSITION
ICA (#4640)	SLG (#7100)	SL (#7151) or SLC (#7141)	S1
		SL (#7152), or SLC (#7142)	S2
		SL (#7153), or SLC (#7143)	S3
		SL (#7154), or SLC (#7144)	S4
	SLHS (#7121) (2)		S5

(1) ALG (#1201) and SLHS (#7121) are mutually exclusive. **Note:** SLHS (#7121) cannot be operated concurrently with lines in positions S1 through S4.

FIGURE 2A

START/STOP TERMINALS

TERMINALS	SPEED (bps)	FACILITIES	LINE INTERFACE FEATURE	LINE CONTROL SPECIFY
2741	134.5	C1, C2, D1	#1241	**#9738**§
3767 mdl 1, 2 w #7111 or #7113	300	C1, D1	#1231	**#9739**§
3767 mdl 1, 2, 3 w #7112	600 or 1200	D2	#1231	**#9739**§
5010 mdl Axx	134.5	C1, C2, D1	#1241	**#9738**§
	600	D2	#1231	**#9739**§
5100/5110	134.5	B1, B2, C1, C2, D1	#1241	**#9738**§
	300	C1, D1	#1231	**#9739**§
AT&T 83B2/83B3 WU 115A	45.5	A1	#7881	**#9734**§
	56.9	A2	#7881	**#9734**§
	74.2	A3	#7881	**#9735**§
TWX 33/35	110.0	C3	#1241	**#9737**§

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3115 Processing Unit (cont'd)

FIGURE 2B

BINARY SYNCHRONOUS TERMINALS

SPEED (bps)	600	1200	1200	2400	2400	2400/ 1200	4800	4800/ 2400	4800/ 2400	7200/ 3600	7200/ 3600 & 3600/ 1800	19,200	40,800	50,000
LINE INTERFACE	#7141- #7144	#7141- #7144	#7141- #7144	#7151- #7154	#7151- #7154	#7151- #7154	#7151- #7154, #7131/ #7132	#7151- #7154	#7151- #7154	#7151- #7152	#7151- #7152	#7121	#7121	#7121
FACILITIES	C3	C4	D3	C5	D4, X1M■	D4SB	D5, X2M¤	C6	D5SB	D6	D6SB	E1	E2	E3
Another 3115 w #4640	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3125 w #4640	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3135, -3, 3138 w #4640	X	X	X	X	X	X	X	X	X	X	X			
2701 ▶		X	X	X	X	X	X	X	X	X	X	X	X	X
2703 ▶		X	X	X	X	X	X	X	X	X*	X*			
3704/3705 ▶	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3020 w #2074		X	X	X	X	X	X	X	X	X	X	X	X	X
3025 w #4580		X	X	X	X		X	X	X					
S/3 w #2074	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1131 w #7690		X	X	X	X		X	X						
1826 w #7550		X	X	X	X		X	X						
2715 mdl 2		X	X	X	X		X	X						
2780		X	X	X	X	X	X	X	X	X	X			
3271			X		X		X			X	X			
3275		X	X		X		X			X	X			
3651 mdl A60 or B60				X										
3661**		X	X											
3684		X	X	X	X	X	X	X	X					
3741 mdl 2/3747		X	X	X	X									
3771, 3773, 3774, 3775		X	X	X	X	X	X	X	X					
3776				X	X	X	X	X	X					
3777							X	X	X	X	X			
3780		X	X	X	X	X	X	X	X	X	X			
4331 Proc w #1601	X	X	X	X	X	X	X	X	X	X	X			
5110		X	X	X	X	X	X	X	X					
5231		X	X	X	X	X	X	X						
5265 Communicating Mdl		X	X	X	X									
5275***		X	X											
5285, 5288 w #2500	X	X	X	X	X	X	X	X	X					
S/7 w #2074		X	X	X	X		X			X		X	X	X
S/32 & S/34 ****	X	X	X	X	X	X	X	X	X	X	X			
Series/1	X	X	X	X	X		X	X		X		X	X	X

■ X1M facility may not be used for communications with a 2703 or a S/360 mdl 25.
¤ X2M facility may not be used for communications with a 2703 or a S/360 mdl 25.
* Contact IBM for RPQ ordering information.
** Switched Network only.
*** 3115 ICA must use the IBM 1200 bps Modem (#4781 or #4782).
**** S/32 with #2074 & S/34 with #2500.
▶ On S/360 mdl 22 and up, S/370 or 4300 processor.

FIGURE 3

AUTO CALL ADAPTERS

Auto Call Adapter Feature Code	Provides Auto Call for Line Position	Prerequisites	Precludes Line Positions
#1291	A1 (1)	#1241	A3 and A4
#1292	A2 (1)	#1241 and #1291	A3 and A4
#1295	S1	#7141 and #7151	S3 and S4
#1296	S2	#7142 or #7152 and #1295	S3 and S4

(1) Provides Autocall in this line position for the first line of the synchronous line pair (#1241).

FIGURE 4A

IBM LINE ADAPTERS

FACILITY	BSC	Start/Stop up to 600 bps	Start/Stop (1) up to 1200 bps
	IBM 1200 bps LINE ADAPTER	IBM LEASED LINE ADAPTER	IBM 1200 bps LINE ADAPTER
Nonswitched pt-to-pt	#4781	#4743	#4781
Nonswitched multipoint control	#4781	#4743	#4781
Nonswitched multipoint tributary	#4781	-	-
Switched with auto answer	#4782	-	-
Switched with auto answer and autocall	#4791	-	-

(1) Only with the 3767 terminals.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3115 Processing Unit (cont'd)

FIGURE 4C

LINE ADAPTER BASE 2 (#4792) ... Maximum, 6 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ	NOTE
A1 1st line	#4743	#9463§	#1241	
A1 2nd line	#4743	#9464§	#9463	
A2 1st line	#4743	#9465§	#1241	
A2 2nd line	#4743	#9466§	#9465	
S1	#4781	#9471§	#7141	Select one line adapter
	#4782	#9473§	#7141	
	#4791	#9475§	#7141	
S2	#4781	#9472§	#7142	Select one line adapter
	#4782	#9474§	#7142	
	#4791	#9476§	#7142	

FIGURE 4D

LINE ADAPTER BASE 3 (#4793) ... Maximum, 12 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ	NOTE
A1 1st line	#4743	#9485§	1241	
A1 2nd line	#4743	#9486§	#9485	
A2 1st line	#4743	#9487§	#1241	
A2 2nd line	#4743	#9488§	#9487	
A3 1st line	#4743	#9489§	#1241	
A3 2nd line	#4743	#9490§	#9489	
A4 1st line	#4743	#9491§	#1241	
A4 2nd line	#4743	#9492§	#9491	
S1	#4781	#9493§	#7141	
S2	#4781	#9494§	#7142	
S3	#4781	#9495§	#7143	
S4	#4781	#9496§	#7144	

.... OR ....

A1 (2)	#4743 or #4781	#9481, #9501§	#1231	Excludes line adapter in position S4 (#9496)
A2 (2)	#4743 or #4781	#9482, #9502§	#1231	Excludes line adapter in position S3 (#9495)
A3 (2)	#4743 or #4781	#9483, #9503§	#1231	Excludes line adapter in position S2 (#9494)
A4 (2)	#4743 or #4781	#9484, #9504§	#1231	Excludes line adapter in position S1 (#9493)
S1	#4781	#9493§	#7141	Excludes line adapter in position A4 (#9484)
S2	#4781	#9494§	#7142	Excludes line adapter in position A3 (#9483)
S3	#4781	#9495§	#7143	Excludes line adapter in position A2 (#9482)
S4	#4781	#9496§	#7144	Excludes line adapter in position A1 (#9481)

(2) #4781 may be used only with the 3767 terminal.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 5

MAXIMUM ICA CONFIGURATION

All lines/line pairs are assigned load factors. The sum of all load factors must not exceed 100%.

LOAD FACTOR IN %

ASYNCHRONOUS LINES	1-2 Line Pairs (1-4 lines)	3-4 Line Pairs (5-8 lines)
TLP at 45.5 & 56.9 bps	20	20
TLP at 74.2 & 75 bps	20	40
ALP at 110 & 134.5 bps	20	40
ALG up to 4 lines		
AL at 300/600/1200 bps	20	

SYNCHRONOUS LINES	1-2 Lines		3-4 Lines	
	Autopoll Not Used	Autopoll Used	Autopoll Not Used	Autopoll Used
SLG w max 1200 bps	20	25	20	25
SLG w max 2400 bps	20	25	40	50
SLG w max 4800 bps	40	50	80	100
SLG w max 7200 bps	60	75		
	1 Line pt-to-pt			
SLHS at max. 50K bps	100			

MODEL CONVERSIONS

Field installable ... model downgrade from 3115-2 to 3115-0 is not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

3125 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3125 is No Longer Available ... MES orders for model changes, features, released RPQs and accessories are not affected. No new RPQs will be accepted.

PURPOSE

Provides main and control storage, plus arithmetic and logic circuits for a S/370 mdl 125.

MODELS

The 3125-0 and 3125-2 Processing Units are available in the following model groups:

3125-0		3125-2		Processor Storage Size
FE	FE0	FE2	FE2	98,304 bytes
G	G00	G2	G02	131,072 bytes
GE	GE0	GE2	GE2	163,840 bytes
GF	GF0	GF2	GF2	196,608 bytes
H	H00	H2	H02	262,144 bytes
		HG2	HG2	393,216 bytes *
		I2	I02	524,288 bytes *

* If 3411 Magnetic Tape and Control is attached see Magnetic Tape Adapter special feature paragraph for RPQ requirement.

HIGHLIGHTS

98,304 bytes up to 524,288 bytes of processor storage are available. The basic main memory cycle time is 480 nanoseconds for two bytes. 16 general purpose, 16 control, and four floating point registers are provided. The system design provides distributed microcoded sub-processors for the independent handling of programs ... Instruction Processing Unit (IPU), Input/Output Processing (IOPs), and Diagnostic/Maintenance (SVP).

Direct attachment of the 3333/3330 DASD Subsystem or the 3340 DASF Subsystem or the 3340/3344 DAS Subsystem (3125-2 only) is provided. Depending on model and features up to 16 spindles can be attached. In a 3340 Subsystem the 3340 mdl A2 and its attached 3340 drives can be shared with another S/370, except 3115-0 or 3125-0, via the String Switch capability (**#9315**).

The 2311/3330 Series, the 2311-1/3340 Series and the 2314/3340 Series Compatibility features are available as options. They are mutually exclusive. Emulation is under DOS and DOS/VS only. 2311 mdl 1 emulation under DOS/VS requires SYSRES on 3340 or on 3330.

Capability to attach the 3803/3420 or 3411/3410 Magnetic Tape Subsystem mdls 1, 2, or 3 via the Magnetic Tape Adapter.

Capability to natively attach the following card I/Os through appropriate Integrated Card I/O Attachments: 2560 mdl A1; 3504 mdls A1, A2; 3525 mdls P1, P2, P3; and the 5425 mdls A1, A2 (96-column card).

Capability to natively attach the 5213 mdl 1 Console Printer (85 cps) is provided with the Integrated 5213 Printer Mdl 1 Attachment. This console slave printer provides hard copy output of operator messages presented on the Video/Display (CRT) Console. The 1052 compatibility feature is also available.

Capability to natively attach up to six synchronous and up to 16 asynchronous lines is provided by the Integrated Communications Adapter with appropriate features.

Capability to natively attach the 1403 Printer (mdl 2 or 7 or N1) is provided with the Integrated Printer Attachment.

Capability to natively attach the 3203 Printer is provided with the Integrated 3203 Printer Attachment.

The 1403/3203 Carriage Control Feature provides the capability to load information contained in the 1403 Carriage Control Tape into the 3203 Forms Control Buffer.

S/360 Model 20 Compatibility and 1401/1440/1460 Compatibility Features are provided to allow execution of the instructions of those systems.

The Operator Console is an integral part of the 3125. The standard online Video/Display-Keyboard enhances operator (human factor) machine communications. Data can be manually entered into the processor's main storage or into internal registers via the keyboard. Contents of storage or internal registers of the 3125 can be displayed on the Video/Display screen. The Video/Display with 16 lines of 56 characters/line and keyboard are designed for use as an operator console. A portion of the screen is reserved to display machine status. The Service Processor (SVP) continuously monitors system operation and logs errors on the magnetic diskette device. The SVP initiates recovery on detection of error conditions and provides control for the display, keyboard, magnetic diskette and optional console printer.

The standard console file is the basic microprogram loading device for the system. The console file contains a small read/write file device that provides the microcode for the system on removable magnetic IBM Diskettes. The diskettes that will be supplied with the system will contain the required microcode for the basic system, the optional features ordered for the system, and CE diagnostics.

The CE logout of machine and I/O related control checks and errors is recorded on the console file diskette for CE diagnosis, to enchance the reliability, availability, and serviceability of the mdl 125.

Extended Control (EC) Mode expands the structure of the Program Status Word to accommodate the control of S/370 features and extends the number of permanently assigned main storage locations. The mdl 125 can operate in either EC Mode or Basic Control (BC) Mode as defined for the S/360.

Dynamic Address Translation (DAT) is a standard facility on the mdl 125. When the mdl 125 is in Extended Control (EC) Mode with Translation Mode operable, programs are not required to be completely resident in main memory for execution. Under Supervisor control, portions of programs ("pages") may be stored on a direct access device until needed, at which time they are returned to main storage and may be relocated to any available location. Program addresses are treated as "logical addresses" and the translation feature develops "real addresses". Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the mdl 125.

Program Event Recording (PER), a standard feature, is a debugging aid which permits four types of events to be selectively monitored: (1) successful branches, (2) instruction fetch address compare, (3) main storage alteration address compare, (4) general register alteration address compare.

Standard features include a S/370 commercial instruction set, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording, Monitor Call, interval timer, time-of-day clock, CPU Timer and Clock Comparator, store and fetch protect, byte-oriented operand feature, error checking and correction in main storage, automatic instruction retry, and Audible Alarm.

Control Storage: Reloadable control storage for the Service Processor (SVP), direct DASD attachment, and Instruction Processing Unit (IPU) are provided as standard on the 3125 Processing Unit. In addition reloadable control storage is available for the optional Card I/O Attachment, Printer Attachment, Integrated Communications Adapter (ICA), Byte Multiplexer Channel, and Console Printer Attachment. Control storage is loaded from the diskette housed in the Service Console Unit.

The IPU of the 3125-0 contains as standard 12K words of control storage. Certain features/combinations require up to two 4K word increments in addition. See Chart A for details.

The IPU of the 3125-2 contains as standard 16K words of control storage. One 8K word increment may be ordered as an optional feature for use with certain feature combinations. See Chart A for details.

3125 Processing Unit (cont'd)

CHART A: Listed below are the valid feature combinations and their respective requirements for additional control storage.

Optional Features																
Model 3125-2	Basic Control Storage								(#4105) Control Storage Extension Required							
Model 3125-0	Basic Control Storage	First Control Storage Increment... (#4101) Required							Second Control Storage Increment ... (#4101) and (#4102) Required							
1401/1440/ 1460 Compatibility (#4457) *	x		*	x	*				x	*	x	x		x	*	x	x
S/360 Mdl 20 Compatibility (#7520) *	x	x	*		*		x	x	x	*		x	x	x	*		
Floating Point Including Extended Precision (#3910)		x	x	x	x		x	x	x			x	x	x	x	x	x
2311 Mdl 1/3330 Series Compatibilty (#8040) **					x		x	x			x	x		x	x		
2311 Mdl 1/3340 Series Compatibilty (#8060) **						x			x	x			x			x	
2314/3340 Series Compatibility (#8070) **						x				x	x		x		x		x

* 1401/1440/1460 Compatibility (#4457) and S/360 Mdl 20 Compatibility (#7520) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed on the 3125.) Cannot be installed with 3344 Attachment **(#9317)**. **Note:** RPQ SU0002 cannot be installed if the 2311 Mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070) is installed.

** #8040 and #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with specify feature **#9190** or 3344 Attachment specify feature **(#9317)**. **#9190** does not require additional control storage.

Note: Specify feature **#9315** is mutually exclusive with #4105 and/or #4460.

Input/Output Attachment - Native: The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices. They are designed to interact with their respective I/O devices and should be installed/removed with them since the system is inoperative with only the attachment/adapter installed.

Direct Disk Attachment (standard): Attaches either the 3340 mdl A2 or the 3333 mdl 1 dual disk drive and control unit directly to the 3125. The attachment supports block multiplexing. Channel address is 1, physical spindle addresses are 160 to 167 on the first string and 168 to 16F on the second string. For logical address assignment for 3344 refer to the *Functional Characteristics Manual*, GA33-1506.

3333/3330 DASD Subsystem: One 3333 mdl 1 and one additional 3330 mdl 1 or 2 can be attached to provide up to four spindles.

3340 DASF Subsystem: On the 3125-0 one 3340 mdl A2 and up to three 3340 mdls B1/B2 can be attached to provide up to eight spindles. On the 3125-2 (with 16-Drive Expansion **#9315**) one or two 3340 mdls A2 can be directly attached with up to three 3340 mdls B1/B2 attached to each of the 3340 mdl A2 to provide up to 16 spindles on the system.

3340/3344 DAS Subsystem: On the 3125-2 with 3344 Attachment **#9317** installed: One 3340 mdl A2 and any combination of up to three 3340 mdls B1/B2 and 3344 mdl B2/B2F can be attached on the first string. In addition, on the 3125-2, one 3340 mdl A2 and up to three 3340 mdls B1/B2 can be attached on the second string to provide up to 16 physical or the equivalent of up to 34 logical spindles on the system.

Magnetic Tape Adapter (optional): This feature attaches one of the following tape control units and is addressed as channel 2:

3411-1 Tape Control (data rate 20KB) housing one tape drive. Up to three additional 3410-1 Magnetic Tape Drives may be attached to the 3411-1 Control Unit.

3411-2 Tape Control (data rate 40KB) housing one tape drive. Up to five additional 3410-2 Magnetic Tape Drives may be attached to the 3411-2 Control Unit.

3411-3 Tape Control (data rate 80KB) housing one tape drive. Up to five additional 3410-3 Magnetic Tape Drives may be attached to the 3411-3 Control Unit.

3803-3 Tape Control. Up to eight 3420 Tape Units Mdl 3 or 5 may be attached to the 3803.

Integrated Card I/O Attachments (optional): These features provide native attachment of one of the following:

3504 Card Reader mdls A1 or A2
3525 Card Punch mdl P1, P2, or P3
2560 Multi-function Card Machine mdl A1
5425 Multi-function Card Unit mdls A1 or A2
3504 Card Reader and 3525 Card Punch
3504 Card Reader and 2560 MFCM
3504 Card Reader and 5425 MFCU

The Integrated Card I/O Attachment uses channel 0. Device address X'00C' is reserved for the 3504 reader and device address X'00D' is reserved for the 2560, 5425, or 3525.

Integrated Printer Attachment (optional): Attachment features for the 1403 Printer mdls 2, 7, and N1 and for the 3203 Printer mdl 1 or 2 are available. Only one printer unit can be natively attached. The printer adapter is addressed as channel 0 and the device address is X'00E'. The Universal Character Set feature can be optionally selected for the 1403-2 or N1 on the 3125 at no charge.

Integrated Console Printer Attachment (optional): Attaches the 5213 mdl 1 Printer to the 3125 to provide hard copy of operator messages presented on the standard Display Operator Console. It uses address X'01F' (same as the Display Operator Console) on channel 0. When the 1052 Compatibility feature is installed, 5213 mdl 1 Printer is required.

Integrated Communications Adapter (ICA) (optional): Provides the basic control storage and common circuits for direct attachment of up to six synchronous (BSC) communication lines or up to 16 asynchronous (start/stop) lines. The **Integrated Communications Adapter Extension (ICAE)** #4641 adds the capability to attach up to six BSC and up to 16 start/stop lines. IBM line adapters are provided within the mdl 125.

Input/Output Channel:

Byte Multiplexer Channel (optional): A wide variety of I/O devices may be attached to the S/370 mdl 125 via the optional byte multiplexer channel. One channel is available on the 3125 as a special feature and is functionally equivalent to the byte multiplexer channel on S/360 mdls 22, 25, 30, and 40. Thirty-two subchannels are provided as standard. (Eight channels may be shared and 24 are unshared). The byte multiplexer channel provides eight control unit positions and permits I/O units to operate normally in byte mode, giving the effect of several I/O operations simultaneous with computing. In burst mode, the channel handles one high-speed unit with a maximum data rate of 29KB per second. It is capable of sustained data rates up to 25KB per second in byte mode. It is addressed as channel 0. For OS/360 exclusions, refer to *System/360 Operating System Generation*, GC28-6554.

Console Function: System control functions are provided by the standard integrated Video/Display-Keyboard. It has the switches and lights necessary to operate and control the system. Optionally, the 5213-1 Console Printer (85 cps) may be attached via feature number #4692. The optional 1052 Compatibility (#8005) operates the 5213-1 printer and standard systems keyboard as an operator console in S/360-1052 mode only. In this mode of operation, the Video/Display-Keyboard acts as a slave unit to the printer.

Publications: GC20-0001

SPECIFY

- Voltage: (AC, 3-phase, 4 wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color Group: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below the floor, or **#9081** for on the floor.
- CPU Configuration: **#9091** for Configuration 1 (CPU located behind console table), or **#9092** for Configuration 2 (CPU bolted to right side of console table). Configuration 2 excludes a 5425 MFCU from being natively attached. See *S/370 Installation Manual* for details.
- Minimum Configuration:
- DASD Attachment: Specify one - **#9313**§ for 3330 Attachment or **#9314**§ for 3340/3344 Attachment (3125-2 only). Specify Fixed Head Attachment **(#9190)**§ if Fixed Head Feature is installed on the 3340 Series drives. **Note:** The Fixed Head Attachment Feature **(#9190)** cannot be installed with 2311 Mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070).
- Specify String Switch Capability/16-Drive Expansion **(#9315)**§ (3125-2 only) if String Switch (#8150) is installed on one or both 3340 mdl A2s, or if a second 3340 mdl A2 is installed no matter how many drives there are (16-Drive Expansion). Specify **#9306** Second String if two 3340 mdl A2s are installed. **#9315** requires 4K DASF Control Storage Extension (#4210). **#9315** cannot be installed with #4105 or #4460, and is mutually exclusive with 3344 Attachment **#9317**§.

3125 Processing Unit (cont'd)

When String Switch is installed, an Emergency Power Off connection between the sharing systems is mandatory. RPQ DC3621 (two system connection) or DC3622 (multiple system connection) must be ordered.

The 3125-2 uses fixed addresses 160 to 16F for its attached disk drives. In the case of string switch, to avoid confusion in Job Control and Operation, the same addresses should be be assigned to shared drives on the other system. In the case of the 3135, 3135-3, 3138 IFA, this requires specify code **#9821** on the 3135 providing addresses 160 through 16F to comply with the fixed addresses of the 3125. If intermixing 3330 and 3340 on the 3135, 3135-3, 3138 (**#9315**), no string switching with the 3125-2 is possible.

Note: The string switch of the DASD hardware function can be operated with the present DOS/VS standard DASD support. DOS/VS does not support the device reserve/release channel commands for program controlled sharing of attached DASD units. Therefore, it is the user's responsibility by appropriate organization and programming procedures to resolve conflicting references to shared files and insure data integrity. One method for controlling potential conflicts involves the use of operator commands DVC UP/DVC DN. For additional information, consult *DOS/VS System Management Guide,* GC33-5371.

- On the 3125-2 ... specify 3344 Attachment (**#9317**)§ when 3344 mdl B2/B2Fs are installed. 4K DASF Control Storage Extension is required. Cannot be installed with any of the following: String Switch Capability (**#9315**), 231X/3340 Compatibility (#8060/#8070), S/360 Mdl 20 Compatibility (#7520) ... 1401/1440/1460 Compatibility (#4457) ... 1403/3203 Carriage Control Feature (#4460). Specify **#9306**, Second String, if two 3340 mdl A2s are installed.
- Specify **#9807** for attachment of 3803 mdl 3 on the Magnetic Tape Adapter (#4675).

Note: RETAIN/370 ... CE access is by telephone.

SPECIAL FEATURES

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One per 3125. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 Direct Control Feature - OEMI,* GA22-6845.

Floating Point Including Extedded Precision (#3910): Adds 51 floating point arithmetic instructions. Provides for floating point operation including extended precision to 28 hexadecimal digits. **Field Installation:** Yes. **Limitations:** Cannot be installed with Floating Point (#3900). **Prerequisites:** See Charts A/B above for control storage requirements.

4K Control Storage Increment (#4101, 4102): [Mdl 0] Each adds 4,096 words (22 bits wide) of control storage. Required for certain feature combinations ... See "Control Storage Requirements" under "Highlights" for details. #4101 for first 4K increment ... #4102 for second 4K increment. **Field Installation:** Yes. **Prerequisites:** #4102 requires #4101.

8K Control Storage Extension (#4105): [Mdl 2] Adds 8,192 words (22 bits wide) of control storage to the IPU. Required for some combinations ... see Chart A. **Limitations:** Cannot be installed with #4210 or **#9315**. **Field Installation:** Yes. **Maximum:** One.

4K DASF Control Storage Extension (#4210): [Mdl 2] Adds 4,096 words (22 bits wide) to the DDA control storage for use with either or both the String Switch Capability or 16 Drive Expansion specify feature (**#9315**) or 3344 Attachment specify feature (**#9317**). **Limitations:** Cannot be installed with #4105 or #4460. **Maximum:** One. **Field Installation:** Yes.

1401/1440/1460 Compatibility (#4457): Microprogram controlled feature which, in combination with an emulator program under DOS/VS, permits the system to execute 1401/1440/1460 instructions. **Field Installation:** Yes. **Prerequisites:** See "Control Storage Requirements" under "Highlights" above. **Limitations:** Cannot be installed with 3344 Attachment (**#9317**) or with S/360 Mdl 20 Compatibility (#7520) unless RPQ SU0002 is installed on the 3125 ... RPQ SU0002 cannot be installed if the 2311 Mdl 1/3340 or 2314/3340 Compatibility feature (#8060, #8070) is installed.

1403/3203 Carriage Control Feature (#4460): Allows the 3203 Printer with its tapeless carriage control to emulate the function of a tape controlled carriage and thus run programs written for a 1403 Printer. **Limitations:** The 5203 Printer is not supported by this feature. Cannot be installed with string switch capability (**#9315**) or 3344 Attachment specify feature (**#9317**). **Field Installation:** Yes. **Prerequisites:** 3203 Printer. Note: This feature is not required with DOS/VS Release 31 and subsequent releases.

5425 Multi-Function Card Unit Power Prerequisite (#4500): Provides the power supply for the 5425 Multi-function Card Unit when no native printer (1403 or 3203) is attached. **Limitations:** Cannot be installed with 1403 Printer/5425 Card Unit Power Prerequisite (#4505). **Maximum:** One. **Field Installation:** Yes.

1403 Printer/5425 Card Unit Power Prerequisite (#4505): Provides the power supply for the natively attached 1403 Printer with or without a 5425 MFCU. **Limitations:** Cannot be installed with 5425 Multi-function Card Unit Power Prerequisite (#4500). **Maximum:** One. **Field Installation:** Yes.

Integrated 3203 Printer Attachment (#4650): Control for attaching the 3203 Printer mdl 1 or 2. **Limitations:** Cannot be installed with Integrated 1403 Printer Attachment (#4662, #4667 or #4668). **Maximum:** One. **Field Installation:** Yes.

Integrated 1403 Printer Mdl 2 Attachment (#4662): Provides control for attaching the 1403 Printer mdl 2. **Specify: #9847**§ to support UCS (#8641) on the 1403 mdl 2. **Limitations:** Cannot be installed with Integrated 3203 Printer Attachment (#4650). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4667 and #4505.

Integrated 1403 Printer Attachment (#4667): Control for attaching the 1403 Printer mdl 7. Prerequisite feature required for installation of the Integrated 1403 Printer Mdl 2 or Mdl N1 Attachment (#4662, #4668). **Limitations:** Cannot be installed with Integrated 3203 Printer Attachment (#4650) **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4505.

Integrated 1403 Printer Mdl N1 Attachment (#4668): Control for attaching the 1403 Printer mdl N1. **Specify: #9847**§ to support UCS (#8640) on the 1403 mdl N1. **Limitations:** Cannot be installed with Integrated 3203 Printer Attachment (#4650). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4662, #4667, #4505.

Integrated 2560 Attachment (#4670): Control for the 2560 Multi-function Card Machine mdl A1. **Limitations:** Cannot be installed with Integrated 3525 Card Punch Attachment (#4685) or with Integrated 5425 Attachment (#4695). **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9726** is required on the 2560 mdl A1 ... see "Specify" in M2560 pages.

2560 Card Print Control (#4674): Provides control for Card Print capability on the 2560 Multi-function Card Machine mdl A1. **Specify: #9797**§ for first two print lines, **#9798**§ for second two, **#9799**§ for third two, when corresponding Card Print features (#1575, #1576, #1577) are installed on the 2560 mdl A1. **Field Installation:** Yes. **Prerequisites:** #4670 on the 3125.

Magnetic Tape Adapter (#4675): Provides control for attachment of one 3411 Magnetic Tape Unit and Control mdl 1, 2 or 3 or one 3803 Tape Control mdl 3. See M3420 and 3803 or 3411 and 3410 pages for additional ordering instructions. The Magnetic Tape Adapter is addressed as Channel 2. **Maximum:** One. **Specify: #9807** for attachment of 3803 mdl 3. See "Highlights" for additional information. **Field Installation:** Yes. **Limitations:** A 3803 and 3411 cannot coexist on the Magnetic Tape Adapter. **Prerequisites:** #7361 on the 3411, except for 3125 mdl HG2. When attached to 3125 mdl HG2, RPQ 870061 is required on the 3411.

Integrated 3504 Card Reader Attachment (#4680): Control for attaching the 3504 Card Reader mdl A1 or A2. Supports Read Column Eliminate capability on the 3504 Card Reader. **Specify: #9781** for 3504 mdl A1, or **#9782** for 3504 mdl A2; **#9783** provides Optical Mark Read capability on the 3125 when Optical Mark Read (#5450) is installed on the 3504 mdl A1 or A2; **#9784** provides the capability of using the Selective Stacker (#6555) feature on the 3504 mdl A1 or A2. **Maximum:** One. **Field Installation:** Yes.

Integrated 3525 Card Punch Attachment (#4685): Control for attaching the 3525 Card Punch mdl P1, P2 or P3. **Specify: #9791**§ for 3525 mdl P1, **#9792**§ for 3525 mdl P2, or **#9793**§ for 3525 mdl P3. Specify **#9794**§ when the Card Read (#1533) feature is installed on the 3525. **Limitations:** Cannot be installed with Integrated 2560 Mdl A1 Attachment (#4670) or Integrated 5425 Attachment (#4695). **Maximum:** One. **Field Installation:** Yes.

Integrated 5213 Printer Mdl 1 Attachment (#4692): Attaches the 5213 Printer mdl 1. Includes a special cable to support the printer. **Maximum:** One. **Field Installation:** Yes.

3525 Card Print Control (#4693): Provides control for Card Print (#8339, #5273) capability on the 3525 Card Punch. **Specify: #9795**§ when Two-line Card Print (#8339) is installed on the 3525, or **#9796**§ when Multiline Card Print (#5273) is installed on the 3525. **Field Installation:** Yes. **Prerequisites:** Integrated 3525 Card Punch Attachment (#4685).

Integrated 5425 Attachment (#4695): Control for attaching the 5425 Multi-function Card Unit mdl A1 or A2. **Specify: #9183**§ for mdl A1, or **#9184**§ for mdl A2. **Limitations:** Cannot be installed with Integrated 3525 Card Punch Attachment (#4685) or with Integrated

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3125 Processing Unit (cont'd)

2560 Mdl A1 Attachment (#4670). Can only be installed with CPU Configuration 1 (**#9091**) ... see "Specify" above. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 1403 Printer/5425 Card Unit Power Prerequisite (#4505) required when 1403 is natively attached, or 5425 Multi-function Card Unit Power Prerequisite (#4500) if no native printer (1403 or 3203) is configured. When 3203 Printer is attached, #4500 or #4505 is not required.

Basic Byte Multiplexer Channel (#5248): To attach low speed byte multiplex devices ... see "Byte Multiplexer Channel" under "Input/Output Channel". Feature includes control storage necessary for IOP operation. **Maximum:** One. **Field Installation:** Yes.

S/360 Mdl 20 Compatibility (#7520): Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 instructions. **Field Installation:** Yes. **Limitations:** Cannot be installed with 3344 Attachment (**#9317**) or with 1401/1440/1460 Compatibility (#4457) unless RPQ SU0002 is installed on the 3125 ... RPQ SU0002 cannot be installed if either 2311 Mdl 1/3340 or 2314/3340 compatibility feature (#8060, #8070) is installed. Also note control storage requirements in Chart A. **Prerequisites:** See "Control Storage Requirements" under "Highlights" above.

1052 Compatibility (#8005): Operates the 5213 Printer mdl 1 and standard keyboard as an operator console in S/360 1052 mode only. In this emulation mode of operation the Video/Display acts as a slave unit to the printer. **Field Installation:** Yes. **Prerequisites:** #4692 and the 5213 Printer mdl 1.

2311 Mdl 1/3330 - Series Compatibility (#8040): Permits the emulation of 2311 mdl 1 files on the 3333/3330 Disk Storage. The user program may access both the emulated 2311 mdl 1 data set as well as the native data set. This provides a "mixed-mode" operating environment. **Prerequisites:** Minimum of one 4K Increment of Control Storage (#4101, #4102) ... see "Control Storage Requirements" under "Highlights" above. Note: When running DOS Release 21-27, 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYSRES on 3330 in native mode. **Field Installation:** Yes. **Limitations:** #8040, #8060 and #8070 are mutually exclusive.

2311 Mdl 1/3340 - Series Compatibility (#8060): Permits the emulation of 2311 mdl 1 files on the 3340 disk storage. The user program may access both the emulated 2311 mdl 1 data as well as the native data set. This provides a "mixed mode" operating environment. **Limitations:** #8060 cannot be installed with **#9317**. ... #8040, #8060, #8070 and **#9190** are mutually exclusive. **Field Installation:** Yes. **Prerequisites:** Minimum of one 4K Increment of Control Storage (#4101, #4102) ... see "Control Storage Requirements" under "Highlights" above. Note: When running DOS Rel. 21 through 27 , 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYRES on the 3340 DASF.

2314/3340 - Series Compatibility (#8070): Permits the emulation of 2314 files on the 3340 disk storage. The user program may access both the emulated 2314 data set as well as the native data set. This provides a "mixed mode" operating environment. **Limitations:** #8070 cannot be installed with 3344 Attachment (**#9317**) ... #8040, #8060, #8070 and **#9190** are mutually exclusive. **Field Installation:** Yes. **Prerequisites:** Minimum of one 4K Increment of Control Storage (#4101, #4102) ... also see "Control Storage Requirements" under "Highlights" above. Note: When running DOS Rel. 21 through 27, 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYRES on the 3340 DASF in native mode.

COMMUNICATIONS FEATURES

Integrated Communications Adapter (ICA) (#4640): Provides the basic control storage and common circuits for direct attachment of up to six synchronous (BSC) communication lines or up to 16 asynchronous (Start/Stop) communication lines depending upon line speed. All combinations of BSC and Start/Stop lines require the Integrated Communications Adapter Extension (#4641). Additional features are required to create appropriate line interfaces for the individual lines. Figure 1A schematically represents the feature build-up. Figure 1A shows the feature build-up for asynchronous lines or for combinations of asynchronous and synchronous lines. The ICA provides as a standard:

- Autopoll — Start/Stop and BSC
- Multipoint central station functions — Start/Stop and BSC
- Multipoint tributary station fnctns — BSC only
- EBCDIC transparent mode — BSC only
- EBCDIC or ASCII code — BSC only

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

Refer to Figures 2A and 2B for attachable terminals and for configuration requirements prior to ordering features below. The normal procedure requires completion of ICA Specification Form Z120-2472 with each 3125 containing feature #4640. Retain this form with the DP Order Guide. Any subsequent orders affecting #4640 or its subfeatures should follow this procedure.

Note: An APL Configurator is available from IBM in configurating the ICA (or refer to *ICA Configurator Manual*, GA33-1508,).

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services. **Communications Facilities:** See M2700 pages for communications facility requirements with this feature. **Maximum:** One. **Field Installation:** Yes.

Integrated Communications Adapter Extension (ICAE) (#4641): This feature is required for all combinations of BSC and Start/Stop lines. Extends the communications capability to up to six BSC and up to 16 Start/Stop lines depending upon line speed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Asynchronous Line Group 1 (ALG1) (#1201): Permits attachment of up to four Medium Speed Asynchronous Lines (AL) (#1231) or up to four Low Speed Asynchronous Lines Pairs (ALP) (#1241) or up to four Telegraph Line Pairs (TLP) (#7881). The lines within the ALG positions A1 through A4, must be installed in ascending order. **Specify:** One line control specify code from Figure 2A. **Limitations:** All lines in the ALG1 must have the same line speed and line control. Different terminals can be attached within one line group, provided they use the same speed and line control. See Figure 2A. ALG1 (#1201) and SLHS (#7121) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Asynchronous Line Group 2 (ALG2) (#1202): Permits attachment of up to four medium speed asynchronous lines (AL) (#1232) or up to four low speed asynchronous line pairs (ALP) (#1242) or up to four telegraph line pairs (TLP) (#7882). ALG1 and ALG2 are identical in function and either one can be installed as the first line group in the ICA. The lines within ALG2, positions A5 through A8, must be installed in ascending order. **Limitations:** All lines in ALG2 must have the same line speed and line control. Different terminals using the same line speed and line control can be attached within one line group. See Figure 2A. **Specify:** One line control specify code from Figure 2A. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Asynchronous Line, Medium Speed (AL) (#1231 in ALG1, #1232 in ALG2): Provides for the attachment of one nonswitched 600 bps Start/Stop communications line. The 3767 terminal can be attached to this feature (at EC 380427 plus EC 380627) via switched or non-switched lines at 300 bps and via nonswitched lines at 600 or 1200 bps. Clocking speed is selected at installation time. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4 in ALG1 and A5 through A8 in ALG2. Note: IBM Line Adapters are tied to specific line positions ... see Figure 4C and 4D. **Limitations:** See Figure 5, Maximum ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. **Maximum:** Four each of #1231 and #1232. **Field Installation:** Yes. **Prerequisites:** #1201.

Asynchronous Line Pair, Low Speed (ALP) (#1241 in ALG1, #1242 in ALG2): Provides for the attachment of two switched 110 bps or two switched or nonswitched 134.5 bps Start/Stop communications lines. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4 in ALG1 and A5 through A8 in ALG2. Note: IBM Line Adapter are tied to specific line positions ... see Figure 4C and 4D. **Limitations:** See Figure 5, Maximum ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #1201 is prerequisite to #1231. #1202 is prerequisite to #1232.

Auto Call Adapter (ACA) (#1291, #1292, #1295, #1296): Provides automatic dialing capabilities on switched facilities. One of these features is required for each line equipped to automatically originate calls on switched networks. See Figure 3 for the selection of correct feature code. **Limitations:** The use of Auto Call in a line group precludes the last two lines/line pairs of that group ... see Figure 3. **Maximum:** Two per line group ... maximum total, six. **Field Installation:** Yes. **Prerequisites:** See Figure 3.

IBM Leased Line Adapter (#4743): A modem for Start/Stop data transmission at 134.5 or 600 bps over nonswitched facilities. This line adapter operates with Leased Line Adapters on other IBM products. Selection between 2- and 4-wire operation is made at installation time. See "Leased Line Adapter" in GA24-3435 for specifications and restrictions. **Specify:** See Figure 4C and 4D. **Maximum:** See Figure 4C and 4D. **Field Installation:** Yes. **Prerequisites:** #4792 or #4793 ... also see Figure 4C and 4D.

IBM 1200 bps Line Adapter (#4781, #4782, #4791): A modem for BSC data transmission at up to 1200 bps over nonswitched facilities or switched network. Also for Start/Stop transmission at 300, 600 or

3125 Processing Unit (cont'd)

1200 bps over nonswitched facilities to the 3767 terminal. Unclocked and must interface to an SLC (#7141-#7144) or AL (#1231).

The Line Adapter is available in three different versions:

#4781 -- nonswitched
#4782 -- switched with auto answer
#4891 -- switched with autocall and auto answer.

Attachment to nonswitched facilities is via an IBM-provided cable directly to the line. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Customer Responsibilities:** See M2700 pages. **Communciations Facilities:** See M2700 pages. **Specify:** See Figure 4C and 4D. **Maximum:** See Figure 4C and 4D. **Field Installation:** Yes. **Prerequisites:** #7141-#7144 or #1231 ... #4792 or #4793. Also see Figure 4C and 4D. #1295 or #1296 is required for #4791.

Line Adapter Base 2 (LAB2) (#4792): Permits attachment of two IBM 1200 bps Line Adapters for BSC lines and up to four IBM Leased Line Adapters. The Line Adapters are tied to specific line positions. See Figure 4C for configuration and possible line combinations. **Note:** LAB2 is required for IBM 1200 bps Line Adapters with Autoanswer (#4782) or with Autocall and Autoanswer (#4791). **Limitations:** LAB2 (#4792) and LAB3 (#4793) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes.

Line Adapter Base 3 (LAB3) (#4793): Provides attachment of up to 12 IBM 1200 bps Line Adapters and IBM Leased Line Adapters. The Line Adapters are tied up to specific line positions. See Figure 4D for configuration and possible line combinations. **Limitations:** LAB2 (#4792) and LAB3 (#4793) are mutually exclusive. **Maximum:** One. **Field Installation:** Yes.

Synchronous Line Group (SLG) (#7100): Permits attachment of up to four medium speed BSC lines, SLC (#7141-#7144) and/or SL (#7151-#7154). Maximum line speed is 1200 and 7200 bps respectively. The lines in this group, positions S1 through S4, must be installed in ascending order. The lines can have different line speeds within the maximum specified. **Specify:** Maximum line speed in the group: **#9751**§ for 1200 bps maximum ... **#9753**§ for 2400 bps max ... **#9754**§ for 4800 bps max ... **#9757**§ for 7200 bps max. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Synchronous Line High Speed (SLHS) (#7121): Provides for the attachment of one nonswitched BSC line at speeds up to 50K bps. See Figure 1. This is a digital current interface for attachment to facility E1, E2 or E3. **Note:** Only for nonswitched point-to-point lines. **Limitations:** This line has a load factor of 100% and must not be operated simultaneously with any other line in the ICA. See Figure 5, Maximum ICA Configuration. #7121 and #7131 are mutually exclusive. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4640.

Synchronous Line, Low Load (SLLL) (#7131 - 1st Line, #7132 - 2nd Line): Each provides for the attachment of one switched or nonswitched BSC line. Nonswitched lines with switched network backup are supported. Maximum line speed on nonswitched lines is 7200 bps. Maximum line speed on switched backup network is 3600 bps. Maximum line speed on switched network is 2400 bps. See Figure 2B for detailed speed and facility information. Requires external modem. This feature has a lower load factor than #7151-#7154 ... see Figure 5. The Modem must provide clocking. **Specify:** The highest line speed used on #7131 and #7132: **#9758** if the highest line speed is from 1200 bps up to 4800 bps. **#9759** if the highest line speed is above 4800 bps and up to 7200 bps. **Note:** 1200 bps is the *LOWEST* allowed line speed for these features. SLG (#7100) not required as a prerequisite. **Limitations:** See Figure 5, Maximum ICA Configuration ... #7121 and #7131 are mutually exclusive. **Maximum:** One each, #7131 and #7132. **Field Installation:** Yes. **Prerequisites:** ICA (#4640) ... #7132 requires #7121 or #7131.

Synchronous Line Medium Spedd Clock (SLC) (#7141-#7144):

#7141 -- Line position S1
#7142 -- Line position S2
#7143 -- Line position S3
#7144 -- Line Position S4

Line positions S1 through S4 must be installed in ascending order. Each feature provides for the attachment of one switched or nonswitched BSC line. The clock can be set by the user for a transmission rate of 600 bps or 1200 bps. Connects to the line via an unclocked modem or IBM Line Adapter. **Notes:** IBM Line Adapters are tied to specific line positions ... see Figure 4C and 4D. SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. **Limitations:** See Figure 5, Max. ICA Configuration. #7141 is mutually exclusive with #7151, #7142 with #7152, #7143 with #7153, and #7144 with #7154. **Maximum:** #7141 through #7144, one each. **Field Installation:** Yes. **Prerequisites:** #7100.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

Synchronous Line Medium Speed (SL) (#7151-#7154):

#7151 -- Line position S1
#7152 -- Line position S2
#7153 -- Line position S3
#7154 -- Line position S4

Line positions S1 through S4 must be installed in ascending order. Each feature provides for the attachment of one switched or nonswitched BSC line. Nonswitched lines with switched network backup are supported. Maximum line speed on nonswitched line is 7200 bps; on switched backup network 3600 bps; on switched network 4800. See Figure 2B for detailed speed and facility information. Connects to the line via a modem. The modem must provide clocking. **Note:** SL (#7141-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. **Limitations:** See Figure 5, Max. ICA Configuration. #7151 is mutually exclusive with #7141, #7152 with #7142, #7153 with #7143, and #7154 with #7144. **Maximum:** #7151 through #7154, one each. **Field Installation:** Yes. **Prerequisites:** #7100.

Telegraph Line Pair (TLP) (#7881 in ALG1, #7882 in ALG2): Provides for the attachment of two nonswitched single current telegraph lines at 45.5, 56.9, 74.2 or 75 bps. Attachment to the lines is via an IBM-provided external cable. Lines A1 through A4 in ALG1 and A5 through A8 in ALG2 are installed in ascending order. **Limitations:** See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. **Maximum:** Four each. **Field Installation:** Yes. **Prerequisites:** #1201 is prerequisite to #7881. #1202 is prerequisite to #7882.

Modems: One IBM modem can be attached to each of the BSC lines of the ICA (#4640). **Prerequisites:** #7151-#7154 or #7131, #7132.

Modem	Speed (bps)
3863	2400/1200
3864	4800/2400
3872	2400/1200
3874	4800/2400
3875	7200/3600/1800

Note: For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872, 3874 and 3875 pages.

Customer Responsibilities: See "Customer Responsibilities" in M2700 pages.

FIGURE 1A

INTEGRATED COMMUNICATIONS ADAPTER SCHEMATIC FEATURE BUILD-UP

ICAE (#4641)	LINE GROUP	LINE INTERFACE	Asynch Line Position	Synch Line Position
ICA (#4640)	ALG1 (#1201)	AL (#1231), or ALP (#1241), or TLP (#7881)	A1	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A2	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A3 (1)	
		AL (#1231), or ALP (#1241), or TLP (#7881)	A4 (1)	
	ALG2 (#1202)	AL (#1232), or ALP (#1242), or TLP (#7882)	A5	
		AL (#1232), or ALP (#1242), or TLP (#7882)	A6	
		AL (#1232), or ALP (#1242), or TLP (#7882)	A7 (1)	
		AL (#1232), or ALP (#1242), or TLP (#7882)	A8 (1)	
	SLG (#7100)	SL (#7151), or SLC (#7141)		S1
		SL (#7152), or SLC (#7142)		S2
		SL (#7153), or SLC (#7143)		S3 (1)
		SL (#7154), or SLC (#7144)		S4 (1)
		SLLL (#7131), or SLHS (#7121)		S5
		SLLL (#7132)		S6

(1) Auto Call Adapters (#1291, #1292, #1295 and #1296) restrict the use of these line positions ... see Figure 3.

3125 Processing Unit (cont'd)

FIGURE 2A

START/STOP TERMINALS

	SPEED (bps)	FACILITIES	ALG1		ALG2	
			LINE INTERFACE	LINE CONTROL SPECIFY	LINE INTERFACE	LINE CONTROL SPECIFY
1030	600	D2	#1231	**#9740**§	#1232	**#9750**§
1050	75	A4	#7881	**#9736**§	#7882	**#9746**§
	134.5	C1, C2, D1	#1241	**#9738**§	#1242	**#9748**§
1060	134.5	D1	#1241	**#9738**§	#1242	**#9748**§
2740 mdl 1	134.5	C1, C2, D1	#1241	**#9738**§	#1242	**#9748**§
2740 mdl 2	75	A4	#7881	**#9736**§	#7882	**#9746**§
	134.5	D1	#1241	**#9738**§	#1242	**#9749**§
	600	D2	#1231	**#9739**§	#1232	**#9749**§
2741	134.5	C1, C2, D1	#1241	**#9738**§	#1242	**#9748**§
3767 mdl 1, 2 w #7111 or #7113	300	C1, D1	#1231	**#9739**§	#1232	**#9749**§
3767 mdl 1, 2, 3 w #7112	600 or 1200	D2	#1231	**#9739**§	#1232	**#9749**§
5010 mdl Axx	134.5	C1, C2, D1	#1241	**#9738**§	#1242	**#9748**§
	600	D2	#1231	**#9739**§	#1232	**#9749**§
5100/5110	134.5	B1, B2, C1, C2, D1	#1241	**#9738**§	#1242	**#9748**§
	300	C1, D1	#1231	**#9739**§	#1232	**#9749**§
AT&T 83B2/83B3 WU 115A	45.5	A1	#7881	**#9733**§	#7882	**#9743**§
	56.9	A2	#7881	**#9734**§	#7882	**#9744**§
	74.2	A3	#7881	**#9735**§	#7882	**#9745**§
TWX 33/35	110	C3	#1241	**#9737**§	#1242	**#9747**§

§ CPU diskette only feature. No fee when ordered at time of manufacture or with TERMINAL feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3125 Processing Unit (cont'd)

FIGURE 2B

BINARY SYNCHRONOUS TERMINALS

SPEED (bps)	600	1200	1200	2400	2400	2400/ 1200	4800	4800/ 2400	4800/ 2400	7200/ 3600	7200/ 3600 & 3600/ 1800	19,200	40,800	50,000
LINE INTERFACE	#7141- #7144	#7141- #7144	#7141- #7144	#7151- #7154	#7151- #7154	#7151- #7154	#7151- #7154, #7131/ #7132	#7151- #7154	#7151- #7154	#7151- #7152, #7131/ #7132	#7151- #7152, #7131/ #7132	#7121	#7121	#7121
FACILITIES	C3	C4	D3	C5	D4, X1M*	D4SB	D5, X2M**	C6	D5SB	D6	D6SB	E1	E2	E3
3115 w #4640	X	X	X		X	X	X	X	X	X	X	X	X	X
Another 3125 w #4640	X	X	X		X	X	X	X	X	X	X	X	X	X
3135, -3, 3138 w #4640	X	X	X		X		X	X		X				
2701		X	X		X	X	X	X	X	X	X	X	X	X
2703		X	X		X	X	X	X	X	X***	X***			
3704/3705	X	X	X		X	X	X	X	X	X	X	X	X	X
3020 w #2074		X	X		X	X	X	X	X	X	X	X	X	X
3025 w #4580		X	X		X		X	X	X					
System/3 w #2074	X	X	X		X	X	X	X	X	X	X	X	X	X
1131 w #2074		X	X		X		X	X						
1826 w #7550		X	X		X		X	X						
2715 mdl 2		X	X		X		X	X						
2780		X	X		X	X	X	X	X	X	X			
3271			X		X		X			X	X			
3275		X	X		X		X			X	X			
3651 mdl A60 or B60				X										
3661		X	X											
3684		X	X		X	X	X	X	X					
3735		X	X		X		X	X	X					
3741 mdl 2/3747		X	X		X									
3771, 3773, 3774, 3775		X	X		X	X	X	X	X					
3776					X	X	X	X	X					
3777							X	X	X	X	X			
3780		X	X		X	X	X	X	X	X	X			
4331 w #1601	X	X	X	X	X	X	X	X	X	X	X			
5110		X	X		X		X	X						
5231 mdl 2		X	X		X		X	X						
5265 Communicating Mdl		X	X	X	X									
5275****		X	X											
System/7 w #2074		X	X		X		X			X		X	X	X
System/32,System/34 @	X	X	X		X	X	X	X	X	X	X			
Series/1	X	X	X		X		X	X		X		X	X	X

* X1M facility may not be used for communications with a 2703 or a S/360 mdl 25.
** X2Mfacility may not be used for communications with a 2703 or a S/360 mdl 25.
*** Contact IBM for RPQ ordering information.
**** 3125 ICA must use the IBM 1200 bps Modem (#4781 or #4782).
@ S/32 with #2074 & S/34 with #2500.

FIGURE 3

AUTO CALL ADAPTERS

Auto Call Adapter Feature Code	Provides Auto Call for Line Position	Prerequisites	Precludes Line Positions
#1291	A1 (1)	#1241	A3 and A4
#1292	A2 (1)	#1241 and #1291	A3 and A4
#1293	A5 (1)	#1242	A7 and A8
#1294	A6 (1)	#1242 and #1293	A7 and A8
#1295	S1	#7141 and #7151	S3 and S4
#1296	S2	#7142 or #7152 and #1295	S3 and S4

(1) Provides Autocall in this line position for the first line of the synchronous line pair (#1241 or #1242).

FIGURE 4A

IBM LINE ADAPTERS

FACILITY	BSC	Start/Stop up to 600 bps	Start/Stop (2) up to 1200 bps
	IBM 1200 bps Line Adapter	IBM Leased Line Adapter	IBM 1200 bps Line Adapter
Nonswitched pt-to-pt	#4781	#4743	#4781
Nonswitched multipoint control	#4781	#4743	#4781
Nonswitched multipoint tributary	#4781	–	–
Switched with autoanswer	#4782	–	–
Switched with autoanswer and autocall	#4791	–	–

(2) Only with the 3767 terminals.

§ CPU diskette only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3125 Processing Unit (cont'd)

FIGURE 4C

LINE ADAPTER BASE 2 (#4792) ... Maximum, 6 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ	NOTE
A5 1st line	#4743	**#9463**§	#1242	
A5 2nd line	#4743	**#9464**§	**#9463**	
A6 1st line	#4743	**#9465**§	#1242	
A6 2nd line	#4743	**#9466**§	**#9465**	
S1	#4781	**#9471**§	#7141	Select one line adapter
	#4782	**#9473**§	#7141	
	#4791	**#9475**§	#7141	
S2	#4781	**#9472**§	#7142	Select one line adapter
	#4782	**#9474**§	#7142	
	#4791	**#9476**§	#7142	

FIGURE 4D

LINE ADAPTER BASE 3 (#4793) ... Maximum, 12 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ	NOTE
A5 1st line	#4743	**#9485**§	1242	
A5 2nd line	#4743	**#9486**§	**#9485**	
A6 1st line	#4743	**#9487**§	#1242	
A6 2nd line	#4743	**#9488**§	**#9487**	
A7 1st line	#4743	**#9489**§	#1242	
A7 2nd line	#4743	**#9490**§	**#9489**	
A8 1st line	#4743	**#9491**§	#1242	
A8 2nd line	#4743	**#9492**§	**#9491**	

.... OR ....

A1 (3)	#4743 or #4781	**#9481, #9501**§	#1231	Excludes line adapter in position S4 (**#9496**)
A2 (3)	#4743 or #4781	**#9482, #9502**§	#1231	Excludes line adapter in position S3 (**#9495**)
A3 (3)	#4743 or #4781	**#9483, #9503**§	#1231	Excludes line adapter in position S2 (**#9494**)
A4 (3)	#4743 or #4781	**#9484, #9504**§	#1231	Excludes line adapter in position S1 (**#9493**)
S1	#4781	**#9493**§	#7141	Excludes line adapter in position A4 (**#9484**)
S2	#4781	**#9494**§	#7142	Excludes line adapter in position A3 (**#9483**)
S3	#4781	**#9495**§	#7143	Excludes line adapter in position A2 (**#9482**)
S4	#4781	**#9496**§	#7144	Excludes line adapter in position A1 (**#9481**)

(3) #4781 may be used only with the 3767 terminal.

FIGURE 5

MAXIMUM ICA CONFIGURATION

All lines/line pairs are assigned load factors.
The sum of all load factors must not exceed 100% if SLHS is not installed.
The sum of all load factors must not exceed 200% if SLHS is installed.

LOAD FACTOR IN %

ASYNCHRONOUS LINES	1-2 Line Pairs	3-4 Line Pairs	5-6 Pairs	7-8 Pairs
TLP at 45.5 & 56.9 bps	20	20	40	40
TLP at 74.2 & 75 bps	20	40	60	80
ALP at 110 & 134.5 bps	20	40	60	80
	First Line Group (ALG1) Up to 4 lines		Second LIne Group (ALG1&ALG2) 5 to 8 lines	
AL at 300/600/1200 bps	20		40	

SYNCHRONOUS LINES	1-2 Lines		3-4 Lines	
	Autopoll Not Used	Autopoll Used	Autopoll Not Used	Autopoll Used
SL and SLC w max. 1200 bps	20	25	20	25
SL and SLC w max. 2400 bps	20	25	40	50
SL w max. 4800 bps	40	50	80	100
SL w max. 7200 bps	60	75		
	1 Line		2 Lines	
SLLL w max. 4800 bps	20	25	20	30
SLLL w max. 7200 bps	20	30	40	60
SLHS w max. 50K bps	100*			

* See "Limitations" in the Special Feature description of the feature.

§ CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

3125 Processing Unit (cont'd)

MODEL CONVERSIONS

Planning for Mdl Conversions: When a customer requires feature changes and/or memory upgrades in addition to a mdl upgrade, consolidating the several changes into a single MES is not recommended. In these cases a planning session between sales, FE and the customer is required to develop the proper sequence of MES ordering.

Field installable.

From To	G	GE	GF	H
FE	x	x	x	x
G		x	x	x
GE			x	x
GF				x

From To	FE2	G2	GE2	GF2	H2	HG2	I2
FE	x	x	x	x	x	x	x
G		x	x	x	x	x	x
GE			x	x	x	x	x
GF				x	x	x	x
H					x	x	x
FE2		x	x	x	x	x	x
G2			x	x	x	x	x
GE2				x	x	x	x
GF2					x	x	x
H2						x	x
HG2							x

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3135 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3135 Is No Longer Available ... features and model changes can be ordered on an 'as available' basis.

PURPOSE

Has main and control storage, plus arithmetic and logic circuits for a S/370 model 135.

MODELS

Model FE	FE0	98,304 bytes of processor storage
Model GD	GD0	147,456 bytes of processor storage
Model GF	GF0	196,608 bytes of processor storage
Model H	H00	262,144 bytes of processor storage
Model HF	HF0	327,680 bytes of processor storage
Model HG	HG0	393,216 bytes of processor storage
Model I	I00	524,288 bytes of processor storage

For additional models of the 3135, see M3135-3 pages. **Prerequisites:** Each 3135 requires a 3046 Power Unit. See M3046 pages.

HIGHLIGHTS

Depending on the mdl, up to 524,288 bytes of processor storage are available. CPU cycle time varies from 275 to 1485 nanoseconds, depending on the internal operation being performed. Sixteen general-purpose and four floating point registers are provided.

Capability to natively attach a 2319 Disk Storage mdl A1 (and additional 2319 mdl A3, 2312 or 2318 Disk Storage). Capability to natively attach one or two 3333 Disk Storage and Control modules. Capability to natively attach one or two 3340 Direct Access Storage Facility mdl A2s. See 3340 and 3333 in "Machines". Capability to natively attach a 1403 Printer mdl 2, 7 or N1. See "Special Features." **Note:** 2312s, 2318s, and 2319 all mdls are no longer available.

Virtual storage capability to increase the effective utilization of main storage.

Up to eight teleprocessing lines are attachable via the Integrated Communications Adapter (#4640).

Standard features include a commercial instruction set, additional S/370 instructions, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording, interval timer, time-of-day clock, store and fetch protect, console file, byte-oriented operand feature, error checking and correction on main and control storage, automatic instruction retry, channel command retry, byte multiplexer channel, OS/DOS Compatibility Feature, and audible alarm.

A standard console file is the basic microprogram loading device for the system. The console file contains a small, low-performance, read-only file device that provides all the microcode for the system on removable magnetic disk cartridges. The disks supplied with the system contain all of the required microcode for the basic system, the optional features ordered for the system, and CE diagnostics.

An optional Clock Comparator and Timer provide additional timing facilities for the programmer.

Control Storage Requirements

Reloadable Control Storage is housed in the 3135 and is loaded from the Console file. 24,576 bytes of control storage are standard; two additional increments of 12,288 bytes are available if required to support special features.

Table of Control Storage Requirements	Bytes
Basic Systems Microcode	15,482
APL Assist (#1005)	13,800
Conditional Swapping (#1051)	300
Autocall (#1290)*	440
Block Multiplexer Channel (#1421)	1,568
Block Multiplexer Shared Subchannel (#1431)	14
Clock Comparator and CPU Timer (#2001)	1,400
OCR Multifont (#2989)	380
Direct Control (#3274)	50
Extended Precision Floating Point (#3840)	676
Floating Point (#3900)	1,200
64 Multiplexer Subchannels (#3905)	1,024
128 Multiplexer Subchannels (#3906)	2,048
256 Multiplexer Subchannels (#3907)	4,096
1401/1440/1460 Compatibility (#4457)	4,492
Integrated Communications Adapter (#4640)	2,100
2319 Integrated File Adapter (#4650)	4,652
3333/3340 Series IFA (#4655) w/**#9313**	10,192
3333/3340 Series IFA (#4655) w/**#9314**	9,768
3333/3340 Series IFA (#4655) w/**#9315**	12,800
3333/3340 Series IFA (#4655) w/**#9316*****	300
3333/3340 Series IFA (#4655) w/**#9317** ++	2,200
IFA Conversion (#4645)	2,048
Integrated Printer Adapter Basic Control (#4670)	1,300
Integrated 1403 Printer Mdl 2/N1 Attachment (#4672)	0
Integrated 1403 Printer Mdl 7 Attachment (#4677)	0
Virtual Machine Assist (#8740)	2,000
First or First & Second Selector Channel(#6981,#6982)	1,584
S/360 mdl 20 Compatibility (#7520)	876
3210 Mdl 1 Adapter (#7844)	1,494
3215 Adapter (#7855)	1,930
2314/3340 Compatibility (#8070)	6,400
String Switch Attachment (#9841) w/**#9313**	300
String Switch Attachment (#9841) w/**#9314**	370
String Switch Attachment (#9841) w/**#9315**	334
String Switch Attachment (#9841) w/**#9316*****	0
Synchronous Data Adapter Type II (**#9649-#9656**)*	3,700
Adapter Base Type I +*	1,200
Terminal Adapter Type I Model II (**#9721-#9728**)+*	1,700
Telegraph Adapter Type II (**#9785-#9792**)+*	200
Terminal Adapter Type III (**#9753-#9760**)*	2,100
Fixed Head Attachment (**#9190**) with **#9314**	300
Fixed Head Attachment (**#9190**) with **#9315**	300

* The specified control storage is required only once for any number of lines of one type.

\+ For Telegraph Adapter Type II or Terminal Adapter Type I Model II, the control storage required is the Adapter Base Type I plus the control storage for the appropriate adapter. One copy of Adapter Base Type I is automatically included whenever either or both of these adapters are ordered.

++ Requires **#9314**

*** Requires either **#9313** or **#9315**

For the basic system and applicable special features, total the control storage requirements given in the table. If the total exceeds 24,576 bytes, First 12K C ontrol Storage Increment (#7861) is required. If the total exceeds 36,864 bytes, Second 12K Control Storage Increment (#7862) is also required.

Limitations: The maximum configuration that can operate at any one time is determined by the available control storage (maximum 49,152 bytes). Alternate feature configurations can be operated by utilizing additional magnetic disk cartridges with another set of 3135 features. Alternate cartridges for an installation with be available by RPQ.

Virtual Storage

Extended Control (EC) Mode expands the structure of the Program Status Word to accommodate the control of additional S/370 features and extends the number of permanently assigned main storage locations. The S/370 mdl 135 can operate in either EC Mode or Basic Control (BC) Mode as defined for the S/360. Dynamic Address Translation (DAT) is a standard feature on the S/370 mdl 135. When the S/370 mdl 135 is in Extended Control (EC) Mode with Translation Mode operable, program addresses are treated as "logical addresses" and the translation feature develops "real addresses". Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the S/370 mdl 135. For I/O operations, Channel Indirect Data Addressing provides a means to transmit data that spans pages in non-contiguous real storage.

Program Event Recording, a standard feature, is a debugging aid which permits four types of events to be selectively monitored in a virtual environment: (1) successful branches; (2) instruction fetch address compare; (3) main storage alteration address compare; (4) general-purpose register alteration address compare.

Input/Output Attachments: A wide variety of I/O devices may be attached to the S/370 mdl 135 via the standard byte multiplexer and optional selector channels. There are, additionally, five direct attachment features for the 3135. They are:

Console Printer-Keyboard (required): This unit serves as the online I/O device for operator/system communications. It provides a means of manually entering data into the system, altering or displaying data already in storage, and for printing error logout messages.

2319 Integrated File Adapter (#4650) (Optional): This feature enables native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1s, or 2318 mdl A1), up to a total of eight drives. The IFA is addressed as channel 1. **Limitations:** Cannot be installed if 3333/3340 Intermix (**#9315**) is specified when 3330/3340 Series IFA (#4655) is also ordered.

3330/3340 Series Integrated File Adapter (#4655) (Optional): This feature allows the native attachment of one or two 3333 modules or 3340 A2 units. Each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11). Each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives. One but not both 3340 mdl A2s which can attach to an IFA may have up to three 3344s attached. Maximum is sixteen drives per IFA. If 2319 IFA (#4650) is also present, IFA Conversion (#4645) is required.

Integrated Communications Adapter (#4640) (Optional): This feature provides attachment of up to eight teleprocessing lines to the

3135 Processing Unit (cont'd)

3135. These may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

Integrated Printer Adapter (Optional): This feature enables native attachment of a 1403 Printer mdl 2, 7 or N1. The Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

Input/Output Channels

Byte Multiplexer Channel: One is standard on the 3135 and is functionally equivalent to the byte multiplexer channel on S/360 mdl 22, 25, 30, 40, 50. Sixteen subchannels are provided as standard, with the option to extend to 64, 128 or 256. See "Special Features". From the number of subchannels chosen, one must be allocated to the Console Printer-Keyboard (see "Specify") and one to each ICA line installed. The byte multiplexer channel provides eight control unit positions and permits I/O units to operate normally in byte mode, giving the effect of several I/O operations simultaneous with computing. Burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the Integrated File Adapter, the Integrated Communications Adapter, or a Selector Channel. See *IBM S/370 Mdl 135 Channel Characteristics Manual,* GA33-3010 for further clarification. For OS exclusion, refer to *System Generation,* GC28-6554.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Additional, in "Special Features".

Selector Channels: Two are available as special features. Data rates are 1.3 megabytes per second. Direct access devices may be attached to selector channels and/or to the Integrated File Adapters. If either or both the 2319 IFA and the 3330/3340 IFA is present, the following applies:

- Direct access devices should be attached to the higher priority selector channel (normally the first).
- If the device on the higher priority selector channel is the 3330/3340 Disk Storage Series, the lower priority selector channel should be limited to devices with data rates not exceeding 144KB per second.
- The selector channel priorities for command chaining may be reversed by specifying Channel Priority (#1501).

If the 3330/3340 Series IFA or both IFAs are present without additional direct access devices attached via a selector channel, tape units on selector channels 2 and 3 are limited to an aggregate 950KB.

If an IFA is not present, two channels of 3330/3340/3350 Series DASD can be attached. For additional information and limitations, see *S/370 Mdl 135 Channel Characteristics,* GA33-3010.

Attention: If Block Multiplexer Channel(s) are installed, subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. Also see Block Multiplexer Shared Subchannels in "Special Features".

Console Function: A standard system control panel is located on the 3135. It has switches and lights necessary to operate and control the system. A system console I/O function is provided with either of two alternatives. Feature #7844 attaches the 3210 Console Printer-Keyboard mdl 1 (15.5 cps) on the console table reading board. Optionally, the 3215 Console Printer-Keyboard (85 cps) may be attached via feature #7855. A right reading board extension is standard on the 3135; a left extension is not available. Either feature #7844 or #7855 is required in the system. See "Special Features".

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below the floor; **#9081** for on the floor.
- Console Printer Keyboard Address: Recorded on console file disk at the plant **#9101**‡ for "01F" or **#9102**‡ for "009".
- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in a S/370 mdl 135.
- Console Printer-Keyboard: A 3210 mdl 1 or 3215 is required in every system. See M3210, 3215 pages and "Special Features" below.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3135 Frame 01 (CPU) are 31-1/2 inches wide x 70 inches long x 60 inches high. Removal of the side covers will reduce the width to 29-1/2 inches. If further reduction in length is required, specify **#9570**. Shipping dimensions will then be 29-1/2 inches wide x 60 inches long x 60 inches high.

Note: RETAIN/370 ... CE access is by telephone.

SPECIAL FEATURES

APL Assist (#1005): Provides performance assist to APL programs when used with VS APL PP (#5748-AP1). **Prerequisites:** #7861, #7862 and #3900. **Field Installation:** Yes.

Conditional Swapping (#1051): Provides two additional instructions: COMPARE and SWAP COMPARE DOUBLE and SWAP. This feature is a prerequisite for the execution of VTAM programming support and for TCAM/NCP. **Field Installation:** Yes.

Autocall (#1290): : Provides automatic calling capabilities on facilities C1, C2, C4 or C5 to initiate (dial), through stored program control, a data link to a remote station. For the appropriate calling units, see M2700 pages. **Specify:** Refer to Table 1C for Terminal Adapter Type I Mdl II or Table 1E for Synchronous Data Adapter Type II or Table 1-F for Telegraph Adapter Type II for appropriate feature code according to line positions desired. **Limitations:** Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. **Cable Order:** Required. **Maximum:** Four. **Prerequisites: 9721-#9728** or **9649-#9656 #9785-#9792** and **#9625-#9632**; and **9625-#9632 Field Installation:** Yes.

Block Multiplexer Channel (#1421): Increases the efficiency of the 3330/3340 Series IFA and selector channel(s) when using direct access storage devices equipped with rotational position sensing or other devices capable of disconnected command chaining. The disconnected command chaining feature of the channel allows multiple devices to perform non-data transfer operation concurrently with one data transfer operation. This permits increased utilization of the channel(s) by performing operations of other devices while the channel would normally have been waiting on one device. The feature provides 16 non-shared and one shared selector subchannel. The shared selector subchannel may attach a control unit having a maximum of 16 device addresses. Devices on a block multiplexer channel which cannot utilize the block multiplexer feature will function as if attached to a conventional selector channel. **Maximum:** One. Applies to both selector channels and to the 3330/3340 Series IFA. **Field Installation:** Yes. **Prerequisites:** #6981 or #4655.

Block Multiplexer Shared Subchannel (#1431): (Note: This feature should only be installed if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See *I/O Configuration Form,* GA22-7002.)

Allows any one of the following combinations of "Non-Shared", "Block Shared", or selector subchannels to be attached to the Block Multiplexer Channel (#1421): [1] 16 non-shared and one shared selector (see "Address Restrictions") ... [2] 8 non-shared, 8 block shared, and 1 shared selector (see "Address Restrictions") ... [3] 8 non-shared, 4 block shared, 1 shared selector (see "Address Restrictions"). If option [2] is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option [3] is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option [1] is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1421.

Address Restrictions with #1431:

a) Addresses X00 through X7F are assigned as block shared subchannels. With option [1], they may not be used. With option [2], each control unit address position, i.e., X00, X10, X20, etc., through X70 is available. With option [3], "even" control unit address positions only are available, i.e., 00, 20, 40 and 60.

b) Selector and non-shared addresses are limited to addresses X80 through XFF.

Channel Priority (#1501): When the IFA (#4650 or #4655) and both selector channels are present, this feature changes the higher priority for command chaining from the first selector channel (Channel 2) to the second selector channel (Channel 3). #1501 is required if any DASD devices are to be attached to Channel 3. **Field Installation:** Yes. **Prerequisites:** #4650 or #4655 and both #6981 and #6982.

Clock Comparator and CPU Timer (#2001): The Clock Comparator provides a means of causing an interruption when the time-of-day clock has passed a program-specified value. The CPU Timer is a binary counter which is decremented every microsecond but has a resolution of 16 microseconds. It provides a means for measuring elapsed CPU

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135 Processing Unit (cont'd)

time by causing an interruption when a prespecified amount of time has elapsed. **Maximum:** One. **Field Installation:** Yes.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 Direct Control Feature - OEMI,* GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Extended Precision Floating Point (#3840): Extends the precision of floating point instructions to 28 hexadecimal digits. **Field Installation:** Yes. **Prerequisites:** #3900.

Floating Point (#3900): Adds 44 floating point arithmetic instructions, which, with the Standard Set, make up the Scientific Instruction Set. **Field Installation:** Yes.

Multiplexer Subchannels, Add'l (#3905-#3907): To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: #3905 for 64 subchannels), #3906 for 128 subchannels, #3907 for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed, there are no shared subchannels. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. **Note:** The number of subchannels ordered must be equal to or greater than the device addresses. **Field Installation:** Yes.

1401/1440/1460 Compatibility (#4457): Microprogrammed controlled feature, which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. **Field Installation:** Yes.

Integrated Communications Adapter (#4640): Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the 3135. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer, multiplexer, or terminal conforming to the Binary Synchronous Communication (BSC) standard. **Note:** In addition to the appropriate adapter, each communication line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. **Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communication facilities and servicing requirements. **Communications Facilities:** See M2700 pages for communication facility requirements with this feature. **Field Installation:** Yes. See "Specify Requirements for Integrated Communication Adapter" under "Specify".

IFA Conversion (#4645): Permits co-residence of both 2319 IFA (#4650) and 3330/3340 Series IFA (#4655). Both IFAs are addressed as Channel 1. **Limitations:** Cannot be installed if 3333/3340 Intermix (**#9315**) or 3344 Attach (**#9317**) is specified. Cannot be installed with 2314/3340 Compatibility Feature (#8070). **Maximum:** One per 3135. **Prerequisites:** #4650 and #4655. **Field Installation:** Yes.

2319 Integrated File Adapter (#4650): Permits native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1, or 2318 mdl A1) up to a total of eight drives. Standard features include file scan and record overflow functions. The IFA is always addressed as channel 1. **Note:** 2312 mdl A1s, 2318 mdl A1s, and 2319 all mdls are no longer available. **Limitations:** Cannot be installed if 3333/3340 Intermix (**#9315**) is specified. Cannot be installed with 2314/3340 Compatibility (#8070). **Maximum:** One per 3135. **Prerequisites:** #4645 is required if installed with 3330 or 3340 Series IFA (#4655). **Field Installation:** Yes.

3330/3340 Series Integrated File Adapter (#4655): Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of sixteen 3330 or 3340 Series drives may be attached to the IFA. The IFA supports rotational position sensing, disconnected command chaining, and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344 standard addresses are (hex) 1C0 through 1E1. **Maximum:** One. **Prerequisites:** #4645 is required if installed with 2319 IFA (#4650). **Field Installation:** Yes. **Note:** 2319 all mdls no longer available.

Specify:

1. DASD Designation. Specify *ONE* of the following: **#9313**‡ (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdls 1, 2 in any combination. **#9314**‡ (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdls B1, B2 in any combination. **#9315**‡ (3333/3340 Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdls 1, 2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdls B1, B2 in any combination). **#9315** cannot be installed with IFA Conversion Feature (#4645).

2. If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify **#9316**‡ (3333/3330 mdl 11) in addition to **#9313** or **#9315**.

With **#9313** plus **#9316** a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached, or two 3333 mdl 11s, each with any mixture of up to three 3330 mdls 1, 2 and 11.

With **#9315** plus **#9316**, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdls B1, B2. The standard addresses with **#9315** for 3330 are (hex) 150 through 157, for 3340 (hex) 158 through 15F.

3. If any 3344 is to be attached, specify **#9317**‡ in addition to **#9314** (**#9317** and **#9315** are mutually exclusive). **#9190**‡ must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301, #4302) is ordered.

With **#9314, #9317** and **#9190** up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2 if present can attach up to three 3340 mdl B1/B2 units.

#9317 is mutally exclusive with IFA Conversion Feature (#4645) and with 2314/3340 Compatibility Feature (#8070).

4. When just **#9314** is specified, also specify 3340 Address Designation: **#9820**‡ for addresses (hex) 1C0 through 1CF, or **#9821**‡ for addresses (hex) 160 through 16F. The specification of 160 allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFAs.

5. When **#9314** or **#9315** is specified, also specify **#9190**‡ (Fixed Head Attachment) if Fixed Head Feature (#4301, #4302) is ordered for any 3340 attached to the IFA.

6. If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (**#9841**)‡.

7. When **#9821**‡ is specified in conjunction with **#9813** the addresses for the 3333/3330s are (HEX) 160 thru 16F.

8. When **#9821**‡ is specified and both **#9314** and **#9317** are specified the addresses for the 3340/3344s are as follows:

	3340 A2		---- 3344 B2/B2Fs ----					
String 0	160	161	162	163	164	165	166	167
			172	173	174	175	176	177
			1E2	1E3	1E4	1E5	1E6	1E7
			1F2	1F3	1F4	1F5	1F6	1F7
Physical Drive	0	1	2	3	4	5	6	7

	3340 A2		---- 3340 B2s ----					
String 1	168	169	16A	16B	16C	16D	16E	16F

Note 1: The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the feature numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

Note 2: Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

3135 3330/3340 IFA (#4655)

	DASD Control Combinations on IFA (#4655)	3333 Disk Storage Control	3333/3340 Intermix	3340 Direct Access Storage Facility
Section A	DASD Designation, one req'd	#9313‡	#9315‡	#9314‡

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135 Processing Unit (cont'd)

Section B	If any 3333 mdl 11 and/or 3330 mdl 11	**#9316**‡	**#9316**‡	—
	3344	—	—	**#9317**‡
	3344 model B2F	—	—	**#9317**‡ + **#9190**‡
	Fixed Head Feature (#4301/#4302) on 3340	—	**#9190**‡	**#9190**‡
	String Switch (#8150) on 3333/3340	**#9841**‡	**#9841**‡	**#9841**‡
	2314/3340 Compatibility Feature (see #8070)	—	—	** #8070
	3330/3340 Supports RPS Disconnected Command Chaining Multiple Requesting if Block MPX #1421 installed	#1421	#1421	#1421
	2319 IFA (#4650)	#4645	—	*** #4645

Section C Addresses	Standard	* Hex 150-15F	* 3330 Hex 150-157, 3340 Hex 158-15F	**#9820**‡ Not 3344 Hex 1C0-1CF	3344 Hex 1C0-1E1
	Address 160	**#9821**‡ Hex 160-16F	—	**#9821**‡ Not 3344 Hex 160-16F	See Item 8 above

* No feature number required.

** Mutually exclusive with String Switch (**#9841**, 2319 IFA (#4650), IFA Conversion feature (#4645), 3344 Attachment (**#9317**).

*** Mutually exclusive with 3344 Attachment (**#9317**) and 2314/3340 Compatibility (**#8070**).

Integrated Printer Adapter Basic Control (#4670): Provides the power supply and basic control for a natively attached 1403 Printer. The standard address is '00E'. **Specify: #9485**‡ if optional address of '00F' is desired. **Maximum:** One. **Field Installation:** Yes.

Note: If the optional addresses of '01F' for the Console Printer Keyboard (#3210 or #3215) and '00F' for the integrated 1403 are both used, Multiplexer Subchannels, Add'l (#3905) must be specified.

Integrated 1403 Printer Mdl 2/Mdl N1 Attachment (#4672): Provides control for attaching 1403 mdl 2 or mdl N1. Specify: **#9182**‡ to attach 1403 mdl 2, **#9188**‡ to attach 1403 mdl N1. **Maximum:** One. **Prerequisites:** #4670. On the 1403, **#9709** and **#9725** are required on a mdl 2; **#9726** is required on a mdl N1. See Specify under 1403. **Field Installation:** Yes.

Integrated 1403 Printer Mdl 7 Attachment (#4677): Provides control for attaching 1403 mdl 7. **Maximum:** One. **Prerequisites:** #4670. On the 1403, **#9725** is required on a mdl 7. See "Specify" under 1403. **Field Installation:** Yes.

Additional Lines (#4722-#4728): Each provides circuits and controls for attachment of an additional line adapter, for a total of eight lines in the system. **Specify:** Order additional lines according to line position required. See Table 1-A. Each line specified requires the next lower order line as a prerequisite. **Maximum:** One of each (#4722 through #4728). **Field Installation:** Yes. **Prerequisites:** #4640.

Specify Requirements For Integrated Communications Adapter:

For each line (#4722-#4728) attached to the ICA, including the first line included in #4640, one of the following line adapters must be specified: Terminal Adapter Type 1 Mdl II (**#9721-#9728**), Terminal Adapter Type III (**#9753-#9760**),

Telegraph Adapter Type II (**#9785-#9792**) or Synchronous Data Adapter Type II (**#9649-#9656**). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to Table 2 below prior to ordering features for the ICA.

Selector Channel (#6981, #6982): Each adds a high-speed channel to the system. The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. If an Integrated File Adapter (#4650 or #4655) is present, these channels are addressed as 2 and 3, respectively. Otherwise, they are addressed as 1 and 2. #6981 for first selector channel, #6982 for second. **Field Installation:** Yes. **Prerequisites:** #6982 requires #6981.

‡ **CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.**

S/360 Mdl 20 Compatibility (#7520): Microprogram-controlled feature, which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. **Field Installation:** Yes.

3210 Mdl 1 Adapter (#7844): To attach a 3210 Console Printer-Keyboard mdl 1 (15.5 cps) for systems console I/O; includes an alter-display ability. **Maximum:** One. **Limitations:** Cannot be installed with 3215 Adapter (#7855). **Field Installation:** Yes. **Prerequisites:** Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

3215 Adapter (#7855): To attach a 3215 Console Printer-Keyboard (85 cps) for system console I/O; includes alter-display ability. **Maximum:** One. **Limitations:** Cannot be installed with 3210 mdl 1 Adapter (#7844). **Field Installation:** Yes. **Prerequisites:** Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

12K Control Storage Increments (#7861, #7862): Each adds 12,288 bytes of control storage. Required for some feature combinations. See "Control Storage Requirements under "Highlights" for detail. #7861 for first 12K increment, #7862 for second. **Field Installation:** Yes. **Prerequisites:** #7862 requires #7861.

2314/3340 Compatibility (#8070): Permits the emulation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on mdl 135. **Maximum:** One. **Limitations:** Cannot be installed with IFA Conversion (#4645), 2319 IFA (#4650), 3330/3340 Intermix (**#9315**), 3344 Attach (**#9317**), or String Switch Attachment (**#9841**). **Field Installation:** Yes. **Prerequisites:** **#9314** on 3330/3340 Series IFA (#4655).

Universal Character Set Adapter (#8637): Permits the use of the Universal Character Set Feature on a 1403 Mdl 2 or Mdl N1 attached via the Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672). **Maximum:** One. **Prerequisites:** #4670, #4672. **Field Installation:** Yes.

Virtual Machine Assist (#8740): Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. **Field Installation:** Yes. **Prerequisites:** #2001 and #3900.

300 bps (#9593-#9600)‡: Allows the Terminal Adapter Type 1 Mdl II to operate at 300 bps. **Specify:** Refer to Table 1-C for Terminal Adapter Type I Mdl II for appropriate feature code according to the line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type 1 Mdl II. 3863 mdl 1, or 3872 mdl 1) which, although basically 2400 bps modems, offer a 1200 bps half-speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, the Modem Clocking Feature (**#9609-#9616**) is still required as a prerequisite on the ICA when such modems are attached to the Synchronous Data Adapter Type II and are switched for 1200 bps operation. **Specify:** Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for approprite feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type III or Synchronous Data Adapter Type II.

Half-Duplex Facility (#9617-#9624)‡: Required if the Synchronous Data Adapter Type II is attached to a two-wire facility. **Note:** This feature is not required with Switched Network (**#9625-#9632**) or Tributary Station (**#9665-#9672**). **Specify:** Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Synchronous Data Adapter Type II.

Switched Network Facility (#9625-#9632)‡: Allows the Terminal Adapter Type I mdl II or the Synchronous Data Adapter Type II to operate over C-type switched lines. **Specify:** Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type I mdl II, or Synchronous Data Adapter Type II.

Synchronous Data Adapter Type II (#9649-#9656)‡: Provides control of data transfers between the 3135 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired.

Speed Selection: Provides operation over C3, D2, and D3 facilities at 600 bps if 600 Bits Per Second feature is specified ... see above. Provides operation over C4 and D3 facilities at 1200 bps (no speed need be specified). Provides operation over C5M facility at 2000 bps if Modem Clocking is specified ... see above. Provides operation over C5, D4, or X1M at 2400 bps, over C6, D5, or X2M at 4800 bps, or over D6 at 7200 bps ... see above.

Field Installation: Yes. **Prerequisites:** #4640.

3135 Processing Unit (cont'd)

For special requirements: See Table 1-E and features below for additional specify requirements if Half-duplex Facility, Transparency, Tributary Station, Switched Network Facility, Autocall, EON, or New Sync are required. See Table 1-E and 600 Bits Per Second (#9601-#9608) if operation at 600 bps is required. See Table 1-E and Modem Clocking below if 2000 bps, 2400 bps, 4800 bps, or 7200 bps operation is required. The appropriate Data Code feature must be specified if other than EBCDIC is required as the primary data code. See "Data Code Features" below.

Limitations: For line speed limitations, refer to *Mdl 135 Channel Characteristics Manual*, GA33-3010.

Note on Data Code Features:

The primary data code for the SDA Type II is EBCDIC. As an option to EBCDIC, either ASCII or 6-bit Transcode (2780 Data Transmission Terminal only) may be specified as the primary code. In addition to the primary data code, an alternate data code, selected under program control, may be specified for the Synchronous Data Adapter Type II. EBCDIC, ASCII, or 6-bit Transcode may be selected as an alternate code. **Specify (for data code features):** Refer to Table 1-E for appropriate feature codes according to line position(s) desired. **Field Installation (of data code features):** Yes. **Prerequisites (for data code features):** Synchronous Data Adapter Type II.

Tributary Station (#9665-#9672)‡: Required when a Synchronous Data Adapter Type II is installed and functioning as a leased communication line, as a tributary station, and not functioning as a control station. **Specify:** Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Synchronous Data Adapter Type II.

Transparency (#9673-#9680)‡: Provides the Synchronous Data Adapter Type II with the ability to transmit and receive 8-bit binary data as well as EBCDIC or ASCII codes; or 6-bit binary data as well as 6-bit Transcode. This feature with ASCII modifies VRC/LRC checking to VRC/CRC checking. **Limitation:** ASCII code and Transparency cannot be installed together for the same line position when attached to the 2770, 2780, 3780, S/3 or S/7. On S/32, EBCDIC and EBCDIC Transparency are standard, and one is selected by programming. **Specify:** Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Synchronous Data Adapter Type II.

Terminal Adapter Type I Model II (#9721-#9728)‡: Controls data transfers between the 3135 and 1050/2740 mdl 1/2741/5010 mdl Axx over facility C1 or D1, and between the 3135 and 2740 mdl 2 or 5010 mdl Axx over facility D1 or D2. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Special Requirements:** See Table 1-C and features below for additional specify requirements if Switched Network Facility, Write Interrupt, Unit Exception Suppression, Read Interrupt, or Autocall are required. Normal operation is at 134.5 bps. 600 Bits Per Second feature must be specified for operation at 600 bps to 2740s or 5010 mdl Axx. **Field Installation:** Yes. **Prerequisites:** #4640.

Unit Exception Suppression (#9729-#9736)‡: If this feature is installed with Terminal Adapter Type 1 Mdl II, Unit Exception will not be set in response to a Circle C. Not supported under BTAM, QTAM or TCAM. **Specify:** Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type 1 Mdl II.

Read Interrupt (#9737-#9744)‡: Allows the Terminal Adapter Type I mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). Not supported under BTAM, QTAM or TCAM. **Specify:** Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type 1 Mdl II.

Write Interrupt (#9745-#9752)‡: Allows the Terminal Adapter Type 1 Mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). Not supported under BTAM, QTAM or TCAM. **Specify:** Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type I mdl II.

Terminal Adapter Type III (#9753-#9760)‡: Controls data transfers between the 3135 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps over facility D3. Permits operation at 2400 bps over facility D4 if Modem Clocking is specified. **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** #4640.

Multipoint (#9761-#9768)‡: Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If **#9761-#9768** is not ordered for a given Terminal Adapter Type III, point-to-point operation is presumed. **Specify:** Refer to Table 1-D for appropriate feature code according to line positions desired. **Prerequisites:** Terminal Adapter Type III. **Field Installation:** Yes.

Telegraph Adapter Type II (#9785-#9792)‡: Controls data transfers between ICA and Mdl 33/35 TTY terminals (8 level code at 110 bps only) with facility C2. **Specify:** Refer to Table 1-B for appropriate feature code according to line positions desired. **Field Installation:** Yes. **Prerequisites:** #4640 and **#9625-#9632**.

EON (#9801-#9807)‡ : Automatically generates an EON digit at the end of the dial sequence. **Specify:** Refer to Table 1E for appropriate feature code according to line position desired. Specify for 3872 and 3874 with EON option. **Field Installation:** Yes. **Prerequisites:** #1290, **#9649-#9656**.

New Sync (#9808-#9815)‡: Allows Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync feature minimizes modem turn-around and allows faster bit synchronization of the following data. **Specify:** Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites: #9609-#9616** and a modem offering New Sync. **Note:** New Sync is not required if **#9617-#9624**, **#9665-#9672**, or **#9625-#9632** is installed for the line position in question.

Modems:

Up to eight modems can be attached to a 3135, any mdl. **Prerequisites:** Integrated Communications Adapter (#4640) and Synchronous Communications Adapter Type II (**#9649-#9656**) 2400 bps to 7200 bps, Terminal Adapter Type 1 Mdl II (**#9721-#9728**) 134.5 bps to 600 bps, or Terminal Adapter Type III (**#9753-#9760**) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)
3863	2400
3864	4800
3872	2400
3874	4800
3875	7200

Note: For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3872, 3874, 3875.

MES Orders

For an MES order containing multiple features, the sequence of installation of individual features is determined at the plant of manufacture. No change to MES content or sequence can be made at installation time. If changes are required, the original MES must be cancelled and a new one originated.

Communication Information Tables

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

TABLE 1-A ADDITIONAL LINE APPEARANCES

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Additional Lines	4640	4722	4723	4724	4725	4726	4727	4728

Specify additional lines according to line positions.

TABLE 1-B TERMINAL ADAPTERS

		Line Position							
FEATURE		1	2	3	4	5	6	7	8
Terminal Adapter Type 1 mdl II‡	9721	9722	9723	9724	9725	9726	9727	9728	
Terminal Adapter Type III‡	9753	9754	9755	9756	9757	9758	9759	9760	
Synchronous Data Adapter Type II‡	9649	9650	9651	9652	9653	9654	9655	9656	
Telegraph Adapter Type II‡	9785	9786	9877	9788	9789	9790	9791	9792	

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135 Processing Unit (cont'd)

TABLE 1-C OPTIONS FOR TERMINAL ADAPTER TYPE 1 MODEL II

FEATURE	Line Position 1	2	3	4	5	6	7	8
300 bps‡	9593	9594	9595	9596	9597	9598	9599	9600
600 bps‡	9601	9602	9603	9604	9605	9606	9607	9608
Switched Network Facility‡	9625	9626	9627	9628	9629	9630	9631	9632
Read Interrupt‡	9737	9738	9739	9740	9741	9742	9743	9744
Wire Interrupt‡	9745	9746	9747	9748	9749	9750	9751	9752
Unit Exception Suppression‡	9729	9730	9731	9732	9733	9734	9735	9736
Autocall	9777	9778	9779	9780	9781	9782	9783	

TABLE 1-D OPTIONS FOR TERMINAL ADAPTER TYPE III

FEATURE	Line Position 1	2	3	4	5	6	7	8
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired.

TABLE 1-E OPTIONS FOR SYNCHRONOUS DATA ADAPTER TYPE II

FEATURE	Line Position 1	2	3	4	5	6	7	8
600 BPS‡	9601	9602	9603	9604	9605	9606	9607	9608
Transparency‡	9673	9674	9675	9676	9677	9678	9679	9680
Switched Network Facility‡	9625	9626	9627	9628	9629	9630	9631	9632
Half Duplex Facility‡	9617	9618	9619	9620	9621	9622	9623	9624
Tributary Station‡	9665	9666	9667	9668	9669	9670	9671	9672
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616
New Sync‡	9808	9809	9810	9811	9812	9813	9814	9815
Autocall	9777	9778	9779	9780	9781	9782	9783	
EON‡	9801	9802	9803	9804	9805	9806	9807	

Select features required for each line position for which Synchronous Data Adapter Type II is specified.

TABLE 1-F OPTION FOR TELEGRAPH ADAPTER TYPE II

FEATURE	Line Position 1	2	3	4	5	6	7	8
Autocall	9777	9778	9779	9780	9781	9782	9783	
Telegraph Adapter Type II	9785	9786	9787	9788	9789	9790	9791	9792
Switched Ntwk Facility‡	9625	9626	9627	9628	9629	9630	9631	9632

OPTIONAL PRIMARY DATA CODES

FEATURE	Line Position 1	2	3	4	5	6	7	8
ASCII	9681	9682	9683	9684	9685	9686	9687	9686
6-Bit Transcode *	9689	9690	9691	9692	9693	9694	9695	9696

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal.

OPTIONAL ALTERNATE DATA CODES

FEATURE	Line Position 1	2	3	4	5	6	7	8
EBCDIC	9697	9698	9699	9700	9701	9702	9703	9704
ASCII	9705	9706	9707	9708	9709	9710	9711	9712
6-Bit Transcode *	9713	9714	9715	9716	9717	9718	9719	9720

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135 Processing Unit (cont'd)

TABLE 2 -- Part 1 **FEATURES REQUIRED FOR START/STOP TERMINALS**

Terminal	IBM Modem	Line Speed (bps)	Communication Line and Modem Facilities	Features Required
1050 Data Communication System		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2260 Display Station mdl 1	Connects via 2848 Display Control mdl 3 - see this table			
2260 Display Station mdl 2	Connects via 2848 Display Control mdl 1 or 2 - see this table			
2265 Display Station mdl 1	Connects via the 2845 Display Control mdl 1 - see this table			
2740 Communication Terminal mdl 1		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2740 Communication Terminal mdl 2		134.5	D1	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second
2741 Communication Terminal mdl 1 (without interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2741 Communication Terminal mdl I (with Receive Interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Unit-Exception Suppression (if required)
2741 Communication Terminal mdl 1 (with Transmit Interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt Unit-Exception Suppression (if required)
2741 Communication Terminal mdl I (with Receive Interrupt and Transmit Interrupt features)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
2760 Optical Image Unit mdl I	Connects via 2740 Communication Terminal mdl I - see this table			
2845 Display Control mdl I (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl I	2400	D4	Terminal Adapter Type III, Modem Clocking multipoint for multipoint operation, New Sync (if required)
2848 Display Control mdls 1, 2 and 3 (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl 1	2400	D4	Terminal Adapter Type III, Modem Clocking multipoint for multipoint operation, New Sync (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			D1	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Transmit Interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7111 - 2740 Line Control		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			D1	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 or 3 with #7112 - 2740-2 Line Control		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
System/7		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
5100/5110 Computer		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
TTY 33/35		110	C2	Telegraph Adapter Type II

3135 Processing Unit (cont'd)

TABLE 2 -- Part 2 **FEATURES REQUIRED FOR BINARY SYNCHRONOUS TERMINALS**

Line Speed (bps)	IBM Modem	Manner of Line Operation	Communication Line and Modem Facilities	Features Required
600		Point-to-Point	D3 (two-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Half Duplex Facility, Data Code features
			D2 (four-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Data Code features
			C3	Synchronous Data Adapter Type II, 600 Bits Per Second, Switched Network facility, Data Code features
		Multipoint -- 3135 as Control Station	D2 (four-wire)	Synchronous Adapter Type II, 600 Bits Per Second, Data Code features
		Multipoint -- 3135 as Tributary Station	D2 (four-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Tributary Station, Data Code features
1200		Point-to-Point	D3 (two-wire)	Synchronous Data Adapter Type II, Half Duplex Facility, Data Code features
			D3 (four-wire)	Synchronous Data Adapter Type II, Data Code features
			C4	Synchronous Data Adapter Type II, Switched Network Facility, Data Code features
		Multipoint -- 3135 as Control station	D3 (four-wire)	Synchronous Data Adapter Type II, Data Code features
		Multipoint -- 3135 as Tributary Station	D3 (four-wire)	Synchronous Data Adapter Type II, Tributary Station, Data Code features
2400	3863	Point-to-Point	D4	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
2400	3863	Multipoint -- 3135 as Control Station	D4	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
2400	3863	Multipoint -- 3135 as Tributary Station	D4	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
2400	3872 mdl 1	Point-to-Point	C5	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
2400	3872 mdl 1	Point-to-Point	D4 (two-wire)	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Data Code features
			D4 (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Control Station	D4 (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
		Multipoint -- 3135 as Tributary Station	D4 (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
		Point-to-Point, Multipoint	X1M	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
4800	3864	Point-to-point	D5	Synchronous Data Adapter Type II, Modem Clocking, Switched Network Facility, Data Code features
4800	3864	Multipoint -- 3135 as Control Station	D5	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
4800	3864	Multipoint -- 3135 as Tributary Station	D5	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
4800	3874 mdl 1	Point-to-Point	C6	Synchronous Data Adapter Type II, Modem Clocking, Switched Network Facility, Data Code features
		Point-to-Point	D5	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Control Station	D5	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync
		Multipoint -- 3135 as Tributary Station	D5	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
		Point-to-Point, Multipoint	X2M	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
7200	3875 mdl 1	Point-to-Point	D6 (with C2 Conditioning)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Control Station	D6 (with C2 conditioning)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Tributary Station	D6 (with C2 conditioning)	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

MODEL CONVERSIONS

From	To	GD	GF	DH	H	HF	HG	I
FE		X	X	X	X	X	X	X
GD			X	X	X	X	X	X
GF				X	X	X	X	X
DH					X	X	X	X
H						X	X	X
HF							X	X
HG								X

Field Installable.

ACCESSORIES (None)

SUPPLIES (None)

3135-3 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3135-3 Is No Longer Available ... features and model changes can be ordered on an 'as available' basis.

PURPOSE

Provides a performance improvement for S/370 model 135 models H, HF, HG and I only.

MODELS

Model A1*	A01	262,144 bytes of processor storage
Model A2*	A02	327,680 bytes of processor storage
Model A3*	A03	393,216 bytes of processor storage
Model A4*	A04	524,288 bytes of processor storage

Note: The 3135-3 is available as a non-removable, field installable upgrade to a S/370 model 135 model H, HF, HG and I only.

* A complete review by IBMis required before ordering.

Prerequisites: The following prerequisites apply to each 3135-3 processor mdl.

(1) 3046 Power Unit ... see M3046 pages.
(2) Extended Precision Floating Point Feature (#3840).

HIGHLIGHTS

Depending on the mdl, up to 524,288 bytes of processor storage are available. CPU cycle time varies from 275 to 1485 nanoseconds, depending on the internal operation being performed. Sixteen general-purpose and four floating point registers are provided.

Standard Features Include: APL Assist ... Audible Alarm ... Byte Oriented Operand ... 1 Byte Multiplexer Channel ... 64 Byte Multiplexer Subchannels ... Channel Command Retry ... Channel Indirect Addressing ... Clock Comparator and CPU Timer ... Conditional Swapping ... Console File ... Control Registers ... Dynamic Address Translation ... Error Checking and Correction (on Main and Control Storage ... Extended Control Mode ... Extended Control-Program Support ... Instruction Retry ... Interval Timer ... Machine Check Handling ... OS/DOS Compatibility ... Program Event Recording ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set (Floating Point included) ... Time of Day Clock ... PSW Key Handling.

Control Storage: 131,072 bytes of Reloadable Control Storage are provided for each mdl in additon to the applicable main storage. This feature permits emulator and control routines to function. Reloadable Control Storage is housed in the CPU and is loaded from the Console file. Reloadable Control Storage is not addressable by the user.

Virtual Storage: Virtual Storage capability is provided to increase the effective utililization of main storage.

Console File (standard): This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be provided with the system will supply all of the required microcode for CE diagnostics, basic system features, plus the optional features ordered for the system.

Console Function: Operator communications with the system is via a system control panel located on the 3135-3 and a 3210 mdl 1 or 3215 Console Printer-Keyboard as on other mdls of the S/370 mdl 135. A right reading board extension is standard ... a left extension is not available.

Input/Output Channels:

Byte Multiplexer Channel: One is standard on the 3135 and is functionally equivalent to the byte multiplexer channel on S/370 mdl 135. Provides eight control unit positions in byte mode, permits simultaneous operation of many low-speed devices. Burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the integrated File Adapter, the Integrated Communications Adapter, or the Block Multiplexer Channel -- see *IBM S/370 Channel Characteristics Manual*, GA33-3010 for further clarification. For OS exclusion, refer to GC28-6554, *System Generation.*

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Additional, in "Special Features".

Block Multiplexer Channels: Two are available as special features. Data rates are 1.3 megabytes per second. Permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" provides greater channel efficiency. Devices on these channels which cannot utilize block multiplexing will function as if attached to selector channels. If the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2.

Subchannels: On the byte multiplexer channel, 64 subchannels are provided as standard with the option of 128 or 256 (see "Special Features"). On each of the two available block multiplexer channels, 16 non-shared subchannels and 1 shared subchannel are provided as standard with the option of 8 non-shared and 9 shared or 8 non-shared and 5 shared (see "Special Features"). On a block multiplexer channel, a single shared subchannel may attach a control unit having a maximum of 16 device addresses.

Attention: If Block Multiplexer Channel(s) are installed, subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. Also see Block Multiplexer Shared Subchannels in "Special Features".

Input/Output Attachments:

Non-native: A wide variety of I/O devices may be attached to these models of the S/370 mdl 135 via the standard byte multiplexer channel, and/or the optional block multiplexer channel(s). In particular, any device which is attachable to a 3135 is attachable to a 3135-3.

Native: The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices.

Console Printer-Keyboard: [required] This unit serves as the online I/O device for operator/system communications. It provides a means of manually entering data into the system, altering or displaying data already in storage, and for printing error logout messages.

2319 Integrated File Adapter (#4650): [optional] This feature enables native attachment of a 2319 Disk Storage mdl A1** (and a 2319 mdl A3**, 2312 mdl A1s** or 2318 mdl A1**) up to a total of eight drives. The IFA is addressed as channel 1. **Limitation** Cannot be installed if 3333/3340 Intermix (**#9315**) is specified when 3330/3340 Series IFA (#4655) is also ordered.

** No longer available.

3330/3340 Series Integrated File Adapter (#4655): [optional] This feature allows the native attachment of one or two 3333 modules or 3340 mdl A2 units. Each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11). Each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives. Maximum is sixteen drives per IFA. If 2319 IFA (#4650) is also present, IFA Conversion (#4645) is required.

Integrated Communications Adapter (#4640): [optional] This feature provides attachment of up to eight teleprocessing lines to the 3135-3. These may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

Integrated Printer Adapter: [optional] This feature enables native attachment of a 1403 Printer mdl 2, 7 or N1. The Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

Programming Features:

APL Assist: [standard] This feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL (5748-AP1).

Conditional Swapping: [standard] Provides two additional instructions ... Compare and Swap ... Compare Double and Swap

PSW Key Handling: [standard] Provides two additional instructions ... Insert PSW Key ... Det PSW Key from Address.

Extended Control Program Support: [standard] The 3135-3 processor mdls of the S/370 mdl 135 include Extended Control Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

Virtual Machine I/O
Storage Management
Page Management
SVC Handler
Priviledged Instruction Interfaces
Dispatching
Virtual Interval Timer

For VS1 the functional areas are:

Storage Management
IOS
SVC FLIH
System Trace
Page Management

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.

3135-3 Processing Unit (cont'd)

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below the floor; **#9081** for on the floor.
- Console Printer Keyboard Address: Recorded on console file disk at the plant **#9101**‡ for "01F" or **#9102**‡ for "009".
- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in a S/370 mdl 135.
- Console Printer-Keyboard: A 3210 mdl 1 or 3215 is required in every system. See M3210, 3215 pages "Special Features" below.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3135 Frame 01 (CPU) are 31-1/2 inches wide x 70 inches long x 60 inches high. Removal of the side covers will reduce the width to 29-1/2 inches. If further reduction in length is required, specify **#9570**. Shipping dimensions will then be 29-1/2 inches wide x 60 inches long x 60 inches high.
- RETAIN/370: CE access is by telephone.

SPECIAL FEATURES

AUTOCALL (#1290): : Provides automatic calling capabilities on facilities C1, C2, C4 or C5 to initiate (dial), through stored program control, a data link to a remote station. For the appropriate calling units, see M2700 pages. **Specify:** Refer to Table 1C for Terminal Adapter Type I Mdl II or Table 1E for Synchronous Data Adapter Type II or Table 1-F for Telegraph Adapter Type II for appropriate feature code according to line positions desired. **Limitations:** Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. **Cable Order:** Required. **Maximum:** Four. **Prerequisites: #9721-#9728** or **#9649-#9656 #9785-#9792** and **#9625-#9632**; and **#9625-#9632**. **Field Installation:** Yes.

Block Multiplexer Channel (#1425, #1426): Each adds a block multiplexer channel with 16 non-shared subchannels and 1 shared selector subchannel to the system. #1425 first ... #1426 second. If the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2. **Field Installation:** Yes. **Prerequisites:** #1426 requires #1425.

Block Multiplexer Shared Subchannel (#1431): (Note: This feature should only be installed if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See *I/O Configuration Form,* GA22-7002.)

Allows any one of the following combinations of "Non-Shared", "Block Shared", or selector subchannels to be attached to the Block Multiplexer Channel (#1421): [1] 16 non-shared and one shared selector (see "Address Restrictions") ... [2] 8 non-shared, 8 block shared, and 1 shared selector (see "Address Restrictions") ... [3] 8 non-shared, 4 block shared, 1 shared selector (see "Address Restrictions"). If option [2] is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option [3] is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option [1] is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1421.

Address Restrictions with #1431:

a) Addresses X00 through X7F are assigned as block shared subchannels. With option [1], they may not be used. With option [2], each control unit address position, i.e., X00, X10, X20, etc., through X70 is available. With option [3], "even" control unit address positions only are available, i.e., 00, 20, 40 and 60.

b) Selector and non-shared addresses are limited to addresses X80 through XFF.

Channel Priority (#1501): When the IFA (#4650 or #4655) and both selector channels are present, this feature changes the higher priority for command chaining from the first selector channel (Channel 2) to the second selector channel (Channel 3). #1501 is required if any DASD devices are to be attached to Channel 3. **Field Installation:** Yes. **Prerequisites:** #4650 or #4655 and both #1425 and #1426.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 Direct Control Feature-OEMI,* GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Extended Precision Floating Point (#3840): Extends the precision of floating point instructions to 28 hexadecimal digits. **Field Installation:** Yes. **Prerequisites:** #3900.

Multiplexer Subchannels, Add'l (#3906-#3907): To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: #3906 for 128 subchannels, #3907 for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed, there are no shared subchannels. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. **Note:** The number of subchannels ordered must be equal to or greater than the device addresses. **Field Installation:** Yes.

1401/1440/1460 Compatibility (#4457): Microprogrammed controlled feature, which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. **Field Installation:** Yes.

Integrated Communications Adapter (#4640): Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the 3135. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer, multiplexer, or terminal conforming to the Binary Synchronous Communications (BSC) standard. **Note:** In addition to the appropriate adapter, each communication line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. **Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communication facilities and servicing requirements. **Communications Facilities:** See M2700 pages for communication facility requirements with this feature. **Field Installation:** Yes.

See "Specify Requirements for Integrated Communication Adapter" under "Specify".

IFA Conversion (#4645): Permits co-residence of both 2319 IFA (#4650) and 3330/3340 Series IFA (#4655). Both IFAs are addressed as Channel 1. **Limitations:** Cannot be installed if 3333/3340 Intermix (**#9315**) or 3344 Attach (**#9317**) is specified. Cannot be installed with 2314/3340 Compatibility Feature (#8070). **Maximum:** One per 3135. **Prerequisites:** #4650 and #4655. **Field Installation:** Yes.

2319 Integrated File Adapter (#4650): Permits native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1, or 2318 mdl A1) up to a total of eight drives. Standard features include file scan and record overflow functions. The IFA is always addressed as channel 1. **Note:** 2312 mdl A1s, 2318 mdl A1s and 2319 all mdls are no longer available. **Limitations:** Cannot be installed if 3333/3340 Intermix (**#9315**) is specified. Cannot be installed with 2314/3340 Compatibility (#8070). **Maximum:** One per 3135. **Prerequisites:** #4645 is required if installed with 3330 or 3340 Series IFA (#4655). **Field Installation:** Yes.

3330/3340 Series Integrated File Adapter (#4655): Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of sixteen 3330 or 3340 Series drives may be attached to the IFA. The IFA supports rotational position sensing, disconnected command chaining, and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344 standard addresses are (hex) 1C0 through 1E1. **Maximum:** One. **Prerequisites:** #4645 is required if installed with 2319 IFA (#4650) **Field Installation:** Yes. **Note:** 2319 all mdls are no longer available.

SPECIFY

1. DASD Designation. Specify *ONE* of the following: **#9313**‡ (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdls 1, 2 in any combination. **#9314**‡ (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdls B1, B2 in any combination. **#9315**‡ (3333/3340 Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdls 1, 2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdls B1, B2 in any combination). **#9315** cannot be installed with IFA Conversion Feature (#4645).

2. If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify **#9316**‡ (3333/3330 mdl 11) in addition to **#9313** or **#9315**.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135-3 Processing Unit (cont'd)

With **#9313** plus **#9316** a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached, or two 3333 mdl 11s, each with any mixture of up to three 3330 mdls 1, 2 and 11.

With **#9315** plus **#9316**, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdls B1, B2. The standard addresses with **#9315** for 3330 are (hex) 150 through 157, for 3340 are (hex) 158 through 15F.

3. If any 3344 is to be attached, specify **#9317**‡ in addition to **#9314** (**#9317** and **#9315** are mutually exclusive). **#9190**‡ must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301, #4302) is ordered.

With **#9314**, **#9317** and **#9190** up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2 if present can attach up to three 3340 mdl B1/B2 units.

#9317 is mutally exclusive with IFA Conversion Feature (#4645) and with 2314/3340 Compatibility Feature (#8070).

4. When just **#9314** is specified, also specify 3340 Address Designation: **#9820**‡ for addresses (hex) 1C0 through 1CF, or **#9821**‡ for addresses (hex) 160 through 16F. The specification of 160 allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFAs.

5. When **#9314** or **#9315** is specified, also specify **#9190**‡ (Fixed Head Attachment) if Fixed Head Feature (#4301, #4302) is ordered for any 3340 attached to the IFA.

6. If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (**#9841**)‡.

7. When **#9821**‡ is specified in conjunction with **#9813** the addresses for the 3333/3330s are (HEX) 160 through 16F.

8. When **#9821**‡ is specified and both **#9314** and **#9317** are specified the addresses for the 3340/3344s are as follows:

	3340 A2		----3344 B2/B2Fs----					
String 0	160	161	162	163	164	165	166	167
			172	173	174	175	176	177
			1E2	1E3	1E4	1E5	1E6	1E7
			1F2	1F3	1F4	1F5	1F6	1F7
Physical Drive	0	1	2	3	4	5	6	7
	3340 A2		----3340 B2s----					
String 1	168	169	16A	16B	16C	16D	16E	16F

Note 1: The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the feature numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

Note 2: Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3135 3330/3340 IFA (#4655)

	DASD Control Combinations on IFA (#4655)	3333 Disk Storage Control	3333/ 3340 Intermix	3340 Direct Access Storage Facility	
Section A	DASD Designation, one req'd	**#9313**‡	**#9315**‡	**#9314**‡	
Section B	If any 3333 mdl 11 and/or 3330 mdl 11	**#9316**‡	**#9316**‡	—	
	3344	—	—	**#9317**‡	
	3344 mdl B2F	—	—	**#9317**‡ + **#9190**‡	
	Fixed Head Feature (#4301/#4302) on 3340	—	**#9190**‡	**#9190**‡	
	String Switch (#8150) on 3333/3340	**#9841**‡	**#9841**‡	**#9841**‡	
	2314/3340 Compatibility Feature (see #8070)	—	—	** #8070	
	3330/3340 Supports RPS Disconnected Command Chaining Multiple Requesting if Block MPX #1421 installed	#1421	#1421	#1421	
	2319 IFA (#4650)	#4645	—	*** #4645	
Section C Addresses	Standard	* Hex 150-15F	* 3330 Hex 150-157, 3340 Hex 158-15F	**#9820**‡ Not 3344 Hex 1C0-1CF	3344 Hex 1C0-1E1
	Address 160	**#9821**‡ Hex 160-16F	—	**#9821**‡ Not 3344 Hex 160-16F	See Item 8 above

* No feature number required.
** Mutually exclusive with String Switch **#9841**, 2319 IFA (#4650), IFA Conversion feature (#4645), 3344 Attachment (**#9317**).
*** Mutually exclusive with 3344 Attachment (**#9317**) and 2314/3340 Compatibility (#8070).

Integrated Printer Adapter Basic Control (#4670): Provides the power supply and basic control for a natively attached 1403 Printer. The standard address is '00E'. **Specify**: **#9485**‡ if optional address of '00F' is desired. **Maximum**: One. **Field Installation**: Yes.

Note: If the optional addresses of '01F' for the Console Printer Keyboard (#3210 or #3215) and '00F' for the integrated 1403 are both used, Multiplexer Subchannels, Add'l (#3905) must be specified.

Integrated 1403 Printer Mdl 2/Mdl N1 Attachment (#4672): Provides control for attaching 1403 mdl 2 or mdl N1. Specify: **#9182**‡ to attach 1403 mdl 2, **#9188**‡ to attach 1403 mdl N1. **Maximum**: One. **Prerequisites**: #4670. On the 1403, **#9709** and **#9725** is required on a mdl 2; **#9726** is required on a mdl N1. See "Specify" under 1403. **Field Installation**: Yes.

Iintegrated 1403 Printer Mdl 7 Attachment (#4677): Provides control for attaching 1403 mdl 7. **Maximum**: One. **Prerequisites**: #4670. On the 1403, **#9725** is required on a mdl 7. See "Specify" under 1403. **Field Installation**: Yes.

Additional Lines (#4722-#4728): Each provides circuits and controls for attachment of an additional line adapter, for a total of eight lines in the system. **Specify**: Order additional lines according to line position required. See Table 1-A. Each line specified requires the next lower order line as a prerequisite. **Maximum**: One of each (#4722 through #4728). **Field Installation**: Yes. **Prerequisites**: #4640.

Specify Requirements For Integrated Communications Adapter:

For each line (#4722-#4728) attached to the ICA, including the first line included in #4640, one of the following line adapters must be specified: Terminal Adapter Type I Mdl II (#9721-#9728), Terminal Adapter Type III (#9753-#9760),

Telegraph Adapter Type II (#9785-#9792) or Synchronous Data Adapter Type II (#9649-#9656). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to Table 2 below prior to ordering features for the ICA.

S/360 Mdl 20 Compatibility (#7520): Microprogram-controlled feature, which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. **Field Installation**: Yes.

3135-3 Processing Unit (cont'd)

3210 Mdl 1 Adapter (#7844): To attach a 3210 Console Printer-Keyboard mdl 1 (15.5 cps) for systems console I/O; includes an alter-display ability. **Maximum**: One. **Limitations**: Cannot be installed with 3215 Adapter (#7855). **Field Installation**: Yes. **Prerequisites**: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

3215 Adapter (#7855): To attach a 3215 Console Printer-Keyboard (85 cps) for system console I/O; includes alter-display ability. **Maximum**: One. **Limitations**: Cannot be installed with 3210 mdl 1 Adapter (#7844). **Field Installation**: Yes. **Prerequisites**: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

2314/3340 Compatibility (#8070): Permits the emulation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on mdl 135. **Maximum**: One. **Limitations**: Cannot be installed with IFA Conversion (#4645), 2319 IFA (#4650), 3330/3340 Intermix (**#9315**), 3344 Attach (**#9317**), or String Switch Attachment (**#9841**). **Field Installation**: Yes. **Prerequisites**: **#9314** on 3330/3340 Series IFA (#4655).

Univesal Character Set Adapter (#8637): Permits the use of the Universal Character Set Feature on a 1403 Mdl 2 or Mdl N1 attached via the Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672). **Maximum**: One. **Prerequisites**: #4670, #4672. **Field Installation**: Yes.

300 Bits Per Second (#9593-#9600)‡: Allows the Terminal Adapter Type I Mdl II to operate at 300 bps. **Specify**: Refer to Table 1-C for Terminal Adapter Type I Mdl II for appropriate feature code according to the line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I Mdl II.

600 Bits Per Second (#9601-#9608)‡: Allows the Terminal Adapter Type I mdl II or the Synchronous Adapter Type II to operate at 600 bps. **Specify**: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I Mdl II, or Synchronous Data Adapter Type II.

Modem Clocking (#9609-#9616): Allows a Terminal Adapter Type III to operate at 2400 bps or a Synchronous Data Adapter Type II to operate at 2000 bps, 2400 bps, 4800 bps or 7200 bps. Requires the appropriate clocking to be in the attached modem. It should be pointed out, however, that there are certain modems (for example, the 3863 mdl 1, or 3872 mdl 1) which, although basically 2400 bps modems, offer a 1200 bps half-speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, the Modem Clocking Feature (#9609-#9616) is still required as a prerequisite on the ICA when such modems are attached to the Synchronous Data Adapter Type II and are switched for 1200 bps operation. **Specify**: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type III or Synchronous Data Adapter Type II.

Half-Duplex Facility (#9617-#9624)‡: Required if the Synchronous Data Adapter Type II is attached to a two-wire facility. **Note**: This feature is not required with Switched Network (#9625-#9632) or Tributary Station (#9665-#9672). **Specify**: Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Synchronous Data Adapter Type II.

Switched Network Facility (#9625-#9632)‡: Allows the Terminal Adapter Type I mdl II or the Synchronous Data Adapter Type II to operate over C-type switched lines. **Specify**: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I mdl II, or Synchronous Data Adapter Type II.

Synchronous Data Adapter Type II (#9649-#9656)‡: Provides control of data transfers between the 3135 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. **Specify**: Refer to Table 1-B for appropriate feature code according to line position(s) desired.

> **Speed Selection**: Provides operation over C3, D2, and D3 facilities at 600 bps if 600 Bits Per Second feature is specified ... see above. Provides operation over C4 and D3 facilities at 1200 bps (no speed need be specified). Provides operation over C5M facility at 2000 bps if Modem Clocking is specified ... see above. Provides operation over C5, D4 or X1M at 2400 bps, over C6, D5 or X2M at 4800 bps, or over D6 at 7200 bps ... see above.

Field Installation: Yes. **Prerequisites**: #4640.

For special requirements: See Table 1-E and features below for additional specify requirements if Half-duplex Facility, Transparency, Tributary Station, Switched Network Facility, Autocall, EON, or New Sync are required. See Table 1-E and 600 Bits Per Second (#9601-#9608) if operation at 600 bps is required. See Table 1-E and Modem Clocking below if 2000 bps, 2400 bps, 4800 bps or 7200 bps operation is required. The appropriate Data Code feature must be specified if other than EBCDIC is required as the primary data code. See "Data Code Features" below.

Limitations: For line speed limitations, refer to *Mdl 135 Channel Characteristics Manual,* GA33-3010.

> **Note on Data Code Features:**
>
> The primary data code for the SDA Type II is EBCDIC. As an option to EBCDIC, either ASCII or 6-bit Transcode (2780 Data Transmission Terminal only) may be specified as the primary code. In addition to the primary data code, an alternate data code, selected under program control, may be specified for the Synchronous Data Adapter Type II. EBCDIC, ASCII, or 6-bit Transcode may be selected as an alternate code. **Specify (for data code features)**: Refer to Table 1-E for appropriate feature codes according to line position(s) desired. **Field Installation (of data code features)**: Yes. **Prerequisites (for data code features)**: Synchronous Data Adapter Type II.

Tributary Station (#9665-#9672)‡: Required when a Synchronous Data Adapter Type II is installed and functioning as a leased communication line, as a tributary station, and not functioning as a control station. **Specify**: Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Synchronous Data Adapter Type II.

Transparency (#9673-#9680)‡: Provides the Synchronous Data Adapter Type II with the ability to transmit and receive 8-bit binary data as well as EBCDIC or ASCII codes; or 6-bit binary data as well as 6-bit Transcode. This feature with ASCII modifies VRC/LRC checking to VRC/CRC checking. **Limitation**: ASCII code and Transparency cannot be installed together for the same line position when attached to the 2770, 2780, 3780, S/3 or S/7. On S/32, EBCDIC and EBCDIC Transparency are standard, and one is selected by programming. **Specify**: Refer to Table 1-E for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Synchronous Data Adapter Type II.

Terminal Adapter Type I Mdl II (#9721-#9728)‡: Controls data transfers between the 3135 and 1050/2740 mdl 1/2741/5010 mdl AXX over facility C1 or D1, and between the 3135 and 2740 mdl 2 or 5010 mdl AXX over facility D1 or D2. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). **Specify**: Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Special Requirements**: See Table 1-C and features below for additional specify requirements if Switched Network Facility, Write Interrupt, Unit Exception Suppression, Read Interrupt, or Autocall are required. Normal operation is at 134.5 bps. 600 Bits Per Second feature must be specified for operation at 600 bps to 2740s or 5010 mdl AXX. **Field Installation**: Yes. **Prerequisites**: #4640.

Unit Exception Suppression (#9729-#9736)‡: If this feature is installed with Terminal Adapter Type I Mdl II, Unit Exception will not be set in response to a Circle C. Not supported under BTAM, QTAM or TCAM. **Specify**: Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I Mdl II.

Read Interrupt (#9737-#9744)‡: Allows the Terminal Adapter Type I mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). Not supported under BTAM, QTAM or TCAM. **Specify**: Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I Mdl II.

Write Interrupt (#9745-#9752)‡: Allows the Terminal Adapter Type 1 Mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). Not supported under BTAM, QTAM or TCAM. **Specify**: Refer to Table 1-C for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: Terminal Adapter Type I mdl II.

Terminal Adapter Type III (#9753-#9760)‡: Controls data transfers between the 3135 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps over facility D3. Permits operation at 2400 bps over facility D4 if Modem Clocking is specified. **Specify**: Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: #4640.

Multipoint (#9761-#9768)‡: Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If **#9761-#9768** is not ordered for a given Terminal Adapter Type III, point-to-point operation is presumed. **Specify**: Refer to Table 1-D for appropriate feature code according to line positions desired. **Prerequisites**: Terminal Adapter Type III. **Field Installation**: Yes.

‡ **CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.**

3135-3 Processing Unit (cont'd)

Telegraph Adapter Type II (#9785-#9792)‡: Controls data transfers between ICA and Mdl 33/35 TTY terminals (8 level code at 110 bps only) with facility C2. **Specify**: Refer to Table 1-B for appropriate feature code according to line positions desired. **Field Installation**: Yes. **Prerequisites**: #4640 and **#9625-#9632**.

EON (#9801-#9807)‡ : Automatically generates an EON digit at the end of the dial sequence. **Specify**: Refer to Table 1E for appropriate feature code according to line position desired. Specify for 3872 and 3874 with EON option. **Field Installation**: Yes. **Prerequisites**: #1290, **#9649-#9656**.

New Sync (#9808-#9815)‡: Allows Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync feature minimizes modem turn-around and allows faster bit synchronization of the following data. **Specify**: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation**: Yes. **Prerequisites**: **#9609-#9616** and a modem offering New Sync. **Note**: New Sync is not required if **#9617-#9624**, **#9665-#9672**, or **#9625-#9632** is installed for the line position in question.

Modems

Up to eight modems can be attached to a 3135, any mdl. **Prerequisites**: Integrated Communications Adapter (#4640) and Synchronous Communications Adapter Type II (**#9649-#9656**) 2400 bps to 7200 bps, Terminal Adapter Type I Mdl II (**#9721-#9728**) 134.5 bps to 600 bps, or Terminal Adapter Type III (**#9753-#9760**) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)
3863	2400
3864	4800
3872	2400
3874	4800
3875	7200

Note: For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872, 3874, 3875.

MES Orders:

For an MES order containing multiple features, the sequence of installation of individual features is determined at the plant of manufacture. No change to MES content or sequence can be made at installation time. If changes are required, the origina l MES must be cancelled and a new one originated.

Communication Information Tables

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

TABLE 1-A ADDITIONAL LINE APPEARANCES

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Additional Lines	4640	4722	4723	4724	4725	4726	4727	4728

Specify additional lines according to line positions.

TABLE 1-B TERMINAL ADAPTERS

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Terminal Adapter Type 1 mdl II‡	9721	9722	9723	9724	9725	9726	9727	9728
Terminal Adapter Type III‡	9753	9754	9755	9756	9757	9758	9759	9760
Synchronous Data Adapter Type II‡	9649	9650	9651	9652	9653	9654	9655	9656
Telegraph Adapter Type II‡	9785	9786	9877	9788	9789	9790	9791	9792

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

Table 1-C OPTIONS FOR TERMINAL ADAPTER TYPE 1 MDL II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
300 bps‡	9593	9594	9595	9596	9597	9598	9599	9600
600 bps‡	9601	9602	9603	9604	9605	9606	9607	9608
Switched Network Facility‡	9625	9626	9627	9628	9629	9630	9631	9632
Unit Exception Suppression‡	9729	9730	9731	9732	9733	9734	9735	9736
Read Interrupt‡ 9737	9738	9739	9740	9741	9742	9743	9744	
Write Interrupt‡	9745	9746	9747	9748	9749	9750	9751	9752
Autocall	9777	9778	9779	9780	9781	9782	9783	

TABLE 1-D OPTIONS FOR TERMINAL ADAPTER TYPE III

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616
Multipoint‡	9761	9762	9763	9764	9765	9766	9767	9768
New Sync‡	9808	9809	9810	9811	9812	9813	9814	9815

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired.

TABLE 1-E OPTIONS FOR SYNCHRONOUS DATA ADAPTER TYPE II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
600 bps‡	9601	9602	9603	9604	9605	9606	9607	9608
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616
Half Duplex Fac.‡	9617	9618	9619	9620	9621	9622	9623	9624
Switched Network Facility‡	9625	9626	9627	9628	9629	9630	9631	9632
Connect Data Set to Line	9633	9634	9635	9636	9637	9638	9639	9640
Switched Speed	9641	9642	9643	9644	9645	9646	9647	9648
Tributary Station‡	9665	9666	9667	9668	9669	9670	9671	9672
Transparency‡	9673	9674	9675	9676	9677	9678	9679	9680
Autocall	9777	9778	9779	9780	9781	9782	9783	
EON‡	9801	9802	9803	9804	9805	9806	9807	
New Sync‡	9808	9809	9810	9811	9812	9813	9814	9815

Select features required for each line position for which Synchronous Data Adapter Type II is specified.

TABLE 1-F OPTION FOR TELEGRAPH ADAPTER TYPE II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Switched Ntwk Facility‡	9625	9626	9627	9628	9629	9630	9631	9632
Autocall	9777	9778	9779	9780	9781	9782	9783	
Telegraph Adapter Type II	9785	9786	9787	9788	9789	9790	9791	9792

OPTIONAL PRIMARY DATA CODES

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
ASCII	9681	9682	9683	9684	9685	9686	9687	9686
6-Bit Transcode *	9689	9690	9691	9692	9693	9694	9695	9696

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal.

OPTIONAL ALTERNATE DATA CODES

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
EBCDIC	9697	9698	9699	9700	9701	9702	9703	9704
ASCII	9705	9706	9707	9708	9709	9710	9711	9712
6-Bit Transcode *	9713	9714	9715	9716	9717	9718	9719	9720

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal

3135-3 Processing Unit (cont'd)

TABLE 2 -- Part 1 **FEATURES REQUIRED FOR START/STOP TERMINALS**

Terminal	IBM Modem	Line Speed (bps)	Communication Line and Modem Facilities	Features Required
1050 Data Communication System		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2260 Display Station mdl 1	Connects via 2848 Display Control mdl 3 - see this table			
2260 Display Station mdl 2	Connects via 2848 Display Control mdl 1 or 2 - see this table			
2265 Display Station mdl 1	Connects via the 2845 Display Control mdl 1 - see this table			
2740 Communication Terminal mdl 1		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2740 Communication Terminal mdl 2		134.5	D1	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second
2741 Communication Terminal mdl 1 (without interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
2741 Communication Terminal mdl I (with Receive Interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Unit-Exception Suppression (if required)
2741 Communication Terminal mdl 1 (with Transmit Interrupt feature)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt Unit-Exception Suppression (if required)
2741 Communication Terminal mdl I (with Receive Interrupt and Transmit Interrupt features)		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
2760 Optical Image Unit mdl I	Connects via 2740 Communication Terminal mdl I - see this table			
2845 Display Control mdl I (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl I	2400	D4	Terminal Adapter Type III, Modem Clocking multipoint for multipoint operation, New Sync (if required)
2848 Display Control mdls 1, 2 and 3 (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl 1	2400	D4	Terminal Adapter Type III, Modem Clocking multipoint for multipoint operation, New Sync (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			D1	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Transmit Interrupt feature)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7111 - 2740 Line Control		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			D1	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 or 3 with #7112 - 2740-2 Line Control		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
System/7		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility
			D1	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
5100/5110 Computer		134.5	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
TTY 33/35		110	C2	Telegraph Adapter Type II

3135-3 Processing Unit (cont'd)

TABLE 2 -- Part 2 **FEATURES REQUIRED FOR BINARY SYNCHRONOUS TERMINALS**

Line Speed (bps)	IBM Modem	Manner of Line Operation	Communication Line and Modem Facilities	Features Required
600		Point-to-Point	D3 (two-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Half Duplex Facility, Data Code features
			D2 (four-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Data Code features
			C3	Synchronous Data Adapter Type II, 600 Bits Per Second, Switched Network facility, Data Code features
		Multipoint -- 3135 as Control Station	D2 (four-wire)	Synchronous Adapter Type II, 600 Bits Per Second, Data Code features
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, 600 Bits Per Second, Tributary Station, Data Code features
1200		Point-to-Point	D3 (two-wire)	Synchronous Data Adapter Type II, Half Duplex Facility, Data Code features
			D3 (four-wire)	Synchronous Data Adapter Type II, Data Code features
			C4	Synchronous Data Adapter Type II, Switched Network Facility, Data Code features
		Multipoint -- 3135 as Control station	D3 (four-wire)	Synchronous Data Adapter Type II, Data Code features
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Tributary Station, Data Code features
2400	3863	Point-to-Point	D4	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
		Multipoint -- 3135 as Control Station		Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
	3872 mdl 1	Point-to-Point	C5	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
			D4 (two-wire)	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Data Code features
			D4 (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Control Station		Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
		Point-to-Point, Multipoint	X1M	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
4800	3864	Point-to-point	D5	Synchronous Data Adapter Type II, Modem Clocking, Switched Network Facility, Data Code features
		Multipoint -- 3135 as Control Station		Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
	3874 mdl 1	Point-to-Point	C6	Synchronous Data Adapter Type II, Modem Clocking, Switched Network Facility, Data Code features
			D5	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3135 as Control Station		Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
		Point-to-Point, Multipoint	X2M	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
7200	3875 mdl 1	Point-to-Point	D6 (with C2 Conditioning)	
		Multipoint -- 3135 as Control Station		
		Multipoint -- 3135 as Tributary Station		Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

MODEL CONVERSIONS

Field Installable.

Planning For Model Conversions: When a customer requires feature changes (except for the prerequisite feature Extended Precision Floating Point, #3840), and/or memory upgrades in addition to a model upgrade to a 3135-3, consolidating the several changes into a single MES is not recommended. In these cases, a planning session between sales, FE and the customer is required in addition to the normally required branch office review/approval to develop the proper sequence of MES ordering.

From	To	A1	A2	A3	A4
H		X	X	X	X
HF			X	X	X
HG				X	X
I					X
A1			X	X	X
A2				X	X
A3					X

ACCESSORIES (None)

SUPPLIES (None)

3138 PROCESSING UNIT

PURPOSE

Provides main and control storage plus arithmetic and logic circuits for the S/370 mdl 138.

MODELS

Model I	I00	524,288 bytes of processor storage
Model J	J00	1,048,576 bytes of processor storage

Prerequisites: Each S/370 mdl 138 requires a 3046 power unit ... see M3046 pages.

HIGHLIGHTS

524,288 bytes or 1,048,576 bytes of processor storage are provided. CPU cycle time ranges from 275 to 1485 nanoseconds depending on the internal operation being performed. 16 general purpose and four floating point registers are provided.

Standard Features Include: Conditional Swapping ... APL Assist ... Audible Alarm ... Byte Oriented Operand ... 1 Byte Multiplexer Channel ... 64 Byte Multiplexer Subchannels ... 2 Block Multiplexer Channels ... 16 Non-Shared Block Multiplexer Subchannels ... 1 Shared Block Multiplexer Subchannel ... Channel Command Retry ... Channel Indirect Addressing ... Clock Comparator & CPU Timer ... Console File ... Control Registers ... Dynamic Address Translation ... Error Checking and Correction (on Main and Control Storage) ... Extended Control Mode ... Extended Control-Program Support ... Extended Precision Floating Point ... Instruction Retry ... Floating Point ... Interval Timer ... Machine Check Handling ... OS/DOS Compatibility ... Program Event Recording ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... Time of Day Clock ... PSW Key Handling.

Control Storage: 131,072 bytes of Reloadable Control Storage are provided in addition to main storage. This permits emulator and control routines to function. The Reloadable Control Storage is housed in the CPU and is loaded from the Console File which is located beneath the operator's display console. Reloadable Control Storage is not available to the user.

Virtual Storage: Virtual Storage capability is provided to increase the effective utilization of main storage.

Console File (Standard): This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be supplied with the system will supply all of the required microcode for diagnostics, basic systems features, plus the optional features ordered for the system.

Console Function: A display console is standard ... includes a cathode ray tube, and a keyboard ... functions as an operator's I/O console to communicate with the operating system ... standard attachment for an optional 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 for hard copy output. CRT can accommodate twenty-four 80-character lines of information. A system control panel is also located on the 3138 for additional operator communication with the system. Three console modes are available: "Printer-keyboard" Mode, "Display" Mode, "115/125 Console-display-emulation" Mode.

In "Printer-keyboard" mode, the display console uses the keyboard for input and the CRT and a recommended 3286 mdl 2 or 3287 mdl 1 and 2 for output. The CRT, keyboard and printer appear to the system as a 3215 Console Printer-Keyboard. "Printer-Keyboard" mode is supported by DOS, DOS/VS, OS/360, OS/VS and VM/370.

In "Display" mode, the keyboard is used for input, the CRT with 24 lines by 80 characters/line for output, and DIDOCS or equivalent support is required. DOS/VS does not support Display Mode. The 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 (optional) has a separate address and requires MCS support or equivalent. When present, the printer appears to the system as a 3213 Console Printer.

In "115/125 Console-display-emulation" mode, the keyboard is used for input, the CRT is used for output, and the CRT displays twelve 56-character lines of information. The 3286 mdl 2 or 3287 mdl 1 or 2 are optional. When present, the printer emulates a 5213 Printer mdl 1 and acts as a slave unit to the display console. That is, the 3286 mdl 2 or 3287 mdl 1 or 2 are not separately addressable in this mode. The "115/125 Console-display-emulation" mode is available in DOS/VS Release 28 and above.

The display console provides the capability to select three aspects of the system's environment at IMPL time:

Console mode - See above (Mode Descriptions).

CPU mode (3138 or 3135) - See "Programming Features".

Unit addresses of natively attached I/O.

Integrated Communications Adapter Line Characteristics - See "Integrated Communications Adapter Features".

These selections will be recorded on the console file for permanent reuse until such time as any new selection is made during a subsequent IMPL. (**Note:** This is the only user access to the console file.) A right reading board extension is standard ... a left extension is not available.

Input/Output Channels:

Byte Multiplexer Channel: One is standard ... functionally equivalent to the byte multiplexer channel on the S/370 mdl 135 ... provides eight control unit positions ... in byte mode, permits simultaneous operation of many low-speed devices ... burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the Integrated File Adapter, the Integrated Communications Adapter, or a Block Multiplexer Channel - see *IBM S/370 Model 138 Channel Characteristics Manual,* GA24-3633, for further clarification ... for OS exclusion refer to SRL GC28-6554, *System Generation.*

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Add'l, in "Special Features".

Block Multiplexer Channels: Two are standard ... data rates are 1.3 megabytes per second ... permits simultaneous operation of high-speed devices ... ability to "Block Multiplex" provides greater channel efficiency and increases the efficiency of the 3330/3340 Series IFA when using direct access storage devices equipped with rotational position sensing ... devices on these channels which cannot utilize block multiplexing will function as if attached to selector channels ... if the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2.

Subchannels: On the byte multiplexer channel 64 subchannels are provided as standard with the option of 128 or 256 (see "Special Features") ... for each of the two standard block multiplexer channels 16 non-shared subchannels and 1 shared selector subchannel are provided as standard with the option of 8 non-shared and 9 shared or 8 non-shared and 5 shared (see "Special Features") ... each of the standard single shared subchannels may attach a control unit having a maximum of 16 device addresses.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

Input/Output Attachment

Non-Native: A wide variety of I/O devices may be attached to the S/370 mdl 138 via the standard byte multiplexer channel or any of the two standard block multiplexer channels.

Native: The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices:

Integrated 3203-4 Printer Attachment, First Printer (Optional) - Provides the capability to natively attach the 3203 Printer mdl 4 as the first systems printer. The Universal Character Set feature is standard on the 3203.

Integrated 3203-4 Printer Attachment, Second Printer (Optional) - Provides the capability to natively attach the 3203 Printer mdl 4 as the second systems printer. The Universal Character Set feature is standard on the 3203.

Integrated 1403 Printer Adapter (Optional) - This feature allows native attachment of a 1403 Printer mdl 2, 7, or N1 ... the Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

Integrated Console Printer Adapter (Standard) - Provides the capability to natively attach the optional 3286 Printer mdl 2, 3287 Printer mdl 1 and 2 as a hard copy console printer.

3330/3340 Series Integrated File Adapter (Optional) - This feature allows the native attachment of one or two 3333 modules or 3340 mdl A2 units ... each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11) ... each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives ... maximum is 16 drives per IFA.

Integrated Communications Adapter (Optional) - This feature provides for attachment of up to eight teleprocessing lines to the S/370 mdl 138 ... these may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

Integrated Communications Adapter Features: To improve the ordering of the ICA on the S/370 mdl 138, the user may define, from the display-console-keyboard, the following line characteristics for each line installed (a maximum of 8 lines are attachable to the ICA):

[1] Leased Facility* or Switched Network Facility: Allows the Terminal Adapter Type 1 mdl II, Synchronous Data Adapter Type II (SDA), or Telegraph Adapter Type II to operate over leased or C-type switched lines.

[2] Half-Duplex Facility or Full Duplex Facility* - Allows the user to make a business tradeoff between his TP applications and turn-around requirements and available teleprocessing facilities.

3138 Processing Unit (cont'd)

and the cost of those facilities ... half-duplex is required if the Synchronous Data Adapter Type II is attached to a 2-wire facility or that facility is part of a switched network unless that facility is a leased line and the Synchronous Data Adapter Type II is installed and functioning as a tributary station and not functioning as a control station on that leased line.

[3] Primary Code for the SDA Type II (EBCDIC*, ASCII, 6-Bit).

[4] Secondary or Alternate Code for the SDA Type II (EBCDIC*, ASCII, 6-Bit).

[5] Tributary Station Address - Allows the user to specify a station address A to R of any Synchronous Data Adapter Type II which is installed and functioning on a leased communications line as a tributary station and not functioning as a control station on that leased line. (Station address 0829*.) Only addresses A to R are valid.

[6] Line Speed:

(a) 134 bps*,300 bps, or 600 bps for Terminal Adapter Type 1 mdl II.

(b) 600 bps or 1200 bps* for Synchronous Data Type II.

(c) Not applicable for Terminal Adapter Type III or Telegraph Adapter Type II.

[7] Transparency - Yes or No* - Provides the SDA Type II with the ability to transmit and receive 8-bit binary as well as EBCDIC or ASCII codes or 6-bit binary data as well as 6-bit Transcode ... Transparency with ASCII modifies VRC/LRC checking to VRC/CRC checking ... **Limitations:** ASCII code and Transparency cannot be installed together for the same line position when attached to the 2780, 3780, System/3, System/7, System/32 or System/34. **Prerequisite:** SDA II.

[8] Write Interrupt - Yes or No* - Allows the Terminal Adapter Type 1 mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). **Limitations:** Not supported under BTAM, QTAM, or TCAM. **Prerequisite:** Terminal Adapter Type 1 mdl II.

[9] Read Interrupt - Yes or No* - Allows the Terminal Adapter Type 1 mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). **Limitations:** Not supported under BTAM, QTAM, or TCAM. **Prerequisite:** Terminal Adapter Type 1 mdl II.

[10] New SYNC - Yes or No* - Allows the Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync minimizes modem turnaround and allows faster bit synchronization of the following data. **Prerequisites:** Modem Clocking (#9606-#9616), and a modem offering New Sync. **Note:** New Sync is not required if Half Duplex Facility, Tributary Station, or Switched Network is selected for the line position in question.

[11] Multipoint - Yes or No* - Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If multipoint is not selected for a given Terminal Adapter Type III, point-to-point operation is presumed. **Prerequisite:** Terminal Adapter Type III.

[12] Unit Exception Supression - Yes or No* - If selected with Terminal Adapter Type 1 mdl II, Unit Exception will not be set in response to a circle C. **Limitations:** Not supported under BTAM, QTAM, or TCAM. **Prerequisite:** Terminal Adapter Type 1 mdl II.

* These options will comprise the standard microcode on the console file as shipped from the plant. They may be altered, as explained, from the display-console-keyboard at the operator's discretion.

Note: See "Special Features" for optional "ICA features" on the S/370 mdl 138.

Programming Features

Conditional Swapping (Standard): Provides two additional instructions ... Compare and Swap ... Compare Double and Swap.

PSW Key Handling (Standard): Provides two additional instructions ... Insert PSW Key ... Set PSW Key from Address.

APL Assist (Standard): This feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL PP (5748-AP1).

IMPL 3135 CPU Mode Selection: Provides the capability to "run" on S/370 mdl 138 any SCP which will "run" today on a S/370 mdl 135. No performance degradation or loss of S/370 mdl 135 recovery from error capabilities will be experienced in this mode. That is, in 3135 CPU Mode the improved hardware performance of the S/370 mdl 138 will be available to the user. Moreover, the user will have the same recovery capabilities on the S/370 mdl 138 as he has on a S/370 mdl 135 when 3135 CPU Mode is selected. **Note:** S/370 mdl 138 Extended Logout/EREP is not supported in this mode.

Extended Control Program Support (Standard): The S/370 mdl 138 includes Extended Control-Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

Virtual Machine I/O
Storage Management
Page Management
SVC Handler
Privileged Instruction Interfaces
Dispatching
Virtual Interval Timer

For VS1 the functional areas are:

Storage Management
IOS
SVC FLIH
System Trace
Page Management

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Cabling: **#9080** for below the floor, **#9081** for on the floor.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in S/370 mdl 138.
- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3138 Frame 01 (CPU) are 800mm (31-1/2 inches) wide x 1778mm (70 inches) long x 1524mm (60 inches) high. Removal of the side covers will reduce the width to 749mm (29-1/2 inches). If further reduction in width is required, specify **#9570**. Shipping dimensions will then be 749mm (29-1/2 inches) wide x 1524mm (60 inches) long x 1524mm (60 inches) high.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

Note: RETAIN/370: CE access is by telephone.

SPECIAL FEATURES

Autocall (#1290): Provides automatic calling capabilities on the public switched telephone network to initiate (dial) through stored program control, a data link to a remote station. For the appropriate automatic calling units, see M2700 pages. **Specify:** Refer to Table 1-C for Terminal Adapter Type 1 mdl II or Table 1-E for Synchronous Data Adapter Type II or Table 1-F for Telegraph Adapter Type II for approprite feature code according to line positions desired. **Maximum:** Four. **Limitations:** Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** #9721-#9728, #9649-#9656, or #9785-#9792 and Switched Network Facility selection from the display console.

Block Multiplexer Shared Subchannel (#1431): Note: This feature should be installed only if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See *370 I/O Configuration Form,* GA22-7002. Allows any one of the following combinations of "Non-Shared", "Block Shared" or selector subchannels to be attached to the block multiplexer channel: [1] 16 Non-Shared and 1 Shared Selector (see address restrictions) ... [2] 8 Non-Shared, 8 Block Shared and 1 Shared Selector (see address restrictions) ... [3] 8 Non-Shared, 4 Block Shared and 1 Shared Selector (see address restrictions). If option [2] is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option [3] is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option [1] is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. **Maximum:** One. **Field Installation:** Yes.

3138 Processing Unit (cont'd)

Address Restrictions with #1431:

a) Addresses X00 through X7F are assigned as block shared subchannels. With option [1] they may not be used. With option [2] each control unit address position, i.e., X00, X10, X20, etc., through X70, is available. With option [3] "even" address positions only are available, i.e., 00, 20, 40 and 60.

b) Selector and Non-Shared addresses are limited to addresses X80 through XFF.

Channel Priority (#1502): When the IFA (#4655) is present, this feature changes the higher priority for command chaining from the first block multiplexer channel (Channel 2) to the second block multiplexer channel (Channel 3). #1502 is required if any DASD devices are to be attached to Channel 3. **Field Installation:** Yes. **Prerequisites:** #4655.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 Direct Control Feature - OEMI*, GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning*, GC22-7004. **Field Installation:** Yes.

Multiplexer Subchannels, Add'l (#3906, #3907): To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: ... #3906 -- for 128 subchannels ... #3907 -- for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed there are no shared subchannels. **Note:** The number of subchannels ordered must be equal to or greater than the device addresses. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. **Field Installation:** Yes.

1401/1440/1460 Compatibility (#4457): Microprogram controlled feature, which, in conjunction with special software, permits the system to execute 1401/1440/1460 instructions. **Field Installation:** Yes.

Integrated Communications Adapter (#4640): Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the S/370 mdl 138. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer multiplexer or terminal conforming to the Binary Synchronous Communications (BSC) standard. **Note:** In addition to the appropriate adapter, each communications line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. **Customer Responsibilities** -- see M2700 pages for customer responsibilites communications facilities and servicing requirements. **Communications Facilities** -- see M2700 pages for communications facility requirements with this feature. **Field Installation:** Yes.

See "Specify Requirements for Integrated Communication Adapter" under "Specify".

3330/3340 Series Integrated File Adapter (#4655): Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of sixteen 3330 or 3340 series drives can be attached to the IFA. The IFA supports rotational position sensing, disconnected command chaining and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344, standard addresses are (hex) 1C0 through 1E1. **Maximum:** One. **Field Installation:** Yes.

Specify:

[1] DASD Designation -- Specify ONE of the following -- **#9313‡** (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdls 1/2 in any combination ... **#9314‡** (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdls B1/B2 in any combination ... **#9315‡** (3333/3340 Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdls 1/2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdls B1/B2 in any combination).

[2] If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify **#9316‡** (3333/3330 mdl 11) in addition to **#9313** or **#9315**.

With **#9313** plus **#9316**, a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdls 1, 2, and 11 (in any combination) can be attached ... or two 3333 mdl 11s, each with any mixture of up to three 3330 mdls 1, 2, and 11.

With **#9315** plus **#9316**, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdls 1, 2, and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdls B1/B2. The standard addresses with **#9315** for 3330 are (hex) 150 through 157, for 3340 (hex) 158 through 15F.

[3] If any 3344 is to be attached, specify **#9317‡** in addition to **#9314** (**#9317** and **#9315** are mutually exclusive). **#9190‡** must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301/#4302) is ordered.

With **#9314**, **#9317**, and **#9190** up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2, if present, can attach up to three 3340 mdl B1/B2 units.

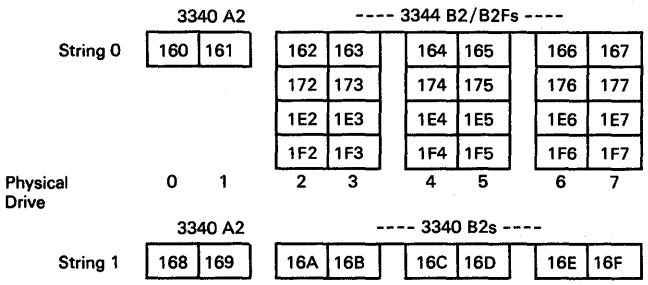
[4] When **#9314** is specified, also specify 3340 Address Designation: **#9820‡** for addresses (hex) 1C0 through 1CF, or **#9821‡** for addresses (hex) 160 through 16F. The specification of 160 allows the 3138 IFA addresses to coincide with those of the 3115 and 3125 IFAs.

[5] When **#9314** or **#9315** is specified, also specify **#9190‡** (Fixed Head Attachment) if Fixed Head Feature (#4301/#4302) is ordered for any 3340 attached to the IFA.

[6] If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (**#9841.‡**

[7] When **#9821‡** is specified in conjunction with **#9313** the addresses for the 3333/3330s are (hex) 160 through 16F.

[8] When **#9821‡** is specified and both **#9314** and **#9317** are specified, the addresses for the 3340/3344s are as follows:



Note: 1 The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the feature numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3138 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

Note 2: Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

3138 3330/3340 IFA (#4655)

	DASD Control Combinations on IFA (#4655)	3333 Disk Storage Control	3333/ 3340 Intermix	3340 Direct Access Storage Facility
Section A	DASD Designation, one req'd	#9313‡	#9315‡	#9314‡

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3138 Processing Unit (cont'd)

Section B	If any 3333 mdl 11 and/or 3330 mdl 11	**#9316**‡	**#9316**‡	—	
	3344	—	—	**#9317**‡	
	3344 mdl B2F	—	—	**#9317** + **#9190**‡	
	Fixed Head Feature (#4301/ 4302) on 3340	—	**#9190**‡	**#9190**‡	
	String Switch (#8150) on 3333/3340	**#9841**‡	**#9841**‡	**#9841**‡	
	2314/3340 Compatibility Feature (see #8070)	—	—	** #8070	
Section C Addresses	Standard	* Hex 150-15F	* 3330 Hex 150-157, 3340 Hex 158-15F	**#9820**‡ Not 3344 Hex 1C0-1CF	3344 Hex 1C0-1E1
	Address 160	**#9821**‡ Hex 160-16F	—	**#9821**‡ Not 3344 Hex 160-16F	See Item 8 above

* No feature number required.

** Mutually exclusive with String Switch (**#9841**), 3330/3340 Intermix (**#9315**), 3344 Attachment (**#9317**).

Integrated 1403 Printer Adapter Basic Control (#4670): Provides the power supply and basic control for a natively attached 1403 Printer. **Maximum:** One. **Field Installation:** Yes.

Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672): Provides control for attaching 1403 mdl 2 or N1. **Specify: #9182** ‡ to attach 1403 mdl 2, **#9188**‡ to attach 1403 mdl N1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4670. On the 1403, **#9709** and **#9725** are required on a mdl 2; **#9726** is required on a mdl N1. See Specify under 1403.

Integrated 1403 Printer Mdl 7 Attachment (#4677): Provides control for attaching a 1403 mdl 7. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4670. On the 1403, **#9725** (see "Specify" in M1403 pages).

Add'l Lines (#4722-#4728): Each provides circuits and controls for attachment of an additional line adapter ... for a total of eight lines in a system. **Specify:** Order additional lines according to line position required ... see Table 1-A below. Each line specified requires the next lower order line as a prerequisite. **Maximum:** One of each (#4722 through #4728). **Field Installation:** Yes. **Prerequisites:** #4640.

Specify Requirements For Integrated Communications Adapter: For each line (#4722-#4728) attached to the ICA, including the first line included in the Integrated Communications Adapter (#4640), one of the following line adapters must be specified: Terminal Adapter Type 1 mdl II (#9721-#9728), Terminal Adapter Type III (#9753-#9760), Telegraph Adapter Type II (#9785-#9792), or Synchronous Data Adapter Type II (#9649-#9656). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to Table 2 below prior to ordering features for the ICA.

S/360 Mdl 20 Compatibility (#7520): Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. **Field Installation:** Yes.

2314/3340 Compatibility Feature (#8070): Permits the emulation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on the mdl S/370 mdl 138. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with 3333/3340 Intermix (**#9315**), 3344 Attach (**#9317**), or String Switch Attachment (**#9841**). **Prerequisites: #9314** on #4655.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

Integrated 3203-4 Printer Attachment, First Printer (#8075): Provides the capability to natively attach the 3203 Printer mdl 4. **Maximum:** One. **Field Installation:** Yes.

Integrated 3203-4 Printer Attachment, Second Printer (#8076): Provides the capability to natively attach a second 3203 Printer mdl 4. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8075.

Universal Character Set Adapter (#8637): Permits the use of the Universal Character Set feature on a 1403 mdl 2 or N1 attached via the Integrated 1403 Printer mdl 2, mdl N1 Attachment (#4672). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4670, #4672.

Modem Clocking (#9609-#9616): Allows a Terminal Adapter Type III to operate at 2400 bps or a Synchronous Data Adapter Type II to operate at 2000 bps, 2400 bps, 4800 bps or 7200 bps. Requires the appropriate clocking to be in the attached modem. **Note:** Certain modems such as the 3872 mdl 1, although basically 2400 bps modems, offer a 1200 bps half speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, when such modems are attached to the Synchronous Data Adapter Type II and are switched for 1200 bps operation, Modem Clocking is still required as a prerequisite on the ICA. **Specify:** Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** Terminal Adapter Type III or Synchronous Data Adapter Type II.

Synchronous Data Adatper Type II (#9649-#9656): ‡ Provides control of data transfers between the 3138 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Speed Selection:** Provides operation over facilities at 600 bps if 600 Bits Per Second is selected from the display console. Provides operation over the Public Switched Telephone Network or nonswitched Voice Grade Lines at 1200 bps (no speed need be specified). Provides operation over the Public Switched Telephone Network at speeds up to 4800 bps, nonswitched Voice Grade Lines at speeds up to 7200 bps and Public Switched and nonswitched Data Networks at speeds up to 4800 bps all provided that the clocking is supplied from the attached DCE. **Field Installation:** Yes. **Prerequisites:** #4640.

Special Requirements: See Table 1-E for additional specify requirements if Autocallor EON are required. See Table 1-E and Modem Clocking above if 2000 bps, 2400 bps, 4800 bps, or 7200 bps operation is required. The appropriate Data Code must be selected from the display console.

Limitations: For line speed limitations, refer to *Model 138 Channel Characteristics Manual*, GA33-3010.

Terminal Adapter Type 1 Mdl II (#9721-#9728): ‡ Controls data transfers between the 3138 and 1050/2740 mdl 1/2741/5010 mdl AXX between the 3138 and 2740 model 2 or 5010 mdl AXX between the 3138 and a 2741 over Facility K1M. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Special Requirements:** See Table 1-C for additional specify requirements if Autocall is required. **Field Installation:** Yes. **Prerequisites:** #4640.

Terminal Adapter Type III (#9753-#9760): ‡ Controls data transfers between the 3138 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps. Permits operation at 2400 bps if Modem Clocking is specified. **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** #4640.

Telegraph Adapter Type II (#9785-#9792): ‡ Controls data transfers between ICA and Model 33/35 TTY terminals (8 level code at 110 bps only). **Specify:** Refer to Table 1-B for appropriate feature code according to line position(s) desired. **Field Installation:** Yes. **Prerequisites:** #4640 and Switched Network Facility selection from the display console.

EON (#9801-#9807): ‡ Automatically generates an EON digit at the end of the dial sequence. **Specify:** Refer to Table 1-E for appropriate feature code according to line position(s) desired. Specify for 3872 and 3874 Modem with EON option. **Field Installation:** Yes. **Prerequisites:** #1290 ... Synchronous Data Adapter Type II.

Modems

Up to eight modems can be attached to a 3138. **Prerequisites:** Integrated Communications Adapter (#4640) and Synchronous Data Adapter Type II (#9649-#9656) 2400 bps to 7200 bps, Terminal

3138 Processing Unit (cont'd)

Adapter Type 1 mdl II (#9721-#9728) 134.5 bps to 600 bps, or Terminal Adapter Type III (#9753-#9760) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)
3863	2400
3864	4800
3872 mdl 1	2400

Note: for communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872, pages.

Communication Information Tables

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

TABLE 1-A ADDITIONAL LINE APPEARANCES

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Additional Lines	4640	4722	4723	4724	4725	4726	4727	4728

Specify additional lines according to line positions.

TABLE 1-B TERMINAL ADAPTERS

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Terminal Adapter Type 1 mdl II‡	9721	9722	9723	9724	9725	9726	9727	9728
Terminal Adapter Type III‡	9753	9754	9755	9756	9757	9758	9759	9760
Synchronous Data Adapter Type II‡	9649	9650	9651	9652	9653	9654	9655	9656

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

Table 1-C OPTIONS FOR TERMINAL ADAPTER TYPE 1 MODEL II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Autocall	9777	9778	9779	9780	9781	9782	9783	

TABLE 1-D OPTIONS FOR TERMINAL ADAPTER TYPE III

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired.

TABLE 1-E OPTIONS FOR SYNCHRONOUS DATA ADAPTER TYPE II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Modem Clocking	9609	9610	9611	9612	9613	9614	9615	9616
Autocall	9777	9778	9779	9780	9781	9782	9783	
EON‡	9801	9802	9803	9804	9805	9806	9807	

Select features required for each line position for which Synchronous Data Adapter Type II is specified.

TABLE 1-F OPTION FOR TELEGRAPH ADAPTER TYPE II

	Line Position							
FEATURE	1	2	3	4	5	6	7	8
Autocall	9777	9778	9779	9780	9781	9782	9783	
Telegraph Adapter Type II‡	9785	9786	9877	9788	9789	9790	9791	9792

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3138 Processing Unit (cont'd)

TABLE 2 -- Part 1 **FEATURES REQUIRED FOR START/STOP TERMINALS**

Terminal	IBM Modem	Line Speed (bps)	Communication Line and Modem Facilities	Features Required
1050 Data Communication System		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility
			NSVGL	Terminal Adapter Type 1 mdl II
2260 Display Station mdl 1	Connects via 2848 Display Control mdl 3 - see this table			
2260 Display Station mdl 2	Connects via 2848 Display Control mdl 1 or 2 - see this table			
2265 Display Station mdl 1	Connects via the 2845 Display Control mdl 1 - see this table			
2740 Communication Terminal mdl 1		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility
			NSVGL	Terminal Adapter Type 1 mdl II
2740 Communication Terminal mdl 2		134.5	NSVGL	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second
2741 Communication Terminal mdl 1 (without interrupt feature)		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility
			NSVGL	Terminal Adapter Type 1 mdl II
2741 Communication Terminal mdl I (with Receive Interrupt feature)		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Unit-Exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Write Interrupt, Unit-Exception Suppression (if required)
2741 Communication Terminal mdl 1 (with Transmit Interrupt feature)		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Unit-Exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Read Interrupt Unit-Exception Suppression (if required)
2741 Communication Terminal mdl I (with Receive Interrupt and Transmit Interrupt features)		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, Unit-Exception Suppression (if required)
2760 Optical Image Unit mdl I	Connects via 2740 Communication Terminal mdl I - see this table			
2845 Display Control mdl I (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl I	2400	D4	Terminal Adapter Type III, Modem Clocking multipoint for multipoint operation, New Sync (if required)
2848 Display Control mdls 1, 2 and 3 (point-to-point or multipoint)		1200	D3	Terminal Adapter Type III multipoint for multipoint operation
	3872 mdl 1	2400	D4	Terminal Adapter Type III, Modem Clocking multipointfor multipoint operation, New Sync (if required)
3232 mdl 51		300	C1,D1	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second
		600	C2,D2	Terminal Adapter Type 1 mdl II, Switched Network Facility, 600 Bits Per Second
		1200	C2,D3	Synchronous Data Adapter Type II, Transparency ASCII
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)		300	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			NSVGL	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)		300	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Write Interrupt, 300 Bits Per Second Line Speed, Unit-exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Transmit Interrupt feature)		300	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Read Interrupt, 300 Bits Per Second Line Speed, Unit-exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)		300	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-exception Suppression (if required)
			NSVGL	Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, 300 Bits Per Second Line Speed, Unit-exception Suppression (if required)
3767 Communication Terminal mdl 1 or 2 with #7111 - 2740 Line Control		300	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, 300 Bits Per Second Line Speed
			NSVGL	Terminal Adapter Type 1 mdl II, 300 Bits Per Second Line Speed
3767 Communication Terminal mdl 1 or 2 or 3 with #7112 - 2740-2 Line Control		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
5100/5110 Computer		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, Unit-Exception Suppression (if required)
		300	C1	Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
			D1	Terminal Adapter Type 1 mdl II, Read Interrupt, Write Interrupt, 300 Bits Per Second Line Speed, Unit-Exception Suppression (if required)
6733*		110	PSTN	Telegraph Adapter Type II
System/7		134.5	PSTN	Terminal Adapter Type 1 mdl II, Switched Network Facility
			NSVGL	Terminal Adapter Type 1 mdl II
		600	D2	Terminal Adapter Type 1 mdl II, 600 Bits Per Second Line Speed
TTY 33/35		110	C2	Telegraph Adapter Type II

* = Supported as CPT-TWX 33/35
PSTN = the public switched telephone network
NSVGL = a nonswitched voice grade line

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3138 Processing Unit (cont'd)

TABLE 2 -- Part 2 **FEATURES REQUIRED FOR BINARY SYNCHRONOUS TERMINALS**

Line Speed (bps)	IBM Modem	Manner of Line Operation	Communication Line and Modem Facilities	Features Required
600		Point-to-Point	NSVGL (two-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Half Duplex Facility, Data Code features
			NSVGL (four-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Data Code features
			PSTN	Synchronous Data Adapter Type II, 600 Bits Per Second, Switched Network facility, Data Code features
		Multipoint -- 3138 as Control Station	NSVGL (four-wire)	Synchronous Adapter Type II, 600 Bits Per Second, Data Code features
		Multipoint -- 3138 as Tributary Station	NSVGL (four-wire)	Synchronous Data Adapter Type II, 600 Bits Per Second, Tributary Station, Data Code features
1200		Point-to-Point	NSVGL (two-wire)	Synchronous Data Adapter Type II, Half Duplex Facility, Data Code features
			NSVGL (four-wire)	Synchronous Data Adapter Type II, Data Code features
			PSTN	Synchronous Data Adapter Type II, Switched Network Facility, Data Code features
		Multipoint -- 3138 as Control station	NSVGL (four-wire)	Synchronous Data Adapter Type II, Data Code features
		Multipoint -- 3138 as Tributary Station	NSVGL (four-wire)	Synchronous Data Adapter Type II, Tributary Station, Data Code features
2400	3863	Point-to-Point	NSVGL	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
2400	3863	Multipoint -- 3135 as Control Station	NSVGL	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
2400	3863	Multipoint -- 3135 as Tributary Station	NSVGL	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
2400	3872 mdl 1	Point-to-Point	C5	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Switched Network Facility, Data Code features
2400	3872 mdl 1	Point-to-Point	NSVGL (two-wire)	Synchronous Data Adapter Type II, Modem Clocking, Half Duplex Facility, Data Code features
			NSVGL (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
		Multipoint -- 3138 as Control Station	NSVGL (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
		Multipoint -- 3138 as Tributary Station	NSVGL (four-wire)	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features
		Point-to-Point, Multipoint	PDSDN	Synchronous Data Adapter Type II, Modem Clocking, Data Code features
4800	3864	Point-to-point	PDSDN	Synchronous Data Adapter Type II, Modem Clocking, Switched Network Facility, Data Code features
4800	3864	Multipoint -- 3135 as Control Station	PDSDN	Synchronous Data Adapter Type II, Modem Clocking, Data Code features, New Sync (if required)
4800	3864	Multipoint -- 3135 as Tributary Station	PDSDN	Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

PSTN = the public switched telephone network
NSVGL = a nonswitched voice grade line
PNSDN = a public nonswitched data network

MODEL CONVERSIONS

From model I to model J are field installable.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

‡ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3145 PROCESSING UNIT

[NO LONGER AVAILABLE]

[The 3145 is No Longer Available ... features and model changes can be ordered on an 'as available' basis.]

PURPOSE

Has program, control and auxiliary storage, plus arithmetic and logic circuits for a S/370 mdl 145.

Model GE	GE0	163,840 bytes of processor storage
Model GFD	GFD	212,992 bytes of processor storage
Model H	H00	262,144 bytes of processor storage
Model HG	HG0	393,216 bytes of processor storage when used with a 3345 mdl 1 or 4
Model I	I00	524,288 bytes of processor storage when used with a 3345 mdl 2 or 5
Model H2	H02	262,144 bytes of processor storage
Model HG2	HG2	393,216 bytes of processor storage
Model I2	I02	524,288 bytes of processor storage
Model IH2	IH2	786,432 bytes of processor storage
Model J2	J02	1,048,576 bytes of processor storage
Model JI2	JI2	1,572,864 bytes of processor storage
Model K2	K02	2,097,152 bytes of processor storage

For additional models of the 3145, see M3145-3 pages.

Prerequisites

For 3145 mdl HG or I -- 3345 Storage and Control Frame and 3046 Power Unit.

For 3145 mdl H2, HG2, I2, IH2, J2, JI2 or K2 -- 3047 Power Unit.

HIGHLIGHTS

Depending upon the processing unit mdl, up to 2,097,152 bytes of processor storage are available. CPU cycle of 202.5 - 315 nanoseconds depending upon internal operation being performed. Sixteen general purpose and four floating point registers.

Virtual storage capability to increase the effective utilization of main storage.

On the 3145 mdls FED (no longer available), GE, GFD, H, HG or I, the 2319 Disk Storage mdl A1 (with 2312, 2313, 2318 or 2319 mdl A2 Disk Storages) can be natively attached via the Integrated File Adapter (#4650). 3333 Disk Storage and Control modules (with 3330 modules) and/or 3340 Disk Storage mdl A2s (with 3340 B mdls and/or 3344s) and/or 3350 Disk Storage mdls A2/A2F (with 3350 B2/B2F, C2/C2F mdls) can be attached to 3145 mdls FED, GE, GFD, H, HG or I via the Integrated Storage Control on 3345 mdls 3, 4 or 5. Attachment of 3330 series, 3340 series and 3344s and/or 3350 series disk storage to 3145 mdls H2, HG2, I2, IH2, J2, JI2 or K2 is via the Integrated Storage Control (#4660).

In addition to main storage, 32,768 bytes of Reloadable Control Storage are included in the CPU for all storage configurations. This feature permits emulator and control routines to function. Any expansion of control storage beyond 32,768 bytes (up to 65,536 bytes maximum) is provided in 2,048 byte increments at the expense of main memory ... see "Control Storage Requirements" below for basic machine and selected feature requirements in microcode.

An optional Clock Comparator and CPU Timer provide additional timing facilities for the programmer.

Virtual Storage: Extended Control (EC) Mode expands the structure of the Program Status Word to accommodate the control of new S/370 features and extends the number of permanently assigned main storage locations. The S/370 mdl 145 can operate in either EC Mode or Basic Control (BC) Mode as defined for S/360. Dynamic Address Translation (DAT) is a standard feature on the S/370 mdl 145. When the S/370 mdl 145 is in EC Mode, with Translation Mode operable, program addresses are treated as "logical addresses" and the translation feature develops "real addresses". Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the S/370 mdl 145. For I/O operations, Channel Indirect Addressing provides a means to transmit data that spans pages of noncontiguous real storage.

Program Event Recording, a standard feature, is a debugging aid which permits four types of events to be selectively monitored in a virtual environment: [1] Successful branches ... [2] Instruction fetch address compare ... [3] Main Storage alteration address compare ... [4] General Purpose Register alteration address compare.

Standard features include a commercial instruction set, new S/370 instructions, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording, interval timer, time-of-day clock, store and fetch protect, console file, byte-oriented operand feature, error checking and correction code on main storage, micro-instruction retry, channel retry information, byte multiplexer channel, audible alarm, OS/DOS Compatibility Feature, and one selector channel.

Control Storage Requirements: The Reloadable Control Storage is housed in the CPU and is loaded from the Console File, which is located below the console reading board. This area of control storage is not available to the user. Control storage requirements for the system are as follows:

	Bytes
Basic System Microcode: Does not include 16 standard subchannels on the byte multiplexer channel	26,000
Byte Multiplexer Channel UCWs: Select one of the following:	
1. 16 MPX Channel Units	256
2. 32 MPX Channel Units	512
3. 64 MPX Channel Units	1024
4. 128 MPX Channel Units	2048
5. 256 MPX Channel Units	4096
Optional System Features	
1. Console Printer/Keyboard and Alternate Console Facility ... select one of the following:	
3210 Console Printer-Keyboard mdl 1	3200
3210 Console Printer-Keyboard mdl 1 with remote 3210 mdl 2	3440
3215 Console Printer-Keyboard	3800
3215 Console Printer-Keyboard with remote 3210 mdl 2	4570
2. Selector Channel Block Multiplex Feature (basic microcode which supports any and all selector channels with block multiplexer)	2500
3. UCWs for the Block Multiplex Channel come in multiples of 16 which are shared among all Block Multiplexer Channels	
8 bytes x no. of UCWs = **Note:** 512 UCWs are maximum.	———
4. Integrated File Adapter	9760
5. Compatibility Support: Select one:	
1401/1440/1460 Compatibility	5200
1401/1440/1460, 1410/7010 Compatibility	6000
6. Floating Point	2240
7. Direct Control Feature	80
8. Clock Comparator and CPU Timer	1800
9. Conditional Swapping	140
10. Advanced Control Program Support	860
11. Virtual Machine Assist	2400
12. APL Assist	19500

Control storage requirements in excess of 32,768 bytes will reduce processor storage by the amount exceeding 32,768 bytes in 2,048-byte increments to a maximum of 65,536 bytes.

Example:

Basic System	26,000 bytes
16 UCWs on byte multiplexer channel	256 bytes
3210 Console Printer-Keyboard mdl 1	3,200 bytes
Integrated File Adapter	9,760 bytes
1401/1440/1460 Compatibility	5,200 bytes
	Total = 44,416 bytes

The Movable Control Storage Boundary is set on 2,048 bytes. Control Storage required is 45,056 (32,768 + 6 x 2,048). The impact on processor storage is 12,288 bytes.

The address boundary between control and processor storage is assigned at Initial Micro Program Load (IMPL) time The boundary is established by the value loaded (during IMPL) according to the requirements in the console file. The boundary established is the upper limit of main storage addresses. If an I/O operation or program instruction attempts to address a main storage location at or above this boundary, an address check occurs and no storage location is accessed. If a control storage access is attempted below the boundary, a machine check occurs. Control storage will never be less than 32,768 bytes. Above this amount - to a maximum of 65,536 bytes - control storage is allocated from processor storage in 2,048-byte increments depending upon requirements specified to the system. This allocation can be changed by utilizing an alternate magnetic disk cartridge with another set of 3145 features. Alternate cartridges for an installation will be available via RPQ.

For S/360 Programming Systems (DOS and OS), the amount of processor storage available after control storage requirements have been met must be equal to or larger than the S/360 memory size that the version of the operating system requires. Any decrementing of processor storage for control storage requirements will be made in increments of 2,048 bytes.

Input/Output Attachment: A wide variety of I/O devices may be attached to the S/370 mdl 145 via the standard byte multiplexer channel and the optional selector channels. There are, however, four

3145 Processing Unit (cont'd)

direct attachment features for the 3145. They are:

Console File [standard] -- this is the basic microprogram loading device for the system. The console file contains a small, low-performance read-only file device that provides all of the microcode for the system on removable magnetic disk cartridges. The several disks that will be supplied with the system will supply all of the required microcode for FEdiagnostics, basic systems features, plus the optional features ordered for the system.

Console Printer-Keyboard [required] -- this unit serves as the online input/output device for operator/system communications. It provides a means of manually entering data into the system, altering data already in storage, and for printing error logout messages.

Integrated File Adapter [optional on 3145 mdls FED, GE, GFD, H, HG or I ... not available on mdls H2, HG2, I2, IH2, J2, JI2 or K2] -- this feature enables native attachment of 2319 Disk Storage mdl A1 (and additional 2312, 2313, 2318 or 2319 mdl A2 Disk Storages) through an integrated adapter. The adapter is permanently assigned to the standard selector channel (Channel 1), and requires space normally assigned to Selector Channel 4. When the IFA is installed, Selector Channel 2 becomes standard, and only Selector Channel 3 can be ordered. **Note:** 2312s, 2313s, 2318s and 2319 all models are no longer available.

Integrated Storage Control [optional on mdls H2, HG2, I2, IH2, J2, JI2 or K2 ... not available on mdls FED, GE, GFD, H, HG or I] -- this feature allows native attachment of 3333 Disk Storage and Control modules (with 3330 modules) and/or 3340 Disk Storage mdl A2s (with 3340 B mdls and/or 3344s) and/or 3350 Disk Storage mdls A2/A2F (with 3350 B2/B2F, C2/C2F mdls). This feature requires an available control unit position on a system channel. A Block Multiplexer Channel and one unshared subchannel per logical device are required for support of block multiplexing and rotational position sensing. If this support is not required, attachment to a system selector channel is permitted.

This attachment capability is provided for the 3145 mdls FED, GE, GFD, H, HG or I via the 3345 mdls 3, 4 and 5 ... see M3345 pages.

Input/Output Channels

Byte Multiplexer Channel -- one is standard on the 3145 and is functionally equivalent to the byte multiplexer channel on the S/360 mdls 30, 40 and 50. Sixteen subchannels are provided as standard with the option of 32, 64, 128 or 256 ... see "Special Features". At system order time, the number of units on the multiplexer channel must be specified in order that the correct amount of control storage is reserved. The byte multiplexer channel provides eight control unit positions and permits I/O units to operate normally in byte mode, giving the effect of several I/O operations simultaneous with computing. In burst mode, the channel handles one high speed unit. For Operating System/360 exclusion, refer to SRL GC28-6554, *System/360 Operating Systems System Generation.*

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Additional, in "Special Features".

Selector Channels -- one is standard ... three additional are available ... see "Special Features". **Note:** If the Integrated File Adapter is specified, see "Selector Channel" under "Special Features" for limitations. With the optional Word Buffer installed, the selector channel data rate will approximate 1.85 megabytes/second, while the unbuffered data rate will be 820 KB. The Block Multiplexer Channel is also available for the selector channels and the channel data rates apply with or without the feature. On channels without the Word Buffer (#8810), the 3330/3830 or 3345 mdl 3, 4, 5 with 3330 drives must be attached to channel 1 of non-IFA systems and to channel 2 of IFA systems. On channels with #8810, the 2305/2835 mdl 2 must be attached to channel 1 on non-IFA systems and to channel 2 on IFA systems, and the 3330/3830 or 3345 mdl 3, 4, 5 may be attached to any available channel. **Note:** If block multiplexing or rotational position sensing is required, the Block Multiplexer Channel feature must be installed. The Word Buffer (#8810) is required to attach the 2305/2835 mdl 2 or 3340. If the S/370 mdl 145 has 3 or 4 selector channels (IFA counts as a selector channel), the Word Buffer (#8810) is required to attach a 3330 series facility.

Attention: If Block Multiplexer Channels are installed, UCW requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

Console Function -- a standard system control panel is located on the 3145. It has switches and lights necessary to operate and control the system. A systems control I/O function is provided with either of two alternatives. Feature #7844 attaches the 3210 Console Printer-Keyboard mdl 1 (15.5 cps) on the console table reading board. Optionally, the 3215 Console Printer-Keyboard (85 cps) can be attached via feature #7855. Either #7844 or #7855 is required in the system. A remote 3210 mdl 2 may also be attached ... see "Special Features".

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#990***s* for 208V or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Console Table (Reading Board) Extension: **#9824** for extension to operator's right or **#9825** for extension to left.
- Cabling: **#9080** for below the floor or **#9081** for on the floor.
- Additional Multiplexer channels: 16 are standard ... if more are required, see "Special Features".
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning,* GC22-7004, for requirements.
- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required on a S/370 mdl 145.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- RETAIN/370: **#9570** for non-use of FE DAU, **#9571** for first CPU using FE DAU, **#9572** for second CPU using FE DAU, or **#9573** for third CPU using FE DAU. Customer must provide interface for FE DAU to the telephone line. For details on ordering and customer responsibilities, see BOM, Orders and Movements. Note: Up to three CPUs in the same physical location can be serviced by a single FE DAU.
- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3145 Frame 01 (CPU) are 31-1/2" wide x 70" long x 60" high. Removal of the side covers will reduce the width to 29-1/2". If further reduction in length is required, specify **#9692**. Shipping dimensions will then be 29-1/2" wide x 60" long x 60" high.
- Console Printer-Keyboard Address: [Recorded on the console file disk at the plant] **#9101**** for "01F," or **#9102**** for "009".
- Alternate Console Printer-Keyboard Address: **#9105**** ... alternate address of "009" for the Second Console Printer-Keyboard (3210 mdl 2). Address is in lieu of the standard Alternate Console Printer-Keyboard address of "01E" when the Primary Console Printer-Keyboard address in "01F". Recorded on the console file disk at the plant. **Prerequisites: #9101**, Primary Console Printer-Keyboard Address "01F".

  ** CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on same diskette.
- When attaching a 3345 mdl 3, 4 or 5, specify **#9851**.

SPECIAL FEATURES

Advanced Control Program Support (#1001): Provides four additional instructions and a new function ... Compare and Swap ... Compare Double and Swap ... Insert PSW Key ... Set PSW Key from Address ... Clear I/O Function. This feature is a prerequisite for the execution of MVS (OS/VS2 Release 2 and above) and/or VTAM and for TCAM/NCP. **Limitations:** Cannot be installed if Conditional Swapping (#1051) is installed. **Field Installation:** Yes.

APL Assist (#1005): Provides performance assist to APL programs when used with the VS APL PP #5748-AP1. **Field Installation:** Yes.

Conditional Swapping (#1051): Provides two additional instructions ... Compare and Swap ... Compare Double and Swap. This feature is a prerequisite for the execution of VTAM programming support and for TCAM/NCP. **Limitations:** Cannot be installed if Advanced Control Program Support (#1001) is installed. **Field Installation:** Yes.

Block Multiplexer Channel (#1421): Increases the efficiency of the selector channel when using direct access storage devices equipped with rotational position sensing. The disconnected command chaining feature of the channel allows multiple devices to perform non-data transfer operation concurrently with one data transfer operation. This permits increased utilization of the channel by performing operations on other devices while the channel would have normally been waiting on one device. This feature provides Block Multiplexer capabilities for all system Selector Channels. **Field Installation:** Yes. **Specify:** The number of UCWs (available in multiples of 16) for Block Multiplexer Channels must be specified. Select one of the following numbers, which will supply the specified number of UCWs to be shared by the Block Multiplexer Channels(s) ... field installable.

3145 Processing Unit (cont'd)

Code	UCWs	Code	UCWs	Code	UCWs	Code	UCWs
#9491*	16	**#9499***	144	**#9507***	272	**#9515***	400
9492*	32	**9500***	160	**9508***	288	**9516***	416
9493*	48	**9501***	176	**9509***	304	**9517***	432
9494*	64	**9502***	192	**9510***	320	**9518***	448
9495*	80	**9503***	208	**9511***	336	**9519***	464
9496*	96	**9504***	224	**9512***	352	**9520***	480
9497*	112	**9505***	240	**9513***	368	**9521***	496
9498*	128	**9506***	256	**9514***	384	**9522***	512

* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

Note: The number of UCWs specified for the Block Multiplexer Channels(s) does *NOT* affect the number of Multiplexer Subchannels. See Multiplexer Subchannels, Add'l (#4951 - 4954).

Channel-To-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 processor). Only one of the processors requires this feature. Uses two control unit positions on each of the connected channels. **Maximum**: One. **Field Installation**: Yes.

Clock Comparator and CPU Timer (#2001): The Clock Comparator provides a means of causing an interruption when the time-of-day clock has passed a program-specified value. The CPU Timer is a decrementing binary counter with a resolution of one microsecond. It provides a means for measuring elapsed CPU time by causing an interruption when a pre-specified amount of time has elapsed. **Maximum**: One. **Field Installation**: Yes.

Control Store Extension (#2150): [Mdls H2, HG2, I2, IH2, J2, JI2, K2] Provides additional control storage for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Maximum**: One. **Field Installation**: Yes. **Limitations**: Cannot be installed with Expanded Control Store (#2152).

Expanded Control Store (#2152): [Mdls H2, HG2, I2, IH2, J2, JI2, K2] Provides additional control storage for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Limitations**: Cannot be installed with Control Store Extension (#2150). **Maximum**: One. **Field Installation**: Yes.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum**: One. **Cable Order**: Required. **Field Installation**: Yes. **Prerequisites**: External devices must meet the interface specifications outlined in *S/360 - Direct Control Feature - OEM,* SRL GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation**: Yes.

Floating Point (#3910): Adds floating point instructions to the S/370 mdl 145 standard instruction set. Provides for floating point operations including extended precision to 28 hexadecimal digits. **Field Installation**: Yes.

1401/1440/1460 Compatibility (#4457): Microprogram controlled feature which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. **Field Installation**: Yes.

1401/1440/1460, 1410/7010 Compatibility (#4458): Gives 1401/1440/1460 compatibility, plus 1410/7010 compatibility. **Field Installation**: Yes.

Integrated File Adapter (#4650): [Mdls FED, GE, GFD, H, HG, I] Permits native attachment of the 2319 Disk Storage mdl A1 (and additional 2312, 2313, 2318 or 2319 mdl A2 Disk Storages ... up to eight drives total) through an integrated adapter. Standard features include file scan and record overflow functions. **Specify**: One of the following additional power features -- **#9303** for three drives ... **#9304** for four ... **#9305** for five ... **#9306** for six ... **#9307** for seven ... **#9308** for eight. See M2319 pages for additional ordering instructions. **Limitations**: Cannot be installed on mdls H2, HG2, I2, IH2, J2, JI2 or K2. **Field Installation**: Not recommended ... but may be removed in the field. Contact IBMfor system time required.

Note: Field removal of this feature by MES provides for the installation of Selector Channel #1 in its place. When this occurs, the currently installed standard selector channel (Channel 2) becomes an optional channel which **Is Billable**. A concurrent MES should be submitted to remove any unwanted optional selector channels.

Integrated Storage Control (#4660): [Mdls H2, HG2, I2, IH2, J2, JI2, K2] Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs ... see DASD Configuration under Specify, below. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2 or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2 or A2F ... see DASD Configuration table below and M3330, 3333, 3340, 3344, 3350 pages. **Maximum**: One. **Field Installation**: Yes. **Limitations**: Cannot be installed on mdls FED, GE, GFD, H, HG or I. **Prerequisites**: Requires a control unit position on a system channel. A block multiplexer channel and one unshared subchannel per logical device are required for support of block multiplexing and rotational position sensing. If this support is not required, attachment to a system selector channel is permitted. Word Buffer (#8810) is required to support the 3340, or if the system includes Selector Channel, 3rd (#6983). **Specify**: The available combinations of storage devices which can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machines(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s). [Note that **#9190** is 3340 Fixed Head Attachment for **#9314** and **#9315** and is *not* specified for **#9317** or **#9318.**]

Multiplexer Subchannels, Add'l (#4951-#4954): To increase the number of I/O devices on the multiplexer channel, the number of subchannels can be increased by specifying one of the following: #4951 -- for 32 multiplexer subchannels ... #4952 -- for 64 ... #4953 -- for 128 ... or #4954 -- for 256. The maximum number of shared subchannels is eight. When 256 multiplexer subchannels are installed there are *NO* shared subchannels. **Note**: The number of Multiplexer Subchannels does not affect the number of UCWs specified for the Block Multiplexer Channel(s). See Block Multiplexer Channel (#1421) specify. **Field Installation**: Yes.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Field Installation**: Yes. **Maximum**: One.

Selector Channel (#6982-#6984): Each adds a high-speed channel to the system. The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. #6982 -- for second selector channel ... #6983 -- for third ... #6984 -- for fourth. **Limitations**: If Integrated File Adapter (#4650) is installed, Selector Channels 1 and 4 are preempted, Channel 2 becomes standard and only Channel 3 (#6983) can be ordered. **Field Installation**: Yes. **Prerequisites**: #6983 requires #6982 or #4650 ... #6984 requires #6983 ... if 3330 or 3333 drives are to be attached to the system, #6983 requires #8810.

3210 Mdl 1 Adapter (#7844): To attach a 3210 Console Printer-Keyboard mdl 1 (15.5 cps) for systems console I/O ... includes an alter-display ability. Position of the 3210 to the right or left of the operator depends on Console Table Extension (**#9824** or **#9825**) ... see "Specify" above. **Limitations**: Cannot be installed with 3215 Adapter (#7855). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: Uses one address on the standard byte multiplexer channel, but does not use a control unit position.

3210 Mdl 2 Adapter (#7845): To attach a free-standing 3210 Console Printer-Keyboard mdl 2 for remote systems console I/O. **Limitations**: Maximum distance from the console is 75 feet. **Maximum**: One. **Cable Order**: Required. **Field Installation**: Yes. **Prerequisites**: Either a #7844 or #7855 and a #4951, 4952, 4953 or 4954. Uses one address on the standard byte multiplexer channel, but does not use a control unit position. The standard address for the Alternate Console Printer-Keyboard is "01E" if the Primary Console Printer-Keyboard address is "01F". If the Primary Console Printer-Keyboard address is "009", the standard address for the Alternate Console Printer-Keyboard is "008". Also see "Specify" for alternate address.

3215 Adapter (#7855): To attach a 3215 Console Printer-Keyboard (85 cps) for systems console I/O ... includes alter-display ability. Position of the 3215 to the right or left of the operator depends upon Console Table Extension (**#9824** or **#9825**) ... see "Specify" above. **Limitations**: Cannot be installed with 3210 Mdl 1 Adapter (#7844). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: Uses one address on the standard byte multiplexer channel, but does not use a control unit position.

Two Channel Switch (#8100): [Mdls H2, HG2, I2, IH2, J2, JI2, K2] To attach the Integrated Storage Control (#4660) to a second channel ... the two-channels may be on the same or different CPUs. Switching is under program control. The ISC feature in the 3145 can be dedicated to a single channel by means of an Enable/Disable switch. **Limitations**: Cannot be installed on a mdl FED, GE, GFD, H, HG or I. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: See "Prerequisites" under ISC (#4660).

3145 Processing Unit (cont'd)

ISC (#4660) WITH ONE CHANNEL OR WITH TWO CHANNEL SWITCH (#8100)

DASD Configuration		Required DASD Specify Features*																	
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190				+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s							x	x		x	JC	x				
	String Switch (#8150) on any 3340 mdl A2				x				x	x		x					
	Fixed Head feature (#4301/ 4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x		
	String Switch (#8150) on any 3340 mdl A2 and/ or Fixed Head feature (#4301/ 4302) on any 3340														x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x				
	Fixed Head feature (#4301/ 4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs															x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F															x	
3333 3340	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																x x
3350 -not 3344	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ 4302) on any 3340																x

† ISC diskette only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. $290 on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** Control Store Extension (#2150) is prerequisite. With **#9315**, the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2152) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Note: Customers who may elect to purchase Control Store Extension (#2150) and later upgrade to Expanded Control Store (#2152) should consider the purchase of Expanded Control Store (#2152) initially because this field upgrade requires replacement of Control Store Extension (#2150) and installation of Expanded Control Store (#2152). The prerequisite of Control Store Extension (#2150) for **#9315** or **#9317** can be satisfied by Expanded Control Store (#2152).

Virtual Machine Assist (#8740): Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. **Field Installation:** Yes. **Prerequisites:** #2001 and #3910.

Word Buffer (#8810): Increases the data rate capability of the selector channels on the 3145 from a maximum aggregate data rate of 1.55 megabytes per second to 5.3 megabytes, and the maximum single channel rate from 0.82 megabytes to 1.85 megabytes. When installed, applies to all selector channels. **Field Installation:** Yes. **Prerequisites:** This feature is required to operate 3330 series drives when the system configuration includes an Integrated File Adapter and two Selector Channels, or three or more Selector Channels. It is also required whenever 3340, 3344 or 3350 series drives are attached.

MODEL CONVERSIONS

Field installable as follows. When ordering field conversion of a 3145 mdl FED, GE, GFD, H, HG or I to a mdl H2, HG2, I2, IH2, J2, JI2 or K2, see "Specify" in M3047 pages for additional requirements.

From To	GFD	H	HG	I
GE	X	X	X	X
GFD		X	X	X
H			X	X
HG				X

From To	H2	HG2	I2	IH2	J2	JI2	K2
GE	X	X	X	X	X	RPQ	RPQ
GFD	X	X	X	X	X	RPQ	RPQ
H	X	X	X	X	X	RPQ	RPQ
HG	RPQ	RPQ	X	X	X	RPQ	RPQ
I			RPQ	X	X	RPQ	RPQ
H2		X	X	X	X	X	X
HG2			X	X	X	X	X
I2				X	X	X	X
IH2					X	X	X
J2						X	X
JI2							X

Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of model changes to the '2' series from the non '2' series involves the removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3145-3 PROCESSING UNIT

[NO LONGER AVAILABLE]

[*The 3145-3 is No Longer Available ... features and model changes can be ordered on an 'as available' basis*]

PURPOSE

Provides a performance improvement for S/370 model 145 models H2, HG2, I2, IH2, J2, JI2 and K2 only.

MODELS

Model A1*	A01	196,608 bytes of processor storage
Model A2*	A02	327,680 bytes of processor storage
Model A3*	A03	458,752 bytes of processor storage
Model A4*	A04	720,896 bytes of processor storage
Model A5*	A05	983,040 bytes of processor storage
Model A6*	A06	1,507,328 bytes of processor storage
Model A7*	A07	2,031,616 bytes of processor storage

Prerequisites: The following prerequisites apply to each 3145-3 processor model:

[1] 3047 Power Unit ... see M3047 pages.
[2] Clock Comparator and CPU Timer Feature (#2001) ... see "Special Features".
[3] Word Buffer Feature (#8810) ... see "Special Features".

Note 1: The 3145-3 is available as a non-removable, field installable upgrade to a S/370 mdl 145 model H2, HG2, I2, IH2, J2, JI2 and K2.

Note 2: Up to 64K of main memory is removed during the conversion to a 3145-3 resulting in the memory sizes as specified.

HIGHLIGHTS

Depending on the mdl, up to 2,031,616 bytes of processor storage are available. CPU cycle time varies from 180 to 270 nanoseconds depending upon the internal operation being performed. 16 general purpose and four floating point registers are provided.

Standard Features Include: Advanced Control Program Support ... APL Assist ... Audible Alarm ... Byte Oriented Operand ... 1 Byte Multiplexer Channel ... 64 Byte Multiplexer Subchannels ... 1 Block Multiplexer Channel ... 64 Block Multiplexer Subchannels ... Channel Command Retry ... Channel Indirect Addressing ... Console File ... Control Registers ... Dynamic Address Translation ... Error Checking and Correction (in Main and Control Storage) ... Extended Control Mode ... Extended Control-Program Support ... Extended Precision ... Interval Timer ... Machine Check Handling ... Microprogram Instruction Retry ... OS/DOS Compatibility ... Program Event Recording ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... Time-of-Day Clock.

Control Storage: 131,072 bytes of Reloadable Control Storage are provided in addition to main storage. This permits emulator and control routines to function. The Reloadable Control Storage is housed in the CPU and is loaded from the Console File which is located beneath the operator's console. Reloadable Control Storage is not accessible to the user.

Virtual Storage: Virtual Storage capability is is provided to increase the effective utilization of main storage.

Console File (standard): This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be supplied with the system will supply all of the required microcode for CE diagnostics, basic system features, plus the optional features ordered for the system.

Console Function: Operator communication with the system is via a system control panel located on the 3145-3 and a 3210 mdl 1 or a 3215 Console Printer-Keyboard as on other models of the S/370 mdl 145. A remote 3210 mdl 2 may also be attached ... see "Special Features".

INPUT/OUTPUT CHANNELS

Byte Multiplexer Channel -- one is standard ... functionally equivalent to the byte multiplexer channel of the S/370 mdl 145 ... provides eight control unit positions ... in byte mode, permits simultaneous operation of many low-speed devices ... in burst mode, handles one high-speed unit.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Add'l, in "Special Features".

Block Multiplexer Channels -- one is standard ... three are available as special features ... the Word Buffer feature applies to any block multiplexer channels which are attached to the system ... as described, each Block Multiplexer Channel approximates 1.85 megabytes/second ... ability to "Block Multiplex" provides greater channel efficiency when using direct access storage devices equipped with rotational position sensing ... devices on these channels which cannot use block multiplexing will function as if attached to selector channels.

Subchannels -- on the byte multiplexer channel 64 subchannels are provided as standard with the option of 128 or 256 (see "Special Features") ... 64 block multiplexer subchannels (UCWs) are provided as standard with the option of 128, 256, or 512 (see "Special Features") ... the number of block multiplexer subchannels (UCWs) chosen will be shared by the number of Block Multiplexer Channel(s) attached to the system.

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

Input/Output Attachment

Non-native -- a wide variety of I/O devices may be attached to these models of the S/370 mdl 145-3 via the standard byte multiplexer channel, the standard block multiplexer channel, and/or the optional block multiplexer channels. In particular, any I/O device which is attachable to a 3145 is attachable to a 3145-3.

Native -- the following integrated I/O attachments/adapters are provided for controlling the designated I/O devices:

Console Printer-Keyboard (required) -- the unit serves as the online input/output device for operator/system communications. It provides a means of manually entering data into the system, altering data already in storage, and for printig error logout messages.

Integrated Storage Control -- this feature allows native attachment of 3333 Disk Storage and Control modules (with 3330 modules) and/or 3340 Disk Storage mdl A2s (with 3340 B mdls and/or 3344s) and/or 3350 Disk Storage mdls A2/A2F (with 3350 B2/B2F, C2/C2F mdls). This feature requires an available control unit position on a system channel.

Programming Features

Advanced Control Program Support (standard) -- provides four additional instructions and an additional function ... Compare and Swap ... Compare Double and Swap ... Insert PSW Key ... Set PSW Key from Address ... Clear I/O Function.

APL Assist (standard) -- this feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL (#5748-AP1).

Extended Control Program Support (standard) -- the 3145-3 processor mdls of the S/370 mdl 145 include Extended Control-Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

Virtual Machine I/O
Storage Management
Page Management
SVC Handler
Privileged Instruction Interfaces
Dispatching
Virtual Interval Timer

For VS1 the functional areas are:

Storage Management
IOS
SVC FLIH
System Trace
Page Management

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Console Table (Reading Board) Extension: **#9824** for extension to operator's right, **#9825** for extension to the left.
- Cabling: **#9080** for below the floor, **#9081** for on the floor.
- Additional Multiplexer Subchannels: 64 are standard ... if more are required, see "Special Features".
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning*, GC22-7004, for requirements.
- RETAIN/370: **#9570** for non-use of FE DAU, **#9571** for first CPU using FE DAU, **#9572** for second CPU using FE DAU, or **#9573** for third CPU using FE DAU. Customer must provide interface for FE DAU to the telephone line. For details on ordering and customer responsibilities, see BOM, Orders and Movements. **Note:** Up to three CPUs in the same physical location can be serviced by a single FE DAU.

3145-3 Processing Unit (cont'd)

Attention: Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- Unless otherwise specified, shipping dimensions of the 3145-3 Frame 01 (CPU) are 800mm (31-1/2") wide by 1778mm (70") long by 1524mm (60") high. Removal of the side covers will reduce the width to 749mm (29-1/2"). If further reduction in length is required, specify **#9692**. Shipping dimensions will then be 749mm (29-1/2") wide by 1524mm (60") long by 1524mm (60") high.
- Console Printer-Keyboard Address: [Recorded on the console file disk at the plant] **#9101*** for "01F", or **#9102*** for "009".
- Alternate Console Printer-Keyboard Address: **#9105*** ... alternate address of "009" for the Second Console Printer-Keyboard (3210 mdl 2). Address is in lieu of the standard Alternate Console Printer-Keyboard address of "01E" when the Primary Printer-Keyboard address is "01F". Recorded on the console file disk at the plant. **Prerequisites: #9101**, Primary Console Printer-Keyboard Address "01F".

SPECIAL FEATURES

Block Multiplexer Channel (#1427-#1429): Each adds a high-speed channel to the system. The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. #1427 -- for second channel ... #1428 -- for third ... #1429 -- for fourth. **Field Installation:** Yes. **Prerequisites:** #1428 requires #1427 ... #1429 requires #1428.

Block Multiplexer Subchannels, Add'l (#1450): To increase the number of I/O devices on the block multiplexer channels, the number of subchannels (UCWs) can be increased by specifying one of the following: **#9581*** for 128 ... **#9582*** for 256 ... **#9583*** for 512. The number of subchannels selected will be shared by the Block Multiplexer Channel(s) attached to the system.

Channel-to-Channel Adapter (#1850): To interconnect two-channels (either S/360, S/370 or 4341 Processor). Only one of the processors requires this feature. Uses two control unit poisitions on each of the connected channels. **Maximum:** One. **Field Installation:** Yes.

Clock Comparator and CPU Timer (#2001): [Prerequisite for 3145-3] The Clock Comparator provides a means of causing an interruption when the time-of-day clock has passed a program-specified value. The CPU Timer is a decrementing binary counter with a resolution of one microsecond. It provides a means for measuring elapsed CPU time by causing an interruption when a pre-specified amount of time has elapsed. **Maximum:** One. **Field Installation:** Yes.

Control Store Extension (#2150): Provides additional control storage for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with Expanded Control Store (#2152).

Expanded Control Store (#2152): Provides additional control storage for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Limitations:** Cannot be installed with Control Store Extension (#2150). **Maximum:** One. **Field Installation:** Yes.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 - Direct Control Feature - OEM*, GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning*, GC22-7004. **Field Installation:** Yes.

1401/1440/1460 Compatibility (#4457): Microprogram controlled feature which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. **Field Installation:** Yes.

1401/1440/1460, 1410/7010 Compatibility (#4458): Gives 1401/1440/1460 compatibility, plus 1410/7010 compatibility. **Field Installation:** Yes.

Integrated Storage Control (#4660): Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs ... see DASD Configuration under Specify. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2 or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2 of A2F ... see DASD Configuraton table under Specify and M3330, 3333, 3340, 3344, 3350 pages. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Requires a control unit position on a block multiplexer channel. Block multiplexing and rotational position sensing require one unshared subchannel on the block multiplexer channel per logical device. **Specify:** The available combinations of storage devices which can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machines(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the special features listed below being ordered for them, order the Required DASD Specify Feature(s).

[Note that **#9190** is 3340 Fixed Head Attachment for **#9314** and **#9315**, and is not specified for **#9317** or **#9318**.]

Multiplexer Subchannels, Add'l (#4953, #4954): To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: #4953 for 128 or #4954 for 256. The maximum number of shared subchannels is eight. When 256 multiplexer subchannels are installed there are *NO* shared subchannels. **Note:** The number of Multiplexer Subchannels does not affect the number of UCWs specified for the Block Multiplexer Channel(s). See Block Multiplexer Subchannels, Add'l (#1450) specify. **Field Installation:** Yes.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Field Installation:** Yes. **Maximum:** One.

3210 Mdl 1 Adapter (#7844): To attach a 3210 Console Printer-Keyboard mdl 1 (15.5 cps) for systems console I/O ... includes an alter-display ability. Position of the 3210 to the right or left of the operator depends on Console Table Extension (**#9824** or **#9825**) ... see "Specify" above. **Limitations:**Cannot be installed with 3215 Adapter (#7855). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Uses one address on the standard byte multiplexer channel, but does not use a control unit position.

3210 Mdl 2 Adapter (#7845): To attach a free-standing 3210 Console Printer-Keyboard mdl 2 for remote systems console I/O. **Limitations:** Maximum distance from the console is 75 feet. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** Either a #7844 or #7855 and a #4953 or #4954. Uses one address on the standard byte multiplexer channel, but does not use a control unit position. The standard address for the Alternate Console Printer-Keyboard is "01E" if the Primary Console Printer-Keyboard address is "01F". If the Primary Console Printer-Keyboard address is "009", the standard address for the Alternate Console Printer-Keyboard is "008". Also see "Specify" for alternate address.

3215 Adapter (#7855): To attach a 3215 Console Printer-Keyboard (85 cps) for systems console I/O ... includes alter-display ability. Position of the 3215 to the right or left of the operator depends upon Console Table Extension (**#9824** or **#9825**) ... see "Specify" above. **Limitations:** Cannot be installed with 3210 Mdl 1 Adapter (#7844). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Uses one address on the standard byte multiplexer channel, but does not use a control unit position.

Two-Channel Switch (#8100): To attach the Integrated Storage Control (#4660) to a second channel ... the two channels may be on the same or different CPUs. Switching is under program control. The ISC feature in the 3145-3 can be dedicated to a single channel by means of an Enable/Disable switch. **Limitations:** Cannot be installed on a mdl FED, GE, GFD, H, HG or I. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Prerequisites" under ISC (#4660).

Word Buffer (#8810): [Prerequisite for 3145-3] Increases the data rate capability of the selector channels on the 3145-3 from a maximum aggregate data rate of 1.55 megabytes per second to 5.3 megabytes, and the maximum single channel rate from 0.82 megabytes to 1.85 megabytes. When installed, applies to all selector channels. **Field Installation:** Yes. **Prerequisites:** This feature is required to operate 3330 series drives when the system configuration includes an Integrated File Adapter and two Selector Channels, or three or more Selector Channels. It is also required whenever 3340, 3344 or 3350 series drives are attached.

* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3145-3 Processing Unit (cont'd)

ISC (#4660) With One Channel or With Two Channel Switch (#8100)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190			+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x													
	Up to four 3333s with associated 3330s						x	x								
	String Switch (#8150) on any 3333		x				x									
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x						
	Up to four 3340 mdl A2s with associated mdl B1/B2s						x	x			x	x				
	String Switch (#8150) on any 3340 mdl A2				x			x		x		x				
	Fixed Head feature (#4301/#4302) on any 3340					x				x	x	x				
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s												x	x		
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340													x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x		
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x			
	Fixed Head feature (#4301/#4302) on any 3340												x	x		
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs														x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F														x	
3333 3340	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives															x x
3350 -not 3344	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340															x

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** Control Store Extension (#2150) is prerequisite. With **#9315**, the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2152) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Note: Customers who may elect to purchase Control Store Extension (#2150) and later upgrade to Expanded Control Store (#2152) should consider the purchase of Expanded Control Store (#2152) initially because this field upgrade requires replacement of Control Store Extension (#2150) and installation of Expanded Control Store (#2152). The prerequisite of Control Store Extension (#2150) for **#9315** or **#9317** can be satisfied by Expanded Control Store (#2152).

MODEL CONVERSIONS

Field installable as follows:

From to	A1	A2	A3	A4	A5	A6	A7
H2	X	X	X	X	X	X	X
HG2		X	X	X	X	X	X
I2			X	X	X	X	X
IH2				X	X	X	X
J2					X	X	X
JI2						X	X
K2							X
A1		X	X	X	X	X	X
A2			X	X	X	X	X
A3				X	X	X	X
A4					X	X	X
A5						X	X
A6							X

Planning for Model Conversions: When a customer requires feature changes (except for one or both of the prerequisite features - Word Buffer #8810, and Clock Comparator and CPU Timer #2001) and/or memory upgrades in addition to a model upgrade to a 3145-3, consolidating the several changes into a single MES is not recommended.

ACCESSORIES (None)

SUPPLIES (None)

3148 PROCESSING UNIT

[No Longer Available ... features and model conversions can be ordered on an "as available" basis.]

PURPOSE

Provides main and control storage plus arithmetic and logic circuits for the S/370 model 148.

MODELS

Model J	J00	1,048,576 bytes of processor storage
Model K	K00	2,097,152 bytes of processor storage

Prerequisites: Each S/370 mdl 148 requires a 3047 Power Unit ... see M3047 pages.

HIGHLIGHTS

1,048,576 bytes or 2,097,152 bytes of processor storage are provided. CPU cycle time ranges from 180 to 270 nanoseconds depending upon the internal operation being performed. 16 general purpose and four floating point registers are provided.

Standard Features Include: Advanced Control Program Support ... APL Assist ... Audible Alarm ... Byte Oriented Operand ... 1 Byte Multiplexer Channel ... 128 or 256 Byte Multiplexer Subchannels ... 4 Block Multiplexer Channels ... 512 Block Multiplexer Subchannels ... Channel Command Retry ... Channel Indirect Addressing ... Clock Comparator and CPU Timer ... Console File ... Control Registers ... Dynamic Address Translation ... Error Checking and Correction (in Main and Control Storage) ... Extended Control Mode ... Extended Control-Program Support ... Extended Precision Floating Point ... Interval Timer ... Machine Check Handling ... Microprogram Instruction Retry ... OS/DOS Compatibility ... Program Event Recording ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... Time-of-Day Clock ... Word Buffer ... 1401/1440/1460, 1410/7010 Compatibility (selectable by CE).

Control Storage: 131,072 bytes of Reloadable Control Storage are provided in addition to main storage. This permits emulator and control routines to function. The Reloadable Control Storage is housed in the CPU and is loaded from the Console File. Reloadable Control Storage is not available to the user.

Virtual Storage: Virtual Storage capability is provided to increase the effective utilization of main storage.

Console File (Standard): This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be supplied with the system will supply all of the required microcode for CE diagnostics, basic systems features, plus the optional features ordered for the system.

Console Function: A display console is standard ... includes a cathode ray tube, and a keyboard ... functions as an operator's I/O console to communicate with the operating system ... standard attachment for an optional 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 for hard copy output. CRT can accommodate twenty-four 80-character lines of information. A system control panel is also located on the 3148 for additional operator communication with the system.

Three console modes are available -- "Printer-Keyboard" Mode, "Display" Mode, "115/125 Console-Display-Emulation" Mode.

In "Printer-Keyboard" mode, the display console uses the keyboard for input and the CRT and a recommended 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 for output. The CRT, keyboard and printer appear to the system as a 3215 Console Printer-Keyboard. "Printer-Keyboard" mode is supported by DOS, DOS/VS, OS/360, OS/VS and VM/370.

In "Display" mode, the keyboard is used for input, the CRT with 24 lines by 80 characters/line for output, and DIDOCS or equivalent support is required. DOS/VS does not support Display Mode. The 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 (optional) has a separate address and requires MCS support or equivalent. When present, the printer appears to the system as a 3213 Console Printer.

In "115/125 Console-Display-Emulation" mode, the keyboard is used for input, the CRT is used for output, and the CRT displays twelve 56-character lines of information. The 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 is optional. When present, the printer emulates a 5213 Printer mdl 1 and acts as a slave unit to the display console. That is, the 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 is not addressable in this mode. The "115/125 Console-Display-Emulation" mode is available in DOS/VS Release 28 and above.

The display console provides the capability to select three aspects of the system's environment at IMPL time:

Console Mode -- see above (Mode descriptions)

CPU Mode (3148 or 3145) -- see "Programming Features"

Unit addresses of natively attached I/O (except for those attached to the Integrated Storage Control)

These selections will be recorded on the console file for permanent reuse until such time as any new selection is made during a subsequent IMPL. **Note:** This is the only user access to the console file.

Input/Output Files

Byte Multiplexer Channel -- one is standard ... functionally equivalent to the byte multiplexer channel on the S/370 mdl 145 ... provides eight control unit positions ... in byte mode, permits simultaneous operation of many low-speed devices ... in burst mode, handles one high-speed unit.

Either 128 or 256 subchannels are available, and are selectable by the CE. When 256 multiplexer subchannels are selected, there are NO shared subchannels

Block Multiplexer Channels -- four are standard ... each contains the Word Buffer ... as described, each Block Multiplexer Channel approximates 1.85 megabytes/second ... ability to "Block Multiplex" provides greater channel efficiency when using direct access storage devices equipped with rotational position sensing ... devices on these channels which cannot use block multiplexing will function as if attached to selector channels.

Subchannels -- on the byte multiplexer channel 128 or 256 subchannels are provided and are selectable by the CE ... for the four block multiplexer channels, 512 block multiplexer subchannels (UCWs) are provided as standard. The 512 subchannels (UCWs) are shared by the four block multiplexer channels.

Input/Output Attachments

Non-Native -- a wide variety of I/O devices may be attached to the S/370 mdl 148 via the standard byte multiplexer channel or any of the four standard block multiplexer channels.

Native -- the following integrated I/O attachments/adapters are provided for controlling the designated I/O devices:

Integrated 3203-4 Printer Attachment, First Printer (optional) -- provides the capability to natively attach the 3203 Printer mdl 4 as the first systems printer.

Integrated 3203-4 Printer Attachment, Second Printer (optional) -- provides the capability to natively attach the 3203 Printer mdl 4 as the second systems printer.

Integrated Console Printer Adapter (standard) -- provides the capability to natively attach the optional 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 as a hard copy printer.

Integrated Storage Control (optional) -- allows native attachment of 3333 Disk Storage and Control modules (with 3330 modules) and/or 3340 Disk Storage mdl A2s (with 3340 B mdls and/or 3344s) and/or 3350 Disk Storage mdls A2/A2F (with 3350 B2/B2F, C2/C2F mdls) ... requires an available control unit position on a block multiplexer channel ... block multiplexing and rotational position sensing require one unshared subchannel on the block multiplexer channel per logical device.

Programming Features

Advanced Control Program Support (standard) -- provides four additional instructions and an additional function ... Compare and Swap ... Compare Double and Swap ... Insert PSW Key ... Set PSW Key from Address ... Clear I/O Function.

APL Assist (standard) -- this feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL (5748-AP1).

IMPL 3145 CPU Mode Selection -- provides the capability to "run" on S/370 mdl 148 any SCP which will "run" today on a S/370 mdl 145. No performance degradation or loss of S/370 mdl 145 recovery from error capabilities will be experienced in this mode. That is, in 3145 CPU Mode, the improved hardware performance of the S/370 mdl 148 will be available to the user. Moreover, the user will have the same recovery capabilities on the S/370 mdl 148 as he has on a S/370 mdl 145 when 3145 CPU Mode is selected. **Note:** S/370 mdl 148 Extended Logout/EREP is not supported in this mode.

Extended Control-Program Support (standard) -- the S/370 mdl 148 includes Extended Control-Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

Virtual Machine I/O
Storage Management
Page Management
SVC Handler
Privileged Instruction Interfaces
Dispatching
Virtual Interval Timer

3148 Processing Unit (cont'd)

For VS1 the functional areas are:

Storage Management
IOS
SVC FLIH
System Trace
Page Management

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Cabling: **#9080** for below the floor, **#9081** for on the floor.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

@SS@

- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in S/370 mdl 148.
- Console Table (Reading Board) Extension: **#9824** for extension to operator's right, **#9825** for extension to operator's left. **Note:** Extension direction may not be changed in the field.
- RETAIN/370: **#9570** for non-use of FE DAU, **#9571** for first CPU using FE DAU, **#9572** for second CPU using FE DAU, or **#9573** for third CPU using FE DAU. Customer must provide interface for FE DAU to the telephone line. For details on ordering and customer responsibilities, see BOM, Orders and Movements. **Note:** Up to three CPUs in the same physical location can be serviced by a single FE DAU.
- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3148 Frame 01 (CPU) are 800mm (31-1/2") wide by 1,778mm (70") long by 1,524mm (60") high. Removal of the side covers will reduce the width to 749mm (29-1/2"). If further reduction in length is required, specify **#9692**. Shipping dimensions will then be 749mm (29-1/2") wide by 1,524mm (60") long by 1,524mm (60") high.
- Emergency Power-Off Control: May be required ... see "Special Features" and *System/370 Installation Information - Physical Planning* for requirements.

SPECIAL FEATURES

Channel-to-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 processor). Only one of the processors requires this feature. Uses two control unit positions on each of the connected channels. **Maximum:** One. **Field Installation:** Yes.

Control Store Extension (#2150): Provides additional control store for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Maximum:** One. **Field Installation:** Yes. **Limitation:** Cannot be installed with Expanded Control Store (#2152).

Expanded Control Store (#2152): Provides additional control storage for microprogram use on the ISC (#4660) ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Limitation:** Cannot be installed with Control Store Extension (#2150). **Maximum:** One. **Field Installation:** Yes.

Direct Control (#3274): Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/360 - Direct Control Feature - OEM,* GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Integrated Storage Control (#4660): Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs ... see DASD Configuration under "Specify" below. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2 or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2 or A2F ... see DASD Configuration table below and M3330, 3333, 3340, 3344, 3350 pages. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Requires a control unit position on a block multiplexer channel. Block multiplexing and rotational position sensing require one unshared subchannel on the block multiplexer channel per logical device. **Specify:** The available combinations of storage devices which can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machines(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the special features listed below being ordered for them, order the Required DASD Specify Feature(s). [Note that **#9190** is 3340 Fixed Head Attachment for **#9314** and **#9315** and is *not* specified for **#9317** or **#9318**.]

Register Expansion (#6111): Provides additional registers microprogram use on the ISC ... see "Specify" under Integrated Storage Control (#4660) to determine when required. **Field Installation:** Yes. **Maximum:** One.

Integrated 3203-4 Printer Attachment, First Printer (#8075): Provides the capability to natively attach the 3203 Printer mdl 4. **Maximum:** One. **Field Installation:** Yes.

Integrated 3203-4 Printer Attachment, Second Printer (#8076): Provides the capability to natively attach a second 3203 Printer mdl 4. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch (#8100): To attach the Integrated Storage Control (#4660) to a second channel ... the two channels may be on the same or different CPUs. Switching is under program control. The ISC feature in the 3148 can be dedicated to a single channel by means of an Enable/Disable switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Prerequisites" under ISC (#4660).

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

3148 Processing Unit (cont'd)

ISC (#4660) With One Channel Or With Two Channel Switch (#8100)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190				+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s							x	x		x	x					
	String Switch (#8150) on any 3340 mdl A2				x				x	x		x					
	Fixed Head feature (#4301/#4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x		
	String Switch (#8150) on any 3340 mdl A2 and/ or Fixed Head feature (#4301/#4302) on any 3340														x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x				
	Fixed Head feature (#4301/#4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs															x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F															x	
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																x x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340																x

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** Control Store Extension (#2150) is prerequisite. With **#9315**, the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2152) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Note: Customers who may elect to purchase Control Store Extension (#2150) and later upgrade to Expanded Control Store (#2152) should consider the purchase of Expanded Control Store (#2152) initially because this field upgrade requires replacement of Control Store Extension (#2150) and installation of Expanded Control Store (#2152). The prerequisite of Control Store Extension (#2150) for **#9315** or **#9317** can be satisfied by Expanded Control Store (#2152).

3158 PROCESSING UNIT

[NO LONGER AVAILABLE]

[*The 3158 is No Longer Available ... New RPQs that do not entail new functions will continue to be accepted.*]

PURPOSE

Performs arithmetic, logic, processor storage and control functions for a S/370 Model 158.

MODELS

..... Models				Bytes of Processor Storage
I	I00	AP1	MP1	524,288
J	J00	AP2	MP2	1,048,576
JI	JI0	AP3	MP3	1,572,864
K	K00	AP4	MP4	2,097,152
KJ	KJ0	AP5	MP5	3,145,728
L	L00	AP6	MP6	4,194,304
LJ	LJ0	AP7		5,242,880
LK	LK0	AP8		6,291,456

HIGHLIGHTS

Depending upon the mdl contains up to 6,291,456 bytes of monolithic processor storage with a cycle time of 1,035 nanoseconds for a 16-byte read, of 690 ns for an 8-byte write, 920 ns for a write of 1 to 7 bytes, and 920 ns for a write of 9 to 16 bytes ... 16-byte parallel data flow ... includes 8,192 bytes of buffer storage which is transparent to the programmer and reduces the effective cycle time of processor storage. 16 general purpose and four floating point registers are implemented in high-speed internal circuits with a 4-byte data flow. The 115 nanosecond cycle CPU and I/O functions are controlled by reloadable control storage. An optional integrated storage controls feature allows direct attachment of 3330, 3340, 3344, 3350 direct access storage devices. Attached Processing is provided by attachment of a 3052 Attached Processing Unit mdl 1.

Standard features include: S/370 universal instruction set ... interval timer ... store and fetch protect ... byte oriented operand feature ... error checking and correction code on main storage ... instruction retry ... channel retry ... one byte multiplexer channel ... block multiplexer channels number one and two ... dynamic address translation ... extended control mode ... program event recording ... time-of-day clock with clock comparator ... CPU timer ... channel indirect addressing function for channels ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O. Four additional instructions on MP mdls -- signal processor, set prefix, store prefix, store CPU address.

Byte Multiplexer Channel: Permits simultaneous operation of many low-speed devices. Can be operated in "burst" mode for attachment of high-speed devices. For OS exclusion, refer to GC28-6554, *OS System Generation,* ... for OS/VS exclusion, refer to GC26-3791, *OS/VS1 System Generation,* and GC26-3792, *OS/VS2 System Generation.* Eight control unit positions are provided on the channel.

Block Multiplexer Channels: Up to five ... first two are standard ... up to three more can be attached. See "Special Features". Permits simultaneous operation of high-speed devices ... ability to "Block Multiplex" provides greater channel efficiency when using direct access storage devices equipped with rotational position sensing or buffered devices ... provides block multiplexing compatible with the same function on the 2880 Block Multiplexer Channel ... operates as a conventional selector channel otherwise.

Subchannels: 256 non-shared subchannels or 120 non-shared and 8 shared subchannels on 1st Byte Multiplexer Channel ... 256 non-shared or 120 non-shared and 8 shared subchannels on 2nd Byte Multiplexer Channel ... 16 shared subchannels on Block Multiplexer Channels ... 480 non-shared subchannels on Block Multiplexer Channels.

Console Function: A Display Console is standard ... includes light pen, keyboard, cathode ray tube, two console files, and control store ... functions as a manual console for IPL, reset, etc., as an operator's console to communicate with the operating system, an indicator display console, and as a diagnostic console for maintenance ... optional attachment for a 3213 Printer (85 cps) for hard copy output. CRT has twenty-five 80-character lines of information; as a system console, the last line displays machine status. Optional attachment for a 3056 Remote System Console for console operation from an additional keyboard and cathode ray tube up to 150 feet from the processor.

In "Printer-Keyboard" mode, the Display Console uses the keyboard for input and CRT and mandatory 3213 for output. It appears to the system as a 3215, and is supported by DOS, DOS/VS, OS/360, OS/VS, and VM/370. In "Display" mode, the keyboard and light-pen are used for input, the CRT for output, and DIDOCS support or equivalent is required. The 3213 (optional) has a separate address and requires MCS support or equivalent.

The Display Console replaces the conventional indicators and switches with displays, and diagnostics can be loaded under light-pen control from one of the console files.

Prerequisites:

Each AP system requires:
(1) a 3158 A series processing unit,
(2) a 3052 APU mdl 1,
(3) a 3056 Remote System Console mdl 1.

Identical MP CPU mdls are required for a multiprocessor system. The 3158 and 3158-3 may be intermixed. However, when mixtures occur, asymmetric MP storage is not an option. In addition, alternate CPU power down does not function. Asymmetric MP storage configuration options are available in 3158-3 mdls with 1, 2, 3, or 4 megabytes of storage in each processor. The 3058 Multisystem Unit is required for each one or two processor MP system.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Console Table (Reading Board) Extension: **#9824** for extension to operator's right, or **#9825** for extension to left.
- Cabling: **#9080** for below the floor, or **#9081** for on the floor.
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning,* GC22-7004, for details. If two processors are installed and the 3052 is to be added and emergency power off ability is required on the systems, then the expanded Emergency Power Off Control (#3622) should be ordered for the host processor. (Contact your Installation Planning Representative.)
- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in a S/370 mdl 158.
- RETAIN/370: Provided by integrated data adapter which is standard on the console. Customers must provide interface to telephone line. For details on customer responsibility, see BOM, Orders and Movements.
- CPU Position: (In MP Configuration Only) **#9441** for left CPU, or **#9442** for right CPU.
- Processor Attach Feature: When one processor is combined with another in a multiprocessor system, each processor must contain sufficient storage protect capability for the total storage in the system. Therefore, each processor must add additional storage protect capability to reflect the storage in the remote processor. The first megabyte of storage protect capability for the remote processor is included in the MP1 and MP2 Processors. One Processor Attach Feature is required in an MP processor for each additional megabyte, beyond the first megabyte in the remote processor. See "Special Features".

SPECIAL FEATURES

Block Multiplexer Channel (#1433-#1435): Each adds a channel for attachment of I/O devices . The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. Channel Indirect Addressing is included in each channel. #1433 -- for third block multiplexer channel ... #1434 -- for fourth ... #1435 -- for fifth. **Limitations:** #1434 cannot be installed if 2nd Byte Multiplexer Channel #4990 is installed. **Field Installation:** Yes. **Prerequisites:** #1434 requires #1433 ... #1435 requires #1434 or #4990.

Channel-To-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 processor). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Maximum:** One. **Field Installation:** Yes.

ISC Control Store Extension (#2150): Provides additional control store for microprogram use on the ISC #4650. When the Staging Adapter for ISC #7220 is *NOT* ordered, see "Specify" under Integrated Storage Controls #4650 to determine when required. **Note:** When #7220 *IS* ordered, #2150 is prerequisite. **Maximum:** One. **Field Installation:** Yes.

Expanded Control Store (#2151): Provides additional control storage for microprogram use on the ISC ... see "Specify" under Integrated Storage Control #4650 to determine when required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150 and #6111.

ISC/SA Control Store Add'l (#2152): Provides additional control store for microprogram use on the ICS (#4650). Required if 3350 DASD is attached to an ISC/SA (#7220). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7220, #6111 and #2151.

3158 Processing Unit (cont'd)

Direct Control (#3274): Provides two instructions, "Read Direct" and "Write Direct", and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/370-Direct Control Feature-OEMI,* GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Emergency Power-off Panel Expansion (#3625): The basic S/370 mdl 158 provides for EPO control for up to 16 control units. When single mdl 158 configurations exceed this limit, #3625 should be ordered. Each #3625 attaches up to four additional EPO terminations. **Maximum:** Five. Where assistance is needed in determining requirements, consult Installation Planning Representatives. **Field Installation:** Yes.

Extended Precision Floating Point (#3700): Provides instructions to handle extended precision (28-hexadecimal digit fraction) floating point operands. Extended precision operands may also be rounded to long-precision format, which in turn may be rounded to short-precision format. This function is also included in and enabled by the OS/VS1 ECPS (#8750). **Field Installation:** Yes.

1401/1440/1460, 1410/7010 Compatibility (#3950): Provides the system with the ability to execute 1401/1440/1460 and 1410/7010 instructions under specific conditions of minimum and matching configurations. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), or with OS/VS1 ECPS (#8750). **Field Installation:** Yes.

Integrated Storage Controls (ISC) (#4650): Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs when Staging Adapter for ISC (#7220) is *NOT* ordered. Add'l storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2 or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2/A2F ... see DASD Configuration table below and M3333, 3330, 3340, 3344, 3350 pages. The ISC is organized functionally into two separate paths with up to 16 drives per path ... up to 32 drives per path when ISC Control Store Extension (#2150) is installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Each ISC path requires a control unit position on a block multiplexer channel. **Specify:** The following applies only when Staging Adapter for ISC (#7220) is *NOT* ordered:

The available combinations of storage devices which can be attached are shown in the table below. One, two, or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the required DASD Specify Feature(s). **Note:** The selected "Required DASD Specify Feature(s)" applies to both ISC paths. Within this constraint the DASD Configuration on one ISC path may be different from the DASD configuration on the other ISC path.

Second Byte Multiplexer Channel (#4990): Provides the same function as the standard multiplexer channel ... contains Channel Indirect Data Addressing. Takes the place of Block Multiplexer Channel No. 4. **Limitations:** Cannot be installed with Block Multiplexer Channel No. 4 (#1434). **Field Installation:** Yes. **Prerequisites:** #1433.

OS/DOS Compatibility (#5450): Provides the system with the ability to execute DOS programs under specific conditions. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes.

Processor Attach (#5552): [MP mdls] One is required for each megabyte of storage over one megabyte in the remote processor of an MP system.

Remote Processor Storage Size (Megabytes)	Quantity of Processor Attach Features (Req'd)
1/2,1	0
1-1/2,2	1
3	2
4	3
5	4
6	6

Field Installation: Yes. **Corequisite:** MP mdl.

ISC (#4650) WITH ONE CHANNEL OR WITH TWO CHANNEL SWITCH (#7905)

DASD Configuration		Required DASD Specify Features*																	
		† 9313		† 9314		† 9314 9190		** † 9315			** † 9315 9190				+ † 9317		++† 9318		
3333 Only	One or two 3333s with associated 3330s	x	x																
	Up to four 3333s with associated 3330s							x	x										
	String Switch (#8150) on any 3333		x					x											
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x					x								
	Up to four 3340 mdl A2s with associated mdl B1/B2s							x	x			x	x						
	String Switch (#8150) on any 3340 mdl A2				x				x		x		x						
	Fixed Head feature (#4301/ 4302) on any 3340					x					x	x	x						
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s														x	x			
	String Switch (#8150) on any 3340 mdl A2 and/ or Fixed Head feature (#4301/ 4302) on any 3340															x			
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives									x	x			x	x				
	String Switch (#8150) on any 3333 or 3340 mdl A2									x				x					
	Fixed Head feature (#4301/ 4302) on any 3340													x	x				
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs																x	x	
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F																x		
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																	x	x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ 4302) on any 3340																	x	

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** ISC Control Store Extension (#2150) is prerequisite. With **#9315**, each path of the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830-2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2151) and Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group each ISC path uses 8 or 16 or 32 or 64 device addresses depending upon the respective DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Power Warning (#5760): Provides signal to the 3158 system when power is outside specified limits. **Field Installation:** Yes. **Prerequisites:** All mdls require customer-supplied uninterruptable

3158 Processing Unit (cont'd)

power supply with line sensor. MP mdls also require special cable -- consult Physical Planning Representative.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "DASD Configuration" table under Integrated Storage Control (#4650) to determine when required. **Maximum:** One. **Field Installation:** Yes.

7070/7074 Compatibility (#7117): Provides the system with the ability to execute 7070/7074 instructions under specific conditions. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (#8750). **Field Installation:** Yes.

Staging Adapter For ISC (#7220): Enables each path of the ISC to attach a maximum of four 3333 mdls 1 and 11 and/or 3350 mdl A2/A2Fs with associated 3330 mdls 1, 2, and 11 and 3350 mdls B2/B2F and C2/C2F, for a maximum of 32 drives per path. See M3333, 3330 and 3350 pages for additional information. Also see note on M3333 pages for feature changes required when 3333s are retained for use with a 3851. Provides up to 64 virtual 3330 addresses for each channel interface on each path of the ISC. Provides for the attachment of up to four Data Recording Controls in one or two 3851 Mass Storage Facilities to each path of the ISC. **Limitations:** If String Switch (#8150) is installed on a 3333, see writeup for this feature on M3333 page. 3340 drives cannot be attached to the ISC when 7220 is installed. 3350 drives attached to the ISC when #7220 is installed cannot be used as staging drives and must be designated as real in 3350 native mode only. 3350 devices may not be mixed with other type devices in the same string. **Maximum:** One. **Field Installation:** Yes ... MES must include removal of any of the following which are installed: **#9190, #9313, #9314, #9315,, #9317, #9318. Prerequisites:** #4650 and #2150. For 3350 attachment the additional prerequisites are #2151, #6111 and #2152. **Specify: #9319.**

S/370 Extended (#7730): Provides System/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Limitations:** This feature cannot be loaded at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (#8750). **Field Installation:** Yes. **Prerequisites:** Required, together with #7731, on each processor in an MP system and on the A-Series processor in an AP system. #7730 is also required on the 3052 Attached Processing Unit in an AP system.

S/370 Extended, Add'l (#7731): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions program product. **Limitations:** This feature cannot be loaded at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (#8750). **Field Installation:** Yes. **Prerequisites:** Required, together with #7730, on each processor in an MP system, and on the A-Series processor in an AP system. #7730 is also required on the 3052 Attached Processing Unit in an AP system.

3056 Remote Console Attachment (#7820): Provides attachment to the Display Console of an optional console up to 150 feet away. **Maximum:** One. **Field Installation:** Yes.

3213 Printer Attachment (#7840): To attach a 3213 Printer to the Display Console for optional hard copy. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch For ISC (#7905): To provide each of the two paths of an ISC with the capability of attaching to a second channel. The channels may be on the same CPU or different CPUs. Switching is under program control. Each path of the ISC can be dedicated to a single channel by means of a configuration switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available control unit position and one unshared subchannel for each logical unit address on each of two system block multiplexer channels. For S/360 mdl 195 and S/370 mdls 165, 168, 195, see M2880 pages. For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, 3031, 3032, 3033 Processors, see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155, 3158, 3031 or 3032, or 3033 pages respectively. For 4300 processors, see M4331, 4341, 4361, 4381 pages.

Virtual Machine Assist (#8740): Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. This function is also included in and enabled by the OS/VS1 ECPS (#8750). **Limitations:** This function cannot be loaded at IMPL time, concurrently with 7070/7074 Compatibility (#7117), S/370 Extended (#7730), or with S/370 Extended, Add'l (#7731). **Field Installation:** Yes.

OS/VS1 ECPS (Extended Control Program Support) (#8750): Provides assist to OS/VS1 by emulation of certain supervisor functions. This feature also includes and enables Virtual Machine Assist and Extended Precision Floating Point functions. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), S/370 Extended (7730), S/370 Extended, Add'l (7731), or in Multiprocessing Mode. **Field Installation:** Yes. **Prerequisites:** Feature must be selected at system generation on OS/VS1 Release 6 or subsequent releases. Customer price quotations and customer order acknowledgement letters for Extended Control Store (#2151) and Staging Adapter for ISC (#7220) must state: "Installation of this feature involves the removal of parts which become the property of IBM."

MODEL CONVERSIONS

Field installable.

3158	to	3158 MP
3158	to	3158 AP
3158 AP	to	3158 MP

Models may be upgraded within the 3158, 3158 MP and 3158 AP.

Notes:

1. There are no additional installation charges over the above mdl conversion and mdl upgrade prices.
2. The above mdl conversions and mdl upgrades are field installable.
3. Planning for Mdl Conversions and Mdl Upgrades: When a customer requires storage upgrades in addition to a mdl conversion, the changes must not be consolidated into a single MES. Also, storage upgrades for storage above two megabytes should be ordered individually in one megabyte increments. A planning session between Marketing, FE, and the customer should be held to develop the proper sequence of MES ordering.
4. When an MES for an MP storage upgrade is submitted, the proper number of Processor Attach Features (#5552) for the remote processor should be ordered.
5. When an MES for an AP storage upgrade is submitted, the proper number of Processor Attach Features (#5552) for the 3052 APU should be ordered.
6. When an MES for an upgrade to an MP system is submitted, the proper number of Processor Attach Features (#5552) for the remote processor must be ordered.
7. 3158 machines with S/370 Extended (#7730) that convert to an AP require S/370 Extended, Add'l (#7331) on the A-Series Processor.
8. 3158 machines with S/370 Extended (#7730) that convert to an MP require S/370 Extended (#7730) and S/370 Extended, Add'l (#7731) on both processors.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3158-3 PROCESSING UNIT

[NO LONGER AVAILABLE]

[The 3158-3 is No Longer Available ... new RPQs that do not entail new functions will continue to be accepted.]

PURPOSE

Performs arithmetic, logic, processor storage and control functions for a S/370 model 158-3.

MODELS

Models	Bytes of Processor Storage	Models	Bytes of Processor Storage
U31 A31 M31	524,288	U35 A35 M35	3,145,728
U32 A32 M32	1,048,576	U36 A36 M36	4,194,304
U33 A33 M33	1,572,864	U37 A37 M37	5,242,880
U34 A34 M34	2,097,152	U38 A38 M38	6,291,456

Prerequisites: Each AP system requires (1) a 3158-3 A series processing unit, (2) a 3052 APU mdl 1, (3) a 3056 Remote System Console mdl 1. Identical MP CPU mdls are not required for a multiprocessor system. 3158 and 3158-3 mdls may be intermixed. However, when mixtures occur asymmetric MP storage is not an option. In addition, alternate CPU power down does not function. Asymmetric MP storage configuration options are available in the 3158-3 mdls with 1, 2, 3, or 4 megabytes of storage in each processor. The 3058 Multisystem Unit is required for each one or two processor MP system.

HIGHLIGHTS

Depending upon the mdl contains up to 6,291,456 bytes of monolithic processor storage with a cycle time of 1,035 nanoseconds for a 16-byte read, of 690 ns for an 8-byte write, 920 ns for a write of 1 to 7 bytes, and 920 ns for a write of 9 to 16 bytes ... 16-byte parallel data flow ... includes 16,384 bytes of buffer storage which is transparent to the programmer and reduces the effective cycle time of processor storage. 16 general purpose and four floating point registers are implemented in high-speed internal circuits with a four byte data flow. The 115 nanosecond cycle Processor and I/O functions are controlled by reloadable control storage. An optional integrated storage control feature allows direct attachment of 3330, 3340, 3344, 3350 direct access storage devices. The 3158-3 has 128 word instruction buffer, improved instruction execution times over the 3158, increased block multiplexer subchannel pool over the 3158. Asymmetric multiprocessor storage. Alternate Processor power down while all storage is left available to the other processor (MP mdls only). Attached Processing is by attachment of a 3052 Attached Processing Unit mdl 1.

Standard features include: S/370 universal instruction set ... interval timer ... store and fetch protect ... byte oriented operand feature ... error checking and correction code on main storage ... instruction retry ... channel retry ... one byte multiplexer channel ... block multiplexer channels number one and two ... dynamic address translation ... extended control mode ... program event recording ... time-of-day clock with clock comparator ... CPU timer ... channel indirect addressing function for channels ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O. Four additional instructions on MP mdls -- signal processor ... set prefix ... store prefix ... store CPU address.

Byte Multiplexer Channel: Permits simultaneous operation of many low-speed devices. Can be operated in "burst" mode for attachment of high-speed devices. For OS exclusion, refer to GC28-6554, *OS System Generation* ... for OS/VS exclusion, refer to GC26-3791, *OS/VS1 System Generation* and GC26-3792, *OS/VS2 System Generation*. Eight control unit positions are provided on the channel.

Block Multiplexer Channels: Up to five ... first two are standard ... up to three more can be attached. See "Special Features". Permits simultaneous operation of high-speed devices ... ability to "Block Multiplex" provides greater channel efficiency when using direct access storage devices equipped with rotational position sensing or buffered devices ... provides block multiplexing compatible with the same function on the 2880 Block Multiplexer Channel ... operates as a conventional selector channel otherwise.

Subchannels: In a 3158-3, byte multiplexer channel 0 or 4 may have 256 non-shared subchannels less 16 or 32 for each shared subchannel. A 3158-3 block multiplexer channel may have 40 shared subchannels when the second byte multiplexer channel is not installed. When the second byte multiplexer channel is installed, the block multiplexer channel may have 32 shared subchannels. The block multiplexer channel may have 736 non-shared subchannels when the second byte multiplexer channel is not installed on the 3158-3 and 480 non-shared subchannels when the second byte multiplexer channel is installed.

Console Function: A Display Console is standard ... includes light-pen, keyboard, cathode ray tube, two console files, and control store ... functions as a manual console for IPL, reset, etc., as an operator's console to communicate with the operating system, an indicator display console, and as a diagnostic console for maintenance ... optional attachment for a 3213 Printer (85 cps) for hard copy output. CRT has twenty-five 80-character lines of information; as a system console, the last line displays machine status. Optional attachment for a 3056 Remote System Console for console operation from an additional keyboard and cathode ray tube up to 150 feet from the processor.

In "Printer-Keyboard" mode, the Display Console uses the keyboard for input and CRT and mandatory 3213 for output. It appears to the system as a 3215, and is supported by DOS, DOS/VS, OS/360, OS/VS, and VM/370. In "Display" mode, the keyboard and light-pen are used for input, the CRT for output, and DIDOCS support or equivalent is required. The 3213 (optional) has a separate address and requires MCS support or equivalent.

The Display Console replaces the conventional indicators and switches with displays, and diagnostics can be loaded under light-pen control from one of the console files.

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Console Table (Reading Board) Extension: **#9824** for extension to operator's right, or **#9825** for extension to left.
- Cabling: **#9080** for below the floor, or **#9081** for on the floor.
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning*, GC22-7004 for details. If two processors are installed and the 3052 is to be added and emergency power off ability is required on the systems, then the Expanded Power Off Control (#3622) should be ordered for the host processor. (Contact IBM.)
- RETAIN/370: Provided by integrated data adapter which is standard on the console. Customers must provide interface to telephone line.
- Processor Position: (In MP configuration only) **#9441** for left processor, or **#9442** for right processor.
- Remote MP Processor: Asymmetric MP storage provides asymmetric multiprocessor storage on the 3158-3 with the use of the appropriate optional specify feature to specify the mdl of the remote processor. The 3158-3 multiprocessor may have asymmetric mdl combinations of M32, M34, M35, and M36. With this feature, symmetric mdl combinations are standard. For asymmetric combinations specify: Remote Processor-- **#9001** for 1 megabyte ... **#9002** for 2 megabytes ... **#9003** for 3 megabytes ... **#9004** for 4 megabytes ... **#9005** for 5 megabytes ... **#9006** for 6 megabytes. **Field Installation:** Yes.
- Processor Attach Feature: When one processor is combined with another in a multiprocessor system, each processor must contain sufficient storage protect capability for the total storage in the system. Therefore, each processor must add additional storage protect capability to reflect the storage in the remote processor. The first megabyte of storage protect capability for the remote processor is included in the M31 and M32 Processors. One Processor Attach Feature is required in an MP processor for each additional megabyte, beyond the first megabyte in the remote processor. See "Special Features".
- Keyboard and Printer Language Groups (must be specified on either 3210 or 3215): **#2956**.

SPECIAL FEATURES

Block Multiplexer Channel (#1433-#1435): Each adds a channel for attachment of I/O devices . The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. Channel Indirect Addressing is included in each channel. #1433 -- for third block multiplexer channel ... #1434 -- for fourth ... #1435 -- for fifth. **Limitations:** #1434 cannot be installed if 2nd Byte Multiplexer Channel (#4990) is installed. **Field Installation:** Yes. **Prerequisites:** #1434 requires #1433 ... #1435 requires #1434 or #4990.

Channel-to-Channel Adapter (#1850): To interconnect two channels (either S/360, S/370 or 4300 processor). Only one of the processors requires this feature. Uses one control unit position on each of the connected channels. Function can be expanded under program control so that the adapter will operate as a standard control unit. **Maximum:** One. **Field Installation:** Yes.

ISC Control Store Extension (#2150): Provides additional control store for microprogram use on the ISC (#4650). When the Staging Adapter for ISC (#7220) is *NOT* ordered, see "Specify" under Integrated Storage Controls (#4650) to determine when required. **Note:** When #7220 *IS* ordered, #2150 is prerequisite. **Maximum:** One. **Field Installation:** Yes.

3158-3 Processing Unit (cont'd)

Expanded Control Store (#2151): Provides additional control storage for microprogram use on the ISC ... see "Specify" under Integrated Storage Control (#4650) to determine when required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150 and #6111.

ICA/SA Control Store Add'l (#2152): Provides additional control store for microprogram use on the ISC (#4650). Required if 3350 DASD is attached to an ISC/SA (#7220). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7220, #6111 and #2151.

Direct Control (#3274): Provides two instructions, "Read Direct" and "Write Direct", and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or a cable-connected processing unit and external devices. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External devices must meet the interface specifications outlined in *S/370-Direct Control Feature-OEMI,* GA22-6845.

Emergency Power-Off Control (#3621, #3622): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Emergency Power-Off Panel Expansion (#3625): The basic S/370 mdl 158 provides for EPO control for up to 16 control units. When single mdl 158 configurations exceed this limit, #3625 should be ordered. Each #3625 attaches up to four additional EPO terminations. **Maximum:** Five. Where assistance is needed in determining requirements, consult Installation Planning Representatives. **Field Installation:** Yes.

Extended Precision Floating Point (#3700): Provides instructions to handle extended precision (28-hexadecimal digit fraction) floating point operands. Extended precision operands may also be rounded to long-precision format, which in turn may be rounded to short-precision format. This function is also included in and enabled by the OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes.

1401/1440/1460, 1410/7010 Compatibility (#3950): Provides the system with the ability to execute 1401/1440/1460 and 1410/7010 instructions under specific conditions of minimum and matching configurations . **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes.

Integrated Storage Controls (ISC) (#4650): Provides for the attachment of 3333 mdl 1s and/or 11s and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs when Staging Adapter for ISC (#7220) is *NOT* ordered. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2 or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2/A2F ... see DASD Configuration table below and M3333, 3330, 3340, 3344, 3350 pages. The ISC is organized functionally into two separate paths with up to 16 drives per path ... up to 32 drives per path when ISC Control Store Extension (#2150) is installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Each ISC path requires a control unit position on a block multiplexer channel. **Specify:** The following applies only when Staging Adapter for ISC (#7220) is *NOT* ordered:

The available combinations of storage devices which can be attached are shown in the table which follows. One, two, or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the required DASD Specify Feature(s). **Note:** The selected "Required DASD Specify Feature(s)" applies to both ISC paths. Within this constraint, the DASD Configuration on one ISC path may be different from the DASD Configuration on the other ISC path.

Second Byte Multiplexer Channel (#4990): Provides the same function as the standard multiplexer channel ... contains Channel Indirect Data Addressing. Takes the place of Block Multiplexer Channel 4. **Limitations:** Cannot be installed with Block Multiplexer Channel 4 (#1434). **Field Installation:** Yes. **Prerequisites:** #1433.

OS/DOS Compatibility (#5450): Provides the system with the ability to execute DOS programs under specific conditions. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field installation:** Yes.

Customer price quotations and customer order acknowledgement letters for Extended Control Store (#2151) and Staging Adapter for ISC (#7220) must state: "Installation of this feature involves the removal of parts which become the property of IBM."

ISC (#4650) WITH ONE CHANNEL OR WITH TWO-CHANNEL SWITCH (#7905)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190				+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s						x	x			x	x					
	String Switch (#8150) on any 3340 mdl A2				x			x		x		x					
	Fixed Head feature (#4301/#4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x		
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340														x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives							x	x			x	x				
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x				
	Fixed Head feature (#4301/#4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs															x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F															x	
3333 3340	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																x x
3350 -not 3344	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340																x

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** ISC Control Store Extension (#2150) is prerequisite. With **#9315**, each path of the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830-2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2151) and Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group each ISC path uses 8 or 16 or 32 or 64 device addresses depending upon the respective DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

3158-3 Processing Unit (cont'd)

Processor Attach (#5552): [MP mdls only] One is required for each megabyte of storage over one megabyte in the remote processor of an MP system.

Remote Processor Storage Size (Megabytes)	Quantity of Processor Attach Features (Req'd)
1/2,1	0
1-1/2,2	1
3	2
4	3
5	4
6	6

Field Installation: Yes. **Corequisite:** MP mdl.

Power Warning (#5760): Provides signal to the 3158/3158-3 system when power is outside specified limits. **Field Installation:** Yes. **Prerequisites:** All mdls require customer-supplied uninterruptable power supply with line sensor. MP mdls also require special cable. Contact IBM.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "DASD Configuration" table under Integrated Storage Control (#4650) to determine when required. **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment (#6148): [MP mdls only] To attach the Two-Channel Switch for ISC (#7905) to the configuration control panel on the 3058 Multisystem Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7905.

7070/7074 Compatibility (#7117): Provides the system with the ability to execute 7070/7074 instructions under specific conditions . **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730), S/370 Extended, Add'l (#7731), Virtual Machine Assist (#8740) or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes.

Staging Adapter For ISC (#7220): Enables each path of the ISC to attach a maximum of four 3333 mdls 1 and 11 and/or 3350 mdl A2/A2Fs with associated 3330 mdls 1, 2, and 11 and 3350 mdls B2/B2F and C2/C2F, for a maximum of 32 drives per path. See M3333, 3330 and 3350 pages for additional information. Also see note on M3333 pages for feature changes required when 3333s are retained for use with a 3851. Provides up to 64 virtual 3330 addresses for each channel interface on each path of the ISC. Provides for the attachment of up to four Data Recording Controls in one or two 3851 Mass Storage Facilities to each path of the ISC. **Limitations:** If String Switch (#8150) is installed on a 3333, see write-up for this feature on M3333 page. 3340 drives cannot be attached to the ISC when (#7220) is installed. 3350 drives attached to the ISC when #7220 is installed cannot be used as staging drives and must be designated as real in 3350 native mode only. 3350 devices may not be mixed with other type devices in the same string. **Maximum:** One. **Field Installation:** Yes ... MES must include removal of any of the following which are installed: **#9190, #9313, #9314, #9315,, #9317, #9318**. **Prerequisites:** #4650 and #2150. For 3350 attachment the additional prerequisites are #2151, #6111 and #2152. **Specify: #9319**.

S/370 Extended (#7730): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Limitations:** This feature cannot be loaded at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes. **Prerequisites:** Required, together with #7731, on each processor in an MP system and on the A-Series processor in an AP system. #7730 is also required on the 3052 Attached Processing Unit in an AP system.

S/370 Extended, Add'l (#7731): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Limitations:** This feature cannot be loaded at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), Virtual Machine Assist (#8740), or with OS/VS1 ECPS (Extended Control Program Support) (#8750). **Field Installation:** Yes. **Prerequisites:** Required, together with #7730, on each processor in an MP system, and on the A-Series processor in an AP system. #7730 is also required on the 3052 Attached Processing Unit in an AP system.

3056 Remote Console Attachment (#7820): Provides attachment to the Display Console of an optional console up to 150 feet away. **Maximum:** One. **Field Installation:** Yes.

3213 Printer Attachment (#7840): To attach a 3213 Printer to the Display Console for optional hard copy. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch For ISC (#7905): To provide each of the two paths of an ISC with the capability of attaching to a second channel. The channels may be on the same CPU or different CPUs. Switching is under program control. Each path of the ISC can be dedicated to a single channel by means of a Configuration Switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available control unit position and eight non-shared subchannels on a system block multiplexer channel. For S/360 mdl 195 and S/370 mdls 165, 168, 195, see M2880 pages. For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, or 3031, 3032, 3033 Processors, see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155, 3158, 3031, 3032 or 3033 pages, respectively. For 4300 processors, see M4331, 4341, 4361, 4381 pages.

Virtual Machine Assist (#8740): Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. This function is also included in and enabled by the OS/VS1 ECPS (Extended Control Program Support) (#8750). **Limitations:** This function cannot be loaded at IMPL time, concurrently with 7070/7074 Compatibility (#7117), S/370 Extended (#7730), or with S/370 Extended, Add'l (#7731). **Field Installation:** Yes.

OS/VS1 ECPS (Extended Control Program Support) (#8750): Provides assist to OS/VS1 by emulation of certain supervisor functions. This feature also includes and enables Virtual Machine Assist and Extended Precision Floating Point functions. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with 1401/1440/1460, 1410/7010 Compatibility (#3950), OS/DOS Compatibility (#5450), 7070/7074 Compatibility (#7117), S/370 Extended (#7730), S/370 Extended, Add'l (#7731) or in Multiprocessing Mode. **Field Installation:** Yes. **Prerequisites:** Feature must be selected at system generation on OS/VS1 Release 6 or subsequent releases.

MODEL CONVERSIONS

3158 to 3158-3 Model Conversion

3158	to	3158 U3
3158 AP	to	3158 A3
3158 MP	to	3158 M3

3158-3 to 3158-3 Model Conversion

3158 U3	to	3158 M3
3158 U3	to	3158 A3
3158 A3	to	3158 M3

Notes:

1. There are no additional installation charges above mdl conversion and mdl upgrade costs.
2. The above mdl conversions and mdl upgrades are field installable.
3. Planning for Mdl Conversions and Mdl Upgrades: When a customer requires storage upgrades in addition to a mdl conversion, the changes must not be consolidated into a single MES. Also, storage upgrades above two megabytes should be ordered individually in one megabyte increments.
4. When an MES for an MP storage upgrade is submitted, the proper number of Processor Attach Features (#5552) for the remote processor should be ordered.
5. When an MES for an AP storage upgrade is submitted, the proper number of Processor Attach Features (#5552) for the 3052 APU should be ordered.
6. Field change from 3158-3 to 3158 is not recommended.
7. When an MES for an upgrade to an MP system is submitted, the proper number of Processor Attach Features (#5552) for the remote processor must be ordered.
8. 3158-3 machines with S/370 Extended (#7730) that convert to an AP require S/370 Extended, Add'l (#7731) on the A-Series Processor.
9. 3158-3 machines with S/370 Extended (#7730) that convert to an MP require S/370 Extended (#7730) and S/370 Extended, Add'l (#7331) on both processors.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3168 PROCESSING UNIT

[NO LONGER AVAILABLE]

[The 3168 is No Longer Available ... new RPQs that do not entail new functions will continue to be accepted.]

PURPOSE

Provides arithmetic, logic, processor storage and control functions for a S/370 mdl 168.

MODELS

Models		Bytes of Processor Storage	
J	J00	MP1	1,048,576
K	K00	MP2	2,097,152
KJ	KJ0	MP3	3,145,728
L	L00	MP4	4,194,304
LJ	LJ0	MP5	5,242,880
LK	LK0	MP6	6,291,456
LKJ	LKJ	MP7	7,340,032
M	M00	MP8	8,388,608

Prerequisites: Each 3168 requires [1] At least one selector channel (2860), block multiplexer channel (2880), or a 2870 with at least one Selector Subchannel ... [2] One 3066 System Console mdl 2 ... [3] One 3067 Power and Coolant Distribution Unit mdl 2 ... [4] An appropriate 415 Hz power input. Customer-supplied chilled water is required for cooling the system. See *S/370 Installation Manual - Physical Planning,* GC22-7004.

An MP system requires two MP CPU mdls of any size. Each MP CPU mdl requires Multiprocessing (#5050) on both the 3066 mdl 2 and the 3067 mdl 2. The 3068 Multisystem Communication Unit is required for each one or two processor MP system. If either of the processors is a mdl MP5, MP6, MP7 or MP8, Extended Storage Attachment (#3850) is required on the 3068.

HIGHLIGHTS

Depending upon the mdl, can contain up to 8,388,608 bytes of monolithic processor storage ... eight byte parallel data flow ... includes up to 16,384 bytes of 80 nanosecond cycle buffer storage which is transparent to the program and significantly reduces the effective cycle time of storage ... buffer storage does not increase the amount of addressable storage ... 80 nanosecond processor cycle ... double-words are four-way interleaved ... overlapped operation of instruction and execution units ... extensive data checking is coupled with increased reliability, availability and serviceability.

Standard Features: Universal instruction set ... extended precision ... one-microsecond time-of-day clock with clock comparator ... one-microsecond CPU timer ... dynamic address translation ... extended control mode ... program event recording ... dual channel I/O bus ... additional variable field length instructions ... control registers, expanding the functions of PSWs ... byte-oriented operand feature ... buffer storage (8,192 bytes) ... fetch and store protection ... direct control feature ... attachment for 2860 Selector Channel(s), 2870 Multiplexer Channel(s), and 2880 Block Multiplexer Channel(s) ... storage configuration control ... writable control storage ... interval timer ... storage error checking and correction ... instruction retry ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O. Channel Reconfiguration Hardware and four additional instructions on the MP mdls: signal processor ... set prefix ... store prefix ... store CPU address.

Channels: Separate channnels facilitate maximum overlap with processing. Channel speeds of 1.5 million bytes/second are standard and up to 3 million bytes/second with Two Byte Interface (#7850, 7851) on the 2880 Block Multiplexer Channel. Up to seven logical channels can be attached per CPU. Valid combinations include: (a) One 2870 plus up to six channels of 2860s and 2880s ... (b) Two 2870s plus up to five channels of 2860s and 2880s ... (c) If no 2870 is attached, only up to six channels, 2860s and/or 2880s, can be attached per CPU. See 2860, 2870, 2880.

With the addition of Extended Channels (#3855), up to twelve channels can be attached ... for valid combinations, see "Special Features". Depending upon data rates, all channels, including the Selector Subchannels and basic multiplexer channel of the 2870 can operate concurrently. Each selector or block multiplexer channel can control up to eight control units. The basic multiplexer channel and each Selector Subchannel of the 2870 controls up to eight control units. If one 2841 is attached, no other control unit can be attached to that Selector Subchannel ... see 2841.

Publications: GC20-0001.

SPECIFY

- Voltage: (AC, 3-phase, 4-wire, 60 Hz). Specify **(#9903)** for 208V or **(#9905)** for 230V.
- Motor Generator Set and Starter: If desired, see M10000 pages for ordering instructions and prices.
- Channel Attachment: The basic 3168 has connection facilities for channels addressed 0-6. For channels 7-11, see Extended Channels (#3855).
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- RETAIN/370: Customer must provide interface for FE DAU to the telephone line. For details on ordering and customer responsibilities, see BOM, Order and Movements. **Note:** Up to three CPUs in the same physical location can be serviced by a single FE DAU.

SPECIAL FEATURES

Buffer Expansion (#1435): Expands the basic 8,192-byte buffer to 16,384 bytes. **Field Installation:** Yes. **Prerequisites:** Buffer Expansion (#1435) on the 3067 Power and Coolant Distribution Unit mdl 2.

ISC Control Store Extension (#2150): Provides additional control store for microprogram use on the ISC (#4650). When the Staging Adapter for ISC (#7220) is *NOT* ordered, see "Specify" under Integrated Storage Controls (#4650) to determine when required. **Note:** When #7220 *IS* ordered, #2150 is prerequisite. **Maximum:** One. **Field Installation:** Yes.

Expanded Control Store (#2151): Provides additional control storage for microprogram use on the ISC. See "Specify" under Integrated Storage Control (#4650) to determine when required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150 and #6111.

ISC/SA Control Store Additional (#2152): Provides additional control store for microprogram use on the ISC (#4650). Required if 3350 DASD is attached with Staging Adapter for ISC (#7220). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2151, #6111 and #7220.

Emergency Power-Off Control (#3623, #3624): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3623 to interconnect two emergency power-off switches; #3624 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Extended Channels (#3855): To attach up to 12 channels, in combinations of 2860 Selector Channels, 2870 Multiplexer Channels and 2880 Block Multiplexer Channels. A maximum of 12 channels, or a total of seven channel frames, whichever occurs first, can be attached. The feature includes the capability of addressing channels 7 thru 11. Valid maximum channels attachable are:

2860s -- maximum 6 channels
2870s -- maximum 2 channels
2880s -- maximum 11 channels.

Limitations: 2860 channel addresses must be numbered one thru six. The first 2870 must be numbered zero. The second 2870 must be numbered one thru six. The 2880 channel addresses may be any number one thru eleven. If the address of the 2880 is seven thru eleven, only 2301s, 2303s, 2305s, 2311s, 2314s, 2321s, 2420s, 3211s, 3330s, 3340s, 3350s, 3420s, 3505s or 3705s may be attached. **Field Installation:** Yes.

High Speed Multiply (#4525): Improves processor speed in both fixed and floating point multiply operations. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 2.

Integrated Storage Controls (ISC) (#4650): Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs when Staging Adapter for ISC (#7220) is *NOT* ordered. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2, or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2/A2F ... see DASD Configuration table below and 3333, 3330, 3340, 3350 "Machines" pages. The ISC is organized functionally into two separate paths with up to 16 drives per path ... up to 32 drives per path when ISC Control Store Extension (#2150) is installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Each ISC path requires a control unit position on a block multiplexer channel. **Specify:** The following applies only when Staging Adapter for ISC (#7220) is *NOT* ordered:

The available combinations of storage devices that can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s). *NOTE:* The selected "Required DASD Specify Feature(s)" applies to both ISC paths. Within this constraint

3168 Processing Unit (cont'd)

the DASD Configuration on one ISC path may be different from that on the other ISC path.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "DASD Configuration" table under

ISC (#4650) WITH ONE CHANNEL OR WITH TWO-CHANNEL SWITCH (#7905)

DASD Configuration		Required DASD Specify Features*																	
		† 9313		† 9314		† 9314 9190		** † 9315			** † 9315 9190			+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x																
	Up to four 3333s with associated 3330s							x	x										
	String Switch (#8150) on any 3333		x					x											
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x					x								
	Up to four 3340 mdl A2s with associated mdl B1/B2s								x	x		x	x						
	String Switch (#8150) on any 3340 mdl A2				x				x		x		x						
	Fixed Head feature (#4301/#4302) on any 3340					x					x	x	x						
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x				
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340														x				
3333	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives									x	x			x	x				
3340 -not 3344	String Switch (#8150) on any 3333 or 3340 mdl A2									x				x					
	Fixed Head feature (#4301/#4302) on any 3340													x	x				
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs															x	x		
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F															x			
3333 3340	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																	x	x
3350 -not 3344	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340																		x

† ISC diskette only specify feature. No fee when ordering at time of manufacture or with changeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** ISC Control Store Extension (#2150) is prerequisite. With 9315, each path of the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830-2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 Model A2s on the first and third strings may attach up to three 3340 Model B1s, B2s, and/or 3344s in any combination. The 3340 Model A2 on the second string may attach up to three 3340 Model B1/B2s. The 3340 Model A2 on the fourth string may attach one 3340 Model B1 or B2.

++ Expanded Control Store (#2151) and Control Store Extension (2150) and Register Expansion (#6111) are prerequisites. For configurations in this group each ISC path uses 8 or 16 or 32 or 64 device addresses depending upon the respective DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Integrated Storage Control (#4650) to determine when required. **Field Installation:** Yes. **Maximum:** One.

Remote Switch Attachment (#6148): To attach the Two Channel Switch for ISC (#7905) to the configuration control panel on the 3068 Multisystem Communication Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7905.

7070/7074 Compatibility (#7127): Provides the system with the ability to execute 7070 and 7074 instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. 7070/7074 system features included are: Channels, 729 magnetic tape, 7501 Console Card Reader, and Floating Point Decimal Arithmetic. *NOT* included are: Teleprocessing equipment, disk storage, punched card I/O, printer, Hypertape, Interval Timer, and core storage addresses above 9989. For a detailed explanation of system requirements with this feature, see "Compatibility Features" under S/370 in "Systems". **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** #7127 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 2.

7080 Compatibility (#7128): Provides the system with the ability to execute 705 and 7080 instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. 7080 system features included are: Channels, punched card input, typewriter, and 729 magnetic tape. *NOT* included are: Teleprocessing equipment, disk storage, Hypertape, and 705 units on-line with the 7080. Only the 7080 is emulated, but 705 programs can be run because the "705 mode" of the 7080 is emulated. For a detailed explanation of system requirements with this feature, see "Compatibility Features" under S/370 in "Systems". **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with System/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** 7080 Compatibility (#7128) on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 2.

709/7090/7094/7094 II Compatibility (#7129): Provides the system with the ability to execute 709, 7090, 7094 and 7094 II instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. Included are the following features of those systems: Channels, punched card I/O, printer, and 729 magnetic tape. *NOT* included are: Hypertape, teleprocessing equipment, direct couple, disk storages, drum storages, 1401 adapter, direct data on 7094 special and custom systems. For a detailed explanation of system requirements with this feature, see "Compatibility Features" under S/370 in "Systems". **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with System/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** #7129 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 2.

Staging Adapter For ISC (#7220): Enables each path of the ISC to attach a maximum of four 3333 Mdls 1 and 11 and/or 3350 Mdl A2/A2F's with associated 3330 Mdls 1, 2 and 11 and 3350 Mdls B2/B2F and C2/C2F, for a maximum of 32 drives per path. See 3333, 3330 and 3350 for additional information. Also see note on M3333 pages for feature changes required when 3333s are retained for use with a 3851. Provides up to 64 virtual 3330 addresses for each channel interface on each path of the ISC. Provides for the attachment of up to four Data Recording Controls in one or two 3851 Mass Storage Facilities to each path of the ISC. **Maximum:** One. **Field Installation:** Yes ... MES must include removal of any of the following which are installed: **#9190, 9313, 9314, 9315, 9317, 9318, 9317, 9318. Prerequisites:** #4650 and #2150. For 3350 attachment the additional prerequisites are Expanded Control Store (#2151), Register Expansion (#6111) and ISC/SA Control Store Additional (#2152). **Limitations:** If String Switch (#8150) is installed on a 3333, see writeup for this feature in M3333 page. 3340 drives cannot be attached to the ISC when #7220 is installed. 3350 drives attached to the ICS when #7220 is installed cannot be used as staging drives and must be designated as real in 3350 native mode only. 3350 devices may not be mixed with other type devices in the same string. **Specify: #9319** (Staging Adapter 3333/3330/3350).

S/370 Extended (#7730): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions Program Product. **Field Installation:** Yes. **Prerequisites:** RPQ S20579, Performance Improvements. RPQ S20580, APU Attach, is also required if the 3168 is used with a 3062. Required on each processor in an MP system and on a 3168 with RPQs S20579 and S20580. System/370 Extended (#7730) is also required on the 3062 Attached Processing Unit in an AP system. **Limitations:** This feature cannot be loaded, at IMPL time, concurrently with 7070/7074 Compatibility (#7127), 7080 Compatibility (#7128), or 709/7090/ 7094/7094 II Compatibility (#7129).

3168 Processing Unit (cont'd)

Two-Channel Switch For ISC (#7905): To provide each of the two paths of an ISC with the capability of attaching to a second channel. The channels may be on the same CPU or different CPUs. Switching is under program control. Each path of the ISC can be dedicated to a single channel by means of a Configuration Switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available control unit position and eight unshared subchannels on a system block multiplexer channel. For S/360 mdl 195 and S/370 mdls 165, 168, see 2880 Block Multiplexer Channel. For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, or 3031, 3032 or 3033 Processor, see M3135, 3135-3, 3138, 3145, 3145-3, 3148 3155, 3158, 3031, 3032 or 3033 pages respectively. For 4300 processors, see M4331, 4341, 4361, 4381 pages.

ACCESSORIES

Motor Generator Set

These units are not manufactured by IBM and are available on a purchase-only basis. Manufacturer's warranty will be extended to the purchaser. Installation, check-out and maintenance will not be provided by IBM, and any expenses involved must be borne by the customer. Units must be ordered one year in advance of installation. For additional information, contact IBM. Contact installation planning representative for installation requirements.

For 3168 Processor: If a motor generator set is chosen as the power source, then one Motor Generator Set (with internally mounted starter) is required for each 3168 Processor. **Specify:** Feature number for Motor Generator Set on 3168 machine order.

	Feature
208/230V AC, 3-phase, 60 Hz-Motor Generator Set	**#9447**
440V AC, 3-phase, 60 Hz-Motor Generator Set	**#9449**

Note: If more than one MG set is desired on initial order, specify quantity.

If additional MG set is to be ordered for delivery after system, order as follows:

	Part No.
Motor Generator Set ... 208/230V AC	**2574790**
Motor Generator Set ... 440V AC	**2574290**

SUPPLIES (None)

3168-3 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3168-3 is No Longer Available ... Features and Model Conversions can be ordered on an 'as available' basis.

PURPOSE

Provides arithmetic, logic, processor storage and control functions for a S/370 model 168.

MODELS

Models			Bytes of Processor Storage
U31	M31	A31	1,048,576
U32	M32	A32	2,097,152
U33	M33	A33	3,145,728
U34	M34	A34	4,194,304
U35	M35	A35	5,242,880
U36	M36	A36	6,291,456
U37	M37	A37	7,340,032
U38	M38	A38	8,388,608

Prerequisites: Each 3168-3 requires [1] At least one selector channel (2860), block multiplexer channel (2880), or a 2870 with at least one Selector Subchannel ... [2] One 3066 System Console mdl 2 ... [3] One 3067 Power and Coolant Distribution Unit mdl 3 ... [4] An appropriate 415 Hz power input. Customer-supplied chilled water is required for cooling the system. See *S/370 Installation Manual - Physical Planning,* GC22-7004.

An AP system requires [1] one 3062 APU mdl ... [2] at least one 2860 selector channel, or one 2870 byte multiplexer channel with at least one selector subchannel ... [3] one 3066 System Console mdl 3 ... [4] one 3067 Power and Coolant Distribution Unit mdl 3 ... [5] one 3067 Power and Coolant Distribution Unit mdl 5 ... [6] two motor generator sets.

Each AP system requires [1] a 3168-3 mdl A series processor ... [2] a 3062 APU mdl 1 ... [3] a 3066 System Console mdl 3 ... and [4] a 3067 PDU/CDU mdl 5.

An MP system requires two M CPU mdls of any size. Each M CPU mdl requires Multiprocessing (#5050) on both the 3066 mdl 2 System Console and the 3067 mdl 2 Power and Coolant Distribution Unit. The 3068 Multisystem Communication Unit is required for each one or two processor M system. If either of the processors is a mdl MP5, MP6, MP7, MP8, M35, M36, M37 or M38, Extended Storage Attachment (#3850) is required on the 3068.

HIGHLIGHTS

Depending upon the mdl, can contain up to 8,388,608 bytes of monolithic processor storage ... 8-byte parallel data flow ... includes up to 32,768 bytes of 80 nanosecond cycle buffer storage which is transparent to the program and significantly reduces the effective cycle time of storage ... buffer storage does not increase the amount of addressable storage ... 80 nanosecond processor cycle ... double-words are 4-way interleaved ... overlapped operation of instruction and execution units ... extensive data checking is coupled with increased reliability, availability and serviceability. Improved instruction execution times over the 3168. Improved interrupt execution times over the 3168. Improved availability and serviceability through a service processor. Attached Processing by attachment of a 3062 Attached Processing Unit mdl 1.

Standard Features: Universal instruction set ... extended precision ... one-microsecond time-of-day clock with clock comparator ... one-microsecond CPU timer ... dynamic address translation ... extended control mode ... program event recording ... dual channel I/O bus ... additional variable field length instructions ... control registers, expanding the functions of PSWs ... byte-oriented operand feature ... buffer storage (32,768 bytes) ... fetch and store protection ... direct control feature ... attachment for 2860 Selector Channel(s), 2870 Multiplexer Channel(s), and 2880 Block Multiplexer Channel(s) ... storage configuration control ... writable control storage ... interval timer ... storage error checking and correction ... instruction retry ... compare and swap ... compare double and swap ... insert PSW key ... set PSW key from address ... clear I/O. Channel Reconfiguration and four additional instructions on the M mdls: Signal processor ... set prefix ... store prefix ... store CPU address.

Channels: Separate channnels facilitate maximum overlap with processing. Channel speeds of 1.5 million bytes/second are standard and up to 3 million bytes/second with Two Byte Interface (#7850, 7851) on the 2880 Block Multiplexer Channel. Up to seven logical channels can be attached per CPU. Valid combinations include: (a) One 2870 plus up to six channels of 2860s and 2880s ... (b) Two 2870s plus up to five channels of 2860s and 2880s ... (c) If no 2870 is attached, only up to six channels, 2860s and/or 2880s, can be attached per CPU. See M2860, 2870, 2880 pages.

With the addition of Extended Channels (#3855), up to 12 channels can be attached ... for valid combinations, see "Special Features". Depending upon data rates, all channels, including the Selector Subchannels and basic multiplexer channel of the 2870 can operate concurrently. Each selector or block multiplexer channel can control up to eight control units. The basic multiplexer channel and each Selector Subchannel of the 2870 controls up to eight control units. If one 2841 is attached, no other control unit can be attached to that Selector Subchannel ... see M2841 pages.

Bibliography: GC20-0001

SPECIFY

- Voltage: (AC, 3-phase, 4-wire, 60 Hz). Specify **#9903** for 208V or **#9905** for 230V.
- Motor Generator Set and Starter: If desired, see M10000 pages for ordering instructions.
- Channel Attachment: The basic 3168-3 has connection facilities for channels addressed 0-6. For channels 7-11, see Extended Channels (#3855).
- Emergency Power-Off Control: May be required ... see "Special Features" and *S/370 Installation Manual - Physical Planning,* GC22-7004, for details.

  If two processors are installed, the 3062 is to be added, and emergency power off ability is required on the systems, then the expanded Emergency Power Off Control (#3624) should be ordered. (Contact IBM.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- RETAIN/370: Customer must provide interface for FE DAU to the telephone line. RETAIN may be used with the 3168-3, however it is not required. Remote service is a customer option where it is available. When the option is selected, the customer must provide the telephone lines required for the service processor remote link capability. The customer must also arrange the connection of the telephone interface cable provided by IBM to the telephone network. **Note:** Up to three CPUs in the same physical location can be serviced by a single FE DAU.

SPECIAL FEATURES

ISC Control Store Extension (#2150): Provides additional control store for microprogram use on the ISC (#4650). When the Staging Adapter for ISC (#7220) is *NOT* ordered, see "Specify" under Integrated Storage Controls (#4650) to determine when required. *Note:* When #7220 *IS* ordered, #2150 is prerequisite. **Maximum:** One. **Field Installation:** Yes.

Expanded Control Store (#2151): Provides additional control storage for microprogram use on the ISC ... see "Specify" under Integrated Storage Control (#4650) to determine when required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150 and #6111.

ISC/SA Control Store Add'l (#2152): Provides additional control store for microprogram use on ISC. Required if 3350 DASD is attached with Staging Adapter for ISC (#7220). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7220, #6111 and #2151

Emergency Power-Off Control (#3623, #3624): To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3623 to interconnect two emergency power-off switches; #3624 to interconnect up to 12 emergency power-off switches. For further information, see *S/370 Installation Manual - Physical Planning,* GC22-7004. **Field Installation:** Yes.

Extended Channels (#3855): To attach up to 12 channels, in combinations of 2860 Selector Channels, 2870 Multiplexer Channels and 2880 Block Multiplexer Channels. A maximum of 12 channels, or a total of seven channel frames, whichever occurs first, can be attached. The feature includes the capability of addressing channels 7 through 11. Valid maximum channels attachable are:

2860s -- maximum 6 channels
2870s -- maximum 2 channels
2880s -- maximum 11 channels.

Limitations: 2860 channel addresses must be numbered one through six. The first 2870 must be numbered zero. The second 2870 must be numbered one through six. The 2880 channel addresses may be any number one through eleven. If the address of the 2880 is seven through eleven, only 2301s, 2303s, 2305s, 2311s, 2314s, 2321s, 2420s, 3211s, 3330s, 3340s, 3350s, 3420s, 3505s or 3705s may be attached. **Field Installation:** Yes.

High-Speed Multiply (#4525): Improves processor speed in both fixed and floating point multiply operations. **Field Installation:** Not recommended. **Prerequisites:** #4525 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 3 and/or mdl 5. **Specify:** [A mdls only] **#9440** for #4525 on the 3062 APU, or **#9441** for no #4525 on the 3062 APU.

Integrated Storage Controls (ISC) (#4650): Provides for the attachment of 3333s (mdls 1 and/or 11) and/or 3340 mdl A2s and/or 3350 mdl A2s/A2Fs when Staging Adapter for ISC (#7220) is *NOT*

3168-3 Processing Unit (cont'd)

ordered. Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 mdl Bs and/or 3344s to the 3340 mdl A2, or by attaching 3350 mdl Bs and/or a mdl C to the 3350 mdl A2/A2F ... see DASD Configuration table below and M3333, 3330, 3340, 3350 pages. The ISC is organized functionally into two separate paths with up to 16 drives per path ... up to 32 drives per path when ISC Control Store Extension (#2150) is installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Each ISC path requires a control unit position on a block multiplexer channel. **Specify:** The following applies only when Staging Adapter for ISC (#7220) is *NOT* ordered:

The available combinations of storage devices that can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s). *Note:* The selected "Required DASD Specify Feature(s)" applies to both ISC paths. Within this constraint the DASD Configuration on one ISC path may be different from that on the other path.

Register Expansion (#6111): Provides additional registers for microprogram use on the ISC ... see "DASD Configuration" table under Integrated Storage Control (#4650) to determine when required. **Field Installation:** Yes. **Maximum:** One.

Remote Switch Attachment (#6148): To attach the Two Channel Switch for ISC (#7905) to the configuration control panel on the 3068 Multisystem Communication Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Two Channel Switch for ISC (#7905).

7070/7074 Compatibility (#7127): Provides the system with the ability to execute 7070 and 7074 instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. 7070/7074 system features included are: Channels, 729 magnetic tape, 7501 Console Card Reader, and Floating Point Decimal Arithmetic. *NOT* included are: Teleprocessing equipment, disk storage, punched card I/O, printer, Hypertape, Interval Timer, and core storage addresses above 9,989. **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** #7128 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 3.

7080 Compatibility (#7128): Provides the system with the ability to execute 705 and 7080 instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. 7080 system features included are: Channels, punched card input, typewriter, and 729 magnetic tape. *NOT* included are: Teleprocessing equipment, disk storage, Hypertape, and 705 units on-line with the 7080. Only the 7080 is emulated, but 705 programs can be run because the "705 mode" of the 7080 is emulated. **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** #7128 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 3.

709/7090/7094/7094 II Compatibility (#7129): Provides the system with the ability to execute 709, 7090, 7094 and 7094 II instructions. This capability is integrated under OS and emulated programs operate as processing programs under MFT and MVT. Included are the following features of those systems: Channels, punched card I/O, printer, and 729 magnetic tape. *NOT* included are: Hypertape, teleprocessing equipment, direct couple, disk storages, drum storages, 1401 adapter, direct data on 7094 special and custom systems. **Limitations:** Cannot be installed with any other compatibility feature. Cannot be loaded, at IMPL time, concurrently with S/370 Extended (#7730). **Field Installation:** Not recommended. **Prerequisites:** #7129 on the 3066 System Console mdl 2 and on the 3067 Power and Coolant Distribution Unit mdl 3.

Staging Adapter For ISC (#7220): Enables each path of the ISC to attach a maximum of four 3333 mdls 1 and 11 and/or 3350 mdl A2/A2Fs with associated 3330 mdls 1, 2 and 11 and 3350 mdls B2/B2F and C2/C2F, for a maximum of 32 drives per path. See M3333, 3330 and 3350 pages for additional information. Also see note on M3333 pages for feature changes required when 3333s are retained for use with a 3851. Provides up to 64 virtual 3330 addresses for each channel interface on each path of the ISC. Provides for the attachment of up to four Data Recording Controls in one or two 3851 Mass Storage Facilities to each path of the ISC. **Maximum:** One. **Field Installation:** Yes ... MES must include removal of any of the following which are installed: #9190, #9313, #9314, #9315, #9317, #9318. **Prerequisites:** #4650 and #2150. For 3350 attachment the additional prerequisites are #2151, #6111 and #2152. **Limitations:** If String Switch (#8150) is installed on a 3333, see writeup for this feature on M3333 page. 3340 drives cannot be attached to the ISC when #7220 is installed. 3350 drives attached to the ISC when #7220 is installed cannot be used as staging drives and must be designated as real in 3350 native mode only. 3350 devices may not be mixed with other type devices in the same string. **Specify: #9319** (Staging Adapter 3333/3330/3350).

ISC (#4650) WITH ONE CHANNEL OR WITH TWO-CHANNEL SWITCH (#7905)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190				+ † 9317		++† 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s							x	x		x	x					
	String Switch (#8150) on any 3340 mdl A2				x			x		x		x					
	Fixed Head feature (#4301/#4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x		
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340														x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2									x			x				
	Fixed Head feature (#4301/#4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/ A2Fs with associated mdl B2/B2Fs, C2/C2Fs															x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F															x	
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives																x x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340																x

† ISC diskette-only specify feature. No fee when ordering at time of manufacture or with changeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** ISC Control Store Extension (#2150) is prerequisite. With 9315, each path of the ISC requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830-2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2151) and Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group each ISC path uses 8 or 16 or 32 or 64 device addresses depending upon the respective DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

S/370 Extended (#7730): Provides S/370 Extended facilities which are a prerequisite for operation with the MVS/System Extensions program product. **Field Installation:** Yes. **Prerequisites:** Required on each processor in an MP system, and on the A-series processor in an AP system. S/370 Extended (#7730) is also required on the 3062 Attached Processing Unit in an AP system. **Limitations** This feature cannot be loaded, at IMPL time, concurrently with 7070/7074

3168-3 Processing Unit (cont'd)

Compatibility (#7127), 7080 Compatibility (#7128), or 709/7090/7094/7094 II Compatibility (#7129).

3213 Integrated Printer Attachment (#7850): Provides the interface needed to attach the optional 3213 Printer to the service processor on the 3168-3. The 3213 can be used to print error data captured and stored in the service processor. The printer does not attach to the channel interface. **Field Installation:** Yes.

Two-Channel Switch For ISC (#7905): To provide each of the two paths of an ISC with the capability of attaching to a second channel. The channels may be on the same CPU or different CPUs. Switching is under program control. Each path of the ISC can be dedicated to a single channel by means of a Configuration Switch. **Prerequisites:** An available control unit position and one unshared subchannel for each logical unit address on each of two system block multiplexer channels. For S/370 mdl 195 and S/370 mdls 165, 168, 195, see M2880 pages. For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, and 3031, 3032 or 3033 Processor, see M3135, 3135-3, 3138, 3145, 3145-3, 3148 3155, 3158 and 3031, 3032 or 3033 pages. For 4300 processors, see M4341 pages.

Note: Customer price quotations and customer order acknowledgement for feature #7220 (Staging Adapter for ISC) must state: "Installation of this feature involves removal of parts which become the property of IBM."

MODEL CONVERSIONS

Field Installable.

3168 to 3168-3 Model Conversion:

3168 to 3168 U3 (no change in storage size)
3168 MP to 3168 M3 (no change in storage size)

3168-3 to 3168-3 Model Conversion:

3168 U3 to 3168 M3 (no change in storage size)
3168 U3 to 3168 A3 (no change in storage size)
3168 A3 to 3168 M3 (no change in storage size)

3168-3 to 3168-3 Model Upgrade:

From/To	U32	U33	U34	U35	U36	U37	U38
U31	x						
U32		x					
U33			x				
U34				x			
U35					x		
U36						x	
U37							x

From/To	M32	M33	M34	M35	M36	M37	M38
M31	x						
M32		x					
M33			x				
M34				x			
M35					x		
M36						x	
M37							x

From/To	A32	A33	A34	A35	A36	A37	A38
A31	x						
A32		x					
A33			x				
A34				x			
A35					x		
A36						x	
A37							x

Notes:

1. There are no additional installation charges over the model conversion and model upgrade prices.
2. The above model conversion and model upgrades are field installable.
3. Planning for Model Conversions and Model Upgrades: When a customer requires model (storage) upgrades in addition to a model conversion, the changes must not be consolidated into a single MES. Also, model (storage) upgrades should be ordered individually in one-model increments. A planning session between Marketing, FE, and the customer should be held to develop the proper sequence of MES ordering.
4. Field change from 3168-3 to a 3168 is not recommended.
5. Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "All parts which are removed from purchased processors to accomplish a model change to and from the A series become the property of IBM."

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3178 DISPLAY STATION

PURPOSE

A cathode-ray tube (CRT) display station used in clusters with the 3274 Control Unit, the 3276 Control Unit Display Station, the 4701 Controller,the 4321 Processor or the 4331 Processor with Display Printer Adapter for displaying alphameric data, and for entering data into and retrieving data from S/360, S/370, an 4300 Processor, or 8100 System. A keyboard permits an operator to display and manipulate data on the screen. The 3178 meets both general-purpose and unique display requirements.

MODELS

Model C10: Displays up to 1,920 characters and provides 75-key Data Entry Keyboard Entry keyboard.

Model C20: Displays up to 1,920 characters and provides 87-key Typewriter Keyboard .

Model C3: Displays up to 1,920 characters and provides an 87-key Typewriter Keyboard which includes a numeric pad. This model attaches to the 3274 or 3276 and requires a no-charge microcode RPQ in the control unit.

Prerequisites :

Attachment	Required on Control Unit
3274	Available Category A terminal port.
	Mdl C3 attachment to a 3274 requires one of four no-charge microcode RPQs in the 3274: 8K1034 or 8K1035 for 3274s with Configuration A, B, C or support with or without the numeric lock feature, or 8K1164 or 8K1165 for 3274s with Configuration D support with or without the numeric lock features. numeric lock feature. *Caution:* PRQs must be ordered well in advance of the Model C3 to assure receipt prior to the Mdl C3.
3276	Available port or added #3255, #3256 or #3257.
	Mdl C3 attachment to a 3276 requires RPQ 8K1059 or 8K1059 or 8K1060, a no-charge microcode RPQ with or without the numeric lock feature, in the 3276. *Caution:* RPQs must be ordered well in advance of the Mdl C3 to assure receipt prior to the Mdl C3.
4321	Standard Display/Printer Adapter on 4321.
	Attachment of the 3178 mdl C3 to the 4321 is not supported.
4331	Standard Display/Printer Adapter on 4331 or Display/Printer Adapter Expansion (#2001) on a 4331 mdl group 1 or 2.
	Attachment of the 3178 mdl C3 to the 4331 is not supported.
4701	Available Port on optional DCA adapter.

HIGHLIGHTS

Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7 X 14 dot matrix in the 9 X 16 contiguous box matrix. Displays a 94 character set: 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters.

The 3178 offers functions equivalent to the 3278 model 2 Display Station with features of an 87-key/75-key Keyboard, Keyboard Numeric Lock, Audible Alarm and Security Keylock.
The Mdl C3 provides a keyboard layout like that provided with RPQ 8K1038 for the 3278.

A monocase switch, located on the keyboard, provides the capability of switching to uppercase alphameric mode for 3277 compatibility. Uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphameric, normal/ intensified, and displayable/ non-displayable.

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of 3178. When the 3178 is attached to a 3274 Control Unit or 4300 Processor Display Printer Adapter, the printer designation is controlled by operator use of the IDENT key and by: (a) a printer authorization matrix which is loaded into the 3274 Control Unit through a user written host application program, or, (b) a customer definable matrix loaded from the system diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3178 is attached to a 3276 Control Unit Display Station, the printer designation is controlled by operator use of the IDENT Key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276. (The host can perform a copy in a manner compatible with 3271/3272 support.)

The 3178 consists of three workstation elements (WSEs): video, logic and keyboard elements. With optional extension cables, provided as accessory, the logic unit may be placed away from the video unit and the keyboard. The logic unit may be mounted on a vertical surface such as the side of a desk or a wall using a mounting bracket provided as a separate accessory.

Operator Factors: The 3178 has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option, are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard is light and thin, and the keyboard can be adjusted to either 12 degrees by attaching or 6 degrees by detaching the keyboard foot assembly offered as basic.

Input Editing Capability: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphameric, special symbol, and cursor move keys have typamatic capability. Double speed cursor typamatic is attached with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. Ten Program Function (PF) keys are available on the Data Entry Keyboard; 24 PF keys are available on the Typewriter Keyboard.

When attached to a 3274 Control Unit with Configuration Support C with Entry Assist RPQ or with Configuration Support D and with a typewriter keyboard (3178 Model C2), it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 Sales pages for languages supported.

Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions.

Customer Problem Analysis and Resolution: Functions have been designed into the 3178 to enhance the availability to the customer. This has been done through the use of customer problem analysis and resolution (CPAR) routines and procedures that are used by the operator. See "Customer Responsibilities" below.

Customer Set-Up (CSU): The 3178 is designated as a customer setup machine except for the Logic Unit Mounting Bracket accessory. The customer is responsible for arranging for the attachment of the Mounting Bracket to the desk, wall or other surface . Setup instructions are included with each machine, as a part of the IBM 3178 Display Station Operator Reference Guide.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Physical setup, connection of cables in customer access areas, switch settings and checkout.
- Contact an IBM customer service coordinator for attachment of the 3178 communications cable to an on-site serviced IBM control unit where customer access area is not provided.
- Determination of the required number of spares.

3178 Display Station (cont'd)

- Performing customer problem analysis and resolution (CPAR).
- Returning failing workstation element to the Repair Center or to the Service/Exchange Center with a completed Service/Replacement Order Form for repairs.
- Call the National Support Center on a toll-free number for service.
- Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time and material basis.)
- Each customer must order the *IBM 3178 Display Station Description Manual,* GA18-2127, for site planning and preparation work since this is not shipped with each machine.

Spares: It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3178 units for such use. The number of spare units is dependent upon the number of the 3178 units the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

Warranty Service and Maintenance:

Customer Carry-in/Repair is available for a five year maintenance charge.

In addition, following services are available for an annual charge:

- Customer On-site Exchange
- Customer Carry-in Exchange
- IBM On-site Exchange

  IBM warranty service is provided using the Customer On-site Exchange service.

The warranty period is 3 months following the date of installation.

There is no regularly scheduled preventive maintenance recommended by IBM on these units.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center or IBM Service/Exchange Center for repair on a time and material basis. The Service/Replacement Order Form is to be completed with all shipments to the Repair Center. Upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, testing, estimating of repair charges, and return shipping charges. The 3178 qualifies for an IBM maintenance agreement immediately following expiration of the service and parts warranty.

If an IBM maintenance agreement is not contracted for immediately following expiration of the service and parts warranty and the customer subsequently wants maintenance coverage, the customer must ship the machine(s) to the designated IBM Repair Center or Service/Exchange Center for an inspection. A minimum charge to cover handling, inspection, cleaning, testing and return shipping charges will be applied. In addition, all time and parts required to qualify the machine for maintenance agreement acceptability will be billed at IBM's then current rates and terms. The machine will then qualify for an IBM maintenance agreement coverage.

If on the basis of an inspection, IBM concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to minimum charge.

Customer Carry-in/Repair: After isolating the failure to a workstation element, the customer calls the National Support Center on a toll free number and carries in the failing workstation element to a Service/Exchange Center (S/EC). The S/EC will ship the workstation element to an IBM Repair Center. IBM will then ship the repaired workstation element to the S/EC to hold for customer pick-up. Alternatively, the customer may ship the failing workstation element directly to an IBM Repair Center. It is the customer's responsibility to pack the failing WSE in the original shipping container or equivalent and ship it prepaid to the designated IBM Repair Center. IBM will return the repaired unit prepaid.

Customer Carry-in Exchange: To use this service, a customer calls the National Support Center on a toll-free number. After isolating a failing element using CPAR, the customer transports the failing element to an IBM Service/Exchange Center. IBM will provide a replacement element on an exchange basis. The customer is responsible for delivering the failing element to/from the Service/Exchange Center. For further information on the Customer Carry-in Exchange, see the General Information section of the sales manual.

Customer On-site Exchange: To use the service a customer calls the IBM National Support Center on a toll-free number. IBM arranges for delivery of a replacement element to the customer site specified by the customer using various delivery methods within or outside Designated Service Area (DSA).

The customer is responsible for the installation and the test of the replacement element using the customer set-up (CSU) procedures. The currier returns the defective element to IBM as instructed by IBM. The delivery transportation charge to/from the customer site is paid by IBM.

IBM On-site Exchange: This service allows the customer to call the National Support Center on a toll-free number , after the customer has performed CPAR, and have a representative bring a replacement element to the customer site, install and test the replacement element. The failing element becomes the property of IBM.

Customer Responsibility for Damaged or Altered Elements: Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable time and material charges. Altered elements will not be eligible for the exchange or replacement services.

Customer Engineer On-Site Assistance: If the customer desires assistance in performing CPAR, the National Support Center on a toll-free number may be called for their assistance. The CE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer owned spare Workstation Elements (WSE) may be installed to replace defective workstation elements by the CE upon customer request. Shipping of defective WSEs to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is available on a per-call basis at the applicable hourly rates and terms.

Keyboards: (See Notes 1, 2 and 3 below):

- 75-key Data Entry Keyboard: Movable with 35 data keys, 10 program function keys and 30 control keys.
- 87-key Typewriter Keyboard: Typewriter-like layout, moveable with 49 alphameric keys, 26 control keys and 12 program function keys (total 24 PF keys).
- 87-key Typewriter Keyboard: Typewriter-like layout, moveable with 49 alphameric keys, 26 control keys and a block of 12 keys which are PF 1-12, PF 13-24, or a numeric pad (0-9, plus decimal and tab), depending on upper/lower shift status and use of the Alt key.

Note 1: Keyboards used on 3101, 3104, 3275, 3276, 3277, 3278, 3279, or 8775 machines are not interchangeable with keyboards used on 3178.

Note 2: A 0.9 meter (3 foot) keyboard cable is provided, as basic. The keyboard cables can be extended to 3.0 meters (10 feet) with 2.1 meters (7 feet) Keyboard Extension Cable provided as accessory.

Note 3: Keyboard foot assembly is provided as basic. It provides a keyboard surface angle of 12 degrees (6 degrees without the foot assembly).

Bibliography: *IBM 3178 Display Station Description,* GA18-2127; *IBM 3178 Display Station Operator Reference Guide,* GA18-2128. For others, see *KWICK Index,* G320-1621, or specific system bibliography.

SPECIFY

* Voltage (120V, AC, 1-phase, 3-wire, 60Hz)

* Power Cable:

* 1.8 meter (6 feet), non-locking plug.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Field installable.

ACCESSORIES

The following accessories can be ordered using a feature code via AAS when ordered with machine; and using a part number when ordered separately from machine. IBM Distribution Center at Mechanicsburg will ship to customer.

Extension Cables: Provides 2.1 meter (7-feet) Video Extension Cable, (Total 2.7 meters (9 feet) with 0.6 meter (2-feet) standard Video cable), and 2.1 meter (7-feet) Keyboard Extension Cable (Total 3.0 meters (10 feet) with 0.9 meter (3-feet) standard keyboard cable). With this

3178 Display Station (cont'd)

accessory, the Logic unit can be located away from the Video unit and the Keyboard.

Extension Cables are designated as a customer set-up accessory. Set-up instructions are included with each accessory.

Extension Cable **P/N 5641829 feature #3696**

Logic Unit Mounting Bracket: Provides a mounting bracket to mount Logic unit on a vertical surface such as the side of a desk or a wall when Logic unit is placed away from Video unit and Keyboard using Extension Cables accessory. Arrangements for mounting the bracket is the customer's responsibility.

Logic Unit Mounting Bracket **P/N 5641651 or feature #4956**

CUSTOMER REPLACEMENT PARTS

Following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order through Branch Office Spare Parts and/or parts Distribution Centers to FED Greencastle or the customer directly places orders to the IBM Parts Order Center in Greencastle.

Description	Part Number	
Pedestal	5641300	
Keyboard Feet (pair)	5641297	
Keyboard Extn Cable	5641815	
Video Extension Cable	5641814	
Field Packaging Material		
For Video	2655956	
For Logic	8665651	
For Keyboard	7387286	
Keys*	5641830	for Flat key
	5641800	for Tubular key
Power Cable	5640670	

Note 1. * The 3178 is shipped with two keys. Additional keys may be purchased from IBM. Key identification number must accompany each order. Note: If the key identification number is unknown, the Logic WSE should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on a time and material basis.

Note 2. Logic Unit Mounting Bracket accessory is not covered by an IBM maintenance agreement. Order as an accessory when the replacement is needed.

MACHINE ELEMENTS

Workstation Elements may be ordered to provide individual elements as needed by the customer in the use of the 3178 Display Station.

3178 Display Terminal Workstation Elements:

Order Entry: For shipment, specify MACHINE ELEMENT (B/M) Number at time of order entry.

1) Order entry via NAD/NMD marketing representative and/or account administrator.
2) Account administrator should complete MES order form.
3) Form is mailed to:
   IBM Corporation
   IBM Parts Order Center
   P.O. Box 505
   Greencastle, IN 46135
4) FE and I&D/Greencastle will ship to customer. bill customer

Workstation elements may be ordered to provide individual elements as needed by the customer in the use of the 3178.

Customer Responsibilities: The customer's responsibilities are the same as those above under "Customer Responsibilities".

Site Planning and Preparation: These are the responsibility of the customer. The customer should have on hand, or should order the IBM 3178 Display Station Description Manual, (GA18-2127) for site planning and preparation work.

Warranty: Category B (Customer On-site Exchange)

Maintenance: Maintenance for individual workstation element is only available on a time-and-material basis at an IBM Repair Center or through an IBM Service/Exchange Center. Minimum charge is applied.

The video, logic and keyboard workstation elements of the 3178 Display Station can be ordered as follows:

To Fit Model	Workstation Element	Number*
C1/C2	Video	5894000
C1/C2	Logic	5640980
C1	Keyboard	5640991
C2	Keyboard	5640987

Note:
- Logic does not include a power cable.
- Keyboard includes a pair of Keyboard Feet.
- Video does not include Pedestal.

* Same as Bills of Material number.

SUPPLIES (None)

3195 PROCESSING UNIT

[NO LONGER AVAILABLE]

The 3195 is no longer available ... features and model changes can be ordered on an "as available" basis.

PURPOSE

Provides arithmetic, logic, control and processing storage for a S/360 or S/370 model 195.

MODELS

For S/360		
Model J	J00	1,048,576 bytes
Model K	K00	2,097,152 bytes
Model KJ	KJ0	3,145,728 bytes
Model L	L00	4,194,304 bytes
For S/370		
Model J1	J10	1,048,576 bytes
Model K1	K10	2,097,152 bytes
Model KJ1	KJ1	3,145,728 bytes
Model L1	L10	4,194,304 bytes

Prerequisites: Each 3195 requires: [1] At least one selector channel (2860), or block multiplexer channel (2880), or a 2870 with at least one Selector Subchannel ... [2] One 3060 System Console ... [3] One 3080 Power Unit mdl 1, one 3080 mdl 2 and one 3080 mdl 3 ... [4] One 3085 Power Distribution Unit ... [5] One 3086 Coolant Distribution Unit ... [6] A Motor Generator Set with Motor Starter. See "Specify".

Customer-supplied chilled water is required for cooling the system ... see *S/360 Installation Manual - Physical Planning,* GC22-6820.

HIGHLIGHTS

Depending upon the mdl, includes up to 4,194,304 bytes with a 756-nanosecond cycle time ... eight byte parallel data flow ... includes 32,768 bytes of 54-nanosecond cycle buffer storage which is transparent to the programmer and reduces the effective cycle time of processor storage ... buffer storage does notpincrease the amount of addressable storage ... 54-nanosecond processor cycle ... double words are 8-way interleaved on mdl J; 16-way on mdl K and L; 16-way on the first 2 million bytes and 8-way on the third million bytes on mdl KJ ... overlapped operation of instruction and execution units, as well as concurrent operations in multiple execution units and with the instruction unit ... performance emphasis on floating point arithmetic.

Because of the high performance emphasis, there are operational differences from other S/360 and S/370 models.

[1] The quotient of a floating point divide operation may differ in the mdl 195 from that of other models by an amount equal to one bit in the low order fraction position. For zero remainders, however, the results will be identical.

[2] Several program interruptions that should, according to the IBM *S/360 Principles of Operation,* store a non-zero Instruction-Length Code (ILC) are imprecise in the mdl 195 and store a zero ILC. This zero ILC indicates that the address of the instruction causing the interruption has not been retained. When precise program interruptions occur, the interruption code portion of the current PSW is used in a special way.

[3] The mdl 195 is capable of executing processor stores out of sequence. Logical consistency is maintained among processor fetches and stores -- including the beginning and ending I/O operations. However, if a program is to modify a string of CCWs while they are being used by the channel, then steps must be taken to arrange the program so that the stores are made in sequence. This is described in the *Model 195 Functional Characteristics* (GA22-6943).

[4] If a floating point underflow occurs, the result will be replaced by all zeros. If an overflow occurs, the result will be replaced by all ones with the correct sign. For those instructions that change the condition code, the code is 1 or 2 for overflow, and 0 for underflow.

With each 3195, a Basic Storage Module Analyzer and one additional basic storage module is provided, along with two carriers. Each carrier provides for supporting and moving a basic storage module from the processor to a service area. Use of these items normally reduces the duration of system interruption when a failure occurs in one of the basic storage modules in the system. IBM maintenance agreements normally allow for offline servicing and repair of a failing basic storage module.

Standard Features (All Mdls): Universal instruction set, extended precision floating point arithmetic, fetch protection (read and write), internal timer (9.6 khz -- about 104us interval), byte-oriented operands, direct control, attachment for 2860 Selector Channels, 2870 Multiplexer Channels, and 2880 Block Multiplexer Channels.

Additional Standard Features (S/370 Mdls): In addition to those features listed above, the S/370 models include a 250-nanosecond time-of-day clock, additional variable field length instructions, control registers (expanding the functions of the PSWs).

Channels: Separate channels facilitate maximum overlap with processing. Channel speeds of 1.5 million bytes/second are standard and up to 3.0 million bytes/second with Two-Byte Interface (#7850, #7851) on the 2880 Block Multiplexer Channel. Up to seven logical channels can be attached per CPU. Valid combinations include: (a) One 2870 plus up to six channels of 2860s and/or 2880s ... (b) Two 2870s plus up to five channels of 2860s and/or 2880s ... (c) If no 2870 is attached, only up to six channels, 2860s and/or 2880s, can be attached per CPU. See 2860, 2870 and 2880. With the addition of Extended Channels (#3851), up to 14 channels can be attached ... for valid channel combinations, see "Special Features". Depending upon data rates, all channels, including the Selector Subchannels of the 2870s, can operate concurrently. Each selector or block multiplexer channel can control up to eight control units. The basic multiplexer channel of the 2870 and each Selector Subchannel controls up to eight control units. The 2841 is restricted to one control unit per Selector Subchannel ... see M2841 pages.

Limitations: A 3195 can accommodate three 2880 channels attaching either the 2835 Storage Control mdl 1 or 2 or the 2820 Storage Control. The channels attaching 2835s or 2820s must be assigned the highest priorities in the system.

Console Function: An operator control panel, a system control panel and a display console are included with the 3630 mdl 1. They have switches and lights necessary to operate and control the system. The display console may be used as an operator's console. The display console is functionally equivalent to a 2250 mdl 1 with the following features: alphameric keyboard, 8K buffer (4K is maintenance only), character generator, light-pen, and OCP, First. The operator control section may be duplicated once to provide a remote operator panel by ordering the appropriate feature on a 2150 Console or 2250 Display Unit mdl 1 ... see M2150 and M2550 pages. An optional operator console function can be provided by using a 2150 and a 1052 Printer-Keyboard mdl 7 in combination ... see M2150 pages. Additional console functions can be provided through use of other I/O units such as readers, displays, punches and printers.

Emergency Power-Off Control, a standard feature on the 3060, provides, in effect, a single emergency power-off switch in a "room" or "area". To interconnect up to six Emergency Power-Off Switches, see *S/360 Installation Manual - Physical Planning* GC22-6820, for details.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V.
- Motor Generator and Starter.
- Remote Operator Control Panel Attachment: **#9560**, required if the operator control panel of the 3195 is to be duplicated by use of an Operator Control Panel (#5475, #5476) on a 2150 Console or 2250 Display Unit mdl 1. Field Installation: Yes.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- RETAIN/370: **#9570** for non-use of FE DAU, **#9571** for first CPU using FE DAU, **#9572** for second CPU using FE DAU, or **#9573** for third CPU using FE DAU. Customer must provide interface for FE DAU to the telephone line.

  Note: *Up to three CPUs in the same physical location can be serviced by a single FE DAU.*

SPECIAL FEATURES

Extended Channels (#3851): Provides for attachment of up to 14 channels, combinations of 2860 Selector channels, 2870 Multiplexer Channels, and 2880 Block Multiplexer Channels. A maximum of 14 channels or a total of eight channel frames, whichever occurs first, can be attached. Valid maximum combinations of channels are:

2860s -- maximum of 2 (6 channels)
2870s -- maximum of 2 (2 channels)
2880s -- maximum of 7 (13 channels)

Limitations: The 2860 channel addresses must be numbered one through six. The first 2870 channel must be number zero, the second must be any number one through six. The 2880 channel addresses may be any number one through 13. If the address of the 2880 is seven through 13, only 2301s, 2303s, 2305s, 2311s, 2314s, 2321s, 2420s, 3211s or 3330s may be attached. **Field Installation:** Yes. **Prerequisites:** On 2150 -- **#9175** if Operator Control Panel, First (#5475) is to be installed on the 2150 ... **#9176** if Operator Control Panel, Second (#5476) is to be installed. On 2250 ... **#9175** if Operator Panel, First (#5475) is to be installed on 2250 ... **#9176** if Operator Control Panel, Second (#5476) is to be installed.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3203 PRINTER

PURPOSE

Printer output unit for System/38, all virtual storage S/370, 3031, 3032, 3033, 3081, 3083, 3084 Processors and the 3777 Communication Terminal.

MODELS

Model 1	001	[NO LONGER AVAILABLE] 600 lpm -- native attachment on S/370 models 115 and 125 only.
Model 2	002	[NO LONGER AVAILABLE] 1,200 lpm -- native attachment on S/370 models 115 and 125 only.
Model 3	003	1,000 lpm -- for use with a 3777 Communication Terminal model 1, 2 or 3.
Model 4	004	[NO LONGER AVAILABLE] 1,200 lpm -- native attachment on S/370 models 138 and 148 only.
Model 5	005	1,200 lpm -- channel attachment on all Virtual Storage S/370, 3031, 3032, 3033, 3081, 3083, 3084, 4331 or 4343 Processor, System/38.

Note: All rated speeds are based on a 48-character set.

Limitations: [1] Only marginally-punched, pin-fed, continuous forms can be used. For multiple part forms, it is preferred that both sides be securely fastened. However, when only one side is fastened, it must be the right side. No staples are permitted in the print train area ... [2] The 3203 may be used to generate input in OCR applications ... see M1287, 1288, 3881 and 3886 pages for information on acceptable characters and printing devices. For OCR applications, a special ribbon is recommended ... [3] Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use single-part forms for OCR printing ... [4] Print quality and forms feeding varies with paper specifications, ribbon and number of copies. Multiple copy forms of more than four parts and forms with a first part heavier than 49 grams/sq. meter (13-pounds) should be tested under operating conditions to determine that results are satisfactory for the user's application ... [5] The 3203 may not be natively attached on a S/370 mdls 115, 125 with a natively attached 1403.

Maximum: A maximum of two 3203 mdl 5s can be attached to a System/38. See System/38 special features for attachment explanation. Only one 3203 mdl 1 or 2 can be natively attached to a S/370 mdl 115 or 125. Only one 3203 mdl 3 can be attached to a 3777. A maximum of two 3203 mdl 4s can be natively attached to a S/370 mdl 138 or 148. 3203 mdl 5 is limited only by the number of control unit positions available on a system channel.

Prerequisites: One 1416 Interchangeable Train Cartridge is required for each 3203. See M1416 page. In addition, the following are required, depending upon the 3203 mdl:

Model 1	An Integrated 3203 Printer Attachment (#4650) on the 3115 or 3125. In addition, on the 3115 only, Integrated 3203/5203 Printer Prerequiste (#4653) is required. On the 3115 and 3125, specify **#9770** for 3203 mdl 1.
Model 2	#4650 on the 3115 or 3125. In addition on the 3115 only, #4653 is required. On the 3115 and 3125, specify **#9771** for 3203 mdl 2.
Model 3	A 3777 Communication Terminal mdl 1, 2 or 3.
Model 5	For System/38 ... 3203-5 Printer Attachment Feature (#1135 or #1136) on the System/38 system unit. See M5381 special features. Cables for the 3203-5 must be ordered when attaching to a System/38. Refer to the *System/38 Installation Manual-Physical Planning* for ordering information.

HIGHLIGHTS

132 print positions are standard. Horizontal spacing is 10 characters per inch. Vertical spacing is 6 or 8 lines per inch under operator control.

Forms skipping and spacing are controlled by a forms control buffer. The carriage is a dual speed unit for mdls 1, 2, 4 and 5, and single speed for mdl 3. Normal skipping for mdls 1, 2, 4 and 5 is up to 24 inches per second with high speed skip of up to 55 inches per second after 6 lines have passed. The carriage speed for mdl 3 is up to 18 inches per second.

A Universal Character Set buffer of 240 positions is standard. Use of graphics sets from 30 to 240 characters are allowed. Print speeds vary depending upon frequency of character repetition on the cartridge. One 1416 Interchangeable Train Cartridge is required for each 3203 Printer. The 3203 uses the proven train printing principle of the 1403 mdl N1 and maintains comparable high quality printing. Additionally, the 3203 has the capability of producing better copies.

Continuous marginally punched forms are fed by a forms tractor. Maximum forms dimensions are: *Width* -- 20 inches; *Length* -- 24 inches. Minimum forms dimensions are: *Width* -- 3-1/2 inches; *Length* -- 3 inches. Mdls 1, 2, 4 and 5 of the 3203 have a power-assisted stacker.

For full flexibility of column location for margins, 17-25/32 inches maximum width is recommended. If forms greater than 14 inches in length are used, the rear stacker enclosure must be opened. If forms greater than 17 inches in length are used, the forms compartment front door must be opened. See *Forms Design Manual*, GA24-3488.

Bibliography: S/370 -- GC20-0001, S/3770 -- GA27-3097. System/38 -- *System/38 Installation Manual - Physical Planning* (GA21-9293), *3203-5 Printer Component Description and Operator's Guide* (GA33-1529), and *Form Design Reference Guide for Printers* (GA24-3488).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V ... must be consistent with system voltage for the mdl 1, 2 or 4.
- Color: Mdls 1, 2, and 4 -- **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white. Mdl 3 -- blue is supplied as standard. Mdl 5 -- available from plant in pearl white only, MES orders will retain original color.
- Train Arrangement: See page TC 3203 in Type Catalog and M1416 pages for arrangements and required feature numbers.
- System Attachment: Specify **#9501** for S/370 Mdl 115 Adapter, or **#9502** for S/370 mdl 125 Adapter or **#9503** for the first 3203 mdl 4 on S/370 mdl 138 or 148 and **#9504** for the second 3203 mdl 4 on S/370 mdl 138 or 148.

  System/38: Specify **#9509** for the first 3203-5 to be installed at a customer's locations. This provides one tool kit required for CE maintenance. Another tool kit for the second 3203-5 installed on the system is not necessary. When rental machines are purchased, a tool kit can, if necessary, be ordered on a no-charge MES.
- Tool Kit - Mdl 5: Specify **#9190** for first and fifth 3203 mdl 5 in a multiple rental machine installation. Specify **#9191** for the second to fourth and sixth to ninth 3203 mdl 5 in a multiple rental machine installation. The **#9191** eliminates tool kit shipment(s) to second to fourth and sixth to ninth printer. Check with Field Engineering for additional tool kit requirement in multiple machine installation(s) or in case of machine transfer(s).
- Specify **#9190** for all purchase machines.
- When installed rental 3203 mdl 5s are purchased, a tool kit has to be ordered on a no-charge MES for each printer requiring one.
- When installed rental 3203 mdl 5 out of multiple printer installation is transferred and becomes a first or fifth printer, a tool kit has to be ordered on a no-charge basis MES.
- On mdl upgrades from mdls 1, 2 or 4, no tool kit is to be specified.
- OCR: When OCR ribbons are used for either OCR printing or other applications, specify **#9488.** **Field Installation:** Yes.

MODEL CONVERSIONS

Can be made in the field between models 1, 2, 4 and 5. Model upgrades of models 1 to 4 or 1 to 5 require multiple MES orders. Prices are additive. When upgrading from models 4 to 5 or 2 to 5, specify on MES orders the required power/voltage and frequency. For model 5, see above specify/feature codes.

SPECIAL FEATURES

Speed Enhancement (#6360): [Mdl 3] Provides capability to operate the 3203 mdl 3 at 1,200 lpm. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5595 on the 3777.

ACCESSORIES (None)

SUPPLIES

Ribbons: Contact IBM.

3210 CONSOLE PRINTERnKEYBOARD

[NO LONGER AVAILABLE]

PURPOSE

Selectric® console typewriter for use as an input (keyboard) and output (printer) unit for a S/370 model 135, 135-3, 145, 145-3 or 155.

MODELS

Model 1	001	For mounting on the console table reading board.
Model 2	001	For remote use ... not available for S/370 models 135, 135-3, 138.

HIGHLIGHTS

Both mdls consist of a Selectric keyboard printer. Mdl 1 is mounted on the 3135, 3135-3, 3145, 3145-3 or 3155 reading board. Mdl 2 is supplied with a stand which can be located up to 75 feet from the processor. For the mdl 1, a forms rack is supplied with the system. A forms rack is standard with the mdl 2.

In both mdls, the keyboard and printer operate independently under program control. The general facilities provided are: direct data entry into the system, printed output from the system, and switches and lights for system control.

The keyboard on both mdls is similar to other Selectric typewriters. However, it provides only those functions useful and necessary in a system console. Functions such as tab, tab set and clear, backspace, ribbon shift, and end-of-line bell are not included. On mdl 1, keys and lights are provided so that the operator can "display and alter" processor storage and system control information.

The printer for both mdls has an 88-character data set and a 125-character print line. It operates at a rated speed of 15.5 characters/second, has a stationary carriage and an interchangeable print element. A 15-inch carriage provides a 12-1/2" writing line at 10 characters/inch. A 6 lines/inch pin feed platen (13-1/8" pin-to-pin) is standard. A maximum of an original and five carbon copies can be prepared, depending upon paper, carbon quality and thickness. A Data 1 Font, dual case printing element is provided ... see "Type Catalog" pages for character layout.)

Limitations: One of each mdl can be attached to a system ... mdl 1 cannot be attached if a 3215 Console Printer-Keyboard is installed.

Prerequisites: Mdl 1 -- requires a 3210 mdl 1 Adapter (#7844) on the 3135, 3135-3 3145, 3145-3 or 3155 Processing Units. **Mdl 2** -- requires a 3210 mdl 2 Adapter (#7845) on the 3145, 3145-3 or 3155.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): [Mdl 2] -- **#9901** for 115V, **#9902** for 208V, **#9904** for 230V.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3211 PRINTER

PURPOSE

Printed output unit for S/360 models 22, 30, 40, 50, 65, 67 (in model 65 mode), 75, 85, 195, any S/370 Processor (except 3115 and 3125) or a 4321, 4331, 4341 Processor.

MODELS

Model 1 001

Prerequisites: [1] One 3811 Printer Contol Unit for each 3211 Printer ... see M3811 pages for attachment details. [2] One 3216 Interchangeable Train Cartridge for each 3211 Printer ... see M3216 pages for details.

HIGHLIGHTS

2,000 lpm rated speed for nine equal and alike arrays of 48-character sets. Other speeds are obtained when using other character arrays repeated with different frequencies. The Universal Character set capability is standard. Also, the 3216 Interchangeable Train Cartridge must be specified. This allows maximum flexibility in train layout to obtain maximum speed for varying character sets.

The 3211 has 132 print positions as standard. 18 additional positions are available as a special feature. Horizontal spacing is 10 characters per inch. Vertical spacing is 6 or 8 lines per inch under program control. Continuous marginally punched form spacing and skipping are controlled by a forms control buffer, a standard feature of the 3811. This program-controlled buffer allows skipping at 30 inches per second with a high-speed skip of 90 inches per second after seven lines have passed. Maximum form length is 22.5 inches at 8 lines per inch and 24 inches at 6 lines per inch. Form width may vary from 3.5 inches to 18.75 inches. Minimum form length is 3 inches. A pair of guides may be purchased for use with forms having a fanfold depth greater than 18 inches. A powered stacker helps refold the forms after printing. The 3211 is used in Optical Character Recognition applications when equipped with the OCR Print Package feature.

Limitations: Form sets of more than four parts should be tested for acceptable print quality of the last copies. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use 20-24 lb. Bond in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3211 documents on the 3886, Reread On Reject capability and 3211/5211 Compatability (**#9701**) should be used on the 3886.

For preprinted forms having print position 1 more than 33.02mm (1.3 inches) from the left edge, electronic indexing will be needed, see GA24-3543. For layout dimensions ... see GA24-3488. For forms sets that vary in thickness in excess of 0.0762mm (0.003") across either the width or length of the form, see GA24-3488.

The 3211 may be used to generate input in OCR applications ... see "Type Catalog", 3216 Interchangeable Train Cartridge section, for printable OCR characters. The OCR Print Package (#5450) is a prerequisite for OCR applications.

For 3211 Printer diagnostic support, OLTEP facilities are required under OS or DOS. Standalone diagnostics require 32K storage and a disk or tape.

Arrays of less than 27 characters should not be used on the 3211 Printer.

Paper form crimp should be on the left side of the form ... see *Forms Design Consideration for System Printers,* GA24-3488.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Kickstrips: **#9350**, if desired ... also available on MES. When kickstrips are installed, the open area underneath the machine is enclosed. They reduce the amount of "toe-room" and may be inconvenient to the user if the power outlet is located beneath the machine.
- Required for use in OCR printing: #5450 for the OCR Print Package ... see "Special Features" below.
- Tool Kit: **#9710** (standard) or **#9711** (OCR). Required for CE maintenance. **For Rental Customer:** Specify **#9710** on first 3211 without OCR Print Package (#5450) ordered for a customer ... specify **#9711** on first 3211 with #5450 ordered for a customer. If required for a multiple machine installation, an additional Tool Kit(s) is available on no-charge MES. **For Purchase Customer:** Specify **#9710** on **each** 3211 without #5450 machine order ... specify **#9711** on **each** 3211 without #5450 machine order. When installed rental 3211s are purchased, a Tool Kit is to be ordered on no-charge MES for each machine.

SPECIAL FEATURES

OCR Print Package (#5450): Provides additional manual operator platen controls; required for OCR applications. **Field Installation:** Yes, on machines with serial number above 10081 . Available at time of manufacture only for machines with serial numbers below 10082 . **Prerequisites:** **#9711** ... see "Specify".

Print Positions, 18 Add'l (#5554): Increased print positions from 132 to 150. Operation of the 3211 printer remains unchanged. **Field Installation:** Yes. **Prerequisites:** #5553 on the 3811.

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stacker Guides (P/N 2471661): Useful on 3211s when it is required to print on forms having a fanfold depth greater than 18 inches. One guide supports the paper supply stack and the other extends the stacking area to accommodate the long folds. The rear stacker guide prevents automatic operation at the power stacker folding belts only when in use.

SUPPLIES

Contact IBM.

3216 INTERCHANGEABLE TRAIN CARTRIDGE

PURPOSE

A cartridge and print train which provides interchangeability of type font for the 3211 Printer.

MODELS

Model 1 001

HIGHLIGHTS

At least one 3216 is required when running a 3211 Printer. OCR type styles are available.

Interchangeability: When multiple 3216s are available, they can be interchanged by the operator, providing flexibility for printing different type fonts, type styles or character arrangements. Character sets up to 254 characters can be provided for unique requirements.

Prerequisites: The 3216 functions only when mounted in a 3211 Printer.

Bibliography: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Print Train Arrangement: See "Type Catalog" for characters in each standard arrangement and feature numbers to be specified.
- Storage Container: **#9668**, if needed for the 3216 ... recommended for storage use when multiple 3216s are ordered for a single 3211.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3230 PRINTER

[NO LONGER AVAILABLE]

PURPOSE:

Provides single part output.

MODELS

Model 1	001	Attaches to the 8100 Information System via the direct attached loop or data link attached loop.
Model 2	002	Attaches to the 3274 Control Unit as a category A terminal, 3276 Control Unit Display Station, 8775 Display Station or to the 3081, 3083 or 3084 via the 3082 Processor Controller or to the 4321/4331 via Display/Printer Adapter, APL/Text, SCS and Character Print Operation are not supporter.

Prerequisites:

For Mdl 1: Direct Attached Loop Operation -- #4380 or #4835 on the 8100 System. For Data Link Attached Loop Operation -- 3842 or 3843 Loop Control Unit.

For Mdl 2: 3274 Attachment:

- An available Category A port and 3274 Configuration Support at the designated or higher release number.
- Configuration Support A (**#9110**) - Release Number 13.
- Configuration Support B (**#9111**) - Release Number 24.
- Configuration Support C (**#9112**) - Release Number 43.
- Configuration Support D (**#9124**)
- 3081/3083 Standard Adapter on 3082

3276 Attachment:

- A 3276 mdl that can support the 3230 Character Print Operation Feature Selected.

8775 Display Terminal attachment:

- 8775 Printer Attachment feature (#5580).

Customer Setup: Machine only.

HIGHLIGHTS

The 3230 prints at a burst speed of 350 cps at 10 characters per 25.4mm (1 inch) and 450 cps at 13-1/3 characters per 25.4mm (1 inch) bidirectionally. Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput. See *3230 Printer Model 1 Product Description,* GA24-3760, or *3230 Printer Model 2 Product Description,* GA24-3759 for throughput considerations.

The 3230 consists of control functions, printer and indicator lights in one integrally designed table-top unit.

Printer: Uses aluminized coated single-ply friction-feed roll paper only (see SSD Sales Manual). Roll paper is available in 215.9mm (8.5-inch) or 279.4mm (11-inch) width only. This printer uses the electromatrix print technology which removes the aluminum coating on the paper exposing a black under-surface. Characters are formed within a 10 x 18 dot matrix cell with a resolution of 160 dots per 25.4mm (1 inch) both vertically and horizontally. Character spacing is 13-1/3 per 25.4mm (1 inch) and 10 per 25.4mm (1 inch). At 13-1/3 characters per 25.4mm (1 inch), a maximum of 132 characters can be printed on 279.4mm (11-inch) wide paper; and at 10 characters per 25.4mm (1 inch), a maximum of 100 characters can be printed. At 13-1/3 characters per 25.4mm (1 inch), a maximum of 100 characters can be printed on 215.9mm (8.5-inch) wide paper and at 10 characters per 25.4mm (1 inch) a maximum of 80 characters can be printed. Line spacing is 3, 4, 6 or 8 lines per 25.4mm (1 inch). A tear bar located approximately 25.4mm (1 inch) from the print line is provided. An audible alarm is also provided for operator intervention-required situations. Graphic Escape APL/Text is included in the 3230 mdl 2. Expands the character handling capability to accommodate the APL, text and graphic plot character sets.

Control Functions: The mdl 1 operates in SCS (SNA Character Stream) mode which provides for customer program definable horizontal and vertical formatting and line spacing of 3, 4, 6 or 8 lines per 25.4mm (1 inch). Printer address, data rate, carrier rate and language are selected by the customer via customer accessible switches. A Cancel Switch is provided on the Operator Panel which allows operator termination of the current print operation.

Character spacing (mdl 1 and 2), 10 or 13-1/3 characters per 25.4mm (inch), is selectable by the printer operator only via the "Change CPI" button.

The mdl 1 operates at 2400, 4800, 9600 and 38,400 bps. Selection is made by the customer via customer accessible switches.

The mdl 2 operates in 3270 Data Stream and SCS (SNA Character Stream) mode. When operating in SCS mode, the mdl 2 has the same program-controlled function characteristics as the mdl 1. Also provided are Cancel, Buffer Reprint, and Program Attention 1/Program Attention 2 (PA1/PA2) switches. The Cancel switch allows operator termination of the current print operation. The Buffer Reprint allows one successful reprint of the contents of the buffer when in 3270 Data Stream mode or reprint from the previous chain boundary when in SCS mode. The PA1/PA2 switch allows an operator to request a specific action from the user-written program in the host.

The mdl 2, when operating in 3270 Data Stream mode or in SCS mode and no control function data has been received by the printer, allows the printer operator to have control via the Operator Panel. Buttons or switches are provided to select 6 or 8 lines per 25.4mm (inch). Single/Double line spacing, Page Length Control, Maximum Print Positions and Mono/Dual Case. Change case (Mono/Dual) button is not effective when the printer terminal is operating in SCS mode, copying from a display or operating in APL mode.

Maintenance: 3230s utilize IBM Service Center Service either under the "Maintenance" or "Replacement" option. See "Replacement" option. See IBM for description and procedures associated with Service Center Service.

It is the customer's responsibility to set-up the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service Center Maintenance, it is the customer's responsibility to disconnect the unit(s), transport them to a designated IBM location and pick them up when repair is completed. Alternately, the customer may ship them prepaid to a mail-in service location. IBM will repair the units and return-ship them to the customer. Re-setup of the units is the customer's responsibility. Under Service Center Replacement it is the customer's responsibility to disconnect the units, transport them to a designated IBM location and exchange the defective unit with IBM for an equivalent unit in good working order. The defective unit becomes the property of IBM.

Maintenance is provided during the warranty period, under the Terms and Conditions of Service Center Maintenance.

Customers with 3230s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if repairable, through a designated IBM location for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the machine(s) inspected. This inspection will be done through a designated IBM location for a fixed charge. Alternately, inspection may be performed at the customer's site on a time and material basis or under CSS contract.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then is eligible for IBM Maintenance Agreement Coverage.

Replacement Parts and Maintenance Information Manuals: Replacement parts and maintenance information manuals for maintenance of Service Center purchased machines are available for sale and may be ordered by the customer through the local DP branch office.

Spares: It is recommended that the customer replace a failing printer with a spare printer, and that the customer be advised to purchase sufficient spare printers for such use. Customers should be advised that warranty on spares matures to expiration whether the spares are in operation or on the shelf. The number of spare printers recommended is dependent upon the number of printers the customer has installed, his application requirements, physcial locations, and layouts. Determination of the required number of spares is a customer responsibility. The minimum number of spare units recommended is shown in the following.

3230 Printer (cont'd)

Recommended Minimum Number of Spare 3230 Printers

Number of 3230s Installed	Minimum Number of Spares Recommended
1 to 10	1
15	2
50	3
75	4
100	5
200	8
300	12
500	18
700	24
1000	30

The customer should be advised that warranty on spares matures to expiration whether the spares are in operation or on the shelf, and to test spares for correct operation before putting them on the shelf.

Customer Problem Determination Aids: Problem determination is a customer responsibility. Through the use of off-line tests, status indicators on the printer and the 3230 Problem Determination Procedure, the customer can determine if service is required. If customer is not certain the terminal requires service, the customer may obtain problem determination assistance from IBM by calling:

800 942-1918 NY State
800 431-2670 Continental US outside NY
914 696-6840 Collect-Alaska, Hawaii, Puerto Rico

Problem determination assistance is available for those terminals by an IBM Maintenance Agreement or under warranty, from 8:30 AM to 5:00 PM. EST, Monday through Friday, excluding holidays.

Note: IBM reserves the right to withdraw this service upon 90 days notice.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other customer preparation
- Receipt at the customer's receiving dock, unpacking and placement of the 3230 at initial setup and re-setup after repair or replacement.
- Procurement, installation and maintenance of the communications/ loop network. See "Accessories" section.

  For mdl 1, see "3630 System and 8100 System Loop Cable and 3730, 8100 Loop Accessories."

  For mdl 2, see "Cables for attachment to the 3271/3272, 3274 Control Units and 3276 Control Unit Display Stations."
- Physical setup, connection of cables, switch settings and checkout.
- Use and follow the Problem Determination Procedures.
- Using and following the Problem Determination Procedures and filling out the applicable replacement/ service authorization form prior to bringing or shipping the printer to IBM for service.
- Disconnecting and transporting the machine to and from a designated IBM location for maintenance or replacement or disconnecting, packing, moving to the customer shipping dock and shipping the printer prepaid to an IBM location offering mail-in service. Machines so shipped will be repaired and returned, shipped prepaid to the customer.
- Providing a desk or table top to support the 3230.
- Replacing worn or defective printheads and maintaining a supply of spare printheads.

Customer Setup (CSU): The 3230 is designated customer setup, thereby offering the customer early availability and relocation flexibility. Detailed setup instructions are included with each printer.

Customer Assistance Group: Assistance in customer setup and problem determination is available. See "Customer Problem Determination Aids."

On-Site Problem Determination: If the customer desires on-site assistance to perform Problem Determination, the local FE branch office may be called for Customer Engineering assistance. The CE will do Problem Determination using the same documentation available to the customer. Shipping of defective printers to the Repair Center or the local service center remains a customer responsibility. CE assistance is billable at the current CE hourly rate.

Shipping Materials: All shipments are from the plant of manufacture and are shipped in specially designed containers. The customer should be advised to store some of these containers so that they will be available to ship a failing printer to the IBM Repair Center. Additional containers can be purchased from IBM. IBM will ship the repaired printer prepaid to the customer.

IBM Aids: The CF3270 configurator aid available on HONE supports the 3230.

Five 3270 is being enhanced to provide performance estimates for the 3268. This aid will be available within 30 days.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

Specify codes may not be necessary to order a 3230. If codes are not specified, the following defaults are assumed:

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Non-locking plug. If locking type plug is required, specify **#9890**. If hospital grade plug is required, specify **#9885**.
- Power Cable Length: 2.8 meters (9 feet). If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for a 1.8 meter (6 foot) or **#9513** for a 4.3 meter (14 foot) cable.
- Communication Cable:

  Mdl 1: A communications cable terminated with a right angle connector to plug into a Loop Station Connector (LSC) is provided. Cable Length: 1.8 meters (6 feet). If the 1.8 meter (6 foot) cable is not desired, specify **#9405** for a 4.3 meter (14 foot) cable.

  Mdl 2: See "Accessories" and "Price List" section for additional information.
- Color: Pearl white is the only available color.
- Compatibility Specify Options for 3270 Data Stream (non-SCS) Operation: (mdl 2) Operation of the 3230 is defined as standard. Alternate operation may be specified.

  Note: Standard 3230 mdl 2 operation is the same as the standard 3287 mdls 1 and 2.

  1. Carriage Return (CR) at MPP Plus 1:

     Std: An automatic New Line (NL) is executed at MPP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

     #9501: No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

  2. New Line (NL) at MPP Plus 1:

     Std: An automatic New Line (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

     #9502: No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

  3. Form Feed Followed by Data:

     Std: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

     #9503: The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220 - SC3752.

  4. Form Feed is Last Character in Print Order:

     Std: An automatic New Line (NL) is executed after the form feed is completed. The next print position will be the first print position of the second line on the next form.

     #9504: The automatic New Line (NL) is suppressed at completion of the form feed. The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219 - SC3749.

  5. Null Suppression:

     Std: If an entire print line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. The next print position is the first print position of the current line.

     #9505: Prints all non-printable character lines as a blank line and performs a New Line (NL). The next print position is the first print position of the next line. Compatible with 3287 RPQ ML0442 - SC3741 or 3287 RPQ MK3988 - SC3741.

3230 Printer (cont'd)

6. Form Feed (FF) Order Position:

   Std: Execute a Form Feed (FF) Order only if it occurs at the first print position in a line or at MPP plus 1. Treat FF at other positions as spaces.

   #9506: Execute a Form Feed (FF) Order whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

7. Automatic Function at End of Print Buffer:

   Std: An automatic New Line (NL) is executed following a print order. The next print position is the first print position of the next line.

   #9507: An automatic Form Feed (FF) is executed following a print order. The next print position is the first print position of the first line of the next form. Compatible with 3287 RPQ MK3988 - SC3740.

- Character Print Operation: (mdl 2 only) The basic machine provides for operation with a program which requires a print buffer of 1920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below:

  #9521 (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  #9523 (2560-character print operation) for use with a program which requires a printer buffer size of 2560 bytes while using Erase/Write Alternate Command.

  #9524 (3440-character print operation) for use with a program which requires a printer buffer size of 3440 bytes while using Erase/Write Alternate Command.

  #9525 (3564-character print operation) for use with a program which requires a printer buffer size of 3564 bytes while using Erase/Write Alternate Command. Limitations: This specify code is not valid when the 3230 is attached to a 3274 with Configuration Support A (feature **#9110**).

  Note: To provide compatibility with current application programs on the 3270 Information Display System, the customer can use an Erase/Write command for **#9521** to provide 480-character print operation and specify **#9523**, **#9524** and **#9525** to provide 1920-character print operation. Allowable usage in SNA Character String of the full buffer varies according to the control unit (3274 or 3276) to which the printer is attached and to programming considerations. See *3276 Description and Programmers Guide*, GA18-2081 or *3274 Description and Programmers Guide*, GA23-0061. Copy operation from larger screen display to smaller printer buffer is not acceptable.

  Mdl 2 Printer Attachment Table:

Mdl 2 Character Print Operation

3276 Mdl	480/960	1920/1920	1920/2560	1920/3440
1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

Note: 3276 mdls 1, 2 and 3 with SDLC/BSC Switch feature installed and operating in SDLC mode will support all 3230 Character Print Operations, except **#9525** (3564-character print operation). See also previous Copy restrictions in Note above.

SPECIAL FEATURES (None) **MODEL CONVERSION**

Not recommended.

ACCESSORIES

Accessories are available on a purchase-only basis. Order part number as indicated below at the price indicated in the "Price List section".

CABLES - Mdl 2

Cables and or associated parts to attach the subject machines to the 3271/3272/3274 Control Units and 3276 Control Unit Display Station, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning*, GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 2)
P/N	1836418	Connector Kit (No te 2)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 3)
P/N	1836419	Connector Kit (Note 3)
P/N	2621414	Modification Kit (Note 4)
P/N	1833106	Station Protector Attachment Kit (Note 6)
P/N	5252643	Adapter (Note 8)
P/N	1830818	Station Protection Kit, Gas (Note5)
P/N	5252899	Station Protector Element, Gas (Note7)

Notes:

1. Order via MSORDER (Category = Bulk Cable) on AAS. Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

CABLES-COMMUNICATION (LSA) GROUP

Cable to attach the 3230 Model 1 to the loop.

Part Number	Length
4440786	1.8 meter (6')
99240819	4.3 meter (14')

FIELD PACKAGING MATERIAL

For the 3230 part number 7323495, order via MES. To be used for shipping the printer to the IBM Repair Center.

POWER LINE CORDS

Part Number	Length	Plug Description
5699344	1.8 m (6')	Locking
4448996	2.8 m (9')	Locking
5699343	4.3 m (14')	Locking
5699370	1.8 m (6')	Nonlocking, Hospital Grade
4448999	2.8 m (9')	Nonlocking, Hospital Grade
5699369	4.3 m (14')	Nonlocking, Hospital Grade
5699346	1.8 m (6')	Nonlocking
4448997	2.8 m (9')	Nonlocking
5699345	4.3 m (14')	Nonlocking

SUPPLIES

Electrosensitive Roll Paper: P/N 7032529 (215.9mm x 71.6m (8.5-inch x 235 foot)) roll, or 7032530 (279.4mm x 71.6m (11-inch x 235 foot)) roll, or other commercially available equivalent paper may be used. Print quality and printhead wear vary as a function of the paper used. See SSD sales manual.

Printhead: One printhead is shipped with the printer. Head life is estimated to be 30 million characters, including spaces, when using P/N 7032529 or 7032530 or equivalent, paper. The printhead is a consummable item and it is recommended that the customer have one spare printhead per printer on hand.

Ordering Information: Electrosensitive paper and customer replaceable printheads can be ordered by calling the IBM Direct Telephone number:

800/631-5582 outside New Jersey
800/352-4960 within New Jersey.

3232 KEYBOARD PRINTER TERMINAL MDL 1, 11

[NO LONGER AVAILABLE]

PURPOSE:

A desk top interactive keyboard printer terminal for entering data into and retrieving data from a host processor. The 3232 provides in a single unit, a keyboard, a high quality printer for a hard copy record of information keyed and received, control to manage terminal and communications functions and a communications attachment.

MODELS

Model 1 001

Model 1 uses SNA LU-Type 1 protocol to communicate over data link facilities with any suitably equipped and programmed virtual storage S/370, 3031, 3032, 3033, 3081. Attachment to the 8100 is via Direct Connection Attachment or Communication Attached (DCE). Attachment can be either point-to-point or multipoint. The 3232 mdl 1 obtains its clocking from an external modem and operates at speeds up to and including 9600 bits per second in synchronous, half-duplex mode on half or full duplex communications facilities. The model 1 connects to communications facilities via its standard connector that complies with EIA RS-232-C Standard. Terminal address is set from the keyboard.

Model 11 011

Model 11 uses SNA LU-Type 1 protocol to communicate with the 8100 Information System via the direct loop of the 8101, 8130 or 8140. Remote attachment is via a data link attached 3842 or 3843 Loop Control Unit. Communication speeds are 9600 or 38400 bps per second when attached to a directly attached loop, or 2400 bps when data link attached to the 3842 loop control unit, or 2400, 4800 or 9600 bps when data link attached to the 3843 Loop Control Unit.

Station address is user-selectable from the terminal's keyboard. Carrier rate and data rate are selectable via operator accessible switches on the rear of the 3232 model 11. Single line edit and horizontal tabulation are standard operator selectable functions of this terminal.

Prerequisites: For mdl 1, a modem cable is required. See Specify below.

For mdl 11 Direct Attached Loop Operation - Specify **#4830** or **#4835** on the 8100 System; specify **#4830** or **#4831** on the 4331 System.

Customer Setup: Machine only.

HIGHLIGHTS

The 3232 keyboard printer communications terminal configuration and function supports an operator/machine relationship that supports interactive applications. Backspace and overstrike APL is standard on both mdls as an operator selectable alternate character set.

Control Function: Provides control for online and offline operations.

Mdl 1: Facilitates communications in SDLC line discipline as an LU-Type 1 attached via a data link. SCS processing provides customer program-definable horizontal and vertical formatting and tabulation, page length, and line spacing (3, 4, 6 or 8 lines per 25.4mm (inch)). The mdl 1 also has single line editing, auto (EOB/EOM) key function, dynamic control of four 256-byte buffers for keyed and received data and automatic answer and disconnect on switched facilities.

SDLC as used in the 3232 conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI AADCP standards. For details of this conformance, see the *General Information Manual, IBM Synchronous Data Link Control,* GA27-3093.

Mdl 11: Facilitates communications in SNA LU-Type 1 discipline on an 8100 or 4331 direct attached loop; or remote data link attached loop. SCS processing provides customer program-definable horizontal and vertical formatting and tabulation, page length, and line spacing (3, 4, 6 or 8 lines per 25.4mm (inch)). It also has controls for single line editing, auto (EOB/EOM) key function and dynamic control of four 256-byte buffers for keyed and received data.

Keyboard: A 64-key keyboard is a standard part of every 3232 terminal. Tactile keys provide positive feedback to the operator. Buffering is provided to prevent input data loss during keying. Numerics are located on the top row of keys. A data entry keyboard is not available. The keyboard has the character set graphics engraved on the left side of the key tops. The alternate APL character set is engraved on the right side of the key tops. All control functions are printed on the key fronts. Typamatic keys are provided on some (backspace, line feed, advance, space, return, hyphen, and underscore) or all key basis under operator control.

Printer: Printing is accomplished using a multi-element matrix printhead and aluminum coated single-ply roll friction-feed paper (see SSD sales manual). Roll paper is available in 215.9mm (8.5-inch) and 279.4mm (11.0-inch) widths. The 3232 prints at burst speeds up to 350 characters per second at 10 characters per 25.4mm (inch) and up to 450 cps at 13-1/3 characters per 25.4mm (inch) pitch. Actual printer speed is dependent on operational and system characteristics such as communication facilities, print format and application program processing. Paper skip speed is approximately 127mm (5 inches) per second. The printer uses electromatrix printing technology. Imaging is accomplished by electrically removing dots of the paper's aluminum coating, thereby exposing the dark contrast layer. Character graphics are formed in a 10x18 dot matrix cell. Maximum print line lengths at 10 character pitch on 215.9mm (8.5-inch) and 279.4mm (11-inch) wide paper are 80 and 100 characters, respectively. Maximum print line lengths at 13-1/3 character pitch on 215.9mm (8.5-inch) and 279.4mm (11-inch) wide paper are 106 and 132 characters, respectively. Vertical print line spacing is at 3, 4, 6 or 8 lines per 25.4mm (inch). A tear bar is located approximately 25.4mm (1 inch) from the print line. A print position column scale is provided for both 10 and 13-1/3 pitch printing. A line on the top of the printhead, visible through the terminal cover, points to the scale position identifying the next column to be printed. The narrow profile printhead provides last-line and character-printed visibility from the operator position. Printer control logic and bidirectional printing capability help optimize printing performance by minimizing head movement while paper is advanced to the next print line. The printhead is user-replaceable and is considered a consumable item (see SSD sales manual).

Indicator Lights: Nine indicators are provided. In operating mode, the lights display terminal status conditions such as test, communications, APL character set, shift lock and print inhibit, and power on. In exception mode, conditions such as machine check, out-of-forms and head trouble are indicated.

Operator Factors: The 3232 provides the operator last-line and character-printed visibility by way of its thin and low profile printhead. Legibility of printing is good due to the paper-to-character contrast and the dense dot matrix used in forming characters. The light weight (13.6kg (30 lbs.)), compact 530mm (20.9 inch) wide by (488mm (19.2-inch) deep by 150mm (5.9-inch)) desk-top design of the terminal makes it readily movable for operator convenience. The printer's high speed permits better utilization of communication facilities and potentially improved user productivity. The print position scale defines the next position to be keyed and printed and aids in the setting of tabs and margins. The electromatrix printing technology make this terminal quieter than conventional matrix printers, thereby helping to minimize operator distraction due to noise. Control keys allow the operator to tailor the terminal to job requirements, thus helping to improve operator productivity. Indicator lights show terminal status.

Communications Facilities: The 3232 mdl 1 communicates to a host processor via the following facilities:

Mdl 1: SNA/SDLC operates in synchronous half duplex mode on the following *modem clocked* 2- and 4-wire facilities:

–Switched pt-to-pt Public Telephone Network:

1200 bps on C2M Facilities.

2400 bps on C3 or C3M Facilities.

4800 bps on C4 or C4M Facilities.

–Nonswitched pt-to-pt and multipoint Public Telephone Network:

1200 bps on D3M Facilities.

2000 bps on D4M Facilities.

2400 bps on D5, D5M or D5SB Facilities.

4800 bps on D6, D6M or D6SB Facilities.

7200 bps on D7M Facilities.

9600 bps on D8, D8M or D8SB Facilities.

–Nonswitched pt-to-pt and multipoint Base Band at 2400, 4800 or 9600 bps on or G3M Facilities.

Mdl 11: Attached to customer-owned loops. A direct loop to an 8100 or 4331 may operate at 9600 or 38400 bps. A data link attached loop may be connected to an 8100 via a 3843 Loop Control Unit, or to a 4331 via a 3843 Loop Control Unit. The 3843 provides for attachment to a synchronous external modem operating at 2400, 4800 or 9600 bps. The Loop Control Units support pt-to-pt or multipoint telecommunications links. Refer to the 3843 pages for further information.

For additional information regarding communications capabilities, see the M2700 pages and appropriate modem machine pages.

Customer Setup (CSU): The 3232 is designated a customer setup terminal, thereby offering the customer early availability and relocation

3232 Keyboard Printer Terminal Mdl 1, 11 (cont'd)

flexibility. Assistance in customer setup is available. See Customer Problem Determination Aids.

Maintenance: 3232 utilizes IBM Service Center Service either under the "Maintenance" or "Replacement" option ... see IBM for description and procedures associated with Service Center Service.

It is the customer's responsibility to set-up the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service Center Maintenance, it is the customer's responsibility to disconnect the unit(s), transport them to a designated IBM location and pick them up when repair is completed. Alternately, the customer may ship them prepaid to a mail-in service location. IBM will repair the units and return ship them to the customer. Re-setup of the units is the customer's responsibility. Under Service Center Replacement, it is the customer's responsibility to disconnect the units, transport them to a designated IBM location and exchange the defective unit with IBM for an equivalent unit in good working order. The defective unit becomes the property of IBM.

Maintenance is provided during the warranty period under terms and conditions of Service Center Maintenance.

Customers with 3232s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if repairable, through a designated IBM location for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the machine(s) inspected. This inspection will be done through a designated IBM location for a fixed charge. Alternately, inspection may be performed at the customer's site on a time and material basis or under a CSS contract.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine is eligible for IBM Maintenance Agreement Coverage.

Contact IBM for information on IBM locations designated to support these offerings

Note: RPQ's may affect the eligibility for the service center replacement option.

Customer Problem Determination Aids: Problem determination is a customer responsibility. Through the use of off-line tests, status indicators on the terminal and the 3232 Visual Error Conditions and Recovery Actions, the customer can determine if service is required. If the customer is not certain the terminal requires service, the customer may obtain problem determination assistance from IBM by calling:

800 492-1918 NY State
800 431-2670 Continental US outside NY
914 696-6840 Collect-Alaska, Hawaii, Puerto Rico

Problem determination assistance is available for those terminals covered by an IBM Maintenance Agreement or under Warranty, from 8:30 AM to 5:00 PM, EST, Monday through Friday, excluding holidays.

Note: IBM reserves the right to withdraw this service upon 90 days notice.

Spares: It is recommended that the customer replace a failing terminal with a spare terminal and that the customer be advised to purchase or lease sufficient spare terminals for such use. The number of spare terminals recommended is dependent upon the number of terminals the customer has installed, his application requirements, physical locations, and layouts. However the minimum number of spare terminals recommended is shown in the following table:

Number of 3232s Installed	Minimum Number of Spares Recommended
1 to 10	1
15	2
50	3
75	4
100	5
200	8
300	12
500	18
700	24
1000	30

THE CUSTOMER SHOULD BE ADVISED THAT WARRANTY ON SPARES MATURES TO EXPIRATION WHETHER THE SPARES ARE IN OPERATION OR ON THE SHELF, AND TO TEST SPARES FOR CORRECT OPERATION BEFORE PUTTING THEM ON THE SHELF.

Shipping Materials: All shipments are from the plant of manufacture and are shipped in specially designed containers. The customer should be advised to store some of these containers, if he elects repair center maintenance, so that they will be available to ship a failing terminal to the IBM Repair Center. Additional containers can be purchased from IBM (see "Accessories" M10000 pages).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other customer preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3232 at initial setup and re-setup after repair or replacement.
- Replacement of the failing terminal from his spares inventory.
- Determination of the required number of spare terminals.
- Procurement, installation and maintenance of the communications facilities. For the 3232 mdl 1 this includes the required modems and terminal to modem cables. For the 3232 mdl 11, this includes the multi-use communications loop cable and accesory units (LSCs). (See M2700 and M10000 pages).
- Physical setup, connection of cables, terminal function settings and checkout.
- Use and follow the Problem Determination Procedures and fill out the applicable Replacement/ Service Authorization form prior to bringing or shipping the terminal to the IBM Repair Center or transporting to the IBM Service Center.
- Detaching and transporting the machine to and from a designated IBM location for maintenance or replacement or disconnecting, packing and moving to the customer shipping dock when sending the terminal to an IBM location offering mail-in service.
- If applicable, shipping the terminal prepaid to an IBM location offering mail-in service. IBM will return ship the repaired terminal prepaid.
- Providing a desk or table top to support the 3232.
- Replacing worn or defective printheads and maintaining a supply of spare printheads.

Bibliography: See *KWIC Index,* G320-1621 or specific system bibliography.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

Specify codes may not be necessary to order a 3232. If codes are not specified, the following defaults are assumed:

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Non-locking plug. If locking type plug is required, specify **#9890**. If hospital grade plug is required, specify **#9885**.
- Model 11 Keyboard: If the ASCII keyboard is required, specify **#2950**.

  Note: To print the ASCII-B character set, the control unit to which the printer is attached must support ASCII transmission code.
- Power Cable Length: 2.8m (9 feet). If standard 2.8m (9 foot) power cable is not desired, specify **#9511** for 1.8 m (6 foot), or **#9513** for a 4.3m (14 foot) cable.
- Communication Cable:

  Mdl 1: An external modem cable is required to attach the the 3232 to a modem (DCE). The standard 6.1m (20 foot) communication cable is provided. If the standard communication cable is not desired, specify **#9061** for 3.0m (10 foot) cable, **#9062** for 9.1m (30 foot) cable or **#9063** for 12.2m (40 foot) cable. See M10000 pages for ordering instructions.

  Note: For direct connect to the 8100 System, 3.0m (10 foot) modem cable must be used. The length of the 8100 direct connect cable cannot exceed 9.1m (30 feet), thus the total cable length from the 8100 System to the 3232 mdl 1 cannot exceed 12.2m (40 feet).

  Mdl 11 A communication cable terminated with a right angle connector to a plug into a Loop Station Connector is provided.

  Cable Length: 1.8m (6 feet). If the 1.8m (6 foot) cable is not desired, specify **#9405** for a 4.3m (14 foot) cable.
- Character Sets: No specify required. Mdl 1 and 11 are 96-character set EBCDIC and APL/Text.
- Color: Pearl white is the only available color.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Available at time of manufacture only.

3232 Keyboard Printer Terminal Mdl 1, 11 (cont'd)

ACCESSORIES

Accessories are available on a purchase-only basis. Order part number indicated below at the price indicated in the Price List section.

COMMUNICATION CABLES - Mdl 1

External modem cable to attach the 3232 to a modem (DCE).

Part Number	Length
5640736	3.0 m (10')
2721244	6.1 m (20')
2721246	9.1 m (30')
2721248	12.2 m (40')

Note: For direct connect to the 8100 System, the 3.0 meter (10') modem cable must be used. The length of the 8100 direct connect cable cannot exceed 9.1 meters (30'), thus the total cable length from the 8100 System to the 3232 cannot exceed 12.1 meters (40 feet).

For connection to IBM modems one of the above IBM cables, or equivalent, must be used.

COMMUNICATION CABLE (LSA) GROUP - Mdl 11

Cable to attach the 3232 to the loop.

Part Number	Length
4440786	1.8 m (6')
4440819	4.3 m (14')

FIELD PACKAGING MATERIALS

The original shipping containers should be used for shipping the 3232 printer to the IBM Repair Center. Additional or replacement field packaging material can be ordered via MES as follows:

Field Packaging Material	Part Number
3232 Printer	**7323495**

POWER LINE CORDS

Part Number	Length	Plug Description
5699344	1.8 m (6')	Locking
4448996	2.8 m (9')	Locking
5699343	4.3 m (14')	Locking
5699370	1.8 m (6')	Nonlocking, Hospital Grade
4448999	2.8 m (9')	Nonlocking, Hospital Grade
5699369	4.3 m (14')	Nonlocking, Hospital Grade
5699346	1.8 m (6')	Nonlocking
4448997	2.8 m (9')	Nonlocking
5699345	4.3 m (14')	Nonlocking

SUPPLIES

Electrosensitive Roll Paper: P/N 7032529 (215.9mm x 71.6m (8.5-inch x 235 feet) roll); or 7032530 279.4mm x 71.6m (11-inch x 235 feet) roll, or other commercially available equivalent paper may be used. Print quality and printhead wear may vary as a function of the paper used. See Sales Manual.

Printhead: One printhead is shipped with the terminal. Head life is estimated at 30 million characters, including spaces, when using P/N 7032529 or 7032530 or equivalent paper. P/N 7032851 (package of two print heads), or P/N 7032850 (package of five print heads) may be ordered.

Ordering Information: Paper and printheads may be ordered by calling the IBM Direct Telephone number:

800/631-5582 for outside New Jersey
800/352-4960 for New Jersey.

3232 MODEL 51 KEYBOARD PRINTER TERMINAL

[NO LONGER AVAILABLE]

PURPOSE

A desk top interactive keyboard printer terminal for entering data into and retrieving data from a host processor. The 3232 Model 51 provides in a single unit, a keyboard, a high quality printer for a hard copy record of information keyed and received, control to manage terminal and communications functions and a communications attachment.

MODELS

Model 51 uses asynchronous transmission and ASCII data and control codes to communicate over data link facilities with any suitably equipped and programmed OEM Host Processor, S/370 or 4300 processor. The 3232 Model 51 also attaches to the 8100 Information System via the communication capabilities of the 8101, 8130, or 8140. The Model 51 provides business machine (DTE) clocking. Transmission speed is operator selectable at 300, 600, and 1200 bits per second. For 8130 attachment, 300 bps is the only line speed supported; and the aggregate line speed must not exceed 330 bps. For 8140 attachment, 300 and 600 bps are the only line speeds supported; and the aggregate line speed must not exceed 660 bps. The Model 51 operates over full duplex communications facilities only. The Model 51 interfaces to communications facilities via its standard interface that complies with the EIA RS 232-C standard.

Prerequisites: For the 3232 Model 51 a modem cable is required. See Specify section.

Customer Setup: Machine only.

HIGHLIGHTS

The 3232 Model 51 keyboard printer communications terminal configuration and function supports an operator/machine relationship that supports interactive applications. Backspace and overstrike APL is standard as an operator selectable alternate character set. APL operates in the full ASCII mode.

Control Function: Provides control for on-line and off-line operations.

The model 51 uses asynchronous transmission and ASCII data and control codes as a full 128 character ASCII or CPT-TWX 33/35 terminal. It also controls basic functions such as margins, horizontal tabbing, end of line alarm, character data receive buffer, data loss indication, parity selection (odd, even, mark-hold, space-hold), half or full duplex ASCII terminal mode operation, business machine (DTE) clocking, transmit/receive interrupt and line spacing (3, 4, 6 or 8 lines per 25.4mm or 1 inch).

Keyboard: A sixty-four (64) key keyboard is a standard part of every 3232 Model 51 terminal. Tactile keys provide positive feed back to the operator. Buffering is provided to prevent input data loss during keying. Numerics are located on the top row of keys. A data entry keyboard is not available. The keyboard has the ASCII graphics engraved on the left side of the key tops. The alternate APL character set is engraved on the right side of the key tops. All control functions are printed on the key fronts. Typamatic function is provided for some (backspace, line feed, advance, space, return, hyphen, and underscore) or all keys under operator control.

Printer: Printing is accomplished using a multi-element matrix print head and aluminum coated single ply roll friction feed paper. Roll paper is available in 215.9mm (8.5) inches and 279.4mm (11.0 inches) widths. The 3232 Model 51 prints at burst speeds up to 350 characters per second (cps) at 10 characters per 25.4mm (1 inch) and up to 450 cps at 13 1/3 characters per 25.4mm (1 inch) pitch. Actual printer speed is dependent on operational and system characteristics such as communication facilities, line speed, print format and application program processing. Paper skip speed is approximately 127mm (5 inches) per second. The printer uses electromatrix printing technology. Imaging is accomplished by electrically removing dots of the paper's aluminum coating thereby exposing the dark contrast layer. Character graphics are formed in a 10 x 18 dot matrix cell. Maximum print line lengths at 10 character pitch on 215.9mm (8.5 inch) and 279.4mm (11 inch) wide paper are 80 and 100 characters respectively. Maximum print line lengths at 13 1/3 character pitch on 215.9mm (8.5 inch) and 279.4mm (11 inch) wide paper are 106 and 132 characters respectively. Vertical print line spacing may be set at 3, 4, 6 or 8 lines per 25.4mm (1 inch). A tear bar is located approximately 25.4mm (1 inch) from the print line. A print position column scale is provided for both 10 and 13 1/3 pitch printing. A line on the top of the print head, visible through the terminal cover, points to the scale position identifying the next column to be printed. The narrow profile print head provides last line and last character printed visibility from the operator position. Printer control logic and bidirectional printing capability help optimize printing performance by minimizing head movement while paper is advanced to the next print line. The print head is user replaceable and is considered a consumable item.

Indicator Lights: Nine (9) indicators are provided. In operating mode, the lights display terminal status conditions such as test, communications, APL character set, shift lock and print inhibit, and power on. In exception mode, conditions such as machine check, out of forms, and head trouble are indicated.

Operator Factors: The 3232 Model 51 provides the operator last line and last character printed visibility by way of its thin and low profile print head. Legibility of printing is good due to the paper to character contrast and the dense dot matrix used in forming characters. The light weight 13.6kg (30 lbs), compact 530mm (20.9 in) wide by 488mm (19.2 in) deep by 150mm (5.9 in)) desk-top design of the terminal makes it readily movable for operator convenience. The printer's high speed permits better utilization of communication facilities and potentially improved user productivity. The print position scale defines the next position to be keyed and printed and aids in the setting of tabs and margins. The electromatrix printing technology make this terminal quieter than conventional matrix printers thereby helping to minimize operator distraction due to noise. Control keys allow the operator to tailor the terminal to job requirements thus helping to improve operator productivity. Indicator lights show terminal status.

Communications Facilities: The 3232 Model 51 communicates to a host processor via the following facilities.

- 3232 Model 51 - operates asynchronously in CPT-TWX 33/35, or 128 character ASCII mode over the following (duplex only) facilities.
  - Switched point-to-point public telephone networks at 300 bps using C1M facilities; 600 or 1200 bps using C2M facilities.
  - Nonswitched point-to-point public telephone networks at 300 bps using D1M facilities; 600 bps using D2M facilities; 600 or 1200 bps using D3M facilities.

For additional information regarding communications capabilities, see the M2700 pages.

Customer Setup: The 3232 Model 51 Keyboard Printer is designated a customer setup (CSU) machine thereby offering the customer early availability and relocation flexibility. Detailed setup instructions are included with each machine. CSU will be considered complete after receipt by the

On-Site Problem Determination: If the customer desires on-site assistance to perform problem determination, the local FE branch office may be called for Customer Engineering assistance. The CE will do problem determination using the same documentation available to the customer. Shipping of defective printers to the Repair Center or the local Service Center remains a customer responsibility. CE assistance is billable at the current CE hourly rate.

Maintenance: 3232-51s utilize IBM Service Center Service either under the "Maintenance" or "Replacement" option ... Contact IBMfor description and procedures associated with Service Center service.

It is the customer's responsibility to set-up the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service Center Maintenance, it is the customer's responsibility to disconnect the unit(s), transport them to a designated IBM location and pick them up when repair is completed. Alternately, the customer may ship them prepaid to a mail in service location. IBM wil repair the units and return ship them to the customer. Reset-up of the units is the customer's responsibility. Under Service Center Replacement, it is the customer's responsibility to disconnect the units, transport them to a designated IBM location and exchange the defective unit with IBM for an equivalent unit in good working order. The defective unit becomes the property of IBM.

Maintenance is provided during the warranty period, under the Terms and Conditions of Service Center Maintenance.

Customers with 3232-51s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if repairable, through a designated IBM location for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the machine(s) inspected. This inspection will be done through a designated IBM location for a fixed charge. Alternately, inspections may be performed at the customer's site on a time and material basis or under a CSS contract.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then is eligible for IBM Maintenance Agreement Coverage.

A list of IBM locations designated to support these offerings may be found in the GI section under Field Engineering services.

Replacement Parts And Maintenance Information Manuals: Replacement parts and maintenance information manuals for maintenance of Service Center purchased machines are available for sale and

3232 Model 51 Keyboard Printer Terminal (cont'd)

may be ordered by the customer through the authorized IBM Distributors or the local IBM Branch Office.

Spares: It is recommended that the customer replace a failing terminal with a spare terminal and that the customer be advised to purchase sufficient spare terminals for such use. The number of spare terminals recommended is dependent upon the number of terminals the customer has installed, his application requirements, physical locations, and layouts. However, the minimum number of spare terminals recommended is shown in the following table:

Number of 3232 Model 51s Installed	Minimum Number of Spares Recommended
1 to 10	1
15	2
50	3
75	4
100	5
200	8
300	12
500	18
900	24
1000	30

The customer should be advised that warranty of spares matures to expiration whether the spares are in operation or on the shelf, and to test spares for correct operation before putting them on the shelf.

Customer Problem Determination Aids: Problem determination is a customer responsibility. Through the use of off-line tests, status indicators on the terminal and the 3232 Model 51 Visual Error Conditions and Recovery Actions, the customer can determine if service is required.

If the customer is not certain the terminal requires service, the customer may obtain problem determination assistance from IBM by calling:

800 942-1918 (NY State)
800 431-2670 (Continental US outside NY)
914 696-6840 (Collect-Alaska, Hawaii, Puerto Rico)

Problem determination assistance is available for those terminals covered by an IBM Maintenance Agreement or under warranty, from 8 AM to 5:30 PM, EST, Monday through Friday, excluding holidays.

Shipping Materials: All shipments are from the plant of manufacture and are shipped in specially designed containers. The customer should be advised to store some of these containers, if he elects mail-in service, so that they will be available to ship a failing terminal to IBM. Additional containers can be purchased from IBM for a charge. See Accessories section.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other customer preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3232 Model 51 at initial setup and re-setup after repair or replacement.
- Replacement of the failing terminal from spares inventory.
- Determination of the required number of spare terminals.
- Procurement, installation and maintenance of the communications facilities. For the 3232 Model 51 this includes the required modems and connection of the IBM supplied terminal to modem cable.
- Physical setup, connection of cables, terminal function settings and checkout.
- Using and following the Problem Determination Procedures and filling out the applicable replacement/service authorization form prior to bringing or shipping the printer to IBM for service.
- Disconnecting and transporting the machine to and from a designated IBM location for maintenance or replacement - or disconnecting, packing, moving to the customer shipping dock and shipping the printer prepaid to an IBM location offering mail-in service. Machines so shipped will be repaired and return shipped prepaid to the customer.
- If applicable shipping the terminal prepaid to an IBM location offering mail-in service. IBM will return ship the repaired terminal prepaid.
- Providing a desk or table top to support the 3232 Model 51.
- Replacing worn or defective printheads and maintaining a supply of spare printheads.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

Specify codes are not necessary to order a 3232 Model 51. The following defaults are assumed:

- Voltage (120V AC, 1-Phase, 3-wire, 60Hz): Non-locking plug. See Accessories section.
- Power Cable Length: 2.8 meter (9 foot).
- Communication Cables:
  - 3232 Model 51 - An external modem cable is required to attach the 3232 Model 51 to a modem (DCE). The standard 20 foot (6.1 meter) communication cable is provided. See Accessories section.

    Note: For direct connect to the 8100 System, a 3.0 meter (10 feet) modem cable must be used. See Aaccessories section. The length of the 8100 direct connect cable cannot exceed 9.1 meters (30 feet). Thus the total cable length from the 8100 system to the 3232 Model 51 cannot exceed 12.2 meters (40 feet).
- Character Sets: No specify required. 3232 Model 51 has 95 character set ASCII and APL/Text.
- Color: Pearl white is the only available color.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (NONE)

ACCESSORIES

Accessories are available on a "Purchase Only" basis. Order part number indicated below at the price indicated in the Price List section.

COMMUNICATION CABLES

External modem cable to attach the 3232 to a modem (DEC).

Part Number	Length
5640736	3.0 m 10'
2721244	6.1 m 20'
2721246	9.1 m 30'
2721248	12.2 m 40'

Note: For direct connect to the 8100 System, the total cable length from the 8100 System to the 3232 cannot exceed 12.1 meters (40 feet).

FIELD PACKAGING MATERIALS

For shipping the printer to the IBM Repair Center, P/N **7323495**.

POWER LINE CORDS

Part Number	Length	Plug Description
5699344	1.8 m (6')	Locking
4448996	2.8 m (9')	Locking
5699343	4.3 m (14')	Locking
5699370	1.8 m (6')	Nonlocking, Hospital Grade
4448999	2.8 m (9')	Nonlocking, Hospital Grade
5699369	4.3 m (14')	Nonlocking, Hospital Grade
5699346	1.8 m (6')	Nonlocking
4448997	2.8 m (9')	Nonlocking
5699345	4.3 m (14')	Nonlocking

SUPPLIES

- **Electrosensitive roll paper:** IBM Part No. **7032529** (215.9mm x 71.6m (8.5 inches x 235 feet roll)); or **7032530** (279.4mm x 71.6m (11 inches x 235 feet roll)) or other commercially available equivalent paper may be used. Print quality and printhead wear may vary as a function of the paper used.
- **Printhead:** One spare printhead is shipped with the terminal. Head life is estimated at 30 million characters, including spaces, when using part number **7032529** or **7032530** or equivalent paper. Part No. **7032851** (package of two printheads) or Part No. **7032850** (package of five printheads) may be ordered.

  Ordering Information: Paper and printheads may be ordered by calling the IBM Direct Telephone number:

  800/631-5582 for outside New Jersey
  800/352-4960 for New Jersey

3251 DISPLAY STATION MDL 1

PURPOSE

An interactive computer graphics display station for the display of graphical and alphameric data generated within a S/370, 30XX or 43XX processor. The display station may have attachments for operator interaction with the displayed picture, thereby providing highly interactive man-machine communication.

The 3251 requires a 3255 Display Control and a 3258 Control Unit or a 5088 Graphics Channel Controller. It may be used in multiple display station configurations for Computer Aided Design, Computer Aided Manufacturing, and scientific analysis applications. It is particularly suited to those applications requiring a high interaction rate and the display of pictures containing a high vector and character content.

Up to two 3251 model 1s can be attached to each 3255 model 1, or up to three 3251 model 1s to each 3255 model 2. The first 3251 must be located adjacent to the 3255, the second and third 3251s may be located up to 15.2m (50 feet) from the 3255. Up to 16 3255s may be attached to each 3258 or 5088 model 1 via up to a total of four high speed point-to-point or multipoint coaxial cable connections, with up to four 3255s per multipoint coaxial cable connection. Similarly, up to 32 3255s may be attached to a 5088 model 2. However, the maximum number of 3251s supported by a 3258 or 5088 model 1 is 16, and the maximum number of 3251s supported by a 5088 model 2 is 32.

MODELS

Model 1 001

Prerequisites: A 3255 Display Control mdl 1 adjacent or up to 15.2m (50 feet) away ... maximum of two 3251 mdl 1s per 3255 mdl 2 ... see M3255 pages.

Publications: GC20-0001

HIGHLIGHTS

- A free-standing, tabletop mounted, interactive computer graphics display station for the display of graphical and alphameric data generated within a S/370, 30XX or 43XX processor.
- A 534mm (21 inch) diagonal, directed beam, display unit having a 305mm x 305mm (12" x 12") viewing area.
- Vector graphics - straight lines may be displayed between any of the 1024 x 1024 addressable positions on the screen. Display buffer orders are provided which enable the expression of vector endpoint coordinates in absolute form, or incrementally, relative to the current beam position.
- Graphical data can be displayed as a series of points (Point Plot orders), or in one of four line types: -- solid, dotted, dashed, dot-dashed (Vector Plot orders).
- Eight programmable intensities (including blank) for points, vectors or characters; the three brightest levels can be detected by the light-pen.
- Audible and visible (blink) alerts which can be programmed to notify the display station operator of exceptional conditions.
- Free standing Alphameric Keyboard ... see "Special Features".
- Backlighted 32 key Program Function Keyboard ... see "Special Features".
- Light-Pen ... see "Special Features".
- The 3250 is generally upward compatible from the 2250 Graphic Display mdl 3. Valid programs written for the 2250 can be used on the 3250 without change, with minor exceptions:
  - 3250 supports one cursor per display station.
  - Some previously undefined orders have a defined function in the 3250.
  - Lower case characters are displayed as lower case by the 3250.
  - 3250 does not have Program Function Keyboard overlay sense switches.
  - 3250 shares display buffers among a maximum of two display stations.
  - Undefined characters in 3250 text strings are treated as blanks or nulls.
- Software support via Graphic Programming Services (GPS), which includes the Graphic Access Method (GAM), and Graphic Subroutine Package (GSP). These are SCP programs running under OS/VS1 and OS/VS2 operating systems. GAM/SP Release 1 program product provides support under VM/SP-CMS. GAM/SP Release 2 program product provides support under VM/SP-CMS, MVS, and MVS-XA.

Human Factors: The 3251 has an antiglare screen designed to reduce reflection in office lighting. Brightness and focus controls are provided for operator adjustment to best suit ambient lighting. Program Function Keyboard angled for operator convenience ... see "Special Features". Alphameric Keyboard has separators to help prevent accidental striking of control keys. It also has a palm rest on the keyboard ... see "Special Features". The keyboards are free standing to allow placement to suit the operator.

Input-Output Flexibility:

- Alphameric Keyboard, or Numeric-Keypad Alphameric Keyboard, with upper and lower case input. Cancel, Jump, Backspace and Enter function keys, continuous-type key ... see "Special Features". Input assisted by provision of visible cursor on the screen and display buffer orders enabling definition of fields either protected or unprotected from operator input.
- Program Function Keyboard with 32 backlighted keys. Lighting of keys is under S/370, 30XX or 43XX processor program control ... see "Special Features".
- Light-Pen; hand held, pen-like device for interaction with the displayed image ... see "Special Features".

Performance (Basic performance characteristics):

See the appropriate M3255-1 or M3255-2 pages for basic performance characteristics.

When the 3251 mdl 1 displays images at a regeneration rate of 40 cycles per second, the picture quality is superior to that of images displayed by the 2250 Display Unit mdl 3 at 40 cycles per second. As the picture content is reduced the regeneration rate increases up to a maximum of 46 cycles per second.

SPECIFY

- Voltage (AC, 1-phase, 3 wire, 60 Hz): Locking Plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V, **#9894** for 240V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V, **#9895** for 240V
- Power Cable Length: If standard 4.3 meter (14 foot) is not desired, specify **#9511** for 1.8 meter (6 foot) power cable.
- Cables: For cables between 3251 mdl 1 and 3255, specify **#9071** for the first head. For each add'l head, if appropriate, specify **#9071** for 4.6 meters (15 feet), **#9072** for 9.1 meters (30 feet), or **#9073** for 15.2 meters (50 feet).
- Extended Keyboard Support: Always specify **#9145.**

SPECIAL FEATURES

Alphameric Keyboard (#4621): Typewriter-like layout, movable, with data keys and control keys. **Maximum:** One #4621 or one #4627 per 3251 mdl 1. **Field Installation:** Yes.

Numeric-Keyboard Alphameric Keyboard (#4627): As Alphameric Keyboard (#4621) but with add'l right-hand numeric keypad and special drafting symbols. **Prerequisites:** Extended Keyboard Support (#9145); 3251 mdl 1 attached to a 3255 mdl 2. **Maximum:** One #4627 or one #4621 per 3251 mdl 1. **Field Installation:** Yes.

Light-Pen (#4750): A hand-held, pen-like device which permits the operator to interact with the displayed image. **Maximum:** One per 3251 mdl 1. **Field installation:** Yes.

Program Function Keyboard (#5555): 32 keys with program controlled indicators. **Maximum:** One per 3251. **Field installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3251 DISPLAY STATION MDL 2

PURPOSE

An interactive computer graphics display station for the display of graphic and alphameric data generated within a 7361 Fastdraft System. The display station has attachments for operator interaction with the displayed picture, thereby providing highly interactive man-machine communication. Up to two 3251 model 2s can be attached to a 7361 Graphics Processing Unit.

MODELS

Model 2 002

Prerequisites: A 7361 Graphics Processing Unit. The first 3251 mdl 2 is cable-connected to the 7361 by a 4.6 meter (15 foot) cable and must be sited adjacent to the 7361. The second 3251 may be attached via a cable up to 15.2 meters (50 feet) in length ... see M7361 pages. Alphameric Keyboard (#4621) and Light-Pen (#4750) are required for the Fastdraft System.

HIGHLIGHTS

- A free-standing, table-top, interactive computer graphics display station for the display of graphic and alphameric data generated by a 7361 Fastdraft System.
- A 534mm (21 inch) diagonal, directed beam, display unit having a 305mm x 305mm (12 inches x 12 inches) graphics display area plus a 54mm x 305mm (2.1 inches x 12 inches) menu area situated to the left or right of the graphics display area (under program control).
- The amount of data displayable depends on many factors, including the mix of vectors and characters. With two 3251 mdl 2s attached to a 7361, the amount of data displayable is slightly less than half of that displayable when only one 3251 mdl 2 is attached.
- 75-key alphameric keyboard with upper, lower, and alternate case input. Has Program Function Keys, Cancel, Jump, Backspace, and Enter function keys ... see "Special Features". Input assisted by provision of visible cursor on the screen.
- Light-Pen: Hand-held, pen-like device for interaction with the displayed image ... see "Special Features".
- Software support via the 7361 Fastdraft System licensed program (5719-GP1).

Human Factors: The 3251 mdl 2 has brightness and focus controls for operator adjustment to best suit ambient lighting. The alphameric keyboard has separators to help prevent accidental striking of control keys. It also has a palm rest on the keyboard. The keyboard is free-standing to allow placement to suit the operator.

Installation: The 3251 mdl 2 will be installed by a Customer Engineer.

Physical Specifications:

Width	556mm (22.25 inches)
Depth	681mm (27.25 inches)
Height	450mm (18 inches)
Weight	64kg (140 pounds)

Publications: *IBM Fastdraft Systems Guide* (SC34-0514), *IBM Fastdraft Training Guide* (SC34-0515), *IBM 7361 Fastdraft Workstation Reference* (SC34-0516).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz):
  #9884 for 208V with locking plug
  #9894 for 240V with locking plug
  #9885 for 208V with non-locking plug
  #9895 for 240V with non-locking plug

  Note: The voltage for each 3251 mdl 2 must be the same as the operating voltage for the 7361 to which each will be attached. See voltage options in M7361 pages.
- Power Cable Length: If standard 4.3 meter (14 foot) cable is not desired, specify **#9511** for 1.8 meter (6 foot) power cable.
- Cables: For cables between 3251 mdl 2 and the 7361, specify **#9071** for the first 3251 mdl 2. For the second 3251 mdl 2, if appropriate, specify **#9071** for 4.6 meters (15 feet), **#9072** for 9.1 meters (30 feet), or **#9073** for 15.2 meters (50 feet).

SPECIAL FEATURES

Alphameric Keyboard (#4621): 75-key typewriter-like layout, movable, with data keys, program function keys, and control keys. See "Keyboard Language" under "Specify". **Maximum:** One per 3251 mdl 2. **Field installation:** Yes.

Light-Pen (#4750): A hand-held, pen-like device which permits the operator to interact with the displayed image. **Maximum:** One per 3251 mdl 2. **Field installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3255 DISPLAY CONTROL MDL 1

[NO LONGER AVAILABLE]

PURPOSE

Control unit that provides common controls and attachments for up to two 3251 model 1 Display Stations.

MODELS

Model 1 001

Prerequisites: Control Unit -- a channel attached 3258 or 5088 mdl 1 which attaches to up to 16 3255s via up to a total of four high-speed point-to-point or multipoint coaxial cable connections. Similarly, up to 32 3255s may be attached to a 5088 mdl 2. A maximum of four 3255s may be attached to a single multipoint coaxial cable connection. The maximum total cable length between a 3258 or 5088 and an attached 3255 depends upon the characteristics of the customer-supplied coaxial cable. A maximum length of 1,525m (5,000 feet) can be achieved using coaxial cable of standard specification available from multiple sources; greater lengths can be achieved using coaxial cable of a higher specification. (Refer to *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.) Note that 75 ohm coaxial cable must be used in any configuration incorporating a 3258 or 3255.

HIGHLIGHTS

- Free-standing floor-mounted unit attached to a 3258 Control Unit or a 5088 Graphics Channel Controller via a high-speed point-to-point or multipoint coaxial cable connection. Supports one or two 3251 mdl 1s at distances of up to 15.2m (50 feet). **Note:** At least one of the 3251s must be adjacent to the 3255.
- The maximum number of 3251 mdl 1s supported by a 3258 or 5088 mdl 1 is 16. The 5088 mdl 2 will support up to 32 3251s.
- 32,768 byte user-programmable display buffer shared under S/370, 30XX or 43XX processor software control among the attached 3251 Display Stations. Capability for dynamic assignment of refresh buffer to specific 3251s, under S/370, 30XX or 43XX processor software control - such as is provided by the OS/VS1 and OS/VS2 Graphic Programming Services (GPS) SCP, which includes Graphics Access Method (GAM), and the GAM/SP Release 1 program product under VM/SP-CMS. GAM/SP Release 2 program product provides support under VM/SP-CMS, MVS, and MVS-XA.
- Eight light-pen display buffer orders enabling the creation of display buffer programs which perform functions such as light-pen track and drag, without recourse to the S/370, 30XX or 43XX processor.
- Data transferred across 1M bit per second serial link between 3258 or 5088 and 3255 ... maximum effective data rates approximate to 100K bytes per second, depending on message lengths.

Publications: GC20-0001

Performance (Basic performance characteristics):

- Vector draw speed of 8,890m (350,000 inches) per second, i.e., 34 microseconds for 305mm (12 inch) screen deflection.
- Vector move speed of 22 microseconds for 305mm (12 inch) screen deflection.
- Character draw average speed of 4.2 microseconds for a BASIC size character [height 4.1mm (0.16 inches)].

The amount of data displayable depends on many factors, including the mix of vectors and characters. With one 3251 mdl 1 attached to a 3255 mdl 1, then at 40 cycles per second regeneration rate, at least the following can be displayed:

Either - 9,500 Incremental vectors of 9.5mm (0.375 inches), or
2,150 Absolute vectors of 76mm (3 inches), or
5,250 BASIC size characters (average mix).

With two 3251s attached to a 3255 mdl 1, the performance is slightly less than half that shown above.

When the 3251 displays images at a regeneration rate of 40 cycles per second, the picture quality is superior to that of images displayed by the 2250 Display Unit mdl 3 at 40 cycles per second. As the picture content is reduced the regeneration rate increases up to a maximum of 46 cycles per second.

SPECIFY

- Voltage (AC, 1-phase, 3 wire, 60 Hz): Locking Plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V. A 3255 and its attached 3251s must all be connected to the same supply phase.
- Power Cable Length: If standard 4.3 meter (14 feet) is not desired, specify **#9511** for 1.8 meter (6 feet).
- Cables: Refer to *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3255 DISPLAY CONTROL MDL 2

PURPOSE

Control unit that provides common controls and attachments for up to three 3251 model 1 Display Stations.

MODELS

Model 1 001

Prerequisites: Control Unit -- a channel attached 3258 or 5088 mdl 1 which attaches to up to 16 3255s via up to a total of four high-speed point-to-point or multipoint coaxial cable connections. Similarly, up to 32 3255s may be attached to a 5088 mdl 2. A maximum of four 3255s may be attached to a single multipoint coaxial cable connection. The maximum total cable length between a 3258 or 5088 and an attached 3255 depends upon the characteristics of the customer-supplied coaxial cable. A maximum length of 1,525m (5,000 feet) can be achieved using coaxial cable of standard specification available from multiple sources; greater lengths can be achieved using coaxial cable of a higher specification. (Refer to *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.) Note that 75 ohm coaxial cable must be used in any configuration incorporating a 3258 or 3255.

HIGHLIGHTS

- Free-standing floor-mounted unit attached to a 3258 Control Unit or a 5088 Graphics Channel Controller via a high-speed point-to-point or multipoint coaxial cable connection. Supports up to three 3251 mdl 1s at distances of up to 15.2m (50 feet). **Note:** At least one of the 3251s must be adjacent to the 3255.
- The maximum number of 3251 mdl 1s supported by a 3258 or 5088 mdl 1 is 16. The 5088 mdl 2 will support up to 32 3251s.
- Two 32,768 byte user-programmable display buffers. Capability for dynamic assignment of refresh buffer under S/370, 30XX or 43XX processor software control - such as is provided by the OS/VS1 and OS/VS2 Graphic Programming Services (GPS) SCP, which includes Graphics Access Method (GAM), or the GAM/SP Release 1 program product under VM/SP-CMS. GAM/SP Release 2 program product provides support under VM/SP-CMS, MVS, and MVS-XA.
- Eight light-pen display buffer orders enabling the creation of display buffer programs which perform functions such as light-pen track and drag without recourse to the S/370, 30XX or 43XX processor.
- Data transferred across 1M bit per second serial link between 3258 or 5088 and 3255 ... maximum effective data rates approximate to 100K bytes per second, depending on message lengths.

Publications: GC20-0001

Performance (Basic performance characteristics):

- Vector draw and move speeds of 15,240m (600,000 inches) per second, i.e., 20 microseconds for 305mm (12 inch) screen deflection.
- Character draw average speed of 4.2 microseconds for a BASIC size character [height 4.1mm (0.16 inches)].

The amount of data displayable depends on many factors, including the mix of vectors and characters. With one 3251 mdl 1 attached to a 3255 mdl 2, then at 40 cycles per second regeneration rate, at least the following can be displayed:

Either - 12,500 Incremental vectors of 9.5mm (0.375 inches), or
3,550 Absolute vectors of 76mm (3 inches), or
5,750 BASIC size characters (average mix).

With two or three 3251s attached to a 3255 mdl 2 the performance is slightly less than half or one-third respectively of that shown above.

When the 3251 displays images at a regeneration rate of 40 cycles per second, the picture quality is superior to that of images displayed by the 2250 Display Unit mdl 3 at 40 cycles per second. As the picture content is reduced the regeneration rate increases up to a maximum of 46 cycles per second.

SPECIFY

- Voltage (AC, 1-phase, 3 wire, 60 Hz): Locking Plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V, **#9894** for 240V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V, **#9895** for 240V. A 3255 and its attached 3251s must all be connected to the same supply phase.
- Power Cable Length: If standard 4.3 meter (14 feet) is not desired, specify **#9986** for 1.8 meter (6 feet).
- Cables: Refer to *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3258 CONTROL UNIT

PURPOSE

A channel-attached control unit which supports up to 16 3251 model 1 Display Stations attached to the 3258 via up to 16 3255 Display Control units model 1 or model 2 which are connected to the 3258 via high-speed point-to-point and/or multipoint coaxial cable connections. The 3258 can also support up to 16 5085 Graphics Processors or a mix of up to a total of 16 3255s or 5085s. A maximum of four coaxial cable connections may be made to the 3258; a maximum of four 3255s or 5085s may be attached to a single multipoint coaxial cable connection. The maximum total cable length between a 3258 and an attached 3255 or 5085 depends upon the characteristics of the customer-supplied coaxial cable. A maximum length of 1,525m (5,000 feet) can be achieved using coaxial cable of standard specification available from multiple sources; greater lengths can be achieved using coaxial cable of a higher specification. (Refer to *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.) Note that 75 ohm coaxial cable must be used in any configuration incorporating a 3258 or 3255.

MODELS

Model 1 001

HIGHLIGHTS

Free-standing floor-mounted unit capable of receiving data from a S/370, 30XX or 43XX processor channel at rates of up to 250K bytes per second, transmitting data to 3255 Display Control units or 5085 Graphics Processors over 1M bit per second serial links ... maximum effective data rates approximate to 100K bytes per second, depending on message lengths.

Prerequisites: Channel Attachment -- a control unit position on a system channel.

Processors	Channel Type		
3115, 3125 - (no DOS/VS support for 3250)	Byte Multiplexer in burst mode only		
	Selector	**Block Multiplexer**	**Selector Subchannel**
3135	X	X	
3135-3, 3138, 3145-3, 3148		X	
3145	X		
3155-2, 3158		X	
3165-2, 3168	X	X	
3031, 3032, 3033		X	
3081		X	
4331, 4341, 4361, 4381		X	

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3 wire, 60 Hz): Locking Plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Power Cable Length:) If standard 4.3 meter (14 feet) is not desired, specify **#9511** for 1.8 meter (6 feet).
- Cables: Cables to S/370, 3000 or 4300 processor must be ordered. See *IBM 3250 Installation Manual - Physical Planning,* GA33-3036.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3262 LINE PRINTER MDLS 1, 2, 3, 11, 12, 13

PURPOSE

A series of line printers for attachment to the 3274, 3276, 3601, 3602, 3694, 3777, 4321, 4331, 4701, 8100 or 8775.

MODELS

Model 1	001	4321 or 4331 Processor via Display Printer Adapter.
Model 2	002	8100 Information System via the loop (9.6 and 38.4 KB). 3777-4 Communication Terminal via direct attachment (38.4 KB).
Model 3	003	3601 Controller models 3A or 3B, 3602 Finance Communication Controller, 4701 Finance Communication Controller model 1, 3694 Document Processor, 3274 Control Unit and System/3 via the 3274 Control Unit.
Model 11	011	4321 or 4331 Processor via Display Printer Adapter.
Model 12	012	8100 Information System via the loop (9.6 and 38.4 KB). 3777-4 Communication Terminal via direct attachment (38.4 KB).
Model 13	013	3601 Controller models 3A or 3B, 3602 Finance Communication Controller, 4701 Finance Communication Controller model 1or 2, 3694 Document Processor, 3274 Control Unit, 3276 Control Unit Display Station and System/3 via the 3276 Control Unit Display station and 8775 Display Station via Printer Attachment feature (#5580).

Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be engaged by the forms tractor pin feed.
3. No staples are permitted in the areas exposed to the interchangeable print belt.
4. Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts (one part with specify ,**#9529**, and one part with 128 character text print bands) should be tested in operating conditions to verify that results are satisfactory. Maximum forms thickness is .51mm (.020 inch).
5. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use 20-24 lb OCR bond in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3262 documents on the 3886, reread on reject capability and 3211/5211 Compatibility (**#9701**) should be used on the 3886. OCR printing is limited to controlled DP room environment. *Refer to Site Planning and Preparation Guide,* GA24-3734. The OCR feature #5450 is a prerequisite for OCR Applications.

Maximum: Up to two 3262 Printers (mdl 1 and/or 11) may be attached to a 4321 or 4331 Processor ... for mdl 2s/12s, see 3777 mdl 4, 8101, 8130 or 8140 ... for mdl 3s/13s, see 3274 mdl 1A, 1B, 1C, 1D, 3274 mdl 51C, 3602, 3694 or 4701 ... for mdl 13s, see 3276.

Prerequisites:

Model 1 and 11 -- a position on the 4321 or 4331 standard Display/Printer Adapter or the Display/Printer Adapter Expansion (#2001) on the 4331 Model Group 1 or 2 ... see M 4321 or 4331 pages.

Model 2 and 12 -- a position on an 8100 system loop ... see 8101, 8130 or 8140, or direct attachment to a 3777 mdl 4 ... see 3777 mdl 4.

Model 3 and 13 -- an available Category A terminal port on a 3274, or a Device Cluster Adapter (#3101) on a 3601 mdl 3A or 3B, 3602, 3694, 8775 Display Station via the Printer Attachment feature (#5580) or 4701 ... see M3274, 3601, 3602, 3694, 4701 or 8775 pages.

Model 13 -- an available terminal port on a 3276 ... see M3276 pages.

HIGHLIGHTS

132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm. Vertical spacing is 3, 4, 6 or 8 Lines per 25.4mm for the mdls 1 and 11 under system control. Forms skipping and spacing are program controlled. The carriage is a single speed unit allowing skipping up to 508mm (20 inches) per second. Continuous forms are fed by a forms tractor, which accepts forms of up to a maximum of 406.4mm (16 in.) wide. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations. 288 character Universal Character Set Buffer is standard (for mdls 1 and 11 only).

Print Format Compatibility: Compatibility Options for 3270 Data Stream (Non-SCS) Operation mdls 3 and 13 only. Differences in the functional responses of the 3287, 3289 and 3262 result in differences in the format of the printed output. A no-charge RPQ MM4370 can be ordered for print format compatibility when compared to a 3287 or 3289 printer. For additional information refer to the 3262 mdl 3 or 13 *Component Description Manual,* GA24-3741-1 or the DP-Hone/Smart Data Base.

Decompaction: (mdls 2 and 12) Provides the decompaction function associated with the receipt of a compaction data stream whereby a pair of consecutive alpha numeric characters is represented by a single transmission byte. The function is dependent upon receipt from the host of a decompaction table corresponding to the compaction table used by the host programming in creating the compacted data stream. The master character count may range from 3 to 16.

Decompression: (mdls 2 and 12) Provides expansion of compressed data streams whereby a two byte identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters and one byte is substituted for each occurrence of two or more consecutive blank characters.

Performance Considerations: Actual printer throughput is dependent upon operational and programming characteristics. The following factors must be considered in determining actual throughput:

- System Configuration
  - Loop speed (mdls 2 and 12 on S/8100)
  - Transmission speeds (mdls 2 and 12 on 3777-4)
  - Multiple device operational loads
- Host Link Communications Facility
  - Communication protocol (BSC/SDLC)
  - Transmission line speed
  - Compression and compaction characteristics
- Application Processing
  - Data organization
  - Output format: skipping ... spacing ... print line length Character set size of print band application program.

Model 3 and 13 Performance Considerations: In addition to the performance considerations listed above, the 3262 mdls 003 and 013 are sensitive to data stream characteristics. Optimum throughput can be achieved using SN LU-1-Datastreams. Significantly less than maximum rated speed may be experienced when using BSC or DSC (SNA-LU-3) Datastreams. Refer to the *Component Description Manual* for additional details.

The FIVE3270 SE aid is available to estimate printer performance for the particular environment in which the mdls 3 and 13 will be installed. Use of the aid is essential for understanding the effects of transmission speed, datastream protocol, and message sized on printer throughput.

Print Bands: Operator interchangeable print bands are available which offer the following character sets and maximum rated speeds:

	Maximum Rated Speed (lpm) Mdl 1,2,3	Mdl 11,12,13
48-character set	650	325
64-character set	467	230
96-character set (94 printable)	364	180
128-Character set	253	125

A general purpose optimized 63 character set print band is available which can provide speeds of up to 310 LPM on the mdls 11 and 12 and up to 625 LPM on the mdls 1 and 2. The optimized 63-character print band can be used on the mdls 003 and 013, however, performance may be limited by system configurations and other factors described under Performance Considerations. *See Component Description Manual,* GA24-3741.

A special 128 character set Distributed Office print band is available on mdls 2 and 12.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

Customer Setup (CSU): The 3262 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the General Information section.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3262.
- Physical setup, connection of cables, switch settings and checkout, with the exception that the FE will connect the printer communication cable to the 3777-4.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling IBM for service.

3262 Line Printer Mdls 1, 2, 3, 11, 12, 13 (cont'd)

- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Replacing a worn print band with the spare provided and rotating the platen per the instructions provided with the printer, and order another spare band.
- Procurement, installation, and management of the loop network see Accessories section.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- The basic machine is shipped with the following: Voltage 120V, AC, 1-phase, 3-wire, 60 Hz, power plug non-locking, power cable length 4.3 meter (14 foot).
- The following options may be specified: **#9081** for locking plug, **#9080** water tight plug (required where connection is beneath raised floor) or **#9511** for 1.8 meter (6 foot) cable length.
- Power Cord: If standard 4.3m (14.0 ft) power cord is not required, specify **#9511** for 1.8m (6.0 ft) power cord.
- Color: Background color is pearl white. One color accent panel must be specified: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Cables: For the mdls 1, 3, 11 and 13, the customer is responsible for procurement, maintenance and installation of coaxial signal cable. See Accessories for ordering instructions, see Price List section for prices. For the mdls 2 and 12, a 1.8m (6.0 ft) communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. If the standard length cable is not desired, specify **#9405** for a 4.3m cable.
- Print Band Character Set: Specify one number from Group A (character set size) and one number from Group B (character set height). When printing 8 lpi, 2.0mm (.079") character height is recommended. Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a back-up. When the customer installs this back-up band, a replacement should be ordered via an MES, and the platen rotated as described in the instructions provided with the printer. The customer will be billed at the current accessory band price. If the customer desires to have field engineering replace or install the print band, or rotate the platen, the CE time involved will be billed to the customer. Available at time of manufacture only. See Print Band, Add'l, in "Accessories" if more than one band is required.

Group A

Specify Number	Character Set Size
#9520	48-character set EBCDIC
#9522	64-character set EBCDIC
#9523	63-character EBCDIC (optimized)
#9526 (1)(2)	96-character set EBCDIC
#9527 (2)	128-text character set (mdls 3 and 13 only).
#9529 (2)	128-character Distributed Office (mdls 2 and 12 only).

Notes:
(1) Not available with System/3.
(2) Available only with 2.4mm (0.095") character height (**#9950**).

Group B

Specify Number	Character Set Height
#9951*	2.0mm (0.079")
#9950	2.4mm (0.095")

*Recommended for printing 8 lpi (25.4mm)

ASCII or back level EBCDIC character sets may be requested by RPQ.

If Spanish N (with Tilde) printing capability is desired on the print band provided with the 3262, order **#2961** and one number from Group A (character set size) and one number from Group B (character set height).

Group A

Specify	Character Set Size
#9520	48 - Character Set
#9522	64 - Character Set
#9526*	96 - Character Set

*Available only with 2.4mm (0.095") character height (**#9950**).

Group B

Specify	Character Set Height
#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

*Recommended for printing 8 lpi (25.4mm)

Character Print Operations: For mdls 3 and 13 only, the basic machine is shipped for use with a program which assumes the buffer size to be 1920 bytes while using Erase/Write Alternate Command. Specify the following options only to alter the basic machine:

#9200 960-Character Print Operation: For use with a program which assumes the buffer size is 960 bytes while using Erase/Write Alternate Command.

#9202 2,560-Character Print Operation: For use with a program which assumes the buffer size is 2,560 bytes while using Erase/Write Alternate Command.

#9203 3,440-Character Print Operation: For use with a program which assumes the buffer size is 3,440 bytes while using Erase/Write Alternate Command.

#9204 3,564 Character Print Operation: For use with a program which assumes the buffer size is 3,564 bytes while using Erase/Write Alternate Command. **Limitation:** This specify code is not valid when the 3262 mdls 3 or 13 is attached to a 3274 Display Controller with Configuration Support A **#9110**.

Note: To provide compatibility with programs written for 3271/3272 using Erase/Write Command, **#9200** provides 480-character print operation. Specify **#9202**, **#9203** and **#9204** provide 1,920-character print operation. Allowable usage in SNA character string of the full buffer varies according to the control unit (3274 or 3276) to which the printer is attached and to programming consideration. See *IBM Information Display Component Description,* GA27-2749. Copy operation from larger screen size display to smaller printer buffer is not accepted.

SPECIAL FEATURES

Audible Alarm Feature (#1090): Audibly notifies the operator that manual intervention or problem determination is required. On mdls 2, 3, 12 and 13, the alarm sounds when the printer receives the SCS "Bell Code" or when the "Check Indicator" goes on. On mdls 1 and 11, the alarm is under printer control and is activated only when the "Check Indicator" is turned on. A switch on the operator's panel can disable the alarm. **Maximum:** One. **Field Installation:** Yes.

OCR Print Feature (#5450): Provides a manual selection for OCR print applications.

One of the following OCR bands (numerics only) must also be specified.

#9666 OCR-AON 48 Character Set (1)
#9667 OCR-BON 48 Character Set (1)

Notes:
(1) Non-OCR characters are 2.4mm (0.095") in height

Two OCR print bands (OCR numerics and specials only) will be shipped with #5450, in addition to the bands shipped with the basic printer. The second band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES, billing, warranty and ordering additional bands is the same as for non-OCR bands shipped with the printer. **Field Installable:** Yes

MODEL CONVERSIONS

Model 11 to a model 1, model 12 to a model 2, and model 13 to model 3 are field installable.

Cables: Cables and or associated parts to attach the subject machines to the 3271/3272/3274 Control Units and 3276 Control Unit Display Station, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item Number	Description
Assm 2577672	Cable Assembly In-Door
Bulk 0323921	Coax Wire (Note 2)
P/N 1836418	Connector Kit (Note 2)
Assm 1833108	Cable Assembly Out-Door
Bulk 5252750	Coax Wire (Note 3)
P/N 1836419	Connector Kit (Note 3)
P/N 2621414	Modification Kit (Note 4)
P/N 1833106	Station Protector Attachment Kit (Note 6)
P/N 5252643	Adapter (Note 8)
P/N 1830818	Station Protection Kit, Gas (Note 5)
P/N 5252899	Station Protector Element, Gas (Note 7)

3262 Line Printer Mdls 1, 2, 3, 11, 12, 13 (cont'd)

Notes:

1. Order via MSORDER (Category = Bulk Cable) on AAS. Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

Print Band, Add'l: Permits the customer to obtain more than one character set print band for various applications. When ordering, use one feature number for character set size and one feature number for character height. Installation and replacement of these bands are the customer's responsibility. If customer desires to have IBM Field Engineering replace or install the print band, the CE time will be billed to the customer.

Character Set Size	Feature
48-character EBCDIC	**#5940**
48 OCR-AON (numeric and specials)*	**#5974**
48 OCR-BON (numeric and specials)*	**#5975**
63-character EBCDIC (optimized)	**#5946**
64-character EBCDIC	**#5944**
96-character EBCDIC*	**#5948**
128-character Text* (mdl 3, 13 only)	**#5961**
North American 128 distributed office (Models 2 and 12 only)	**#5962**

Character Set Height	Feature
2.0mm (0.079")**	**#5951**
2.4mm (0.095")	**#5950**

* Available only with 2.4mm (0.095") character height (#9950).
** Recommended for 8 lpi operation.
Note: ASCII bands available by RPQ.

SUPPLIES

Ribbons: A black ribbon, P/N 7819690, or equivalent, is required. An OCR ribbon P/N 7032877 or equivalent is required with OCR feature #5450.

3262 LINE PRINTER MDLS B1, C1

PURPOSE

The 3262 mdl B1 is the printed output unit for System/34 and System/38. The 3262 mdl C1 is the printed output unit for System/36.

MODELS

Model B1 B01 650 lpm Stand-alone
Model C1 C01 650 lpm CSU Stand-alone

The above nominal rated speed is based on a standard 48-character set.

Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be fastened in the forms tractors.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Forms sets of more than four parts should be tested in operating conditions to verify that results are satisfactory.
5. Due to the complexity of certain characters on the multinational print bands, multiple part forms should be tested in operating conditions to ensure that results are satisfactory.
6. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results use 20-24 lb (75-90g/sg. m.) OCR bond in single-part forms. OCR forms utilizing other papers should be tested for satisfactory results with the user requirements. When reading 3262 documents on the 3886, Re-read on Reject capability and 3211/5211 compatibility **(#9701)** should be used on the 3886. OCR printing is limited to controlled DP room environment. Refer to system planning guides. The OCR feature is a prerequisite for OCR applications.

Maximum: Two 3262 Printers can attach to System/38, one 3262 Printer can attach to System/36, one 3262 Printer can attach to System/34.

Prerequisites: A 3262 Attachment on the 5381 System Unit. Specify #1100 or #1110 on 5381. See 5381 Special Features.

A 3262 attachment on the 5360 System Unit. A 3262 printer attachment feature (#5830) is required on the 5360 System Unit. See 5360 special features. 5360-AXX mdls additionally require processor unit expansion A (#5732).
Note: If an installed 3262 mdl B1 is to be attached to a 5360 system unit, see specify **#9876** in the 5360 pages. See 5360 special features.
Note: An installed 3262 mdl B1 can attach to the 5360 System via specify code **#9030** which is a no-charge MES on the printer. No new orders will be accepted in AAS for a 3262 mdl B1 printer for attachment to the 5360 System.

A 3262 Printer Attachment Feature (#5815) and a 5211/3262 Base Printer Attachment (#1110) are required on the 5340 System Unit. See 5340 Special Features.

For 3262 mdl	Attached to System	Specify System Prereq.	Printer Specify Features	System Sales Pages
B1	5381	#1100 or #1110	#9020	5381
B1	5340	#5815 & #1110	#9010	5340
B1	5360	#9876	#9030	5360
C1	5360-AXX	#5830 & #5732	N/A	5360
C1	5360-BXX	#5830	N/A	5360

Customer Setup (CSU): Yes, mdl C1 only.

HIGHLIGHTS

A universal character set buffer of 288 positions in the 3262 Attachment allows use of graphic sets of up to 288 characters. A general purpose optimized print band of 64-characters is available. (See 3262 in Type Catalog section.) The 64-character optimized print band can provide speeds up to a maximum of 625 lpm. Should specific application data have unique characteristics and not conform to the 64 character set optimized print band, the normal print bands will provide the following nominal rated speeds:

	Nominal Rated Speeds(lpm)
48-character set	650
64-character set	467
96-character set	364

132 print positions are standard. Horizontal spacing is 10 characters per inch. Vertical spacing is six or eight lines per inch under system control for System/38 and operator control for System/34 and System/36. Forms skipping and spacing are program controlled. The carriage is a single speed unit allowing skipping up to 20 inches per second. Continuous forms are fed by a forms tractor. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

OCR capability is provided as a feature (#5460). See special features. The 48 character bands containing numeric A or B font (10 numbers and 3 special characters) are available only as part of the feature. The new OCR feature is supported by the System/38 hardware and software beginning with Release 3.0. The OCR feature is also supported by the System/34 and System/36.

Customer Setup (CSU): The 3262 mdl C1 is designated as a customer setup device. The Marketing Representative must advise the customers of their responsibilities before receipt of the device.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power cord and plug: (120 V AC 1-phase, 3 wire, 60 Hz) The standard power cord is 4.3m (14 ft) long with locking plug; specify **#9081**. For Chicago the cord is 1.8m (6 ft) long with a locking plug, specify both **#9986** and **#9081**. For a watertight power cord (System/38 only), specify **#9080**.
- Color: Background color is pearl white. A color accent must be specified. **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray or **#9066** for pearl white.
- Interchangeable Print Bands [Plant only] See "Type Catalog" for print band arrays. When ordering, indicate one specify code for character set and one specify code for character height. When printing 8 lpi, 2.0mm (0.079") character height is recommended.

  Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a back up. When the customer installs this backup band, a replacement should be ordered via MES and the platen rotated as described in the instructions provided with the printer (exception is when OCR feature is installed). In this case the platen is single surface and cannot be rotated. The customer will be billed at the current accessory band price. Replacement and installation of the print band is the customer's responsibility. If the customer desires to have Field Engineering replace or install the print band, the CE time will be billed to the customer.

Specify	Character Set Size
#9520	48-Character
#9565	48-Character FORTRAN ***
#9521	60-Character S/38 Special **
#9522	64-Character EBCDIC
#9523	64-Character EBCDIC (Optimized)
#9524	64-Character ASCII
#9525	64-Character ASCII (Optimized)
#9564	64-Multinational *
#9526	96-Character EBCDIC *
#9528	96-Character ASCII *
#9563	96-Multinational *
#9562	188-Multinational *

* Available only with 2.4mm (0.095") character height **(#9950)**.

** This specially designed band for the System/38 only will enable the user to print the System/38 Control Language characters.

*** Available on System/34 and System/36.

Specify	Character Height
#9951*	2.0mm (0.079")
#9950	2.4mm (0.095")

* Recommended for printing 8 lpi (25.4mm).

If Spanish N (with Tilde) printing capability is desired on the print bands provided with the 3262, order **#2961** plus two additional Specify Codes selected from the following offerings of character set size and character height:

Specify	Character Set Size
#9520	48-Character
#9522	64-Character
#9523	64-Character (Optimized)
#9526*	96-Character

* Available only with 2.4mm (0.095") character height **(#9950)**.

3262 Line Printer Models B1, C1 (cont'd)

Specify	Character Height
#9951*	2.0mm (0.079")
#9950	2.4mm (0.095")

* Recommended for printing 8 lpi (25.4mm).

System Attachment: For attachment to System/34, specify **#9010**. For attachment to System/38 specify **#9020**. When changing from System/34 to System/38, **#9010** must be removed and **#9020** must be added. When changing from System/34 to System/36, **#9030** must be added.

SPECIAL FEATURES

OCR Print Feature (#5460): Provides for manual operator selection of print hammer controls for OCR applications. One of the following OCR print bands must be specified:

Specify	Band Description
#9666	48-Character OCR-AON (1)
#9667	48-Character OCR-BON (1)

Notes:
(1) Non-OCR characters are 2.4mm (0.095") in height.

Two OCR print bands (OCR numerics and 3 specials) will be shipped with #5460 in addition to the two standard bands shipped with the basic printer. The second band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES. Billing, warranty and ordering additional bands (see Accessories section) is the same as for standard bands shipped with the printer. **Field Installation:** CSU.

MODEL CONVERSIONS (None)

ACCESSORIES

Prints Bands: Two print bands are included with the initial shipment. Additional print bands permit the customer to print more than one character set for various applications and can be interchangeably used with the band provided with the machine. OCR print bands are for use only with OCR Feature #5460. See "Type Catalog" for print band arrays. When ordering, indicate one feature code for character set size and one feature code for character height. Interchangeable Print Bands: See "Specify".

Print Band, Add'l: Permits the customer to obtain more than one character set print band for various applications. When ordering, use one feature number for character set size and one feature number for character height. Installation and replacement of these bands are the customer's responsibility. If customer desires to have IBM Field Engineering replace or install the print band, the CE time will be billed to the customer.

Character Set Size	Feature
48-character EBCDIC	**#5940**
48 OCR-AON (numeric and specials)*	**#5974**
48 OCR-BON (numeric and specials)*	**#5975**
64-character EBCDIC (optimized)	**#5946**
64-character EBCDIC	**#5944**
96-character EBCDIC*	**#5948**
128-character Text* (mdl 3, 13 only)	**#5961**

Character Set Height	Feature
2.0mm (0.079")**	**#5951**
2.4mm (0.095")	**#5950**

* Available only with 2.4mm (0.095") character height (**#9950**).
** Recommended for 8 lpi operation.
Note: ASCII bands available by RPQ.

SUPPLIES

Ribbons: A black ribbon, P/N **7819690**, or equivalent, is required. An OCR ribbon P/N **032877** or equivalent is required with OCR feature #5460.

3262 LINE PRINTER MDL 5

PURPOSE

Printer output for attachment to a processor channel.

MODELS

Model 5	005	Printer output unit for 4300 Processors, all Virtual Storage S/370 (except 158II or 168II), 3031, 3032, 3033, 3081, 3083 or 3084 Processors.

Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be engaged by the forms tractor pin feed.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts (and one part with 128 character text print bands) should be tested under operating conditions to verify that results are satisfactory. Maximum forms thickness is 0.51mm (0.020 inch).
5. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use 20-24 lb OCR bond in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3262 documents on the 3886, reread on reject capability and 3211/5211 Compatibility (**#9701**) should be used on the 3886. OCR printing is limited to controlled DP room environment. The OCR feature #5450 is a prerequisite for OCR Applications.

Maximum: The number of 3262 mdl 5s that can be attached is limited only by the number of control unit positions available on the system channel. Channel loading and system configuration may affect printer performance.

Prerequisites: An available control unit position on a system channel.

HIGHLIGHTS

132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm. A fine horizontal vernier adjustment is provided on the mdl 5 to allow the operator to horizontally position printed characters in predetermined print positions. The maximum amount of movement is the width of one and one half print positions 3.8mm (.150 inch) at 10 characters per 25.4mm (1 inch). Vertical spacing is 6 or 8 lines per 25.4mm (1 inch) under system control. Forms skipping and spacing are program controlled. The forms carriage is a single speed unit allowing skipping up to 508mm (20 inches) per second. Continuous forms are fed by a forms tractor, which accepts forms of up to a maximum of 406.4mm (16 inches) wide. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Performance Considerations: Actual printer throughput is dependent upon operational and programming characteristics. The following factors must be considered in determining actual throughput:

- System Configuration
- Application Processing
  - Data organization
  - Output format:
    skipping ... spacing ... print line length
    Character set size of print
    band application program.

Print Bands: Operator interchangeable print bands are available which offer the following character sets and nominal speeds:

	Nominal Speed (lpm)
48-character set	650
64-character set	466
96-character set	363
128-character set	252

A general purpose optimized 63-character set print band is available which can provide speeds of up to 625 lpm. The expected performance of the 63-character optimized band is not determinable unless sample data streams are printed. It is possible that the performance could be less than the 64-character band if the low frequency occurring characters on the 63-character band are used at a higher rate.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt at the customer's receiving dock, unpacking and placement of the 3262.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out Trouble Report Form prior to calling IBM for service.
- Packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Replacing a worn print band with the spare provided and ordering another spare band.
- Rotating the platen per the instructions provided with the printer, The special platen for OCR cannot be rotated when the OCR feature #5450 is installed.

Bibliography: GC20-0001

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- The basic machine is shipped with 120V, AC, 1-phase, 3-wire, 60 Hz, watertight power plug (Russell and Stoll). Power cord length is 4.3m (14 foot). If a 1.8m (6 foot) power cord is desired, specify **#9986**.
- Color: Will be pearl white and accent covers will be pebble gray.
- Print Band Character Set: Specify one number from Group A (character set size) and one number from Group B (character set height). When printing 8 lpi, 2.0mm (0.079") character height is recommended. Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a backup. When the customer installs this backup band, a replacement should be ordered via an MES. The customer will be billed at the current accessory band price. If the customer desires to have Field Engineering replace or install the print band, or rotate the platen, the CE time involved will be billed to the customer. Available at time of manufacture only. See "Print Band, Add'l" in Accessories section if more than one band style is required.

Group A

Specify Number	Character Set Size
#9520	48-character set EBCDIC
#9530	48-character set International
#9522	64-character set EBCDIC
#9523	63-character EBCDIC (optimized)
#9526*	96-character set EBCDIC
#9536*	96-character set International
#9527*	128-text character set EBCDIC

* Available only with 2.4mm (0.095") character height (**#9950**).

Group B

Specify Number	Character Set Height
#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

* Recommended for printing 8 lines per 25.4mm (inch)

Character sets may be requested by RPQ.

If Spanish N (with Tilde) printing capability is desired on the print band provided with the 3262, order **#2961** and one number from Group A (character set size) and one number from Group B (character set height).

Group A

Specify	Character Set Size
#9520	48-Character Set
#9522	64-Character Set
#9526*	96-Character Set

* Available only with 2.4mm (0.095") character height (**#9950**).

Group B

Specify	Character Set Height
#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

*Recommended for printing 8 lines per 25.4mm (inch)

SPECIAL FEATURES

Audible Alarm Feature (#1090): Audibly notifies the operator that manual intervention or problem determination is required. The alarm is under printer control and is activated only when the "Check Indicator" is turned on. A switch on the operator's panel can disable the alarm. **Maximum:** One. **Field Installation:** Yes.

OCR Print Feature (#5450): Provides a manual selection for OCR print applications.

3262 Line Printer Mdl 5 (cont'd)

One of the following OCR bands (numerics only) must also be specified.

#9666 OCR-AON 48-Character Set (1)
#9667 OCR-BON 48-Character Set (1)

Notes:
(1) Non-OCR characters are 2.4mm (0.095") in height

Two OCR print bands (OCR numerics and specials only) will be shipped with #5450, in addition to the bands shipped with the basic printer. The second OCR band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES. Billing, warranty and ordering additional bands are the same as for non-OCR bands shipped with the printer. **Field Installation:** Yes.

MODEL CONVERSIONS

The model 5 cannot be changed to any other model of the 3262 Printer.

ACCESSORIES

The following items are available on a purchase-only basis. Order the feature number indicated below at the price listed in the Price List section. Order by MES. Only one print band per MES.

Print Band, Add'l: Permits the customer to obtain more than one character set. Installation and replacement of these print bands is the customer's responsibility. If the customer desires to have Field Engineering replace or install the print band, the CE time will be billed to the customer. **Maximum:** One per machine order. Order by MES only.

When ordering, indicate one feature code for character set size and one feature code for character set height.

Feature Number	Description
#5940	48-character EBCDIC
#5944	64-character EBCDIC
#5946	63-character EBCDIC Optimized
#5948*	96-character EBCDIC
#5961*	128-character text

* Available only with 2.4mm (0.095") character height (**#5950**)

Specify	Character Set Height
#5950	2.4mm (0.095")
#5951*	2.0mm (0.079")

* Recommended for printing 8 lines per 25.4mm (inch)

SUPPLIES

Ribbons: A black ribbon, P/N **7819690** or equivalent, is required. An OCR ribbon, P/N **7032877** or equivalent, is required with OCR feature #5450.

3268 PRINTER MDL 1

PURPOSE

Provides hard copy output for the 8100 Information System via Loop attachment, printing at a maximum speed of 340 cps.

MODELS

Model 1 001

Prerequisites: For direct attached loop operation: **#4830** or **#4835** on the 8101, 8130, or 8140. For data link attached loop operation: 3842 or 3843 Loop Control Unit.

Customer Setup (CSU): The 3268 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section.

HIGHLIGHTS

The 3268 mdl 1 consists of control functions, printer and indicator lights in one integrally designed pedestal unit. 132 printer positions are standard. Horizontal spacing is 10 characters per 25.4 mm (inch) and 16.7 characters per 25.4mm (inch). Selection of horizontal spacing is via a manual switch on the operator panel or via data stream control. Vertical spacing is 3, 4, 6 or 8 lines per 25.4mm (inch). The printer operates in SCS (SNA LU1) mode, which provides for customer program definable horizontal and vertical formatting. APL/TEXT, Dual Case Operation, Audible Alarm and Cancel Print are provided as standard functions.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 inches) wide. Up to 6-part forms may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration and print quality.

See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities", below.

Performance Considerations: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration, line transmission speed, loop speed, output format, and program application processing must all be considered in determining actual throughput. Refer to *IBM 3268 Printer Component Description,* GA27-3267, for more detail.

Customer Responsibilities: The Customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3268.
- Physical setup, connection of cables, switch settings and checkout.
- Notifying IBM of intent to relocate and follow IBM instructions for relocation.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM Service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Ordering and replacing a worn printhead and insuring that a functional printhead is available for use by a service personnel. The customer must be advised that on his request, FE can provide on-site installation of the customer-supplied printhead (P/N 7033524) on a per call billable basis.
- Procurement, installation, and maintenance of the loop network.

Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. Standard cable is 4.3 meters (14 feet) in length.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

SPECIFY

- The basic machine is shipped with the following: Voltage 120V, AC, 1-phase, 3-wire, 60 Hz; power plug non-locking; power cord lengths of 2.8 meters (9 feet).

  The following options may be specified: **#9890** for locking plug; **#9511** for 1.6 meters (5 foot) power cord.

- **Language:** National Use Character Sets are selected via the operator panel. APL/TEXT may be selected via the SCS data stream.

  Character Sets which may be selected include:

- Machine Nomenclature: Available at time of manufacture only.

  Nomenclature default is as follows:
  All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a one-shelf forms stand. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design and stacking considerations.

For field installation:

Forms Stand P/N 8678375 or Feature **#4450**

SUPPLIES

Ribbon (P/N 7032821): A Black Ribbon Cartridge, P/N 7032821 or equivalent, is required. The ribbon cartridge has a print life* of five million characters. Replacement printheads and ribbon cartridges are available for purchase from SSD ... see SSD sales manual.

* Ribbon print life is derived from IBM - conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and paper quality.

Printhead (P/N 7033524): The life expectancy** of the printhead is 300 million characters.

** Printhead life expectancy is derived from IBM - conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

3268 PRINTER MDL 2

PURPOSE

Provides hard copy output for the 3270 System via a 3274, 3276 or 8775, a 4321 or 4331 Processor via Display/Printer Adapter, the 3081/3083/ 3084 via the 3082 Processor Controller, and the 4341 via a console position, printing at a maximum speed of 340 cps.

MODELS

Model 2 002

Prerequisites:

Attachment	Device Adapter
3274	Available Category A terminal port.
3276	Available port or added **#3255, #3256, or #3257.**
4321/4331	Available position on Display/Printer Adapter (APL/Text, SCS and Character Print Operation specifies are not supported on the 4321/4331). Specify code **#9841** must be ordered.
4341/4361/4381	Available console position on 4341. (APL/Text, SCS and Character Print Operation specifies are not supported on the 4341).
3081/3083/3084	Attaches via 3082 Processor Controller.
3694	Attaches via the 3694 Device Cluster Adapter #3101.
8775	Printer Attachment Feature (#5580)

Customer Setup (CSU): The 3268 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The 3268 mdl 2 consists of control functions, printer and indicator lights in one integrally designed pedestal unit.

The printer operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. 132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm (inch) and 16.7 characters per 25.4mm (inch). Selection of horizontal spacing is via a manual switch on the operator panel or via data stream control. Vertical spacing is 3, 4, 6 and 8 lines per 25.4mm (inch). Vertical spacing may be selected via manual switch on the operator panel or via the program when in SCS mode of operation. APL/TEXT, Dual Case operation, Audible Alarm and Cancel Print are provided as standard functions.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 inches) wide. Up to 6-part forms with a total thickness of 0.457mm (0.018 inches) may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration, and print quality. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities", below.

Performance Considerations: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration, line transmission speed, loop speed, output format, and program application processing must all be considered in determining actual throughput. Refer to *IBM 3268 Printer Component Description,* GA27-3267, for more detail.

The FIVE3270 SE Aid is available to estimate printer performance for the particular environment in which the 3268 mdl 2 will be installed. Use of this aid is essential for understanding the effects of transmission speed, data stream protocol, and message sizes on printer throughput.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking, and placement of the 3268.
- Physical setup, connection of cables, switch settings and checkout.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Contact Field Engineering to make cable connection of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
- Ordering and replacing a worn printhead and insuring that a functional printhead is available for use by service personnel. The customer must be advised that on his request, FE can provide on-site installation of the customer-supplied printhead (P/N 7033524) on a per call billable basis.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

SPECIFY

- The basic machine is shipped with the following: Voltage 120V, AC, 1-phase, 3-wire, 60 Hz; power plug non-locking; power cord length of 2.8 meters (9 feet). Character print operation: 1920 characters. Standard operations: are as specified in paragraphs marked "Standard" under "Compatibility Options for 3270 Data Stream (Non-SCS) Operations", below.
- The following options may be specified: **#9890** for locking plug; **#9511** for 1.6 meter (5 foot) power cord.
- Cables: See "Accessories" and *IBM Information Display System Installation Manual - Physical Planning,* GA27-2787, for cable details.
- Language: National Use Character Sets are selected via the operator panel. APL/TEXT may be selected via the SCS data stream.

  Character Sets which may be selected include:
- Machine Nomenclature: Available at time of manufacture only. Nomenclature default is as follows:

  All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:
- Compatibility Options for the 3270 Data Stream (non-SCS) Operation: Operation of the 3268 mdl 2 is defined as standard. Alternate operation may be specified. **Note:** Standard 3268 mdl 2 operation is the same as the standard 3287 mdls 1 and 2.

Field Installation: Yes. Contact local FE Branch Office for installation.

Carriage Return (CR) at MPP Plus 1

Standard: An automatic New Line (NL) is executed at MP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

#9501 No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

New Line (NL) at MPP Plus 1

Standard: An automatic New (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

#9502 No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

Form Feed Followed by Data

Standard: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

#9503 The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220 - SC3752.

Form Feed is Last Character in Print Order

Standard: An automatic new Line (NL) is executed after the form feed is completed. The next print position will be the first print position of the second line on the next form.

#9504 The automatic New Line (NL) is suppressed at completion of the form feed. The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219 - SC3749.

Null Suppression

Standard: If an entire print Line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is first print position of current line.

#9505 Prints all null lines as a blank line and performs a new Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ ML0442 - SC 3741 or 3287 RPQ MK3988 - SC3741.

Form Feed (FF) Command Position

3268 Printer Mdl 2 (cont'd)

Standard: Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

#9506 Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

Automatic Function at End of Print Buffer

Standard: An automatic New Line (NL) is executed following a print order. Next print position is first print position of the next line.

#9507 An automatic Form Feed (FF) is executed following a print order. Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740.

- **Character Print Operation:** The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below.

  Field Installation: Yes. Contact local FE Branch Office for installation.

  #9521 (960 character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  #9523 (2,560 character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

  #9524 (3,440 character print operation) for use with a program which requires a print buffer size of 3,440 bytes while using Erase/Write Alternate Command.

  #9525 (3,564 character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command. **Limitation:** This specify code is not valid when the 3268 is attached to a 3274 with Configuration Support A (**#9110**).

- **#9181** - Provides the following:
  - Up to 220 characters per line at 16.7 characters per inch.
  - Set print density control code support via data stream.
  - Save/restore formats structured field - provides for saving the current printer format parameters and restoring the previously saved parameters.
  - Query list structured field - provides capability for the application to selectively query the printer.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a 1-shelf forms stand. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design and stacking considerations.

For field installation:

Forms Stand P/N 8678375 or Feature **#4450**

Cables: Cables and or associated parts to attach the 3268 to 3271s/3272s/3274s and the 3276, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 1)
P/N	1836418	Connector Kit (Note 1)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 2)
P/N	1836419	Connector Kit (Note 2)
P/N	2621414	Modification Kit (Note 3)
P/N	1833106	Station Protector Attachment Kit (Note 5)
P/N	5252643	Adapter (Note 7)
P/N	1830818	Station Protection Kit, Gas (Note 4)
P/N	5252899	Station Protector Element, Gas (Note 6)

Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **#1836446**) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **#1836447**) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **#2577672** or two P/N **#1833108** cable assemblies together.

SUPPLIES

Ribbon (P/N 7032821): A Black Ribbon Cartridge, P/N 7032821 or equivalent, is required. The ribbon cartridge has a print life* of five million characters. Replacement printheads and ribbon cartridges are available for purchase from SSD ... see SSD sales manual.

* Ribbon print life derived from IBM - conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings and paper quality.

Printhead (P/N 7033524): The life expectancy** of the printhead is 300 million characters.

** Printhead life expectancy is derived from IBM - conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

3268 COLOR PRINTER MDL 2C

PURPOSE

Provides hard copy output in black and color by using replaceable ribbon cartridges at a maximum speed of 340 cps. Attaches to a 3270 Information Display System via a 3274 or a 3276, a 4321 or 4331 via a port on the Display/Printer Adapter and a 4341 via a console position.

MODELS

Model 2C C02

Prerequisites:

Attachment	Required on Control Unit
3274	Available Category A terminal port.
3276 (1)	Available port or added #3255, #3256 or #3257.
4321 (2)	Available port on Standard Display/Printer Adapter.
4331 (2)	Available port on Standard Display/Printer Adapter or #2001 on 4331 Mdl Group 1 or 2.
4341 (2)	Available console position on 4341.
4361/4381	Available console position on 4361/4381.

Note (1): Programmed Symbols (PS) is not supported on 3276.

Note (2): PS, APL/TEXT, SCS and Character Print Operation specifies are not supported on 4321, 4331 or 4341.

Customer Setup (CSU): The 3268-2C is designed as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The unit consists of control functions, printer and indicator lights in one integrally designed pedestal unit. The printer operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. 132 print positions at 10 characters per 25.4mm (inch) and 220 print positions at 16.7 characters per 25.4mm (inch) are standard. Selection of horizontal spacing (10 cpi or 16.7 cpi) is via a manual switch on the operator panel or via the program when in SCS mode of operation. Vertical spacing is 3, 4, 6 and 8 lines per 25.4mm (inch). Vertical spacing may be selected via manual switches on the operator panel or via the program when in SCS mode of operation. APL/TEXT, Dual Case operation, Audible Alarm, Cancel Print, Extended Character Set Adapter and PS are provided as standard functions.

PS may be configured either as six single-plane 190-symbol sets whose shapes and codes are customer definable and which allow printing within a character location a single selected color (green, blue, red or black) or as three single-plane 190-symbol sets and one triple-plane 190-symbol set. The triple-plane symbol set allows printing of up to four colors within a single character position. Selection of the PS configuration is via the operator panel. Prerequisite for use of PS is attachment to a 3274 with Configuration Support C or D.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 inches) wide. Up to 6-part forms with a total thickness of 0.457mm (0.018 inches) may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration, and print quality. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Using the replaceable multi-color ribbon cartridge, two modes of color selection (base color and extended color) may be employed. Base Color Printing is the selection of color at the field level as a function of the 3270 Data Stream protect and intensify attribute byte. The display to printer mapping is as follows:

3270 Attribute Byte	Color Displayed	Color Printed	
		Base Color -Black	Base Color -Green
Not Protected, Normal Intensity	Green	Black	Green
Protected, Intensified	White	Green	Black
Not Protected, Intensified	Red	Red	Red
Protected, Normal Intensity	Blue	Blue	Blue

Extended color printing is the selection of color at the character level in addition to the field level. The display to printer color mapping for extended color is:

Color Displayed	Color Printed
White	Black
Red	Red
Blue	Blue
Green	Green
Turquoise	Black (by default)
Pink	Black (by default)
Yellow	Black (by default)

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines, and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

Performance Considerations: Actual printer throughput is dependent upon operational and system characteristics. Factors such as control unit configuration, line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

Compared to black or monochrome printing, throughput will be reduced when printing in multi-color as a function of the number of color changes on the page due to a separate pass of the printhead for each color on a line. In addition, when printing in other than the standard character format (4 of 7 horizontal X 8 vertical dots) and using PS, the printer will print at reduced speeds. Under these conditions the printer prints unidirectionally at 147 cps. Dense printing when using PS will also lessen printer throughput. Refer to the *IBM 3268 Printer Component Description,* GA27-3268, for more details.

The FIVE3270 SE Aid is available to estimate printer performance for the particular environment in which the 3268 will be installed. Use of this aid is essential for understanding the effects of transmission speed, data stream protocol, and message sizes on printer throughput.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking, and placement of the 3268.
- Physical setup, connection of cables, switch settings and checkout.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Contact Field Engineering to make cable connection of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
- Ordering and replacing a worn printhead and ensuring that a functional printhead is available for use by service personnel. The customer must be advised that on his request, Field Engineering can provide on-site installation of the customer-supplied printhead (P/N **7033701**) on a per-call billable basis.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

- Voltage: The basic machine is shipped with: 120V, AC, 1-phase, 3-wire, 60 Hz; power plug non-locking; power cord length of 2.8 meters (9.1 feet).

  The following options may be specified: **#9890** for locking plug; **#9511** for 1.6 meter (5.2 feet) power cord.

- Cables: See "Accessories" and *IBM Information Display System Installation Manual - Physical Planning,* GA27-2787, for cable details.

- Language: National Use Character Sets are selected via the operator panel.

  Character Sets which may be selected include:

- Machine Nomenclature: Available at time of manufacture only. Nomenclatures default is as follows:

  All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

- Compatibility Options for the 3270 Data Stream (Non-SCS) Operation: Standard operations of the 3268 mdl 2C are described in the paragraph marked "standard". Alternate operation may be specified. **Note:** Standard 3268 mdl 2C operation is the same as the standard 3287 mdls 1 and 2 and 3268-2. **Field Installation:** Yes. Contact local FE Branch Office for installation.

  Carriage Return (CR) at MPP Plus 1

  Standard: An automatic New Line (NL) is executed at MP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

  #9501 No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

  New Line (NL) at MPP Plus 1

3268 Color Printer Mdl 2C (cont'd)

Standard: An automatic New Line (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

#9502 No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

Form Feed (FF) Followed by Data

Standard: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

#9503 The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220 - SC3752.

Form Feed (FF) is Last Character in Print Order

Standard: An automatic New Line (NL) is executed after the Form Feed (FF) is completed. The next print position will be the first print position of the second line on the next form.

#9504 The automatic New Line (NL) is suppressed at completion of the Form Feed (FF). The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219 - SC3749.

Null Suppression

Standard: If an entire print line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is first print position of current line.

#9505 Prints all null lines as a blank line and performs a New Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ ML0442 - SC 3741 or 3287 RPQ MK3988 - SC3741.

Form Feed (FF) Command Position

Standard: Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

#9506 Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

Automatic Function at End of Print Buffer

Standard: An automatic New Line (NL) is executed following a print order. Next print position is first print position of the next line.

#9507 An automatic Form Feed (FF) is executed following a print order. Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740.

Full Page on Skip Suppress

Standard: Execute an automatic form feed when the number of lines set in the maximum page length counter has been printed when operating in skip suppress mode.

RPQ S30277 Print a full page prior to automatic form feed when operating in skip suppress mode. Compatible with 3287 RPQ S30273. Full page is defined by the values of maximum page length times lines per inch (MPL)x(LPI). **Note:** Machines will be shipped from plant with RPQ S30277 installed.

Field Installation: Yes. Contact local FE Branch Office for installation.

Form Feed after Local Copy

Standard: An automatic New Line (NL) is executed following a print order resulting from an operator-initiated local copy if specify feature **#9507** is not selected.

#9508 An automatic Form Feed (FF) is executed following a print order resulting from an operator-initiated local copy. The operator uses the print key on the display keyboard to initiate a local copy. A host-initiated local or a host direct print does not cause this form feed.

- **Character Print Operation:** The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below. **Field Installation:** Yes. Contact local FE Branch Office for installation.

  #9521 (960 character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  #9523 (2,560 character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

  #9524 (3,440 character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command.

  #9525 (3,564 character print operation) for use with a program which requires a printer buffer size of 3,564 bytes while using Erase/Write Alternate Command.

- **Base Color Print Operation:** The basic machine is shipped with base color black. For base color green order (**#9136**). Base color is defined under "Highlights" above.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a 1-shelf forms stand. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design and stacking considerations. For field installation: Forms Stand P/N **8678375** or Feature **#4450**.

Cables: Cables and or associated parts to attach the 3268-2C to the 3271s/3272s/3274s and the 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446**) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447**) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

SUPPLIES

Ribbon (P/N 7037980): A multi-colored ribbon cartridge, P/N **7037980** or equivalent, is required for color printing. A black ribbon cartridge P/N **7037979** or equivalent may be used for printing only black.

The multi-colored ribbon cartridge has a print life* of one million characters for red, green and blue tracks, and two million characters for the black track. The all-black ribbon cartridge has a print life* of eight million characters. Replacement printheads and ribbon cartridges are available for purchase from SSD ... see SSD sales manual.

* Ribbon print life is derived from IBM-conducted tests. Ribbon life experienced by a user may vary significantly depending on

3268 Color Printer Mdl 2C (cont'd)

the user's own quality criteria and on factors such as printer condition, machine settings and paper quality.

Printhead (P/N 7033701): The life expectancy** of the printhead is 175 million characters.

** Printhead life expectancy is derived from IBM-conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

3274 CONTROL UNIT STANDARD MODEL SELECTION GUIDE

STANDARD MODELS

For simplified order processing, some 3274 models, with certain Specify and Special Features installed as default options, have been designated "3274 Standard Models".

To order a 3274 selected from the 3274 Standard Models Selection Chart, it is only necessary to specify the 3274, the model selected, and any Special Feature indicated by the chart.

It should be noted that requests for accessories, other features, RPQ's, or any other alterations will *NOT* be accepted for shipment with a Standard Model. Any desired deviation from a Standard Model configuration necessitates normal ordering procedures and reference to the M3274 pages which follow this Standard Model Selection Guide.

3274 STANDARD MODEL SELECTION

When selecting a 3274, it is necessary to know the host attachment method, the desired terminal features/functions, plus the quantity and type of terminals to be attached. It should be noted that two terminal ports are required to attach a Displaywriter System when it includes a printer. A Glossary at the end of this guide may aid in understanding the above criteria and the 3274 Standard Models Selection Chart below.

3274 STANDARD MODELS SELECTION CHART

Category A Terminal	LOCAL (1)		REMOTE	
	SNA	Non-SNA	Base Function (2)	Enhanced Functions (3)
8	----	----	51C Standard Model	----
16	----	----	----	61C Std Mdl plus #9901 or #9908
24	----	----	21C Std Mdl	----
32	41A Std Mdl plus #9901 or #9908	41D Std Mdl plus #9901 or #9908	21C Std Mdl plus #6903	41C Std Mdl plus #9901 or #9908

Notes:

(1) These local machines are shipped with the following Specify and Special Features as default options:

Power: 200-240V AC, 1-phase, 3-wire, 60 Hz with non-locking plug.

Power Cable Length: 4.3 meters (14 feet).

Configuration Support D: See "Function List #2" for functions supported.

(2) These remote machines are shipped with the following Specify and Special Features as default options:

Power: 120V AC, 1-phase, 3-wire, 60 Hz with non-locking plug.

Power Cable Length: 4.3 meters (14 feet).

Communications Adapter: Common Communications Adapter w/o Business Machine Clock #6302.

Communications Interface: External Modem Interface #3701.

Terminal Adapters (except 51C): Type A1 #6901 and Type A2 #6902.

Configuration Support: CS-A **#9110**. See "Function List #1" for functions supported.

Communications Cable Length: 5.1 meters (20 feet).

(3) These remote machines are shipped with the following Specify and Special Features as default options:

Power: 100-127V AC, 1-phase, 3-wire, 60Hz with non-locking plug.

Power Cable Length: 4.3 meters (14 feet).

Communications Adapter: Common Communications Adapter w/o Business Machine Clock #6302.

Communications Interface: External Modem Interface #3701.

Configuration Support: CS-D. See "Function List #2" for functions supported.

The above standard models have been chosen because they are the machines commonly ordered by customers. If additional function or capability is required, use the detail M3274 pages or CF3270 to configure the 3274.

PERFORMANCE

Performance is a function of many variables. It should not be inferred that the number of terminals indicated can operate concurrently with satisfactory performance in all situations. Use FIVE3270 to predict performance for individual cases.

Function List #1: All functions/features *NOT* applicable to all models:

- SNA/SDLC or BSC operation
- Category A Terminals

3178 mdl C1, C2, C3	Display Station
3262 mdl 3, 13	Line Printer
3268 mdl 2	Printer
3268 mdl 2C (Base Color)	Color Printer
3270 Personal Computer (Control Unit Terminal Mode)	
3278 mdl 1, 2, 3, 4	Display Station
3279 (Base Color)	Color Display Station
3287 mdl 1, 2 w/#8331	Printer
3287 mdl 1C, 2C (Base Color)	Printer
3289 mdl 1, 2	Line Printer
5210 mdl G01, G02	Printer
6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and L.P. 5608-SR9	Displaywriter System

- 3279 Color Convergence
- Magnetic Reader Control
- SCS Printer Support (SNA)
- Between Bracket Printer Sharing (SNA)
- Host Loadable Printer Authorization Matrix
- Copy - Print Key Function (BSC)
- ASCII (mdls 21C, 41C, 51C, 61C only)
- One 3278/3279 Keyboard Type: either
  - Typewriter (EBCDIC) #4621 and #4627, or
  - Typewriter (ASCII) #4624 and #4628, or
  - Data Entry #4622, or
  - Data Entry - Keypunch Layout #4623
- 3289 Text Print Feature #1130

Function List #2: This list includes all of the functions in Function List #1, plus the following:

- Category A Terminals

3268 mdl 2C	Color Printer
3270 Personal Computer	
3278 mdl 5	Display Station
3279 (Extended Color)	Color Display Station
3287 mdl 1C, 2C	Printer

- 3278/3279 Keyboard #4626, #4629, #4640, #4651, #4652 - (APL, Text, Overlay, Attribute Select, and Attribute Select/APL, respectively).
- APL/Text Control Function
- Extended Highlighting
- Summary Maintenance Statistics (SNA)
- Programmed Symbols (PS)
- Decompression of PS Load Data
- Inbound Pacing (SNA)
- Automatic Session Recovery (SNA-remote)
- Power On/Off Notification (SNA)
- Text Blocking (BSC)
- Transparency (BSC)
- Entry Assist Function.

GLOSSARY

Local Attachment: For attachment to a host via a byte multiplexer, selector, or block multiplexer channel.

Remote Attachment: For attachment to a host in data half-duplex mode via half-duplex or duplex communications facilities.

Enhanced Functions: Support for:

APL
Extended Highlighting
Extended Color
Programmed Symbols (PS)
Query

SNA: Systems Network Architecture

Control Unit Terminal Mode: The 3270 Personal Computer operates as a 3178, 3278 mdl 2 or 3279.

3274 CONTROL UNIT MDL 1

[NO LONGER AVAILABLE]

PURPOSE

Provides the capability of controlling up to a maximum cluster of 32 terminals consisting of display stations, and/or printers. Two categories of terminal adapters are used in attaching the desired displays or printers (see terminal attachment list below). The basic 3274 allows attachment of up to eight Category A terminals. The two categories of terminal adapters can be featured in various combinations to provide the maximum terminal configuration of 32 terminals (a maximum of 16 of the 32 terminals can be Category B units and at least one Category A Display Station with keyboard is needed for diagnostic purposes). The 3274 has one model for communicating in data half-duplex mode via half-duplex or duplex communications facilities and three models for local channel attachment.

ATTACHABLE TERMINALS

Category A Terminals

3178 mdl C1, C2	Display Station
3178 mdl C3	Display Station
3262 mdl 3 & 13	Line Printer
3268 mdl 2	Impact Matrix Printer
3268 mdl 2C	Color Impact Matrix Printer
3270 Personal Computer (Control Unit Terminal Mode)	
3278 mdl 1, 2, 3, 4, & 5 (See Note 1)	Display Station
3279 mdl 2A, 2B, 3A, & 3B S2A, S2B, S3G, 02X & 03X	Color Display Station
3287 mdl 1, 2	Impact Matrix Printer
3287 mdl 1C, 2C w/#8331	Color Impact Matrix Printer
3289 mdl 1 & 2	Line Printer
3290 mdl 1	Information Panel
4250 (See Notes 2 and 3)	APA Printer
5210 mdl G1, G2	Printwheel Printer
6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and L.P. 5608-SR9 (See Note 4)	Displaywriter System

Notes:

1. Mdl 5 cannot be attached to a 3274 mdl 1B.
2. 4250 cannot attach to 3274 mdls 1B and 1C.
3. Because of the high data volumes possible with this printer, it is strongly recommended the IBM Aid FIVE3270 be used to predict the effect the 4250 has on subsystem performance.
4. Two terminal ports are required to attach a Displaywriter System when it includes a printer.

Category B Terminals

3277 mdl 1 & 2	Display Station
3284 mdl 1 & 2	Impact Matrix Printer
3286 mdl 1 & 2	Impact Matrix Printer
3287 mdl 1 & 2 (with 3271/3272 attachment feature)	Impact Matrix Printer
3288 mdl 2	Line Printer

MODELS

Model 1A A01 — For local (SNA version) attachment, via a byte multiplexer, selector, or *block multiplexer channel, to a S/370 processor; or any 4300 processor via a byte multiplexer or block multiplexer channel.

Model B1 B01 — For local (3272 version) attachment, via a byte multiplexer, selector, or *block multiplexer channel, to a S/370 processor, or S/360 mdls 30, 40, 50, 65, 75, and 195; or any 4300 processor via a byte multiplexer or block multiplexer channel.

*Note: Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

Model 1C C01 — For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370 or 4300 processor via 3704 or 3705 (or via the Communications Adapter feature on the 4331), using Synchronous Data Link Control (SDLC/SNA).
- A S/370 or 4300 processor via (where applicable) 2701 , 2703, a 3704 or 3705, or a Communications Adapter feature on the 4331, using Binary Synchronous Communications (BSC).
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701 , 2703, or a 3704 or 3705 using BSC.

Model 1D D01 — For Local (3272 version) attachment, via a byte multiplexer, selector or *block multiplexer channel, to a virtual storage S/370 processor, or any 4300 processor via a byte multiplexer or block multiplexer channel.

*Note: Attachment to non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

Prerequisites:

(1) One 3278 or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0).

(2) A 3274 mdl 1C requires a Communications Adapter and a Communication Interface for host communications. An external modem is required with the External Modem Interface (#3701) and the CCITT V.35 Interface (#1550) unless the 3274 mdl 1C is to be directly attached to its host. The Data Circuit-Terminating Equipment or direct attachment host to which the 3274 mdl 1C is attached must provide clocking.

Customer Setup (CSU): The 3274 mdl 1C is designated as Customer Setup thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274.

HIGHLIGHTS

The 3274 is a terminal control unit which can attach up to 32 displays, and/or printers, unless a Displaywriter System(s), which includes a printer, is to be attached. A Displaywriter System without a printer requires one terminal port (the same as other terminals), but when a Displaywriter System includes a printer, two terminal ports are required to attach. These terminals are grouped into two categories. The Category A terminals are a display and printers which were developed for attachment to the 3274, while the Category B terminals were designed for attachment to the 3271s and 3272s. The 3274 attaches the Category B terminals with certain limitations. A maximum of 16 of the 32 attachable terminals can be Category B terminals. During a write operation, a 3277 attached to a 3274 via a Type B Terminal Adapter will blink more frequently than when attached to a 3271 or 3272. Category A terminals can be driven up to a maximum of 1,500 meters (4,920 feet) while Category B terminals can only be driven a maximum of 610 meters (2,000 feet). Both categories of terminals attach to their respective Terminal Adapter by the same type coaxial cable and connectors which are used between a 3271 or 3272 and its display or printer terminals.

The 3274 can communicate with a S/360, S/370 or 4300 Processor by local channel attach or remotely via communications facilities. The channel attached Control Unit is available in three mdls; mdl 1A for SNA operation with extended data stream handling capabilities, mdl 1B for 3272 operation, and mdl 1D for 3272 operation with extended data stream handling capabilities. The mdl 1C can operate with extended data stream handling capabilities as either a BSC 3271 or as an SNA/SDLC unit.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through a Configuration Support option via feature and system diskettes.

One Feature Diskette and two System Diskettes are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 1C. As part of the installation procedure, a customized System diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 1C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC (3271 compatible) operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML push button. The load occurs from an integrated diskette drive using the previously

3274 Control Unit Mdl 1 (cont'd)

customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Either EBCDIC or ASCII can be selected during 3274 mdl 1C customization. Both ASCII transmission codes and ASCII data codes are supported in BSC. Only ASCII alphanumeric data bytes of Function Management Request/Response Units are supported in SNA/SDLC. SCS, APL/Text, and the 3270 data stream extensions included in the Structured Field and Attribute Processing (SFAP) customization option are not supported in either BSC or SNA/SDLC when ASCII is used.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the *IBM 3270 Information Display System, IBM 3274 Control Unit Planning, Setup and Customizing Guide,* GA27-2827.

COMMUNICATIONS

The 3274 mdl 1C communicates in half duplex mode with a S/370 or 4300 Processor using SDLC over duplex or half-duplex communications facilities to a 3704/3705 (or via Communications Adapter feature (#1601) on the 4331); or by BSC to a S/360, S/370 or 4300 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704/3705.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138. Communications with a 4331 Processor can be via the Communications Adapter (#1601) using BSC or SDLC/SNA protocols.

SDLC as used in the 3274-1C conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see General Information Manual GA27-3093, *IBM Synchronous Data Link Control.*

A 3274 mdl 1C can be used with X.25 communications facilities by using Configuration Support P #9116 and having appropriate hardware features to support this Configuration Support Option. See "X.25 Support" under "Control Storage Functions" and the Configuration Support P description for details.

Performance: For many 3274 mdl 1C, 21C, 31C and 51C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream-dependent. Refer to IBM Aids for performance evaluation information.

Communications Facilities: The 3274 mdl 1C operates in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of 2000, 2400, 4800, 7200 and 9600 bps on nonswitched facilities. See M2700 pages for facilities .

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, or to the 4331 Communications Adapter can be via direct connection (without modems or communications facilities) at speeds up to 57.6K bps. All communications at speeds greater than 9600 bps must use SDLC. See M3705 and 4331 pages for details.

Communications Adapters: Communications adapters handle the transmission control protocols (SDLC and BSC) for the 3274 mdl 1C.

Communications Interfaces: Communications interfaces connect the 3274 mdl 1C to the host link. One and only one, can be selected.

MODEMS

Unless the 3274 mdl 1C will be directly attached to its host, an external modem with its own clocking is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) feature is installed.

Modem	Speed (bps)
3863 mdl 1	2400/1200
3864 mdl 1	4800/1200
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

Four-wire Switched Network Back-up is available on 3863, 3864, and 3865 modems with Auto Answer.

Switched network backup operation with Manual Call and Manual or Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, 3865 mdl 1, 3865 mdl 2 and 3872 mdl 1. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

DIRECT CONNECTION ATTACHMENT

In addition to host attachment via modems or other data circuit-terminating equipment (DCE), attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for the 3274. Only the basic features needed by the 3274 direct connect hosts are listed. These features may have prerequisites, therefore the machine pages for those hosts should also be reviewed. Physical planning manuals for the respective direct connect hosts can provide additional information on the connecting cables.

Attach Host	Speeds(bps)	Host Feature #	BSC	SDLC	Max Cable Length	3274 Feature No.
3705	14.4K,57.6K	4727(1W)	-	x	57m(190')	#1550,#6303
3705	14.4K,57.6K	4728(1Z)	-	x	57m(190')	#1550,#6303
4331	2400	4801	x	x	400m(1312')	#3701,#6302
4331	4800	4801	x	x	200m(656')	#3701,#6302
4331	9600	4801	x	x	100m(328')	#3701,#6302 or #6303

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

The Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/ isolation and enhances the availability and serviceability of the 3274 for the above environments in all host attachment modes. See NPDA in the Program Products Section.

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation enhances the availability and serviceability of the 3274 in BSC mode or channel attachment. See DEMF in the SCP sections for OS/VS1 and OS/VS2.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Receipt at the customer's receiving dock, unpacking, and placement of the 3274.
- Contacting IBM Field Engineering to accomplish the channel connection tasks for the 3274 mdls 1A, 1B, or 1D.
- Connection of communication cable to the communications facility for the 3274 mdl 1C.
- Performing 3274 customization in accordance with IBM-supplied procedures:
  a. For initial installation.
  b. When made necessary by changes in configuration.
  c. For updating of the control unit diskettes (at customer option).

Bibliography: See *KWIC Index,* G320-1621, or applicable system bibliography:

GC20-0360	S/360
GC20-0001	S/370
GC20-0001	4300
GC20-8100	8100

3274 Control Unit Mdl 1 (cont'd)

SPECIFY

- Voltage: (AC, 1-phase, 3-wire, 60 Hz):

	Locking Plug			Non-Locking Plug		
MDL	120V	208V	240V	120V	208V	240V
1A,B,D	NA	#9884*	#9894*	NA	#9885	#9895
1C	#9890	#9884	#9894	#9891	#9885	#9895

* For a Waterproof Connector, see "Special Features".
NA Not Applicable

- Power Cable Length: If standard 4.3 meter (14 feet) power cable is not desired, specify **#9511** for 1.8 meter (6 feet).
- Communication Cable: [mdl 1C only] If the standard 6.1 meter (20 feet) communication cable is not desired, specify one of the following: **#9061** for 3.0 meters (10 feet), **#9062** for 9.1 meters (30 feet) or **#9063** for 12.2 meters (40 feet).
- Configuration Support: The Configuration support required for the 3274 must be determined before ordering special features or attaching certain terminals. Refer to the 3274 Control Storage Requirements Tables under "Special Feature" Extended Function Store (EFS) for a detailed listing of the functions supports by each option. **Field Installation:** Yes. **Customer Setup:** Yes. **Limitations:** Certain functions require host software support in order to be utilized. Refer to host programming support descriptions to determine the levels of software required. **Note:** When operating a large screen (screen size greater than 1920 characters) display station that is connected to a 3274 mdl 1B, 1C, or 1D in a VM/370 environment, an RPQ is recommended to change the function of the display keyboard Clear key so that it will not place the display in default mode. See RPQ 8K0976, 8K0977, or 8K0978.
- Configuration Support A (**#9110**): This Configuration Support is shipped with all 3274s unless Configuration Support B **#9111** or C **#9112** or P **#9116** is specified. It provides support for all 3270 functions listed in Table 1 (see EFS under "Special Features"), plus support for solicitation of summary maintenance statistics from a 3274 mdl 1A or a 3274 mdl 1C with SNA/SDLC IML, through the use of Network Problem Determination Application (NPDA), and support for base color on attached terminals and 3270 Personal Computer (Control Unit Terminal Mode).
- Configuration Support B (**#9111**): [Mdls 1A, 1C, 1D] Provides support for all 3270 functions included in Configuration Support A **#9110** plus the ability to attach 3278 mdl 5 displays, and support for the following functions:
  - Pacing of inbound message traffic (mdls 1A and 1C/SNA).
  - Automatic Session recovery in both single and multidomain networks (mdl 1C/SNA).
  - Host notification of changes in the power on/off status at attached terminals (mdls 1A and 1C/SNA).
- Configuration Support C (**#9112**): [Mdls 1A, 1C, 1D] Provides support for all 3270 functions included in Configuration Support B, plus support for the following additional functions:
  - Structured Field and Attribute Processing. [3]
  - Programmed Symbols (PS) on attached Terminals. [3]
  - Extended Color on attached terminals. [3]
  - Extended Highlighting on attached terminals. [3]
  - Decompression of PS Load data. [3]
  - BSC Text Blocking.
  - BSC Transparency.
  - Entry Assist RPQ
  - 4250 attachment (mdls 1A and 1D only)
  - Alert Function (mdls 1A and 1C/SNA)

  Notes:

  1. The APL/Text Control Function, which is a separate option in Configuration Support A and B, is included as a basic function of Configuration Support C.

  2. Configuration Support C, unlike Configuration Support A or B, generates a program check (X PROG 470) whenever an EBCDIC datastream contains a device control code(s) that the 3274 does not support. To prevent the program check, users must purge the unsupported code(s) from the datastream. Alternately, order RPQ 8K0980. Refer to the RPQF file in the SMART data base for details.

  3. The extended data stream functions (extended color, extended highlighting and Programmed Symbols) that require the Structured Field and Attribute Processing (SFAP) option in Configuration Support C will *NOT* operate with ASCII unless RPQ 8K1037 is installed.

  Configuration Support C requires **#3623** or **#3625** as a prerequisite.
- Configuration Support P (**#9116**): [Mdl 1C] Provides functions equivalent to Configuration Support A, but is for X.25 operation only. The necessary keyboard labels required for X.25 support on the attached 3178, 3278 or 3279 terminals are shipped with each Configuration Support P #9116. **Prerequisites:** [1] 128K of control storage - #1801, #3622, #3625, and #3628, or #1801, #3623, and #3628. [2] #6303.
- Configuration Support T (**#9113**): [Mdls 1A, 1C, 1D] Provides support for the 3290 or 3270 Personal Computer (Distributed Function Mode) in addition to the other 3270 functions and terminals except:

  Category B Terminals
  3279 "Extended Color" Mdls
  Structured Field and Attribute Processing
  Programmed Symbols
  Loop Adapter
  X.21 Adapter
  Encrypt/Decrypt
  Entry Assist
  4250 Printer Attachment
  Alert Function
  Response Time Monitor
  X.25

  Two 3290 microcode load diskettes are automatically included with Configuration Support T (only one System Diskette is included with Configuration Support T). A Utility Diskette is provided to customize keyboard and keypad layouts. This Configuration Support option was developed for the user who desires to evaluate the operation of the 3290 or 3270 Personal Computer (Distributed Function Mode) on existing 3274s. Based on the intended use and inherent limitations, IBM has no intent to enhance Configuration Support T.

  Prerequisites: 128K of control storage - #1801, #3622, #3625, and #3628 or #1801, #3623, and #3628. **Limitations:** Because Configuration Support T was developed as the configuration support for evaluating of 3290s or 3270 Personal Computer (Distributed Function Mode) it does not restrict having one of the other Configuration Support A, B, or C, options although they cannot be used concurrently. **Specify: #9111** for Configuration Support B, **#9112** for C, **#9116** for P or for T, specify **#9113.**
- Alternate Mailing Address (**#9011**): For diskette only updates. Order this optional feature to specify that diskette only updates are to be mailed to an alternate site address supplied by Field Engineering using a Teleprocessing Control number (TPC) rather than to the address of the 3274 installation site. The alternate address selected is usually that of a central site location. Redistribution of the diskettes containing the diskette update is the responsibility of the customer. The user may decide to replace the existing diskette himself with the diskette containing the updates or, if requested, the IBM Field Engineer will replace the diskette. The purpose of this feature is to assist the customer with his network management. **Field Installation:** Yes. Submit Record Purpose Only MES.

Customers who have ordered, or plan to order for purchase, 3274 mdls 1A/B/C/D and anticipate later upgrading to mdls 31A/C/D should consider purchase of mdls 21A/B/C/D initially, because field upgrade of the mdl 1A/B/C/D requires replacement of the base storage at an additional cost.

SPECIAL FEATURES

Note: After the configuration support and the desired special features have been selected, the control storage requirement must be determined by using the tables under Extended Function Store (EFS) features below. Some combinations of functions and features may exceed the capacity of the control storage in the basic machine, in which case table 2 will identify what EFS features must be ordered. Still other combinations may exceed the maximum control storage possible with all EFS features. Such combinations are invalid configurations and cannot be configured. In these situations, feature(s) must be forfeited in order to reduce the control storage requirement to an amount not exceeding the maximum control storage possible.

Control Storage Expansion (#1801): Provides the ability to install storage above the basic level. This feature must be installed with EFS - Type C1 (#3622), or Type C2 (#3623). This combination is also a prerequisite to installing the other EFS features (Types C3/ #3625, D1/ #3627, D2/ #3628). **Limitations:** Cannot be installed on 3274 mdl 1B. **Maximum:** One. **Field Installation:** Yes.

3274 Control Unit Mdl 1 (cont'd)

Extended Function Store (EFS) Type C1, C2, C3 (#3622, #3623, #3625) and Types D1, D2 (#3627, #3628:) Provide increments of control storage to accommodate combinations of functional features that exceed the storage capacity of the base machine. Types C1, C3, and D1 each provide 16,384 additional positions of control storage. Types C2 and D2 each provide 32,768 additional positions of control storage. To determine which EFS features may be required, refer to the 3274 Control Storage Requirements in Tables 1 and 2 below.

Note: A description of non-"Specify", non-"Feature", non-"Machine" Control Storage Requirement Functions is given later in this section, with the exception of "Category A Terminals", "Category B Terminals", EBCDIC, and ASCII, which have been described above.

3274 Control Storage Requirement Tables: Use the following procedure to determine which, if any, EFS features must be ordered on the mdl 1A, 1C or 1D:

Step #1: Select the Configuration Support option which contains the functions desired. If T is selected, go directly to Table 2, line 6, for EFS feature codes needed, otherwise continue to Step #2.

Step #2: After determining the desired Configuration Support, refer to the appropriate part of Table 1 and select the features desired:

3274 mdl 1A, refer to Table 1, Part 1.
3274 mdl 1C/SNA, refer to Table 1, Part 2.
3274 mdl 1C/BSC, refer to Table 1, Part 3.
3274 mdl 1D, refer to Table 1, Part 4.

Step #3: Determine the total Type C and total Type D storage required for the features and functions selected in Step #2.

Step #4: Add the Type C and Type D totals to determine the total control storage required. If the total is equal to or less than 65,536, no EFS features are required. If the total is greater than 65,536, continue with Step #5.

Step #5: Refer to Table 2. For Configuration Support A or B, begin at line 1 and work down. For C, begin at line 4 and work down. Stop at the first line that satisfies the control storage requirements determined in Steps 3 and 4. Order the EFS features listed in the last column.

Notes For Table 1 - Parts 1, 2, 3 and 4

[1] Configuration Support A Consideration Only: If all three keyboard types (Typewriter, Data Entry and Data Entry-Keypunch-like) are required on display stations attached to the 3274, add 1000 to the Type D storage requirements in addition to that listed in the table.

[2] If the total Type D storage requirement calculated for Category A, plus Category B terminals, exceeds the applicable maximum storage value listed below, use the applicable maximum value.

Unit	Maximum Storage Value
3274-1A	10,744
3274-1C/SNA	10,744
3274-1C/BSC	6,844
3274-1D	8,844

[3] There is no customizing option nor additional control storage required to support 10 Numeric-only Character Set for Operator Identification Card Reader (#4600) on 3277s (Category B terminals) which are attached to a 3274.

[4] Add the indicated amount for each keyboard type to be used.

[5] The SFAP function is also required when the SCS Support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.

[6] SCS Printer Support is required for DCA-LV2 Word Processing applications. This support also required for 5210 mdls G01 or G02, attached to 3274 mdls 1A and 1C SNA for applications that utilize the cut sheet feed attachment feature (#7860) when operating with 2 drawers.

[7] Configuration Support C (#9112) is required for 5210 mdls G01, G02 attached to 3274 mdls 1A and 1C SNA for support of Word Processing applications. This includes those applications which utilize the cut sheet feed attachment feature (#7860) when operating with 2 drawers.

[8] The SFAP function is also required when the Query function is used with 3262 mdls 3 and 13, and 3268 mdl 2 printers. The Query function allows the application to interrogate the printer to determine what function is supported.

[9] For 4250 attachment to 3274 mdls 1A and 1D, the SFAP function is required plus support for one Extended Attribute Terminal for each 4250 attached.

[10] SCS printer support required for 4250 attachment.

[11] A Displaywriter System requires two terminal ports when it includes a printer.

[12] **Limitations:** This function does *NOT* support ASCII unless RPQ 8K1037 is installed.

TABLE 1 - PART 1

3274 Model 1A	TYPE C	TYPE D
Mdl 1A Base (including copy) (Choose one)		
Configuration Support A (#9110)	41,200	13,600
Configuration Support B (#9111)	45,072	14,484
Configuration Support C (#9112)	50,030	17,940
Category A terminals (Choose one)[2,11]		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]		
Typewriter[1] (3278/3279-#4621, #4624, #4627, #4628, #4640, #4651, 3178 mdl C2)	0	786
(3270 Personal Computer Control Unit Terminal Mode)	0	786
Typewriter[1] (3178 mdl C3)	0	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry KP[1] (3278/3279-#4623)	0	786
Text (3278/3279 - #4629)	0	1,560
APL (3278/3279-#4626, #4652)	0	1,560
Category B terminals (Choose one)[2,3]		
1 to 4 terminals	4,900	5,624
1 to 8 terminals	4,900	6,648
1 to 12 terminals	4,900	7,672
1 to 16 terminals	4,900	8,696
APL/Text Control Function (Choose one)		
Configuration Support A or B	1,700	1,200
Configuration Support C	0	0
3289 Text Print Control	0	512
Host Loadable Printer Authorization Matrix	500	0
Between Bracket Printer Sharing	800	100
SCS Printer Support (3287-#9660, #9661)[5] (See Note 10) (3262 and 3268 basic function) (See Note 8) (3289 basic function), (4250 basic function) (See Note 9) (5210 mdl G1, G2 basic function-see note 6,7)	1,600	100
Magnetic Reader Control (3278/ 3279-#4999) (Choose one)		
3275/3277 Like 10-Character Set	600	60
Numeric & Alphanumeric Character Sets	1,630	316
Color Convergence (Base or Extended Color)	4,296	1,198
Alert Function	2,544	4,224
The Following Are Available w/ Configuration Support C Only		
Structured Field & Attribute Processing-(SFAP) (note 12)	4,950	950
Programmed Symbols (PS)	2,700	190
Decompression	900	0
Extended Attribute Terminals [add 256 for each terminal] (3268 mdl 2C/3278/3287-#3610/3279 Mdl 2B or 3B)	0	#x256
IBM Personal Computer Support Attachment (3278 - #5315, #5316)	3,200	300
IBM Personal Computer Support Attachment (3278/3279 - #5315, #5316/ #5325, #5326)	3,200	300

TABLE 1 - PART 2

3274 Model 1C/SNA	TYPE C	TYPE D
Mdl 1C/SNA (including copy) (Choose one)		
EBCDIC		
Configuration Support A (#9110)	41,030	13,700
Configuration Support B (#9111)	46,102	15,096
Configuration Support C (#9112)	50,580	17,940
ASCII		
Configuration Support A (#9110)	41,446	14,100
Configuration Support B (#9111)	46,518	15,496
Configuration Support C (#9112)	51,700	18,090

3274 Control Unit Mdl 1 (cont'd)

Category A Terminals (Choose one)[2,11]		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]		
Typewriter[1] (3278/3279-#4621, #4624, #4627, #4628, #4640, #4651, 3178 mdl C2)	0	786
(3270 Personal Computer Control Unit Terminal Mode)	0	786
Typewriter[1] (3178 mdl C3)	0	786
Data Entry[1] (#3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry[1] KP (3278/3279-#4623)	0	786
Text (3278/3279 - #4629)	0	1,560
APL (3278/3279-#4626, #4652)	0	1,560
Category B terminals (Choose one)[2,3]		
1 to 4 terminals	4,900	5,624
1 to 8 terminals	4,900	6,648
1 to 12 terminals	4,900	7,672
1 to 16 terminals	4,900	8,696
APL/Text Control Function (Choose one)		
Configuration Support A or B	1,700	1,200
Configuration Support C	0	0
3289 Text Print Control	0	512
High Performance Communications Adapter (#6303)		
Configuration Support A or B	600	-500
Configuration Support C	600	+400
Host Loadable Printer Authorization Matrix	500	0
Between Bracket Printer Sharing	800	100
SCS Printer Support (3287-**#9660, #9661**)[5] (3262 and 3268 basic function) (See Note 8) (3289 basic function) (5210 mdl G1, G2-basic function	1,600	100
Magnetic Reader Control (3278/ 3279-#4999) (Choose one)		
3275/3277 Like 10-Character Set	600	60
Numeric & Alphanumeric Character Sets	1,630	316
Encrypt/Decrypt (#3680)	3,200	2,000
Color Convergency (Base or Extended Color)	4,296	1,198
Alert Function	2,544	4,224
The Following Are Available w/ Configuration Support C Only		
Structured Field & Attribute Processing-[SFAP] (EBCDIC only) (note 12)	4,950	950
Programmed Symbols (PS)	2,700	190
Decompression	900	0
Extended Attribute Terminals [add 256 for each terminal] (3268 mdl 2C/3278/3287-#3610/3279 Mdl 2B or 3B)	0	#x256
IBM Personal Computer Support Attachment (3278 - #5315, #5316)	3,200	300
IBM Personal Computer Support Attachment (3278/3279 - #5315, #5316/ #5325, #5326)	3,200	300

TABLE 1 - PART 3

3274 Model 1C/BSC	TYPE C	TYPE D
Mdl 1C/BSC (Choose one)		
EBCDIC		
Configuration Support A (**#9110**)	38,000	13,800
Configuration Support B (**#9111**)	41,872	14,684
Configuration Support C (**#9112**)	47,150	22,200
ASCII		
Configuration Support A (#9110)	41,446	14,100
Configuration Support B (#9111)	46,518	15,496
Configuration Support C (#9112)	51,700	18,090
Category A Terminals (Choose one)[2,11]		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]		
Typewriter[1] (3278/3279-#4621, #4624, #4627, #4628, #4640, #4651, 3178 mdl C2)	0	786
(3270 Personal Computer Control Unit Terminal Mode)	0	786
Typewriter[1] (3178 mdl C3)	0	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry KP[1] (3278/3279-#4623)	0	786
Text (3278/3279 - #4629)	0	1,560
APL (3278/3279-#4626, #4652)	0	1,560
Category B terminals (Choose one)[2,3]		
1 to 4 terminals	4,700	1,724
1 to 8 terminals	4,700	2,748
1 to 12 terminals	4,700	3,772
1 to 16 terminals	4,700	4,796
APL/Text Control Function (Choose one)		
Configuration Support A or B	2,200	4,700
Configuration Support C	0	0
3289 Text Print Control	0	512
Host Loadable Printer Authorization Matrix	550	0
Copy (Print Key Function)	2,700	0
Magnetic Reader Control (3278/ 3279-#4999) (Choose one)		
3275/3277 Like 10-Character Set	600	60
Numeric & Alphanumeric Character Sets	1,630	316
Color Convergence (Base or Extended Color)	4,296	1,198
The Following Are Available w/ Configuration Support C Only		
Structured Field & Attribute Processing-(SFAP) (EBCDIC only) (note 12)	4,950	950
Programmed Symbols (PS)	2,700	9,610
Decompression	900	0
Extended Attribute Terminals [add 256 for each terminal] (3268 mdl 2C/3278/3287-#3610/3279 Mdl 2B or 3B)	0	#x256
IBM Personal Computer Support Attachment (3278 - #5315, #5316)	3,200	300
IBM Personal Computer Support Attachment (3278/3279 - #5315, #5316/ #5325, #5326)	3,200	300

TABLE 1 - PART 4

3274 Model 1D	TYPE C	TYPE D
Mdl 1D Base (including copy) (Choose one)		
Configuration Support A (**#9110**)	34,500	17,000
Configuration Support B (**#9111**)	38,372	17,884
Configuration Support C (**#9112**)	39,720	24,900
Category A terminals (Choose one)[2,11]		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]		
Typewriter[1] (3278/3279-#4621 #4624, #4627, #4628, #4640, #4651, 3178 mdl C2)	0	786
(3270 Personal Computer Control Unit Terminal Mode)	0	786
Typewriter[1] (3178 mdl C3)	0	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry KP[1] (3278/3279-#4623)	0	786
Text (3278/3279 - #4629)	0	1,560
APL (3278/3279-#4626, #4652)	0	1,560
Category B terminals (Choose one)[2,3]		
1 to 4 terminals	4,300	3,724
1 to 8 terminals	4,300	4,748
1 to 12 terminals	4,300	5,772
1 to 16 terminals	4,300	6,796
APL/Text Control Function (Choose one)		
Configuration Support A or B	1,700	4,600
Configuration Support C	0	0
Copy (Print Key Function)	2,700	0
3289 Text Print Control	0	512

3274 Control Unit Mdl 1 (cont'd)

Host Loadable Printer Authorization Matrix	550	0
Magnetic Reader Control (3278/3279-#4999) (Choose one)		
3275/3277 Like 10-Character Set	600	60
Numeric & Alphanumeric Character Sets	1,120	316
Color Convergence (Base or Extended Color)	4,296	1,198
The Following Are Available w/ Configuration Support C Only		
Structured Field & Attribute Processing-(SFAP) (See Note 9) (note 12)	4,950	950
Programmed Symbols (PS)	2,700	190
Decompression	900	0
Extended Attribute Terminals [add 256 for each terminal] (3268 mdl 2C/3278/3287-#3610/3279 Mdl 2B or 3B/4250)	0	#x256
IBM Personal Computer Support Attachment (3278 - #5315, #5316)	3,200	300
IBM Personal Computer Support Attachment (3278/3279 - #5315, #5316/ #5325, #5326)	3,200	300

	FACTORS	SIZE	FEATURE CODES
1	Type C + Type D	LT/EQ 65,536	None
2	Type C + Type D and Type C and Type D	GT 65,536 LT/EQ 49,152 LT/EQ 32,768	#1801 and #3622
3	Type C + Type D and Type C and Type D	GT 65,536 LT/EQ 49,152 LT/EQ 49,152	#1801, #3622 and #3627
4	Type C + Type D and Type C and Type D	GT 65,536 LT/EQ 65,536 LT/EQ 32,768	#1801, #3622 and #3625, or #1801 and #3623
5	Type C + Type D and Type C and Type D	GT 65,536 LT/EQ 65,536 LT/EQ 49,152	#1801, #3622, #3625 and #3627; or #1801, #3623, and #3627
6	Type C + Type D and Type C and Type D	GT 65,536 LT/EQ 65,536 GT 49,152	#1801,#3622,#3625 and #3628; or #1801, #3623 and #3628
7	Type C and Type C and Type D	GT 65,536 LT/EQ 71,680 Any	#1801,#3622,#3625 and #3628; or #1801, #3623 and #3628
8	Type C	GT 71,680	Invalid Configuration

TABLE 2

EFS-Type C1 (#3622): [Mdls 1A, 1C, 1D] Provides 16,384 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1801. Limitations:** Cannot be installed with #3623.

EFS-Type C2 (#3623): [Mdls 1A, 1C, 1D] Provides 32,768 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1801. Limitations:** Cannot be installed with #3622.

EFS-Type C3 (#3625): [Mdls 1A, 1C, 1D] Provides 16,384 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. (Field Installation only.) **Prerequisites: #3622. Limitations:** Field Installation only.

EFS-Type D1 (#3627): [Mdls 1A, 1C, 1D] Provides 16,384 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #3622 or #3623.**

EFS-Type D2 (#3628): [Mdls 1A, 1C, 1D] Provides 32,768 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #3622 or #3623.**

NON-COMMUNICATIONS FEATURES

Encrypt/Decrypt (#3680): Provides the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt feature (Feature #6010, Program #5735-RC2) or ACF/TCAM Version 2 (Program Number 5735-RC3) and either the 3848 and the OS/VS1 and OS/VS2 MVS Cryptographic Unit Support Program Product (5740-XY6), or the OS/VS1 and OS/VS2 MVS Programmed Cryptographic Facility Program Product (#5740-XY5), data transmitted over unprotected communications lines can be safeguarded through cryptography. **Limitations:** [1] 3274 mdl 1C (SDLC only). [2] Mutually exclusive with X.25. The crypto feature cannot be used with X.25 operation. **Maximum:** One. **Field Installation:** Yes. **Note:** A mercury battery, P/N **1743456**, or equivalent, is needed. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement or the discharged battery is the customer's responsibility. The discharged IBM battery should be returned to IBM.

Waterproof Power Connector (#8801): [Mdls 1A, 1B, 1D] Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type termination in specific locations. See "Specify" for cable length to be ordered. **Limitations:** The only valid Voltage Specify codes are **#9884 and #9894.** One of these two codes must be specified when ordering this feature. **Maximum:** One. **Field Installation:** Not Recommended.

COMMUNICATION ADAPTERS

Common Communications Adapter Without Business Machine Clock (#6302): [Mdl 1C]. Required for communications at speeds up to 9600 bps (see "Limitations" below when a terminal Adapter(s) Type B (#7802-#7805) is installed). SNA/SDLC and BSC transmission control protocols are supported. Clocking must be provided by the modem or communications facility. **Limitations:** [1] **#6303** must be ordered/installed in lieu of this feature, if SNA/SDLC protocol is required with a line speed greater than 7200 bps and a Category B Terminal Adapter(s) (#7802-#7805) is installed. [2] This feature cannot be ordered/installed with #6303. **Maximum:** One. **Field Installation:** Yes.

High Performance Communications Adapter (#6303): [Mdl 1C]. When SNA/SDLC protocol is required with a line speed of 9600 bps and a Category B Terminal Adapter(s) is installed, or with a line speed greater than 9600 bps or for X.25 support, this feature is required for attachment to the communications lines through either an IBM or a non-IBM modem with its own clocking. **Limitations:** [1] With this feature installed, operation is restricted to SNA/SDLC protocol. IML for BSC protocol is no longer possible. [2] This feature cannot be ordered/ installed with #6302. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS INTERFACES

CCITT V.35 Interface (#1550): [Mdl 1C] Provides a cable and a CCITT interface for attachment to an external modem or other DCE complying with CCITT Recommendation (1976) V.35, ISO Standard 2593, other relevant CCITT Recommendations, and provides clocking of up to 56K bps. Attachment to non-IBM DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3705 at speeds up to 57.6K bps. See "Specify" section for communication cable length. **Limitations:** [1] Cannot be installed with any other communications Interface Feature. [2] BSC is not supported at speeds greater than 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications above 9600 bps or for X.25 operation up to a maximum of 9600 bps.

Note: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

External Modem Interface (#3701): [Mdl 1C] Provides a cable and a RS-232C interface for attachment to an external IBM modem that provides clocking of up to 9600 bps. Attachment to a non-IBM modem or other DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 4331 Processor at speeds up to 9600 bps. See "Specify" for communication cable length. **Limitations:** Cannot be installed with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #6302 or #6303. #6303** is required for X.25 operation.

Digital Data Service (DDS) Adapter (#5650, #5651): [#5650 - For Point-to-Point Operation; #5651 - For Multipoint Operation] [Mdl 1C] An adapter for BSC or SDLC data transmission at speeds of 2400, 4800 or 9600 bps, or SDLC data transmission at 56K bps over the AT&T nonswitched Dataphone® Digital data service network. The DDS Adapter interfaces to a DDS Channel Service Unit, the customer site termination of the DDS network. See "Specify" section for communication cable length. **Specify: #9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps, or **#9833** for 56K bps. To change specify on an installed machine, contact Field Engineering Branch Office. MES number 999999 is to be used for Incident Report (IR) completion data. **Limitations:** Cannot be installed with any other Communications Interface feature. **Maximum:** One #5650 or #5651. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications above 9600 bps. **Note:** [1] After installation of either feature #5650 or #5651, the operational mode can be changed to the other (Point-to-Point to Multipoint or vice versa) by simply re-customizing the System Diskette to select the desired operational mode. [2] Depending on the length and content of the data stream, an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be

3274 Control Unit Mdl 1 (cont'd)

experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

TERMINAL ADAPTERS

Terminal Adapter Type A1, A2, A3 (#6901, #6902, #6903): One each of these adapters can be installed. Each adapter provides for the attachment of an additional eight Category A terminals. It should be noted that two terminal ports are required to attach a Displaywriter System when it includes a printer. The base control unit, which provides for attachment of eight Category A terminals, can be expanded with these three terminal adapters to a maximum configuration of 32 Category A terminals. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type A1 (Terminals 9-16) - #6901
Terminal Adapter Type A2 (Terminals 17-24) - #6902
Terminal Adapter Type A3 (Terminals 25-32) - #6903

Limitations: #6903 is mutually exclusive with #7804 and #7805. **Maximum:** One of each type terminal adapter. **Field Installation:** Yes. **Prerequisites:** #6902 requires **#6901** ... #6903 requires **#6902.** **Note:** To attach Category A terminals via the 3299 , refer to RPQ 8K1156.

Terminal Adapter Type B1 (#7802): Permits the attachment of four Category B terminals and provides for the installation of Terminal Adapter Types B2, B3 and B4 when additional Category B terminals are desired. **Maximum:** One. **Field Installation:** Yes. **Note:** When installed on a 3274 mdl 1A, or on a 3274 mdl 1C/SNA, EFS feature(s) (#3622, #3625, #3627) and Control Storage Expansion (#1801) are required. See "3274 Control Storage Requirements Tables" under EFS features to accurately determine what storage features are required on 3274 mdls 1A, 1C and 1D in specific configurations.

Terminal Adapter Type B2, B3, B4 (#7803, #7804, #7805): Each of these terminal adapters permits the attachment of four additional Category B terminals. A maximum of one each of these terminal adapters can be installed for a combined total of 12 additional or 16 total Category B terminals attached to a control unit. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type B2 (Terminals 5-8) - #7803
Terminal Adapter Type B3 (Terminals 9-12) - #7804
Terminal Adapter Type B4 (Terminals 13-16) - #7805

Limitations: #7804 and #7805 are mutually exclusive with #6903. **Maximum:** One of each type terminal adapter. **Field Installation:** Yes. **Prerequisites:** **#7802.**

CONTROL STORAGE FUNCTIONS

APL/Text Control Function: This function, selectable during the customization of a 3274 mdl 1A, 1C or 1D, expands the character handling capability of the 3274 to accommodate the APL, Text, and graphic plot character sets on 3278s, 3268 mdl 2, 3262s (text only), 3279 , and 3287s attached via Type A Terminal Adapters (#6901, #6902, #6903).

Note: The 3274, with or without this APL/Text control function, does *NOT* support the 3270 Data Analysis/APL Feature (#1066) on attached 3277s or 3284, 3286 or 3287s, *NOR* does it support the Text Print Feature (#7880) on attached 3288s.

3289 Text Print Control Function: This function, selectable during customization of a 3274 mdl 1A, 1C, or 1D, extends the character handling capability of the 3274 to accommodate the text characters for the text print feature (#1130) on attached 3289s.

Copy Function: This function, selectable during the customization of a 3274 mdl 1C (BSC) or 1D, enables the copying of the screen contents of an attached 3278 or 3279 to an attached 3268, 3287 or 3289 through use of the Local Print Key on the display keyboard. This function is provided as basic on the 3274 mdls 1A, 1B and 1C (SNA). The ability to perform host initiated local copies from a 3278 or 3279, to a 3268, 3287 or 3289 attached to a 3274 mdl 1A or 1C (SNA) is also provided as basic. In addition, the 3274 mdl 1C (BSC) supports the 3270 host Copy command as basic.

Local Copy Summary

3274 Mdl	Print Key	Host Initiated
1A	Basic	Basic
1B	Basic	Not Applicable
1C (BSC)	Cust. Option	Basic
1C (SNA)	Basic	Basic
1D	Cust. Option	Not Applicable

Note: The 3274 does not support copying the screen contents of an attached display station to an attached 4250.

Host Loadable Print Authorization Matrix: This function, selectable during the 3274 customization process, provides the capability for the 3274, during subsequent IBM procedures, to receive, from a user-written application program at the host CPU, an updated Printer Authorization Matrix to override the matrix created by the customization operator or by system default.

Between Bracket Printer Sharing Function: This function, selectable during the customization of a 3274 mdl 1A or 1C (SNA), enables attached 3268s, 3287s and 3289s to be used as Local Copy output devices for the screen contents of attached 3278, and 3279s, when the printers are Between Brackets with the host application program. Printers are available for Local Copy operations only when they are not in session with an application program if this option is not selected.

Color Convergence Function: This function, selectable during the customization of any mdl 3274, provides the mechanism through which the operator of a 3279 can perform color convergence for the 3279.

Structured Field and Attribute Processing (SFAP) Function: This function, selectable during the customization of any mdl 3274 except mdl 1B, provides a new 3270 command and several new orders that extend the functional capabilities of appropriately featured 3278, 3279, and 3287 terminals. Data Streams sent to these attached terminals can include extended color, extended highlighting, or Programmed Symbols, in any combination. **Prerequisites:** BSC hosts that utilize this function must transmit in transparent-text mode.

Limitations: This function does *NOT* support ASCII unless RPQ 8K1037 is installed.

Programmed Symbols (PS) Function: This function, selectable during the customization of any mdl 3274 except mdl 1B, enables the customer to define, store, and access up to six, 190-symbol sets on appropriately featured 3278s, 3279s, 3268 mdl 2C and 3287s. **Prerequisites:** SFAP.

Decompression Function: This function, selectable during the customization of any mdl 3274 except mdl 1B, decompresses data streams containing compressed Programmed Symbols generated by the Graphical Data Display Manager (GDDM) program product. Its usage is recommended for all 3274 TP host attachments that use GDDM. **Prerequisites:** SFAP.

Extended Attribute Terminals: This function, selectable during the customization of any mdl 3274 except mdl 1B, establishes an internal control table for each terminal on which Extended Color, Extended Highlighting, and Programmed Symbols, will be used or when a 4250 will be attached. If more extended attribute terminals are attached to the 3274 than are specified during customization, the excess terminals will execute only base-level function. **Prerequisites:** SFAP.

X.25 Support: [Mdl 1C] This function, through the use of Configuration Support P (**#9116**) on a 3274 mdl 1C, provides for attachment to X.25 data transmission services having an interface which complies with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). IBM conformance to this X.25 interface is defined in *IBM General Information Manual - The X.25 Interface for Attaching IBM SNA nodes to Packet - Switched Data Networks,* GA27-3345. Keyboard labels on attached 3178s, 3278s or 3279s keyboards and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. See "X.25 Keyboard Labels" under "Accessories" for details on the labels required for selected keyboards on terminals connected to a 3274 attached to a X.25 communications facility. **Limitations:** #3680 is mutually exclusive with 3274 X.25 capability. The crypto feature cannot be used with X.25 operation. **Prerequisities:** [1] Configuration Support P. [2] SNA/SDLC protocol. [3] Configuration Support P requires 128K of control storage. [4] One of the following Communications Interfaces: **#3701, #5655 or #1550.** **Note:** The maximum line speed supported with any of these Communications Interface features is 9600 bps with X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. [5] **#6303.**

IBM Personal Computer Attachment Support: This function, selectable during the customization of any mdl 3274, except mdls 1B and 21X, provides support for attachment of an IBM Personal Computer to a 3278 or 3279. **Prerequisites:** SFAP.

3274 Entry Assist RPQ: This RPQ provides capabilities which facilitate entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character and word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist RPQ is intended for use with a specific set of host editor programs. See RPQ 8K1147 Description and Price Transmittal for storage requirements and prerequisites.

Alert Function: This function, selectable during the customization of 3274 mdls 1A and 1C/SNA reports problem determination data to the host, for recording and display, when NPDA Version 3 is installed in the host.

MODEL CONVERSIONS

See table below for field installation of model changes.

3274 Control Unit Mdl 1 (cont'd)

From Model	To Model 1A/B/D	1C	21A/B/D	21C	31A/D	31C
1A/B/D	Yes(1)	No	NR	No	Yes	No
1C	No	-	No	NR	No	Yes
21A/B/D	NR	No	Yes(1)	No	Yes	No
21C	No	NR	No	-	No	Yes
31A/D	NR	No	NR	No	Yes	No
31C	No	NR	No	NR	No	-

NR = Field Installation NOT recommended.

Note 1: When making model changes, the applicable Control Storage Requirement Table must be used to determine if sufficient control storage is available. Also, when changing models, refer to FIVE3270 to evaluate expected performance.

Note 2: Customers who have ordered, or plan to order for purchase, IBM 3274 models 1A/B/C/D and anticipate later upgrading to models 31A/C/D should consider purchase of models 21A/B/C/D initially, because field upgrade of models 1A/B/C/D requires replacement of the base storage at an additional cost.

ACCESSORIES

Battery, Mercury: To provide power to sustain the master key of the Encrypt/Decrypt feature **#3680** on the 3274 when normal power is not present. A 4.14 volt mercury battery (**P/N 1743456**). This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

X.25 Keyboard Labels: Stick-on labels are used on the keyboards of 3178s, 3278s and 3279s attached to a 3274 mdl 1C using X.25 communications facilities. These labels are normally provided with Configuration Support P (**#9116**). If new or additional labels are required, they can be obtained by ordering Form Number GX23-0285. Each form number is a sheet containing 16 sets of stick-on labels, enough for 16 keyboards, and the installation procedure for installing the labels.

SUPPLIES (None)

3274 CONTROL UNIT MDLS 21, 31, 51C

PURPOSE

Provides the capability of attaching 3270 Information Display System displays and printers to System/3, S/360, S/370, 4300, 303X, 3081 processors, and the 8100 Information System. Models 21A, 21B, 21D, 31A and 31D are for local channel attachment. Models 21C, 31C and 51C are used for communicating in data half-duplex mode via half-duplex or duplex communications facilities.

For System/3 attachment, each of the control units can communicate via Binary Synchronous Communications (BSC) in data half-duplex mode over half-duplex or full duplex communications facilities with a suitably equipped System/3 model 4, 8, 10, 12, or 15 at speeds up to 9600 bps.

ATTACHABLE TERMINALS

Category A Terminals

3178 mdl C1, C2	Display Station
3178 mdl C3	Display Station
3262 mdl 3 & 13	Line Printer
3268 mdl 2	Impact Matrix Printer
3268 mdl 2C	Color Impact Matrix Printer
3270 Personal Computer Control Unit Terminal Mode (See Note 2)	3270 Personal Computer Distributed Function Mode
3278 mdl 1, 2, 3, 4, & 5 (See Note 1)	Display Station
3279 (except mdl 2C)	Color Display Station
3287 mdl 1, 2 w/#8331	Impact Matrix Printer
3287 mdl 1C, 2C	Color Impact Matrix Printer
3289 mdl 1 & 2	Line Printer
3290 (See Note 2)	Information Panel Display
4250 (See Notes 3 and 4)	APA Printer
5210 mdl G1, G2	Printwheel Printer
6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and L.P. 5608-SR9 (See Note 5)	Displaywriter System

Notes:

1. Mdl 5 cannot be attached to a 3274 mdl 21 or a mdl 51C without Extended Function Store #1800.
2. 3274 Model 31X and 51C.
3. 4250 cannot attach to 3274 mdl 21X, 31C and 51C.
4. Because of the high data volumes possible with this printer, it is strongly recommended that the IBM AID FIVE/3270 be used to predict the effect the 4250 has on subsystem performance.
5. Two terminals ports are required to attach a Displaywriter System when it includes a printer.

Category B Terminals*

3277 mdl 1 & 2	Display Station
3284 mdl 1 & 2	Impact Matrix Printer
3286 mdl 1 & 2	Impact Matrix Printer
3287 mdl 1 & 2 (with 3271/3272 attachment feature)	Impact Matrix Printer
3288 mdl 2	Line Printer
5160 mdl 588 & 568	IBM Personal Computer XT/370
5160 mdl 087	IBM Personal Computer - with XT/370 Option (1503891)

* Category B Terminals cannot be attached to a 3274 mdl 21A, mdl 21C/SNA or a mdl 51C/SNA without Extended Function Store #1800.

Mdl 21s have 64K bytes of control storage and do not support all terminal features. Mdl 31s have 128K bytes of control storage and do support all terminal features, except for limitations on some feature combinations for mdls 31A, 31C/SNA, and 51C (with EFS)/SNA (see Special Considerations table with the Configuration Support Requirements Tables). The mdl 51C has 64K bytes of control storage with a feature for adding 64K bytes to provide for support of all terminal features.

The basic mdl 21s and 31s allow attachment of up to eight Category A terminals. Two types of terminal adapter features are offered to attach additional terminals. The two types can be ordered in various combinations to attach up to a maximum cluster of 32 terminals ... a maximum of 16 of the terminals can be Category B terminals.

Note: The 3274 mdls 21C and 31C are functionally equivalent to the 3274 mdl 1C.

The mdl 51C has 64K bytes for central storage with a feature for adding 64K bytes to provide for support of all terminal features. The basic mdl 51C allows attachment of up to eight Category A terminals. A terminal adapter feature can be used to attach up to four Category B terminals giving a maximum cluster size of 12 terminals.

MODELS

Model 21A A21
Model 31A A31

For local (SNA version) attachment, via a byte multiplexer, selector, or *block multiplexer channel, to a S/370 processor; or a 4300 Processor via a byte multiplexer or multiplexer channel.

Model 21B B21

For local (3272 version) attachment, via a byte multiplexer, selector, or *block multiplexer channel, to a S/370 processor, or S/360 mdls 30, 40, 50, 65, 75, and 195; or a 4300 Processor via a byte multiplexer or multiplexer channel.

Model 21C C21
Model 31C C31
Model 51C C51

For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370 or 4300 processor via 3704, 3705, or 3725 (or via the Communications Adapter feature on the 4321 or 4331), using Synchronous Data Link Control (SDLC/SNA).
- A S/370 or 4300 processor via (where applicable) 2701 , 2703, a 3704, 3705, or 3725, or a Communications Adapter feature on the 4321 or 4331, using BSC.
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701 , 2703, or a 3704 or 3705 using BSC.
- 4331/4361 Processor - The model 51C can also attach to a 4331 via a direct- or data link-attached loop using SDLC.
- 8100 Information System - The model 51C can attach using SDLC via a data link or a direct attached or data link attached loop.

Model 21D D21
Model 31D D31

For Local (3272 version) attachment, via a byte multiplexer, selector or *block multiplexer channel, to a virtual storage S/370 processor, or a 4300 processor via a byte multiplexer or block multiplexer channel.

Prerequisites:

[1] One 3178, 3278 or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0).

[2] A 3274 mdl 21C or 31C requires a Communications Adapter and a Communication Interface for communications. An external Data Circuit-terminating Equipment (DCE) is required with the External Modem Interface (#3701) or the CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655) unless the 3274 model 21C/31C is to be direct connected. The DCE or direct connected unit to which the 3274 mdl 21C or 31C is attached must provide clocking.

For use with System/3, the 3274 requires an Integrated Modem Feature #5500 (51C only) or External Modem Interface #3701, or DDS Adapter (#5650 or #5651) for host communications. An external modem is not required with the External Modem Interface #3701 when attached locally to System/3 via BSCA/EIA Local, BSCC/EIA Local, LCA, or ICA.

[3] The 3274 mdl 51C requires a Communications Adapter and a Communications Interface for host communications. An external DCE may be required with the External Modem Interface (#3701), and the CCITT V.35 Interface (#1550), and the CCITT X.21 Interface (#5655 and #5656).

Customer Setup (CSU): The 3274 mdls 21C, 31C, and 51C are Customer Setup thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274. For additional information on CSU, contact IBM.

STANDARD MODELS

For ease of configuration and simplification in ordering, some predefined configurations for 3274 mdls 21C and 51C have been

* **Note:** Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

3274 Control Unit Mdls 21, 31, 51C (cont'd)

designated Standard Models. These Standard Models are based on commonly ordered configurations and should satisfy a majority of customer requirements. Refer to 3274 Control Unit Standard Model Selection Guide pages for Standard Model descriptions, selection and ordering details.

HIGHLIGHTS

These units can attach up to 32 (12 on the mdl 51C) displays, and/or printers, unless a 6580 Displaywriter System, which includes a printer, is to be attached. A Displaywriter System without a printer requires one terminal port (the same as other terminals), but when a Displaywriter System includes a printer, two terminal ports are required to attach. These terminals are grouped into two categories. The basic unit provides for attachment of up to eight of the Category A terminals. Additional terminals are attached via terminal adapter features. The Category A terminals are a display and printers which were developed for attachment to the 3274s, while the Category B terminals were designed for attachment to the 3271s and 3272s. The 3274s attach the Category B terminals with certain limitations. A maximum of four on the mdl 51C or 16 of the 32 attachable terminals on mdls 21 and 31 can be Category B terminals. During a write operation, a 3277 attached to a 3274 via a Type B Terminal Adapter will blink more frequently than when attached to a 3271 or 3272. Category A terminals can be located up to a maximum of 1,500 meters (4,920 feet) while Category B terminals can only be driven a maximum of 610 meters (2,000 feet). Both categories of terminals attach to their respective Terminal Adapter by the same type coaxial cable and connectors which are used between a 3271 or 3272 and its display or printer terminals.

The 3274 can communicate with a S/360, S/370 or 4300 Processor by local channel attach or remotely via communications facilities. The channel attached Control Units are the mdls 21A and 31A for SNA operation with extended data stream handling capabilities, mdl 21B for 3272-like operation, and mdls 21D and 31D for 3272-like operation with extended data stream handling capabilities. The mdls 21C and 31C can operate with extended data stream handling capabilities using either BSC or SNA/SDLC.

The mdl 51C can also attach via a Data Link to the 8100 Information System or to the 8100 or 4331/4361 via a Direct or Data Link attached Loop.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through Configuration Support options, via Feature and System Diskettes.

One Feature Diskette and two System Diskettes are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 21C, 31C, or 51C. As part of the installation procedure, a customized System Diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 21C, 31C, or 51C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML pushbutton. The load occurs from an integrated diskette drive using the previously customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Either EBCDIC or ASCII can be selected during 3274 mdl 21C, 31C, or 51C customization. ASCII support is provided to correspond with transmission code that is used by System/3. Both ASCII transmission codes and ASCII data codes are supported in BSC. Only ASCII alphameric data bytes of Function Management Request/Response Units are supported in SNA/SDLC. SCS, APL/Text, and the 3270 data stream extensions included in the Structured Field and Attribute Processing (SFAP) customization option are not supported in either BSC or SNA/SDLC when ASCII is used.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the *IBM 3270 Information Display System, IBM 3274 Control Unit Planning, Setup and Customizing Guide,* GA27-2827.

COMMUNICATIONS

The 3274 mdls 21C, 31C, and 51C communicate by BSC in data half-duplex mode with a System/3 over duplex or half-duplex communications facilities as follows:

System/3 mdl 4 via BSCA
System/3 mdl 8 via ICA or BSCA
System/3 mdl 10 via BSCA or LCA
System/3 mdl 12 via ICA or BSCA
System/3 mdl 15 via BSCA or LCA
System/3 mdl 15D via BSCA, BSCC, or LCA

Communications Facilities (System/3): The 3274 mdls 21C, 31C, and 51C operate over data half-duplex mode on point-to-point or multipoint half-duplex or duplex nonswitched facilities at transmission speeds of 1200 (51C only), 2000, 2400, 4800, 7200, and 9600 bps. See M2700 pages for facilities.

The 3274 mdls 21C, 31C, or 51C communicates with a S/370 or 4300 Processor using SDLC over duplex or half-duplex communications facilities to a 3704, 3705, or 3725 or via the Communications Adapter on the 4321 or 4331 (SNA/SDLC), or by BSC to a S/360, S/370 or 4300 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704, 3705, 3725 (see note 1), or the Communications Adapter on a 4321 or 4331. Communications with a 4331 Processor is also provided via a direct or data link attached loop for the mdl 51C.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (#4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138.

The mdl 51C communicates with the 8100 Information System, using SDLC, via a data link, a direct or data link attached loop, or direct connection.

SDLC as used in the 3274-21C or 31C conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see General Information Manual GA27-3093, *IBM Synchronous Data Link Control.*

A 3274 mdl 31C or 51C can be used with X.25 communications facilities by using Configuration Support P (**#9116**), or by customization with Configuration Support D (**#9124**) (release level 62 or higher). Appropriate hardware features must be installed to support the Configuration Support option being used. See "X.25 Support" under "Control Storage Functions" and the Configuration Support P and D descriptions for details.

Note 1: The 3725 is not connectable to a S/360.

Performance: For many 3274 mdl 21C, 31C and 51C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream dependent. Refer to IBM Aids for performance evaluation information.

Communications Facilities: The 3274 mdl 21C, 31C, or 51C operate in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities, using SDLC or BSC, at transmission speeds of 1200/600 (mdl 51C only), 2000, 2400/1200, 4800/2400, 7200/3600 and 9600/4800 bps on nonswitched facilities. In addition, the 3274 mdl 51C operates in half-duplex point-to-point mode using SDLC at transmission speeds of 1200/600, 2400/1200 4800/2400, and 9600/4800 bps on switched facilities. See M2700 pages for facilities .

The 3274 mdl 51C also operates in half-duplex mode at 9600 or 38.4K bps over a direct attached loop, and at 2400, 4800, or 9600 bps over a data link attached loop.

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, or to the Local Attachment Interface #4801 on the 4331 or to an 8130/8140 Processor can be via direct connection without the need for communications facilities or modems. All communications at speeds greater than 9600 bps must use SDLC. See M3705, 4331, 8101, 8130 and 8140 pages for details.

Modems: Unless the 3274 mdls 21C, 31C, or 51C will be direct connected, an external Data Circuit-terminating Equipment (DCE) is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655 or #5656) is installed.

For use with the System/3, unless a Digital Data Service (DDS) Adapter #5650 or #5651 is installed, a 1200 bps integrated modem feature #5500 [51C only] or an external modem must be attached to the 3274 mdl 21C, 31C, or 51C. External modems require the External Modem Interface #3701. No external modem is required when attached locally to System/3 through BSCA/EIA Local, BSCC/EIA Local, LCA or ICA; however, External Modem Interface #3701 is required.

Modem	Speed (bps)
3863 mdl 1/2	2400/1200
3864 mdl 1/2	4800/2400
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

3274 Control Unit Mdls 21, 31, 51C (cont'd)

Switched network backup (SNBU) operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. Four-wire SNBU operation with Manual Call and Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, and 3865 mdls 1 and 2. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

Direct Connection Attachment: In addition to host attachment via modems or other DCE, attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for the 3274. Only the basic features needed by the 3274 direct connect hosts are listed. These features may have prerequisites, therefore the machine pages for those hosts should also be reviewed. Physical planning manuals for the respective direct connect hosts can provide additional information on the connecting cables.

MODELS 21C and 31C

Unit Atch	Speeds(bps)	Host Feature Number	BSC	SDLC	Max Cable Length	3274 Feature Number
3705-1, 2, 80						
	14.4K,57.6K	4727(1W)	-	x	57m(190')	1550,6303
	14.4K,57.6K	4728(1Z)	-	x	57m(190')	1550,6303
3705-80						
	14.4K,57.6K	6715(LS5)	-	x	60m(200')	1550,6303
4331 Mdl Grp 1 and 2						
	2400	4801	x	x	400m(1312')	3701,6302
	4800	4801	x	x	200m(656')	3701,6302
	9600	4801	x	x	100m(328')	3701,6302 or 6303

MODEL 51C

Unit Atch	Speeds(bsp)	Host Feature Number	BSC	SDLC	Max Cable Length	3274 Feature Number
3704						
	1200	4716(1F)	x	x	30m(100')	3701,6301
3705-1, 2, 80						
	1200	4716(1F)	x	x	30m(100')	3701,6301
	14.4K,57.6K	4727(1W)	-	x	57m(190')	1550,6303
	14.4K,57.6K	4728(1Z)	-	x	57m(190')	1550,6303
3705-80						
	14.4K,57.6K	6715(LS5)	-	x	60m(200')	1550,6303
4331 Mdl Grp 1 and 2						
	1200	4801	x	x	800m(2625')	3701,6302
	2400	4801	x	x	400m(1312')	3701,6302
	4800	4801	x	x	200m(656')	3701,6302
	9600	4801	x	x	100m(328')	3701,6302 or 6303
8101/8130/8140						
	1200,2400	3701(FAC 15)	-	x	12m(40')	3701,6302
	4800,9600	3701(FAC 16)	-	x	12m(40')	3701,6302
	1200,2400	1550(FAC 24)	-	x	300m(1000')	1550,6302
	4800,9600	1550(FAC 25)	-	x	300m(1000')	1550,6302
8101/8140BXX						
	56K	1550(FAC 26)	-	x	300m(1000')	1550,6303
8140 CXX						
	4800	1621	-	x	13m(40')	3701,6302
	56K	1614	-	x	300m(1000')	1550,6303

Communications Adapters: [Mdls 21C, 31C, 51C] Communications adapters handle the transmission control protocols (SDLC and BSC). One, and only one can be selected, but one is required on each 21C, 31C or 51C.

Communications Interfaces: [Mdls 21C, 31C and 51C] Communications interfaces connect a mdl 21C, 31C or 51C to the host link. One and only one, can be selected, but one is required.

Problem Determination Procedure: Significant function has been designed into these units to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

The Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/ isolation and enhances the availability and serviceability of the 3274 for the above environments in both BSC and SDLC attachment modes. See NPDA in the Program Products Section of the Sales Manual.

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation, enhances the availability and serviceability of the 3274 in BSC mode. See DEMF in the SCP sections for OS/VS1 and OS/VS2.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Receipt at the customer's receiving dock, unpacking, and placement of the 3274.
- Contacting IBM Field Engineering to accomplish the channel connection tasks for the 3274 mdls 21A, 21B, 21D, 31A or 31D.
- Connection of communication cable to the communications facility for the 3274 mdl 21C or 31C or 51C.
- Procurement, installation, and maintenance of the loop network when applicable on a 3274 mdl 51C.
- Performing 3274 customization in accordance with IBM-supplied procedures:
  a. For initial installation.
  b. When made necessary by changes in configuration.
  c. For updating of the control unit diskettes (at customer option).

Bibliography: See *KWIC Index,* G320-1621, or applicable system bibliography:

GC20-0360	S/360
GC20-0001	S/370
GC20-0001	4300
GC20-8100	8100

Note: Use the HONE configurator (CF3270) to assist in configuring the 3274 before entering an order .

BASIC CONFIGURATION

Specify codes are not normally required to order a 3274. If codes are not specified otherwise, the machines are shipped as follows:

- Voltage: [Mdls 21A, 21B, 21D, 31A, 31D] 208V AC, 1-phase, 3-wire, 60 Hz, non-locking plug.
- Voltage: [Mdls 21C, 31C, 51C] 120V AC, 1-phase, 3-wire, 60 Hz, non-locking plug.
- Power Cable Length: 4.3 meters (14 feet).
- Communications Cable Length: [Mdls 21C, 31C, 51C] 6.1 meters (20 feet).

CONFIGURATION SUPPORT

- Configuration Support A -**#9110**

SPECIFY

The Specify section can be ignored unless the options provided in the "Basic Configuration" above do not meet your needs.

- Voltage: (AC, 1-phase, 3-wire, 60 Hz)

MDLS	Locking Plug 120V	Locking Plug 208V	Locking Plug 240V	Non-Locking Plug 120V	Non-Locking Plug 208V	Non-Locking Plug 240V
21A, B, D 31A, D +	NA	#9884	#9894	NA	D	#9895
21C, 31C	#9890	#9884	#9894	D	#9885	#9895
51C	#9890	NA	NA	D	NA	NA

D -- Default Option
NA -- Not Available
+ -- For Waterproof Connector, see "Special Features"

- Power Cable Length: If standard 4.3 meter (14 feet) power cable is not desired, specify **#9511** for 1.8 meter (6 feet).

3274 Control Unit Mdls 21, 31, 51C (cont'd)

- Communication Cable: A 6.1 meter (20 foot) communication cable is provided as standard with each Communications Interface feature except the Loop Adapter #4850. If the standard 6.1 meter (20 foot) communication cable is not desired, specify one of the following: **#9061** for 3.0 meter (10 feet), **#9062** for 9.1 meter (30 feet) or **#9063** for 12.2 meter (40 feet) cable.

  A 1.8 meter (6 foot) communication cable (Loop Station Connector (LSC) cable) is provided as standard for mdl 51C attachment to a direct attached or data link attached loop. If standard cable is not desired, specify **#9405** for 4.3 meter (14 feet) cable.

- Configuration Support: The Configuration support required for the 3274 must be determined before ordering special features or attaching certain terminals. Refer to the 3274 Control Storage Requirements Tables for a detailed listing of the functions supported by each option. **Field Installation:** Yes. **Customer Setup:** Yes. **Limitations:** Certain functions require host software support in order to be utilized. Refer to host programming support descriptions to determine the levels of software required.
  Note: When operating a large screen (screen size greater than 1,920 characters) display station that is connected to a 3274 mdl 21B, 21C, 31C 21D, 31D or 51C in a VM/370 environment, an RPQ is recommended to change the function of the display keyboard Clear key so that it will not place the display in default mode. See RPQ 8K0976, 8K0977, or 8K0978.

- Configuration Support A (**#9110**): This Configuration Support is the default option and is shipped with all 3274s unlessDiskette Distribution Alternative RPQ (8K1072), Configuration Support C (**#9112**), D (**#9124**) or Configuration Support P (**#9116**) is specified. It need not be specified unless it is being ordered to replace Configuration Support B (no longer available), C or D (**#9111, #9112 or #9124** respectively) in the field. It provides support for all 3270 functions listed in Table 1, plus support for solicitation of summary maintenance statistics from a 3274 mdl 21A, 31A, 21C/SNA, 31C/SNA, 51C/SNA through the use of Network Problem Determination Application (NPDA), and support for base color on attached terminals. It also supports the X.21 Adapter for Non-switched Networks and 3270 Personal Computer (Control Unit Terminal Mode) .

- Configuration Support B (**#9111**): [Mdls 21A, 21C, 31A, 31C, 31D, 51C] Provides support for all 3270 functions included in Configuration Support A (#9110) plus the ability to attach 3278 mdl 5s, and support for the following functions:

  – Pacing of inbound message traffic (mdls 21A, 21C/SNA, 31A, 31C/SNA and 51C/SNA).

  – Automatic Session recovery in both single and multidomain networks (mdl 21C/SNA, 31C, and 51C/SNA).

  – Host notification of changes in the power on/off status at attached terminals (mdls 21A, 21C/SNA, 31A, 31C, and 51C/SNA).

- Configuration Support C (**#9112**): [Mdls 31A, 31C, 31D, 51C] Provides support for all 3270 functions included in Configuration Support A, plus support for the following additional functions:

  – Ability to attach 3278 mdl 5s.

  – Pacing of inbound message traffic (mdls 31A, 31C/SNA, and 51C/SNA).

  – Host notification of changes in the power on/off status at attached terminals (mdls 21A, 21C/SNA, 31A, 31C/SNA, and 51C/SNA).

  – Structured Field and Attribute Processing (SFAP).[3]

  – Programmed Symbols (PS) on attached terminals.[3]

  – Extended Color on attached terminals. [3]

  – Extended Highlighting on attached terminals. [3]

  – Decompression of PS Load Data. [3]

  – BSC Text Blocking.

  – BSC Transparency.

  – Integrated Modems.

  – X.21 Switched Network Operation (SNA/SDLC mdl 51C only).

  – 3274 Entry Assist RPQ

  – 4250 Attachment

  – Alert Function (mdls 31A, 31C/SNA, 51C/SNA)

  – Response Time Monitor (mdls 31A, 31C, 31D, 51C)

  – System/3 support for 1200 bps Integrated Modem #5500 (mdl 51C only)

  Notes: (1) The APL/Text Control Function, which is a separate option in Configuration Support A, is included as a basic function of Configuration Support C.

  (2) Configuration Support C, unlike Configuration Support A or B, generates a program check (X PROG 470) whenever an EBCDIC data stream contains a device control code(s) that the 3274 does not support. To prevent the program check, users must purge the unsupported code(s) from the data stream.

  (3) The extended data stream functions (extended color, extended highlighting, and Programmed Symbols) that require the SFAP option in Configuration Support C will *NOT* operate with ASCII unless RPQ 8K1037 is installed.

  Alternately, order RPQ 8K0980.

  Prerequisites: [Mdl 51C] **#3631 or #3632** or **#1800** Specify: **#9112** for Configuration Support C.

- Configuration Support D (**#9124**): [Mdls 31A, 31C, 31D, 51C] Provides support for all 3270 functions included in Configuration Support C plus support for 3290s, attachment to X.25 data transmission services, and for 3274 Entry Assist on 3178/3278/3279s. **Limitations:** 1) When 3290s are attached, specify **#9301** is required to get two 3290 microcode load diskettes that must be used with Configuration Support D to enable the downstream load of a 3290 with its operational microcode. A Utility Diskette is provided to customize keyboard and keypad layouts. 2) Configuration Support D will support either Category B Terminals or 3290 or 3270 Personal Computer (Distributed Function Mode) , but not both together. 3) The extended data stream functions (extended color, extended highlighting, and Programmed Symbols) that require the SFAP option will *NOT* operate with ASCII unless RPQ 8K1160 is installed. **Prerequisites: #3650.** For X.25 support, 256K of control storage is required (Two **#3650** are required). **Specify: #9124** for Configuration Support D.

- Configuration Support P (**#9116**): [Mdls 31C, 51C] This Configuration Support provides functions equivalent to Configuration Support A, but is for X.25 operation only. **Prerequisites:** [1] **#6303.** [2] Mdl 51C (128K of control storage) , **#1800**, or **#1802** and **#3632** , or **#1802**, **#3630**, and **#3631.**

- Configuration Support T (**#9113**) : [Mdls 31A, 31C, 31D, 51C] Provides support for the 3290 or 3270 Personal Computer (Distributed Function Mode) in addition to the other 3270 functions and terminals except:

  Category B Terminals
  3279 "Extended Color" Models
  Structured Field and Attribute Processing
  Programmed Symbols
  Loop Adapter
  X.21 Adapter
  Encrypt/Decrypt
  Entry Assist
  4250 Attachment
  Alert Function
  Response Time Monitor
  X.25

  Two 3290 microcode load diskettes are automatically included with Configuration Support T (only one systems diskette is included with Configuration Support T). A Utility Diskette is provided to customize keyboard and keypad layouts. This Configuration Support option was developed for initial implementation of the 3290 or 3270 Personal Computer (Distributed Function Mode) on existing 3274s. Based on the intended use and inherent limitations, IBM has no intent to enhance Configuration Support T. For long-term use, use Configuration Support D. **Prerequisites:** [Mdl 51C] **#3631** or **#3632** or **#1800. Limitations:** Because Configuration Support T was developed as the configuration support for use in the initial implementation of the 3290 or 3270 Personal Computer (Distributed Function Mode) , it does not restrict having one of the other Configuration Support A, B, or C options although they cannot be used concurrently. **Specify:** For Configuration Support T, specify **#9113.**

- 3290 Information Panel Display Support (**#9301**) : [Mdls 31A, 31C, 31D, 51C] When 3290s are attached and Configuration Support D is to be used, **#9301** must be specified to get a 3290 microcode load diskette which must be used with Configuration Support D to enable the downstream loading of 3290 Information Panel Displays with operational microcode. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites: #9124.**

---

* This "Specify" feature is available for field installation until December 3, 1982, after which it will no longer be available.

3274 Control Unit Mdls 21, 31, 51C (cont'd)

CONTROL STORAGE REQUIREMENT TABLES [Mdls 21A, 21C, 21D, 51C]

After the desired "Special Features" have been selected, the control storage requirement must be determined by using the appropriate table below. Some combinations of functions and features may exceed the capacity of the control storage in the mdls 21A, 21C, 21D, and 51C w/o EFS. If the sum of the storage requirements is greater than 65,536, a mdl 31 or 51C with EFS Control Unit is required.

Step #1: Refer to the appropriate part of Table 1 and select the features desired:

3274 mdl 21A, refer to Table 1, Part 1
3274 mdl 21C/or 51C w/o EFS SNA, refer to Table 1, Part 2
3274 mdl 21C/or 51C w/o EFS BSC, refer to Table 1, Part 3
3274 mdl 21D, refer to Table 1, Part 4

Step #2: Determine the total storage requirements for the features selected in Step #1.

Step #3: If the total storage requirement calculated in Step #2 is equal to or less than 65,536, the mdl 21 or 51C w/o EFS can be used. However, if step #2 storage requirement is greater than 65,536, the mdl 21 Control Unit or mdl 51C w/o EFS cannot be used and a mdl 31 Control Unit or mdl 51C with EFS is required.

Notes For Table 1 - Parts 1, 2, 3 and 4

[1] Configuration Support A Consideration Only: If all three keyboard types (Typewriter, Data Entry, and Date Entry/Keypunch-like) are required on display stations attached to the 3274, add 1,000 to the storage requirements in addition to those listed in the table.

[2] There is no customizing option nor additional control storage required to support 10 Numeric-only Character Set for Operator Identification Card Reader (#4600) on 3277s (Category B terminals) which are attached to a 3274.

[3] If the total storage requirement calculated for Category A plus Category B Terminals exceeds the applicable maximum storage value below, use the applicable maximum storage:

Unit	Maximum Storage Value
3274 mdl 21C/BSC	11,544
3274 mdl 21D	13,144

[4] Add the indicated amount for each keyboard type to be used.

[5] A 6580 requires two terminal ports when it includes a printer.

TABLE 1 - PART 1

3274 MODEL 21A	Storage Requirements
Mdl 21A (including copy) Configuration Support A (#9110)	54,800
Category A terminals (Choose one)[5]	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]	
Typewriter[1] (3278/3279-#4621,#4627, 3178 mdl C2)	786
Typewriter[1] (3178 mdl C3)	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP[1] (3278/3279-#4623)	786
Text (3278/3279-#4629)	1,560
APL (3278/3279-#4626)	1,560
APL/Text Control Function	2,900
3289 Text Print Control	512
Host Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	900
SCS Printer Support (3287-#9660) (3230, 3268, 3289 and 3262-basic function) (5210 mdl G1, G2-basic function)	1700
Magnetic Reader Control (3278/3279-#4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric and Alphanumeric Character Sets	1,946
3279 Color Convergence	5,494

TABLE 1 - PART 2

3274 Model 21C/SNA or 51C/SNA	Storage Requirements
Mdl 21C/SNA or 51C/SNA (including copy) Configuration Support A (#9110)	54,730
ASCII	816
Category A Terminals (Choose one) (mdl 21C only)[5]	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards for Category A terminals (select all that apply, choosing at least one)[4]	
Typewriter[1] (3278/3279-#4621, #4624, #4627, #4628, 3178 mdl C2)	786
(3270 Personal Computer Control Unit Terminal Mode)	786
Typewriter[1] (3178 mdl C3)	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP[1] (3278/3279-#4623)	786
Text (3278/3279-#4629)	1,560
APL (3278/3279-#4626)	1,560
APL/Text Control Function	2,900
3289 Text Print Control	512
High Performance Communications Adapter (#6303)	100
Host Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	900
SCS Printer Support (3287-#9660) (3262 3268, and 3289-basic feature) (5210 G1, G2-basic function)	1700
Magnetic Reader Control (3278/3279-#4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric and Alphanumeric Character Sets	1,946
Encrypt/Decrypt (#3680)	5,200
3279 Color Convergence	5,494

TABLE 1 - PART 3

3274 Model 21C/BSC or 51C/BSC	Storage Requirements
Configuration Support A (#9110)	51,800
ASCII	700
Category A Terminals (Choose one)[3] (mdl 21C only)[5]	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]	
Typewriter[1] (3278/3279-#4621, #4624, #4627, #4628, 3178 mdl C2)	786
(3270 Personal Computer Control Unit Terminal Mode)	786
Typewriter[1] (3178 mdl C3)	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP[1] (3278/3279-#4623)	786
Text (3278/3279-#4629)	1,560
APL (3278/3279-#4626)	1,560
Category B terminals (Choose one)[2,3]	
1 to 4 terminals	6,424
1 to 8 terminals (mdl 21C)	7,448
1 to 12 terminals (mdl 21C)	8,472
1 to 16 terminals (mdl 21C)	9,496
APL/Text Control Function	6,900
3289 Text Print Control	512
Host Loadable Printer Authorization Matrix	550
Copy (Print Key Function)	2,700
Magnetic Reader Control (3278/3279-#4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric & Alphanumeric Character Sets (mdl 21C)	1,436
Numeric & Alphanumeric Character Sets (mdl 51C)	1,946
3279 Color Convergence	5,494

3274 Control Unit Mdls 21, 31, 51C (cont'd)

TABLE 1 - PART 4

3274 Model 21D	Storage Requirements
Mdl 21D	
Configuration Support A (#9110)	51,500
Category A terminals (Choose one)[3,5]	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)[4]	
Typewriter[1] (3278/3279-#4621,#4627, 3178 mdl C2)	786
(3270 Personal Computer Control Unit Terminal Mode)	786
Typewriter[1] (3178 mdl C3)	786
Data Entry[1] (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP[1] (3278/3279-#4623)	786
Text (3278/3279-#4629)	1,560
APL (3278/3279-#4626)	1,560
Category B terminals (Choose one)[2,3]	
1 to 4 terminals	8,024
1 to 8 terminals	9,048
1 to 12 terminals	10,072
1 to 16 terminals	11,096
APL/Text Control Function	6,300
Copy (Print Key Function)	2,700
3289 Text Print Control	512
Host Loadable Printer Authorization Matrix	550
Magnetic Reader Control (3278/3279-#4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric and Alphanumeric Character Sets	1,436
3279 Color Convergence	5,494

Special Consideration - Mdl 31A, 31C, 51C/EFS: When using Configuration Support C (**#9112**) on a mdl 31A, 31C or a 51C with EFS, it is necessary to ensure that the desired combination of features and functions forms a valid configuration.

Notes For Table 2 - Parts 1, 2, 3

[1] Refer to the appropriate table of control storage requirements, and select the desired features and functions

a. For 3274 mdl 31A, use Table 2, Part 1

b. For 3274 mdl 31C or 51C with EFS using SNA protocol, use Table 2, Part 2.

c. For 3274 mdl 31C or 51C with EFS using BSC protocol, use Table 2, Part 3.

[2] Determine the total storage requirements for the features and functions selected in step 1.

[3] If the total storage requirement exceeds 71,680, one or more features must be forfeited in order to reduce the control storage requirements to 71,680 or less.

[4] SCS printer support is required for DCA-LV2 word processing applications. This support also required for 5210 mdls G01, G02 attached to 3274 mdls 1A and 1C SNA for applications that utilize the cut sheet feed attachment feature #7860, when operating with 2 drawers.

[5] Configuration Support C #9112 is required for 5210 mdls G01, G02 attached to 3274 mdls 1A and 1C SNA for support of word processing applications. This includes those applications which utilize the cut sheet feed attachment feature #7860, when operating with 2 drawers.

TABLE 2 - PART 1

3274 Model 31A	Storage Requirement
Configuration Support C	50,030
Category B Terminals	4,900
Host Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	800
SCS Printer Support (*)	
(3287 - #9660/#9661) (**)	
(3262 and 3268 - basic function)(***)	
(3289 - basic function)	
(5210 mdl G1, G2 basic function - #4, #5)	1,600
(4250 - basic function) (****)	
Mag Rdr Control (3278/3279 - #4999), choose one:	
3275/3277 like 10 Character Set	600
Numeric/Alphameric Character Sets	1,630
Color Convergence (base or extended color)	4,296
Structured Field & Attribute Processing	
SFAP (Required for Extended Color, Extended Highlighting, and Programmed Symbols	4,950
Programmed Symbols (PS)	2,700
Decompression of PS Load Data	900
Alert Function	2,544
Response Time Monitor	4,488
IBM Personal Computer Attachment Support (3278/3279 - #5315, #5316/ #5325, #5326)	3,200

* SCS Printer support required for 4250 attachment.

** The SFAP function is also required when the SCS Support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.

*** The SFAP function is also required when the Query function is used with 3262 mdls 3 and 13, and 3268 mdl 2s. The Query function allows the application to interrogate the printer to determine what function is supported.

**** For 4250 attachment to 3274 mdl 31A, the SFAP function is also required.

TABLE 2 - PART 2

3274 Model 31C/SNA 3274 Model 51C/EFS/SNA	Storage Requirement
Configuration Support C	50,580
Category B Terminals	4,900
Host Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	800
SCS Printer Support (*)	
(3287 - #9660/#9661) (*)	
(3289 and 3262 - basic function)	1,600
(5210 mdl G1, G2 basic function - #4, #5)	1,600
Mag Rdr Control (3278/3279 - #4999), choose one:	
3275/3277 like 10-Character Sets	600
Numeric and Alphameric Character Sets	1,630
Encrypt/Decrypt (#3680)	3,200
Color Convergence (base or extended color)	4,296
Structured Field & Attribute Processing (**)	
SFAP (EBCDIC only) (Required for Extended Color, Extended Highlighting, and Programmed Symbols)	4,950
Programmed Symbols (PS)	2,700
Decompression of PS Load Data	900
Alert Function	2,544
Response Time Monitor	4,488
High Performance Communications Adapter (#6303)	600
IBM Personal Computer Attachment Support (3278/3279 - #5315, #5316/ #5325, #5326)	3,200
X.21 Switched Network Operation (Mdl 51C)	6,500
Loop Attachment (EBCDIC only, mdl 51C)	3,200

* The SFAP function is also required when the SCS support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.

** Limitations: This function does *NOT* support ASCII unless RPQ 8K1037 is installed.

TABLE 2 - PART 3

3274 Model 31C/BSC 3274 Model 51C/EFS/BSC	Storage Requirement
Configuration Support C	47,150
Category B terminals	4,700
Host Loadable Printer Authorization Matrix	550
Copy (Print Key Function)	2,700

3274 Control Unit Mdls 21, 31, 51C (cont'd)

Magnetic Reader Control (3278-#4999) (Choose one)	
3275/3277-like 10-character set	600
Numeric & Alphanumeric character set	1,630
Color Convergence (Base or Extended Color)	4,296
Structured Field & Attribute Processing-(SFAP)(EBCDIC only)	4,950
Programmed Symbols (PS)	2,700
Decompression	900
Response Time Monitor	2,016
IBM Personal Computer Attachment Support (3278/3279-#5315, #5316/ #5325, #5326)	3,200
Any Canadian French Keyboard	500

- Alternate Mailing Address (**#9011**): For diskette only updates. Order this optional feature to specify that diskette only updates are to be mailed to an alternate site address supplied by Field Engineering using a Microcode Control Number (MCN) rather than to the address of the 3274 installation site. The alternate address selected is usually that of a central site location. Redistribution of the diskettes containing the diskette update is the responsibility of the customer. The user may decide to replace the existing diskette himself with the diskette containing the updates or, if requested, the IBM Field Engineer will replace the diskette. The purpose of this feature is to assist the customer with his network management. **Field Installation**: Yes.

  Note: The IBM CE enters the MCN by signing onto application 7 of IMS. The operator is prompted through options concerning the MCN diskette, and mailing address.

- An alternative to feature #9011 is RPQ 8K1071 and RPQ 8K1072. The purpose of these RPQ's is to assist the customer with network management by providing new procedures for altering, rapid copying, and means for sending customized 3274 System Diskettes between a customer's central site location and his remote locations. For a full description of these RPQ's, refer to the RPQ Description and Price Transmittal.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Integrated Diskette Drive Enhancement (#3101): [Mdls 31A, 31C, 31D] Installs the enhanced file that is required to use Configuration Support D. **Field Installation**: Yes. Field Installation only. All parts removed from purchased machines remain customer property.

Encrypt/Decrypt (#3680): [Mdls 21C, 31C, 51C (SDLC)] Provides the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt feature (Feature #6010, Program #5735-RC2) or ACF/TCAM, Version 2 (Program #5735-RC3) and either the 3848 and the OS/VS1 and OS/VS2 MVS Cryptographic Unit Support Program Product (5740-XY6), or, the OS/VS1 and OS/VS2 MVS Programmed Cryptogranic Facility Program Product (#5740-XY5), data transmitted over unprotected communications lines can be safeguarded through cryptography. **Limitations**: [1] SNA/SDLC only. [2] Cannot be installed with #4850 on mdl 51C. [3] Encrypted data streams cannot be sent to a 3290 or 3270 Personal Computer (Distributed Function Mode) . [4] Mutually exclusive with X.25. The crypto feature cannot be used with X.25 operation. **Maximum**: One. **Field Installation**: Yes. **Note**: A mercury battery, P/N **1743456**, or equivalent, is needed. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of a discharged battery is the customer's responsibility. The discharged IBM battery should be returned to IBM.

Integrated Diskette Drive Enhancement (#5101): [Mdl 51C] Installs the enhanced file that is required to use Configuration Support D. **Field Installation**: Yes. Field Installation only. All parts removed from purchased machines remain customer property.

Power Expansion (#5550): [Mdl 51C] Provides the additional power required for #7801 or the 2400, 4800 and 9600 bps Integrated Modem features (#5640, #5740, #5840, #5842). **Maximum**: One. **Field Installation**: Yes.

Response Time Monitor (#6101): [Mdls 31A, 31C, 31D, 51C] Provides the capability for enhanced network management by measuring response times. The Response Time Monitor feature accurately measures and records the transaction time between an inbound host attention (AID) and a user-defined transaction end. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: Configuration Support C #9112 release level 47 and above or Configuration Support D #9124 release level 61 and above.

Waterproof Power Connector (#8801): [Mdls 21A, 21B, 21D, 31A, 31D] Provides a special waterproof connector instead of the normal locking or non-locking plugs on the power cable. This connector is sometimes required to satisfy local ordinances which require this type of termination in specific locations within an installation. See *IBM information Display System Installation - Physical Planning,* (GA27-2787) for the mating receptacle which the customer must have installed. **Note**: This connector is provided for 208V unless 240V feature code #9894 is also specified.

COMMUNICATIONS ADAPTERS

Common Communications Adapter Without Business Machine Clock (#6302): [Mdls 21C, 31C, 51C] Required for communications at speeds up to 9600 bps (see "Limitation" below when a terminal Adapter(s) Type B (#7802-#7805) is installed). SNA/SDLC and BSC transmission control protocols are supported. Clocking must be provided by the modem or communications facility. **Limitations**: [1] **#6303** must be ordered/installed in lieu of this feature, if SNA/SDLC protocol is required with a line speed greater than 7200 bps and a Category B Terminal Adapter(s) (#7802-7805) is installed. [2] This feature cannot be ordered/installed with #6303 or CCA w/BMC (#6301). **Maximum**: One. **Field Installation**: Yes.

High Performance Communications Adapter Without Business Machine Clock (#6303): [Mdls 21C, 31C, 51C] Required for attachment to communications lines at 9600 bps (SNA/SDLC transmission control protocol) when a #7801 (mdl 31C, or 51C with EFS only) is installed, and communication is through either an IBM or non-IBM external modem that provides its own clocking, or other communication facility that provides clocking. It is also required for all attachments with speeds greater than 9600 bps, for 51C attachment to the loops of the 8100 System at speeds up to 38.4K bps, for attachment to X.21 Switched Network, or for attachment to X.25 data transmission services. **Limitations**: [1] With this feature installed, operation is restricted to SNA/SDLC protocol. IML for BSC protocol is no longer possible. [2] This feature cannot be ordered/ installed with #6301 or #6302. [3] When EMI (#3701) is installed, speed is limited to 9600 bps maximum. **Maximum**: One. **Field Installation**: Yes. **Specify**: If to be used for X.25 operation, specify **#9615**. (This specify provides the special X.25 keyboard labels used on 3178s, 3278s or 3279s for X.25).

COMMUNICATIONS INTERFACES

CCITT V.35 Interface (#1550): [Mdls 21C, 31C, 51C] Provides a cable and a CCITT interface for attachment to an external modem or other DCE complying with CCITT Recommendation (1976) V.35, ISO Standard 2593, other relevant CCITT Recommendations, and that provides clocking of up to 56K bps. Attachment to non-IBM DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3705 at speeds up to 57.6K bps. See "Specify" section for communication cable length. **Limitations**: [1] Cannot be installed with any other Communications Interface feature [2] BSC is not supported at speeds greater than 9600 bps. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications above 9600 bps, or for X.25 operation up to a maximum of 9600 bps. **Note**: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

External Modem Interface (#3701): [Mdls 21C, 31C, 51C] Provides a cable and a RS-232C interface for attachment to an external IBM modem that provides clocking of up to 9600 bps. Attachment to non-IBM modem or other DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3704, 3705, 4331, or 8100 Processor at speeds up to 9600 bps. See "Specify" section for communication cable length. **Limitations**: Cannot be installed with any other Communications Interface feature. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: **#6301, #6302 or #6303. #6303** is required for X.25 operation.

Loop Adapter (#4850): [Mdl 51C w/EFS] Provides the ability to attach to a direct or data link attached loop of the 8100 System or a 4331 Processor. Direct loop attachment supports speeds up to 38.4K bps. Data link loop attachment supports 2400, 4800, and 9600 bps. A direct attached loop can use a 9.6K or 38.4K Hz carrier; a data link attached loop uses a 9.6K Hz carrier. **Limitations**: [1] Cannot be ordered with any other Communications Interface feature. [2] Cannot be ordered with #7801, if it will be used for 8100 attachment. [3] Cannot be ordered with #3680. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: **#6303 and #9112 or #9124. Specify**: On initial order or for change by service representative, one of the following must be specified: **#9825** for 9.6K Hz carrier or **#9829** for 38.4K Hz carrier. (All terminals on a loop must use the same carrier frequency.)

Digital Data Service (DDS) Adapter (#5650, #5651): [Mdls 21C, 31C, 51C] [#5650 For point-to-point operation; #5651, for multipoint operation] An adapter for BSC or SDLC data transmission at speeds of 2400, 4800 or 9600 bps or SDLC data transmission at 56K bps over the AT&T nonswitched Dataphone® Digital data service network. The DDS Adapter interfaces to a DDS Channel Service Unit, the customer site termination of the DDS network. See "Specify" section for communication cable length. **Specify**: **#9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps, or **#9833** for 56K bps. **Limitations**: Cannot be

3274 Control Unit Mdls 21, 31, 51C (cont'd)

installed with any other Communications Interface feature. **Maximum:** One **#5650** or **#5651**. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600. [2] **#6303** for communications at 56K bps. **Notes:** [1] After installation of either feature #5650 or #5651, the operational mode can be changed to the other (Point-to-Point to Multipoint or vice versa) by simply re-customizing the System Diskette to select the desired operational mode. [2] Depending on the length and content of the data stream, an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

X.21 Adapter For Nonswitched Networks (#5655): [Mdls 21C, 31C, 51C] An interface adapter for SDLC data transmission at speeds of 2400, 4800, 9600 or 48K bps on nonswitched communication facilities via a DCE complying with CCITT Recommendation X.21. See "Specify" section for communication cable length. **Limitations:** [1] Cannot be ordered with any other Communications Interface feature. [2] Does not support BSC transmission control protocol. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications at 48K bps, or for X.25 operation up to a maximum of 9600 bps. **Note:** Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

X.21 Adapter For Switched Networks (#5656): [Mdl 51C w/EFS] An interface adapter for attachment to an X.21 switched network via a DCE complying with CCITT Recommendation X.21. SDLC communications at speeds of 2400, 4800, 9600 and 48K bps are supported. Keyboard decals and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. **Limitations:** [1] Cannot be ordered with any other Communications Interface feature. [2] Does not support BSC transmission control protocol. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6303**. [2] Configuration Support C **(#9112) or D (#9124)**.

TERMINAL ADAPTERS

Terminal Adapter Type A1, A2, A3 (#6901, #6902, #6903): [Mdls 21A, 21B, 21C, 21D, 31A, 31C, 31D] One each of these adapters can be installed. Each adapter provides for the attachment of an additional eight Category A terminals. It should be noted that two terminal ports are required to attach a Displaywriter System when it includes a printer. The base control unit, which provides for attachment of eight Category A terminals, can be expanded with these three terminal adapters to a maximum configuration of 32 Category A terminals. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type A1 (Terminals 9-16) - #6901
Terminal Adapter Type A2 (Terminals 17-24) - #6902
Terminal Adapter Type A3 (Terminals 25-32) - #6903

Limitations: #6903 is mutually exclusive with #7804, #7805. **Maximum:** One of each type terminal adapter. **Field Installation:** Yes. **Prerequisites:** #6902 requires **#6901**; #6903 requires **#6902**. **Note:** To attach Category A Terminals via the 3299, refer to RPQs 8K1155 and 8K1156.

Terminal Adapter Type B (#7801): [Mdl 51C] Provides for the attachment of four Category B terminals, thus expanding the capability of the control unit up to 12 terminals. **Limitations:** [1] Cannot be installed with #4850 or any 2400, 4800, or 9600 bps Integrated Modem (#5640, #5740, #5840, #5842). [2] Requires EFS**#1800** when IML'd for SNA/SDLC operation. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #5550**.

Terminal Adapter Type B1 (#7802): [Mdls 21B, 21C/BSC, 21D, 31A, 31C, 31D] Permits the attachment of four Category B terminals and provides for the installation of Terminal Adapter Types B2, B3 and B4 when additional Category B terminals are desired. **Maximum:** One. **Field Installation:** Yes.

Terminal Adapter Type B2, B3, B4 (#7803, #7804, #7805): [Mdls 21B, 21C/BSC, 21D, 31A, 31C, 31D] Each of these terminal adapters permits the attachment of four additional Category B terminals. A maximum of one each of these terminal adapters can be installed for a combined total of 12 additional or 16 total Category B terminals attached to a control unit. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type B2 (Terminals 5-8) - #7803
Terminal Adapter Type B3 (Terminals 9-12) - #7804
Terminal Adapter Type B4 (Terminals 13-16) - #7805

Limitations: #7804 and #7805 are mutually exclusive with #6903. **Maximum:** One of each type terminal adapter. **Field Installation:** Yes. **Prerequisites: #7802**.

EXTENDED FUNCTION STORE

Extended Function Store (EFS) - Type D4 (#1800): [Mdl 51C] Provides 65,536 positions of additional control storage. **Limitations:** Cannot be installed with EFS-Types D1, D2, or D3 (#3630, #3631, #3632) or #1802. **Maximum:** One. **Field Installation:** Yes.

EFS - Type D3 (#3631): [Mdl 51C] Provides 32,768 positions of additional control storage. **Maximum:** One. **Field Installation:** Yes. Field installation only. **Prerequisites: #3630**.

Extended Function Store (EFS) - Type C1 (#3650): [Mdls 31A 31C, 31D, 51C] Provides 65,536 positions of additional control storage. **Maximum:** Two. **Field Installation:** Yes.

Prerequisites:

Mdl 31A, 31C, 31D	#3101 Integrated Diskette Drive Enhancement
Mdl 51C	#5101 Integrated Diskette Drive Enhancement *OR* RPQ 8K1071 *AND* either #1800 Extended Function Store Type D4 *OR* #3632 Extended Function Store Type D2 *OR* #3631 Extended Function Store Type D3.

CONTROL STORAGE FUNCTIONS

APL/Text Control Function: This function, selectable during the customization of a 3274 mdl 21A, 21C, 21D, 31A, 31C, 31D, or 51C expands the character handling capability of the 3274 to accommodate the APL, Text, and graphic plot character sets on 3278s, 3262s (text only), 3268 mdl 2 and 2C, 3279s, and 3287 attached via Type A Terminal Adapters (#6901, #6902, #6903). **Note:** The 3274, with or without this APL/Text control function, does *NOT* support the 3270 Data Analysis/APL Feature (#1066) on attached 3277s or 3284s, 3286s or 3286s, *NOR* does it support the Text Print Feature (#7880) on attached 3288s.

3289 Text Print Control Function: This function, selectable during customization of a 3274 mdl 21A, 21C, 21D, 31A, 31C, 31D, or 51C extends the character handling capability of the 3274 to accommodate the text characters for the text print feature (#1130) on attached 3289s.

Copy Function: This function, selectable during the customization of a 3274 mdl 21C/BSC, 21D, 31C/BSC, 31D, or 51C enables the copying of the screen contents of an attached 3178, 3278, or 3279 to an attached 3268, 3287, or 3289 through use of the Local Print Key on the display keyboard. This function is provided as basic on the 3274 mdls 21A, 21B, 21C/SNA, 31A and 31C/SNA. The ability to perform host initiated local copies from a 3178, 3278, or 3279, to a 3268, 3287 or 3289 attached to a 3274 mdl 21A, 21C/SNA, 31A or 31C/SNA is also provided as basic. In addition, the 3274 mdl 21C/BSC and 31C/BSC supports the 3270 host Copy command as basic.

Local Copy Summary

3274 Mdl	Print Key	Host Initiated
21A, 31A	Basic	Basic
21B	Basic	Not Applicable
21C/BSC, 31C/BSC, or 51C/BSC	Cust. Option	Basic
21C/SNA, 31C/SNA, or 51C/SNA	Basic	Basic
21D, 31D	Cust. Option	Not Applicable

Host Loadable Print Authorization Matrix: This function, selectable during the 3274 customization process, provides the capability for the 3274, during subsequent IBM procedures, to receive, from a user-written application program at the host CPU, an updated Printer Authorization Matrix to override the matrix created by the customization operator or by system default.

Between Bracket Printer Sharing Function: This function, selectable during the customization of a 3274 mdl 21A, 21C/SNA, 31A, 31C/SNA, or 51C/SNA enables attached 3268s, 3287s, and 3289s to be used as Local Copy output devices for the screen contents of attached 3178s, 3278s, and 3279s, when the printers are Between Brackets with the host application program. Printers are available for Local Copy operations only when they are not in session with an application program if this option is not selected.

Color Convergence Function: This function, selectable during the customization of any mdl 3274, provides the mechanism through which the operator of a 3279 can perform color convergence for the 3279.

Programmed Symbols (PS) Function: This function, selectable during the customization of any mdl 3274 except mdl 1B, enables the customer to define, store, and access up to six, 190-symbol sets on appropriately featured 3278s and 3279s, 3268 mdl 2C and 3287s. **Prerequisites:** SFAP.

3274 Control Unit Mdls 21, 31, 51C (cont'd)

Decompression Function: This function, selectable during the customization of any mdl 3274 except mdl 1B, decompresses data streams containing compressed Programmed Symbols generated by the Graphical Data Display Manager (GDDM) program product. Its usage is recommended for all 3274 TP host attachments that use GDDM. **Prerequisites:** SFAP.

Extended Attribute Terminals: This function, selectable during the customization of any mdl 3274 except mdl 1B, establishes an internal control table for each terminal on which Extended Color, Extended highlighting, and Programmed Symbols will be used or when a 4250 will be attached. If more extended attribute terminals are attached to the 3274 than are specified during customization, the excess terminals will execute only base-level function. **Prerequisites:** SFAP.

Structured Field and Attribute Processing (SFAP) Function: This function, selectable during customization, provides a new 3270 command and several new orders that extend the functional capabilities of appropriately featured 3268 mdl 2Cs, 3278s, 3279s, and 3287s. Datastreams sent to these attached terminals can include extended color, extended highlighting or programmed symbols, in any combination. **Prerequisites:** BSC hosts that utilize this function must transmit in transparent-text mode. **Limitations:** This function does *NOT* support ASCII unless RPQ 8K1037 is installed.

X.21 Switched Network Operation: [Mdl 51C] This function, selectable during customization for SNA/SDLC operation, is required for attachment to the X.21 Switched network. It provides the controls necessary to support the CCITT X.21 switched network protocols.

X.25 Support: [Mdls 31C, 51C] This function, selectable during the customization of a 3274 mdl 31C or 51C, provides for attachment to X.25 data transmission services having an interface which complies with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). IBM conformance to this X.25 interface is defined in *IBM General Information Manual - The X.25 Interface for Attaching IBM SNA nodes to Packet - Switched Data Networks,* GA27-3345. Keyboard labels on attached 3178s, 3278s or 3279s keyboards and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. See "X.25 Keyboard Labels" under "Accessories" for details on the labels required for selected keyboards on terminals connected to a 3274 attached to a X.25 communications facility. **Limitations:** Encrypt/Decrypt (#3680) is mutually exclusive with 3274 X.25 capability. The crypto feature cannot be used with X.25 operation. **Prerequisites:** [1] Configuration Support P or D at release level 62 or higher. [2] SNA/SDLC protocol. [3] Configuration Support P requires 128K, and Configuration Support D requires 256K of control storage (Two **#3650**) to support X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. [4] One of the following Communications Interfaces: **#3701, #5655 or #1550. Note:** The maximum line speed supported with any of these Communications Interface features is 9600 bps with X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. [5] **#6303.**

3274 Entry Assist: This function provides capabilities which facilitate entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs.

(On 3274's with Configuration Support C, 3274 Entry Assist is available via RPQ 8K1147).

Alert Function: This function, selectable during the customization of a 3274 mdl 31A, and on SNA mdls of the 31C and 51C, reports problem determination data to the host, for recording and display, when NPDA Version 3 is installed in the host.

Response Time Monitor: This function, selectable during the customization of 3274 mdls 31A, 31C, 31D, 51C, provides the capability for enhanced network management by accurately measuring transaction times. Response times are collected in up to four user-defined levels. Response time end-definition is defined by the user and can be one of the following: First Character, Keyboard Usable, or Change Direction/End Bracket (SNA only). The response time information can be displayed at a user-designated display station attached to the 3274. **Prerequisites: #6101.**

3270 Personal Computer (Control Unit Terminal Mode): This function allows the 3270 Personal Computer to appear as a single 3178, 3278 or 3279.

IBM Personal Computer Attachment Support: This function, selectable during the customization of any mdl 3274, except mdls 1B and 21X, provides support for attachment of an IBM Personal Computer to a 3278 or 3279. **Prerequisites:** SFAP.

MODEL CONVERSIONS

See table below for field installation of model changes:

	To Model:						
	1 A/B/D	1 C	21 A/B/D	21 C	31 A/D	31 C	51 C
From Model							
1A/B/D	Yes(1)	No	NR	No	Yes	No	No
1C	No	--	No	NR	No	Yes	No
21A/B/D	NR	No	Yes(1)	No	Yes(2)	No	No
21C	No	NR	No	--	No	Yes	No
31A/D	NR	No	NR	No	Yes	No	No
31C	No	NR	No	NR	No	--	No
51C	No	No	No	No	No	No	--

NR = Field Installation NOT recommended

Note 1: When making mdl changes, the applicable Control Storage Requirement Table must be used to determine if sufficient control storage is available. Also, when changing mdls, refer to FIVE3270 to evaluate expected performance.

Note 2: The 3274 mdls 21A/B/C/D contain the newer storage technology which facilitates upgrading to mdls 31A/C/D at a reduced cost.

ACCESSORIES

Battery, Mercury: To provide power to sustain the master key of the Encrypt/Decrypt feature **#3680** on the 3274 when normal power is not present. A 4.14 volt mercury battery (**P/N 1743456**). This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

X.25 Keyboard Labels: Stick-on labels are used on the keyboards of 3178s, 3278s and 3279s attached to a 3274 mdl 31C or 51C using X.25 communications facilities. These labels are normally provided with the 3274 feature #6303 when Specify feature **#9615** is specified to indicate that X.25 will be used. If new or additional labels are required, they can be obtained by ordering Form Number GX23-0285. Each Form Number is a sheet containing 16 sets of stick-on labels, enough for 16 keyboards, and the installation procedure for installing the labels.

SUPPLIES (None)

3274 CONTROL UNIT MDLS 41, 61C

PURPOSE

Provides the capability of attaching 3270 Information Display System displays and printers to System/3, S/360, S/370, 4300, 303X, 3081 processors, and the 8100 Information System. The models 41A, and 41D are for local channel attachment. The models 41C, and 61C are used for communicating in data half-duplex mode via half-duplex or duplex communications facilities.

For System/3 attachment, each of the control units can communicate via Binary Synchronous Communications (BSC) in data half-duplex mode over half-duplex or full duplex communications facilities with a suitably equipped System/3 Model 4, 8, 10, 12, or 15 at speeds up to 9600 bps.

ATTACHABLE TERMINALS

Category A Terminals	
3178 mdl C1, C2	Display Station
3262 mdl 3 & 13	Line Printer
3268 mdl 2	Impact Matrix Printer
3268 mdl 2C	Color Impact Matrix Printer
3270 Personal Computer	
3278 mdl 1, 2, 3, 4, & 5	Display Station
3279 (except mdl 2C)	Color Display Station
3287 mdl 1, 2	Impact Matrix Printer
3287 mdl 1C, 2C	Color Impact Matrix Printer
3289 mdl 1 & 2	Line Printer
3290	Information Panel Display
4250 (See Notes 1 and 2)	APA Printer
5210 mdl G1, G2	Printwheel Printer
6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and L. P. 5608-SR9 (See Note 3)	Displaywriter System

Mdl 41A, 41C, 41D and 61C control units have 192K bytes of control storage and support all terminal features.

The basic mdl 41A, 41C and 41D control units allow attachment of 32 Category A terminals.

The basic mdl 61C control unit allows attachment of 16 Category A terminals.

Notes:

1. The 4250 cannot attach to the 3274 mdls 41C and 61C.
2. Because of the high data volumes possible with this printer, it it strongly recommended that the IBM Aid FIVE3270 be used to predict the effect the 4250 has on subsystem performance.
3. Two terminal ports are required to attach a 6580 which includes a printer.

MODELS

Model 41A A41

For local (SNA version) attachment, via a byte multiplexer, selector, or *block multiplexer channel, to a S/370 processor; or a 4300 Processor via a byte multiplexer or multiplexer channel.

Model 41C C41
Model 61C C61

For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370 or 4300 processor via 3704, 3705, or 3725 (or via the Communications Adapter feature on the 4321 or 4331), using Synchronous Data Link Control (SDLC/SNA).
- A S/370 or 4300 processor via (where applicable) 2701, 2703, a 3704, 3705, or 3725, or a Communications Adapter feature on the 4321 or 4331, using Binary Synchronous Communications (BSC).
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701, 2703, or a 3704 or 3705 using BSC.
- 4331/4361 Processor - The model 61C can also attach to a 4331 via a direct- or data link-attached loop using SDLC.
- 8100 Information System - The model 61C can attach using SDLC via a data link or a direct attached or data link attached loop.

Model 41D D41

For Local (3272 version) attachment, via a byte multiplexer, selector or *block multiplexer channel, to a virtual storage S/370 processor, or a 4300 processor via a byte multiplexer or block multiplexer channel.

* **Note:** Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

STANDARD MODELS

For ease of configuration and simplification in ordering, some predefined configurations for 3274 models 41A, 41C, 41D, and 61C have been designated Standard Models. These Standard Models are based on commonly ordered configurations and should satisfy a majority of customer requirements. Refer to 3274 Control Unit Standard Model Selection Guide pages for Standard Model descriptions, selection and ordering details.

Prerequisites:

(1) One 3178, 3278, or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0). (This display station may be attached via a 3299.

(2) A 3274 mdl 41C requires a Communications Adapter and a Communication Interface for communications. An external Data Circuit-terminating Equipment (DCE) is required with the External Modem Interface (#3701) or the CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655) unless the 3274 model 41C is to be direct connected. The Data Circuit-terminating Equipment or direct connected unit to which the 3274 mdl 41C is attached must provide clocking.

For use with System/3, the 3274 requires an External Modem Interface #3701, or DDS Adapter (#5650 or #5651) for host communications. An external modem is not required with the External Modem Interface #3701 when attached locally to System/3 via BSCA/EIA Local, BSCC/EIA Local, LCA, or ICA.

(3) The 3274 mdl 61C requires a Communications Adapter and a Communications Interface for host communications. An external DCE may be required with the External Modem Interface (#3701), and the CCITT V.35 Interface (#1550), and the CCITT X.21 Interface (#5655 and #5656).

Customer Setup (CSU): The 3274 mdl 41C, and 61C are Customer Setup thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274. For additional information on CSU, refer to IBM.

HIGHLIGHTS

These units can attach up to 32 (16 on the mdl 61C) displays, and/or printers, unless a 6580, which includes a printer, is to be attached. A 6580 without a printer requires one terminal port (the same as other terminals), but when a 6580 includes a printer, two terminal ports are required to attach. Category A terminals can be located up to a maximum of 1,500 meters (4,920 feet). Terminals attach to their respective Terminal Adapter by the same type coaxial cable and connectors which are used between a 3271 or 3272 and its display or printer terminals.

The 3274 can communicate with a S/360, S/370 or 4300 Processor by local channel attach or remotely via communications facilities. The channel attached Control Units are mdl 41A for SNA operation with extended data stream handling capabilities, and mdl 41D for 3272-like operation with extended data stream handling capabilities. The mdls 41C and 61C can operate with extended data stream handling capabilities using either BSC or SNA/SDLC.

The mdl 61C can also attach via a Data Link to the 8100 Information System or to the 8100 or 4331/4361 via a Direct or Data Link attached Loop.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through Configuration Support options, via feature and System Diskettes.

One Feature Diskette and two System Diskettes are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 41C, or 61C. As part of the installation procedure, a customized System Diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control

3274 Control Unit Mdls 41, 61C (cont'd)

code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 41C, or 61C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML pushbutton. The load occurs from an integrated diskette drive using the previously customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Either EBCDIC or ASCII can be selected during 3274 mdl 41C, or 61C customization. ASCII support is provided to correspond with transmission code that is used by System/3. Both ASCII transmission codes and ASCII data codes are supported in BSC. Only ASCII alphameric data bytes of Function Management Request/Response Units are supported in SNA/SDLC. SCS, APL/Text, and the 3270 data stream extensions included in the Structured Field and Attribute Processing (SFAP) customization option are not supported in either BSC or SNA/SDLC when ASCII is used.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the *IBM 3274 Control Unit Customizing Guide,* GA23-0065.

COMMUNICATIONS

The 3274 mdls 41C and 61C communicate by BSC in data half-duplex mode with a System/3 over duplex or half-duplex communications facilities as follows:

System/3 mdl 4 via BSCA
System/3 mdl 8 via ICA or BSCA
System/3 mdl 10 via BSCA or LCA
System/3 mdl 12 via ICA or BSCA
System/3 mdl 15 via BSCA or LCA
System/3 mdl 15D via BSCA, BSCC, or LCA

The 3274 mdl 41C or 61C communicates with a S/370 or 4300 Processor using SDLC over duplex or half-duplex communications facilities to a 3704, 3705, or 3725 or via the Communications Adapter on the 4321/4331/4361 (SNA/SDLC), or by BSC to a S/360, S/370 or 4300 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704, 3705, 3725 (see note 1), or the Communications Adapter on a 4321 or 4331. Communications with a 4331 Processor is also provided via a direct or data link attached loop for the mdl 61C.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (#4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138.

The mdl 61C communicates with the 8100 Information System, using SDLC, via a data link, a direct or data link attached loop, or direct connection.

SDLC as used in the 3274 mdl 41C and 61C conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see *General Information Manual, IBM Synchronous Data Link Control,* GA27-3093.

A 3274 mdl 41C or 61C can be used with X.25 communications facilities by customization with Configuration Support D (release level 62 or higher). Appropriate hardware features must be installed to support Configuration Support D operation with X.25. See "X.25 Support" under "Control Storage Functions" and Configuration Support D description for details.

Note 1: The 3725 is not connectable to the S/360.

Performance: For many 3274 mdl 41C, and 61C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream dependent. Refer to IBM Aids for performance evaluation information.

Communications Facilities (System/3): The 3274 mdls 41C, or 61C operate over data half-duplex mode on point-to-point or multipoint half-duplex or duplex nonswitched facilities at transmission speeds of 1200 (51C only), 2000, 2400, 4800, 7200, and 9600 bps. See M2700 pages for facilities.

Communications Facilities: The 3274 mdl 41C, or 61C operate in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities, using SDLC or BSC, at transmission speeds of 1200 (61C only with a modem supplied clock), 2000, 2400/1200, 4800/2400, 7200/3600 and 9600/4800 bps on nonswitched facilities. In addition, the 3274 mdl 61C operates in half-duplex point-to-point mode using SDLC at transmission speeds of 1200 (with a modem supplied clock), 2400/1200, 4800/2400, and 9600/4800 bps on switched facilities. See M2700 pages for facilities .

The 3274 mdl 61C also operates in half-duplex mode at 9600 or 38,400 bps over a direct attached loop, and at 2400, 4800, or 9600 bps over a data link attached loop.

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, or to the Local Attachment Interface #4801 on the 4331 or to an 8130/8140 Processor can be via direct connection without the need for communications facilities or modems. All communications at speeds greater than 9600 bps must use SDLC. See M3705, 4331, 8101, 8130 and 8140 pages for details.

Modems: Unless the 3274 mdls 41C, or 61C will be direct connected, an external Data Circuit-terminating Equipment (DCE) is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655 or #5656) is installed.

For use with the System/3, unless a Digital Data Service (DDS) Adapter #5650 or #5651 is installed, a 1200 bps integrated modem feature #5500 [51C only] or an external modem must be attached to the 3274 mdl 21C, 31C, or 51C. External modems require the External Modem Interface #3701. No external modem is required when attached locally to System/3 through BSCA/EIA Local, BSCC/EIA Local, LCA or ICA; however, External Modem Interface #3701 is required.

Modem	Speed (bps)
3863 mdl 1/2	2400/1200
3864 mdl 1/2	4800/2400
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

Switched network backup (SNBU) operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. Four-wire SNBU operation with Manual Call and Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, and 3865 mdls 1 and 2. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

Direct Connection Attachment: In addition to host attachment via modems or other data circuit-terminating equipment (DCE), attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for the 3274. Only the basic features needed by the 3274 direct connect hosts are listed. These features may have prerequisites, therefore the machine pages for those hosts should also be reviewed. Physical planning manuals for the respective direct connect hosts can provide additional information on the connecting cables.

MODEL 41C

Unit Atch	Speeds(bps)	Host Feature Number	B S C	S D L C	Max Cable Length	3274 Feature Number
3705-1, 2, 80						
	14.4K,57.6K	4727(1W)	-	x	57m(190')	1550,6303
	14.4K,57.6K	4728(1Z)	-	x	57m(190')	1550,6303
3705-80						
	14.4K,57.6K	6715(LS5)	-	x	60m(200')	1550,6303
4331 Mdl Grp 1 and 2						
	2400	4801	x	x	400m(1312')	3701,6302
	4800	4801	x	x	200m(656')	3701,6302
	9600	4801	x	x	100m(328')	3701,6302 or 6303

MODEL 61C

Unit Atch	Speeds(bsp)	Host Feature Number	B S C	S D L C	Max Cable Length	3274 Feature Number
3705-1, 2, 80						
	14.4K,57.6K	4727(1W)	-	x	57m(190')	1550,6303
	14.4K,57.6K	4728(1Z)	-	x	57m(190')	1550,6303
3705-80						
	14.4K,57.6K	6715(LS5)	-	x	60m(200')	1550,6303
4331 Mdl Grp 1 and 2						
	1200	4801	x	x	800m(2625')	3701,6302
	2400	4801	x	x	400m(1312')	3701,6302
	4800	4801	x	x	200m(656')	3701,6302
	9600	4801	x	x	100m(328')	3701,6302 or 6303

3274 Control Unit Mdls 41, 61C (cont'd)

8101/8130/8140					
1200,2400	3701(FAC 15)	-	x	12m(40')	3701,6302
4800,9600	3701(FAC 16)	-	x	12m(40')	3701,6302
1200,2400	1550(FAC 24)	-	x	300m(1000')	1550,6302
4800,9600	1550(FAC 25)	-	x	300m(1000')	1550,6302
8101/8140BXX					
56K	1550(FAC 26)	-	x	300m(1000')	1550,6303
8140 CXX					
4800	1621	-	x	13m(40')	3701,6302
56K	1614	-	x	300m(1000')	1550,6303

Communications Adapters: Mdls 41C and 61C Communications adapters handle the transmission control protocols (SDLC and BSC). One, and only one can be selected, but one is required on each 41C or 61C.

Communications Interfaces: Communications interfaces connect a mdl 41C or 61C to the host link. One and only one, can be selected, but one is required.

Control Storage Functions: Control storage functions are the non-"Specify", non-"Feature", non-"Machine" configuration options. For details on any of these functions refer to the following manuals:

IBM 3274 Control Unit - Description and Programmer's Guide, GA23-0061.

IBM 3274 Control Unit - Customizing Guide, GA23-0065.

Since information on recently announced function(s) may not yet be available in your manuals, a description of these function(s) is presented below:

X.25 Support: [Mdls 41C, 61C] This function, selectable during the customization of a 3274 mdl 41C or 61C, provides for attachment to X.25 data transmission services having an interface which complies with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). IBM conformance to this X.25 interface is defined in *IBM General Information Manual - The X.25 Interface for Attaching IBM SNA nodes to Packet - Switched Data Networks,* GA27-3345. Keyboard labels on attached 3178s, 3278s or 3279s keyboards and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. Although a 3290 cannot be used to establish X.25 operations, a 3290 can be used normally on a 3274 using X.25. See "X.25 Keyboard Labels" under "Accessories" for details on the labels required for selected keyboards on terminals connected to a 3274 attached to a X.25 communications facility. **Limitations:** Encrypt/Decrypt (#3680) is mutually exclusive with 3274 X.25 capability. The crypto feature cannot be used with X.25 operation. **Prerequisites:** [1] Configuration Support D at release level 62 or higher. [2] SNA/SDLC protocol. [3] Configuration Support D requires 256K of control storage (#3660) to support X.25. [4] One of the following Communications Interfaces: #3701, #5655 or #1550. **Note:** The maximum line speed supported with any of these Communications Interface features is 9600 bps with X.25. The Communications Interface feature required depends upon the physical interface provided by the network. [5] #6303.

3274 Entry Assist: This function provides capabilities which facilitate entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs.

Alert Function: This function, selectable during the customization of 3274 mdls 41A, 41C/SNA, 61C/SNA, reports problem determination data to the host, for recording and display when NPDA Version 3 is installed in the host.

Response Time Monitor: This function, selectable during the customization of 3274 mdls 41A, 41C, 41D, 61C, provides the capability for enhanced network management by accurately measuring transaction times. Response times are collected in up to four user defined buckets. Response time end-definition is defined by the user and can be one of the following: First Character, Keyboard Usable, or Change Direction/End Bracket (SNA only). The response time information can be displayed at a user designated display station attached to the 3274. **Prerequisites:** #6101.

Problem Determination Procedure: Significant function has been designed into these units to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

The Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/ isolation and enhances the availability and serviceability of the 3274 for the above environments in both BSC and SDLC attachment modes. See NPDA in the Program Products Section of the Sales Manual.

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation, enhances the availability and serviceability of the 3274 in BSC mode. See DEMF in the SCP sections for OS/VS1 and OS/VS2.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Receipt at the customer's receiving dock, unpacking, and placement of the 3274.
- Contacting IBM Field Engineering to accomplish the channel connection tasks for the 3274 mdls 41A and 41D.
- Connection of communication cable to the communications facility for the 3274 mdl 41C or 61C.
- Procurement, installation, and maintenance of the loop network when applicable on a 3274 mdl 61C.
- Performing 3274 customization in accordance with IBM-supplied procedures:
  a. For initial installation.
  b. When made necessary by changes in configuration.
  c. For updating of the control unit diskettes (at customer option).

Bibliography: See *KWIC Index,* G320-1621, or applicable system bibliography:

GC20-0360	S/360
GC20-0001	S/370
GC20-0001	4300
GC20-8100	8100

Note: Use the HONE configurator (CF3270) to assist in configuring the 3274 before entering an order .

BASIC CONFIGURATION

Except for mandatory specify codes, it is not necessary to select codes when ordering a 3274. If no specify codes are selected, other than mandatory specify codes, the machine is shipped as follows:

- Voltage: [Mdls 41A, 41D] 200-240V AC, 1-phase, 3-wire, 60 Hz, non-locking plug.
- Voltage: [Mdls 41C, 61C] 120V AC, 1-phase, 3-wire, 60 Hz, non-locking plug.
- Power Cable Length: 4.3 meters (14 feet).
- Communications Cable Length:
  - Mdl 41C or 61C without Loop Adapter #4850: 6.1 meters (20 feet)
  - Mdl 61C with Loop Adapter #4850: 1.8 meters (6 feet) Loop Station Connector (LSC) cable.
- Configuration Support D: Includes support for the following:
  - ASCII
  - All Category A Terminals and their functions/features
  - All Category A Terminal display keyboards
  - APL/Text Control
  - 3289 Text Print Control
  - Host Loadable Printer Authorization Matrix
  - Between Bracket Printer Sharing
  - SCS Printer Support
  - Magnetic Reader Control
  - Color Convergence
  - Structured Field and Attribute Processing
  - Programmed Symbols
  - Decompression of Programmed Symbols load data
  - Copy (Print Key Function)
  - Solicitation of summary maintenance statistics
  - Pacing of inbound message traffic
  - Automatic session recovery in both single and multidomain networks
  - Host notification of changes in attached terminal power on/off status

3274 Control Unit Mdls 41, 61C (cont'd)

- BSC Text Blocking
- BSC Transparency
- Entry Assist
- Alert Function (mdls 41A, 41C/SNA, 61C/SNA)
- Response Time Monitor
- All 3274 mdls 41A, 41C, 41D and 61C Specify and Special Features
- Unsupported Control Code Translate (similar to RPQ 8K0980)
- Dual Function Clear Key (similar to RPQ 8K0976/7/8)
- 4250 attachment (mdls 41A and 41D only)
- X.25 data transmission services (mdl 41C, 61C with 256K)

Notes:

(1) Some functions are either not applicable or available on all mdls. Refer to the following manuals for details:

IBM 3274 Control Unit - Description and Programmer's Guide, GA23-0061.

IBM 3274 Control Unit - Customizing Guide, GA23-0065.

(2) This configuration support is the same as that which is also available on the 3274 mdls 31A, 31D and/or 51C.

Limitations: [1] When 3290s are attached, specify **#9301** is required to get two 3290 microcode load diskettes that must be used with Configuration Support D to enable the downstream load of a 3290 with its operational microcode. [2] The extended data stream functions (extended color, extended highlighting, and Programmed Symbols) that require the Structured Field and Attribute Processing (SFAP) option in Configuration Support D will *NOT* operate with ASCII unless RPQ 8K1160 is installed. **Customer Setup:** Yes.

SPECIFY

- Terminal Support Interfaces: Provides for the method of attaching terminals. One and only one must be specified on each order.

  3299 Terminal Multiplexer Support (**#9901**): Enables the attachment of Category A Terminals via 3299 Terminal Multiplexers. Up to four multiplexers may be connected to a 41X, each multiplexer attaching up to eight terminals for a total of 32 terminals. One multiplexer may be connected to a 61C for eight terminals (Ports 8 through 15) while up to eight more terminals may be directly attached to Port 0 through 7 for a total of 16 terminals. **Limitations:** [1] Requires 3299s to attach terminals to the control unit (see M3299 pages). [2] Cannot have **#9908**. **Field Installation:** Yes.

  Category A Terminal Support (**#9908**): Provides for the direct attachment of Category A Terminals. Up to 32 terminals may be attached to a 41X. Up to 16 terminals may be attached to a 61C. **Limitations:** Cannot have **#9901**. **Field Installation:** Yes.

The remainder of the Specify section can be ignored unless the options described in the "Basic Configuration" section do not meet your needs.

- Power Cable Plug: Specify **#9890** if locking plug is desired.
- Power Cable Length: If standard 4.3 meter (14 feet) power cable is not desired, specify **#9511** for 1.8 meter (6 feet).
- 3290 Information Panel Display Support (**#9301**) : When 3290s are attached, **#9301** must be specified to get a 3290 microcode load diskette which must be used with Configuration Support D to enable the downstream loading of 3290s with operational microcode. A Utility Diskette is provided to customize keyboard and keypad layouts. **Field Installation:** Yes. **CSU:** Yes.
- Alternate Mailing Address (**#9011**): For diskette only updates. Order this optional feature to specify that diskette only updates are to be mailed to an alternate site address supplied by Field Engineering using a Microcode Control Number (MCN) rather than to the address of the 3274 installation site. The alternate address selected is usually that of a central site location. Redistribution of the diskettes containing the diskette update is the responsibility of the customer. The user may decide to replace the existing diskette himself with the diskette containing the updates or, if requested, the IBM Field Engineer will replace the diskette. The purpose of this feature is to assist the customer with his network management. **Field Installation:** Yes.

  Note: The IBM CE enters the MCN by signing onto application 7 of IMS. The operator is prompted through options concerning the MCN diskette, and mailing address.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Extended Function Store (EFS) - Type D5 (#3660): [Mdl 41C, 61C] Provides 131,072 positions of additional control storage. This feature is required for support of X.25. **Maximum:** One. **Field Installation:** Yes.

Encrypt/Decrypt (#3680): [Mdls 41C, 61C (SDLC)] Provides the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt feature (Feature #6010, Program #5735-RC2) or ACF/TCAM, Version 2 (Program #5735-RC3) and either the 3848 and the OS/VS1 and OS/VS2 MVS Cryptographic Unit Support Program Product (5740-XY6), or, the OS/VS1 and OS/VS2 MVS Programmed Cryptographic Facility Program Product (#5740-XY5), data transmitted over unprotected communications lines can be safeguarded through cryptography. **Limitations:** [1] SNA/SDLC only. [2] Cannot be installed with #4850 on mdl 61C. [3] Encrypted data streams cannot be sent to a 3290 or 3270 Personal Computer (Distributed Function Mode) . (4) Mutually exclusive with X.25. The crypto feature cannot be used with X.25 operation. **Maximum:** One. **Field Installation:** Yes. **Note:** A mercury battery, P/N 1743456, or equivalent, is needed. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of a discharged battery is the customer's responsibility. The discharged IBM battery should be returned to IBM.

Response Time Monitor (#6101): [Mdls 41A, 41C, 41D, 61C] Provides the capability for enhanced network management by measuring response times. The Response Time Monitor feature accurately measures and records the transaction times between an inbound host attention (AID) and a user defined transaction end. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Configuration Support D at release level 61 and above.

Waterproof Power Connector (#8801): [Mdls 41A, 41D] Provides a special waterproof connector instead of the normal locking or non-locking plugs on the power cable. This connector is sometimes required to satisfy local ordinances which require this type of termination in specific locations within an installation. See *IBM information Display System Installation - Physical Planning,* (GA27-2787) for the mating receptacle which the customer must have installed.

COMMUNICATIONS FEATURES

CCITT V.35 Interface (#1550): [Mdls 41C, 61C] Provides a cable and a CCITT interface for attachment to an external modem or other DCE complying with CCITT Recommendation (1976) V.35, ISO Standard 2593, other relevant CCITT Recommendations, and that provides clocking of up to 56K bps. Attachment to non-IBM DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3705 at speeds up to 57.6K bps. See "Specify" section for communication cable length. **Limitations:** [1] Cannot be installed with any other Communications Interface Feature [2] BSC is not supported at speeds greater than 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications above 9600 bps, or for X.25 operation up to a maximum of 9600 bps. **Note:** Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

External Modem Interface (#3701): [Mdls 41C, 61C] Provides a cable and a RS-232C interface for attachment to an external IBM modem that provides clocking of up to 9600 bps. Attachment to non-IBM modem or other DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3704, 3705, 4331, or 8100 Processor at speeds up to 9600 bps. **Limitations:** Cannot be installed with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #6302 or #6303. #6303** is required for X.25 operation.

Loop Adapter (#4850): [Mdl 61C] Provides the ability to attach to a direct or data link attached loop of the 8100 System or a 4331 Processor. Direct loop attachment supports speeds up to 38.4K bps. Data link loop attachment supports 2400, 4800, and 9600 bps. A direct attached loop can use a 9.6K or 38.4K Hz carrier; a data link attached loop uses a 9.6K Hz carrier. **Limitations:** (1) Cannot be ordered with any other Communications Interface feature. (2) Cannot be ordered with #3680. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #6303. Specify:** On initial order or for change by service representative, one of the following must be specified: **#9825** for 9.6K Hz carrier or **#9829** for 38.4K Hz carrier. To change specify on an installed machine, contact Field Engineering Branch Office. MES number 999999 is to be used for Incident Report (IR) completion data. (All terminals on a loop must use the same carrier frequency.)

Digital Data Service (DDS) Adapter (#5650): [Mdls 41C, 61C] For point-to-point or multipoint operation. An adapter for BSC or SDLC data transmission at speeds of 2400, 4800 or 9600 bps or SDLC data transmission at 56K bps over the AT&T nonswitched Dataphone® Digital data service network. The DDS Adapter interfaces to a DDS Channel Service Unit, the customer site termination of the DDS network. **Limitations:** Cannot be installed with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600. [2] **#6303** for communications at 56K bps. **Specify: #9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps, or **#9833** for 56K bps.

3274 Control Unit Mdls 41, 61C (cont'd)

To change specify on an installed machine, contact Field Engineering Branch Office. MES number 999999 is to be used for Incident Report (IR) completion data.

Notes: [1] After installation, the operational mode can be changed to the other (point-to-point to multipoint or vice versa) by simply re-customizing the System Diskette to select the desired operational mode. [2] Depending on the length and content of the data stream, an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

X.21 Adapter For Nonswitched Networks (#5655): [Mdls 41C, 61C] An interface adapter for SDLC data transmission at speeds of 2400, 4800, 9600 or 48K bps on nonswitched communication facilities via a DCE complying with CCITT Recommendation X.21. **Limitations:** [1] Cannot be ordered with any other Communications Interface feature. [2] Does not support BSC transmission control protocol. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6302 or #6303** for communications up to 9600 bps. [2] **#6303** for communications at 48K bps, or for X.25 operation up to a maximum of 9600 bps. **Note:** Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

X.21 Adapter For Switched Networks (#5656): [Mdl 61C] An interface adapter for attachment to an X.21 switched network via a DCE complying with CCITT Recommendation X.21. SDLC communications at speeds of 2400, 4800, 9600 and 48K bps are supported. Keyboard decals and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. **Limitations:** [1] Cannot be ordered with any other Communications Interface feature. [2] Does not support BSC transmission control protocol. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] **#6303.**

Common Communications Adapter Without Business Machine Clock (#6302): [Mdls 41C, 61C]. Required for communications at speeds up to 9600 bps. SNA/SDLC and BSC transmission control protocols are supported. Clocking must be provided by the modem or communications facility. **Limitations:** This feature cannot be ordered/installed with #6303. **Maximum:** One. **Field Installation:** Yes.

High-Performance Communications Adapter Without Business Machine Clock (#6303): [Mdls 41C, 61C]. It is required for all attachments with speeds greater than 9600 bps, attachment to X.25 data transmission services, and for 61C attachment to the loops of the 8100 System at speeds up to 38.4K bps and for attachment to X.21 Switched Network. Clocking must be provided by the modem or communications facility. **Limitations:** [1] With this feature installed, operation is restricted to SNA/SDLC protocol. IML for BSC protocol is no longer possible. [2] This feature cannot be ordered/installed with **#6302. Maximum:** One. **Field Installation:** Yes. **Specify:** If to be used for X.25 operation, specify **#9615.** (This specify provides the special X.25 keyboard labels used on 3178s, 3278s or 3279s for X.25.)

MODEL CONVERSIONS

Model conversions of a model 41A to 41D or 41D to 41A are available. There are no other 41X or 61C model conversions. There are no model upgrades from a model 21X, 31X, or 51C to a model 41X or 61C, respectively. If making a model change, refer to FIVE3270 to evaluate expected performance.

ACCESSORIES

Battery, Mercury: To provide power to sustain the master key of the Encrypt/Decrypt feature **#3680** on the 3274 when normal power is not present. A 4.14 volt mercury battery (**P/N 1743456**). This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

X.25 Keyboard Labels: Stick-on labels are used on the keyboards of 3178s, 3278s and 3279s attached to a 3274 mdl 41C or 51C using X.25 communications facilities. These labels are normally provided with the 3274 feature #6303 when Specify Feature **#9615** is specified to indicate that X.25 will be used. If new or additional labels are required, they can be obtained by ordering Form Number GX23-0285. Each Form Number is a sheet containing 16 sets of stick-on labels, enough for 16 keyboards, and the installation procedure for installing the labels.

SUPPLIES (None)

3275 DISPLAY STATION MDL 3

PURPOSE

A single remote cathode ray tube display station for use in the 3650 Programmable and Retail Store System. Provides controls and display of alphameric information from a 3651 Store Controller utilizing a 2400 bps Loop communications facility.

MODELS

Model 3 003

HIGHLIGHTS

Displays as many as 1,920 characters ... 24 lines of 80 characters each. Displays sixty-three 7 x 9 dot matrix characters ... 36 alphamerics, 27 special characters, including the space. Features Data Field Organization, which permits individual fields of data on the screen to be program-defined with various attributes such as protected or unprotected, alphameric or numeric, and normal intensity, non-displayed, or brightened intensity.

Editing Features: -- Typamatic cursor, tab, back-tab, protected-data, insert and delete, and extended-erase (erase to end-of-field, erase all keyboard input data, erase entire screen) are standard features.

Input Flexibility: -- The keyboard provides a set of three program action keys and five program function keys for input flexibility.

Security Enhancement Features: -- A special non-displayed keying mode (standard) provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification of data on the display screen unless the key is turned to the "On" position.

Optional features allow the attachment of a 3284 mdl 3 dedicated printer, an audible alarm, and the Security Keylock ... see "Special Features" below.

Communications: The 3275 mdl 3 may be attached to the Loop facility of the 3650 Programmable and Retail Store System along with the other types of terminals supported in the system.

Communicates only with a 3651 Store Controller mdl 25, 50, or 75. The 3275 mdl 3 includes the mdl 50 Loop Adapter and a 15 foot cable for attachment to the Loop facility

Maximum: The maximum number of 3275 mdl 3s that can be attached to a 3651 mdl 25, 50, or 75 depends upon the number of positions available and the traffic volumes and response times required.

SPECIFY

- Voltage (115V, AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.

  Note: The Hospital Grade Plug, RPQ 8K0696 (no-charge), is required for Hospital General Patient Care Areas. Field Installation: No.

- **Keyboard:** A 66-key EBCDIC Data Entry Keyboard **#4631** must be installed on each 3275 mdl 3.
- Transmission Code: Specify **#9761** -- EBCDIC transmission code.
- Character Set: Specify **#9089** -- EBCDIC Character Set.
- Machine Nomenclature: [plant installation only]
- **Character Generator Language** (all Mono Case): See "Special Features". Select one of the following:
- **Keyboard Language:** For keyboard #4631, specify one of the following:

SPECIAL FEATURES

Audible Alarm (#1090): An alarm, activated under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is sounded when a character is entered into the next to last position on the screen. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4631): 66 Key EBCDIC Data Entry Keyboard, key-punch like layout, movable, with 36 alphameric keys and 30 control keys. **Maximum:** One. **Field Installation:** Yes.

Keyboard Numeric Lock (#4690): Provides the ability to lock the keyboard if a non-numeric key [other than 0-9, minus (-), period (.), or DUP] is depressed in a predefined numeric-only field. **Maximum:** One. **Field Installation:** Yes. Contact local Field Engineering Branch Office for installation. MES number 999999 is to be used for I.R. (Incident Report) Completion Data.

Printer Adapter (#5550): To attach a 3284 Printer mdl 3. Provides the controls to print out the contents of the 3275 mdl 3 buffer. **Maximum:** One. **Field Installation:** Yes.

Security Keylock (#6340): A lock and key which prevents modification and display of data on the display when in the "off"position. For additional or replacement keys, see "Accessories " below. **Maximum:** One. **Field Installation:** Yes.

Transmission Speed, 9600 bps (#7825): Provides for transmission at 9600 bps over a local Loop on a 3651 Model A50, B50. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 9600 bps Loop Adapter (#4890) on the 3651 mdl A50 or B50.

MODEL CHANGES

3275 model 3 cannot be changed in the field from or to model 1 or 2.

ACCESSORIES

Locks And Keys (P/N 2577741): The 3275 with Security Keylock (#6340) is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). Order P/N 2577741via Allow two to three weeks for delivery.

3275 Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3275 Display Station keyboard. These accessories affect keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

SUPPLIES (None)

3276 CONTROL UNIT DISPLAY STATION

PURPOSE

A cathode-ray tube (CRT) display station used for displaying alphameric data, and for entering data into and receiving data from a S/370, a 4300 Processor, a 3790 Communication System, a S/360, or an 8100 System. The 3276 optionally provides control and multiplexing capabilities to support up to seven 3230 mdl 2s, or 3262 mdl 13s, or 3268 mdl 2s and 2Cs, or 3178, or 3278, or 3279s, or 3287s, or 3289s, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, allowing a maximum cluster size of eight displays or printers including the 3276's own display. The 6580 Displaywriter System can connect to 1 or 2 terminal ports (display station, or display station and printer). A keyboard, or a selector light-pen, permit an operator to display and manipulate data on the screen in a flexible and efficient manner. The 3276 meets both general and unique display requirements with its set of basic and optional features.

The 3276 communicates with a S/370 or 4300 Processor, using Synchronous Data Link Control (SDLC) or Binary Synchronous Communications (BSC) over communications facilities; or with a S/360, S/370 or 4300 Processor, using BSC over communications facilities; or with a 3790 Communication System using SDLC over communications facilities; or with an 8100 System using SDLC via a communication link, or a direct or data link attached loop or with a 4331 using SDLC via a direct or data link attached loop.

MODELS

Models 1-4 : For use with BSC transmission control.

Model 1	001	Displays up to 960 characters ... 12 lines of 80 characters each.
Model 2	002	Displays up to 1,920 characters ... 24 lines of 80 characters each.
Model 3	003	Displays up to 2,560 characters ... 32 lines of 80 characters each.
Model 4	004	Displays up to 3,440 characters ... 43 lines of 80 characters each.

Models 11-14 : For use with SNA/SDLC transmission control.

Model 11	011	Displays up to 960 characters ... 12 lines of 80 characters each.
Model 12	012	Displays up to 1,920 characters ... 24 lines of 80 characters each.
Model 13	013	Displays up to 2,560 characters ... 32 lines of 80 characters each.
Model 14	014	Displays up to 3,440 characters ... 43 lines of 80 characters each.

Note: Models 1 and 11 have a 480-character mode for existing 480-character programs, and Models 3, 4, 13 and 14 have a 1,920-character mode to accommodate existing 1,920-character programs.

ATTACHABLE TERMINALS

3178 mdl C1, C2	Display Station
3262 mdl 13	Line Printer
3268 mdl 2 & 2C	Printer
3278 mdl 1, 2, 3, & 4*	Display Station
3279 mdl 2A, 2B, 3A & 3B*	Color Display Station
3287 mdl 1, 2, 1C & 2C	Printer
3289 mdl 1 & 2	Line Printer
5210 mdl G1, G2	Printwheel Printer
6580 mdl A04, A06, A08, A10	Displaywriter System (25-Line Display)
6580 mdl B04, B06, B08, B10	Displaywriter System (66-Line Display)

* For 3178, 3278 and 3279 model restrictions, see "ATTACHMENT MATRIX" under TERMINAL ADAPTERS in "Special Features".

The 3276 does not support Programmed Symbols, Extended Color, or Extended Highlighting on a 3268, 3278, 3279, 3287, or a 5210.

For use with 3790 Communication System: The 3791 Controller supports only selected models of the 3276 and the 1,920 character mode. See the *3791 Configurator,* GA27-2768, and M3791 pages for additional details.

For use with an 8100 System: See the *8100 System Configurator,* GA27-2876 and refer to the M8130/8140, 8101 pages and programming pages for possible support restrictions.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation Adapter #8332.

Prerequisites: The 3276 requires an integrated, or external modem,or a DDS Adapter, or an X.21 Adapter for Switched Networks, or an X.21 Adapter for Nonswitched Networks for TP attachment, or a Loop Adapter for IBM 8100 System loop attachment. A keyboard is needed on each 3276 for diagnostic purposes.

Customer Setup (CSU): The 3276 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The CSU allowance is four days.

HIGHLIGHTS

Displays a character within a 7x14 character matrix in 960, 1,920 and 2,560-character mdls; within a 7x11 character matrix in the 3,440-character mdl. The basic 26-character upper case letters are presented in a 7x9 character matrix for the 960, 1920 and 2,560-character mdls, and in a 7x8 character matrix for the 3,440-character mdl. Displays a 94-character set: 62 alphameric and 32 special characters, not including the Space and Null characters. The display character set may be restricted to upper case characters by the monocase switch. Uses 3270 Field Formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/ unprotected, alphameric, normal/ highlighted intensity, displayable/ non-displayable, and selector light-pen detection allowed/ disallowed. All terminals attached to a 3276 can be driven at distances of up to 1,500 meters (4,920 feet).

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of a 3178, 3276, 3278, 3279, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, attached to a 3276. [Order RPQ 8K0929 or 8K0991 on mdls 1, 2, 3 and 4 using BSC when all the following operating conditions are expected:

- Operator use of the print key for a local copy on a printer that is also used by the host.
- The host does not use General Poll.
- The host does not issue Specific Poll after a printer has completed a host printout.

Refer to the RPQ Description and Price Transmittal for details.] The printer designation is controlled by a configuration default matrix which is fixed by the relative port positions of displays and printers attached to the 3276. Other printers may be accessed using the IDENT key.

Devices attached to the 3276 are assigned port positions 1 through 8. Displays are authorized to print only to printers which are attached to higher numbered ports. If the IDENT key is not used, a PRINT operation from a given display will cause printing to take place at the first printer whose port position is higher than the display. The operator may use the IDENT key to print to any printer. (The host can perform copy in a manner compatible with existing 3271/3272 support).

Operator Factors: The 3276 has an anti-glare screen. Indicators are displayed on the bottom row of the screen, outside the data display area, and provide useful operator information. Host display of data on the screen is accomplished without refresh interrupt (i.e., no blinking). The keyboard, which is low in profile, provides a palm rest area, and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

Cluster Capability: Up to seven 3262s, 3178s 3230s, 3262s, 3278s, 3279s, 3268s, 3287s, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, 3289s or a 5210 may be attached. The basic 3276 provides a display and a port for one device, a 3178, a 3230, a 3262, a 3268, a 3278, a 3279, a 3287, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, 3289 or a 5210. Up to three Terminal Adapters, each controlling up to two devices, can be attached to the 3276. The 3276 allows the attachment of seven additional displays and/or printers for a maximum cluster size of eight including its own display. The 6580 Displaywriter System can connect to one or two terminal ports (display station, or display station and printer). ... See "Special Features".

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic. All alphameric, special symbol, and cursor move keys have typamatic capability. Double speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the selector light-pen function. Fields of data may be selected by positioning the cursor and then using the cursor select key.

Input Flexibility: A choice of keyboards or the selector light-pen provide input flexibility ... see "Special Features" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are basic with all typewriter keyboards.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display buffer unless the key is turned to the "on" position. An Address Keylock (optional) controls access to the address switches. These capabilities and the terminal's ability to identify itself to the host program (SNA/SDLC operation only), allow customer-supplied security program routines to control access to data and audit of actions. A

3276 Control Unit Display Station (cont'd)

Magnetic Slot Reader is available to enter system user identification. An Encrypt/Decrypt feature (optional) protects data transmitted over unsecured communication lines from accidental or intentional disclosure and/or modification (mdls 11-14 in S/370 or 4300 Processor attachment only).

Audible Alarm: An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone.

Communications: The 3276 mdls 11-14, and the 3276 mdls 1-4 with the SDLC/BSC Switch (#6315) communicate with a S/370 or 4300 processor using SDLC transmission over communications facilities (where applicable) to a 3704, 3705, or 3725, or a Communications Adapter (#1601) feature on the 4331. The 3276 mdls 1-4 communicate with a S/360, S/370 or 4300 Processor, using BSC transmission over communications facilities (where applicable) to a 2701, 2703, 3704, 3705, 3725 (see note), an Integrated Communications Adapter (3115, 3125, 3135 or 3138), or a Communications Adapter (#1601) feature on the 4331. See 3791 pages for specific models. All mdls of the 3276 can also communicate with a 3704, 3705, or 3725, or a Communications Adapter (#1601) feature on the 4331, at 1200 bps without need for communications facilities or a modem. The 3276 mdls 11-14 communicate with a 4331 Processor using SDLC transmission via a direct or data link attached loop. The 3276 mdls 11-14 communicate with an 8100 System using SDLC transmission via a data link, or a direct or data link attached loop. The 3276 mdls 1-4 with the SDLC/BSC switch (#6315) can communicate with the 8100 System using SDLC transmission via a data link. **Note:** The 3725 is not connectable to a S/360.

Communication Facilities: The 3276 operates in data-half-duplex point-to-point or multipoint mode on half-duplex or duplex non-switched communiction facilities at speeds of 1200, 2000, 2400, 4800, 7200 or 9600 (SNA/SDLC only) bps. In addition, the 3276 mdls 11-14 operate in data-half-duplex point-to-point mode on the public switched telephone network at speeds of 1200 and 4800 bps and on public switched data networks at speeds of 2400, 4800, and 9600 bps. See the M2700 pages for information on the communication facilities over which this operation can occur. The 3276 mdls 11-14 also operate in half-duplex mode at 9600 bps over a direct attached loop, and at 2400, 4800 or 9600 bps over a data link attached loop.

Modems: If a Loop Adapter (#4850) (mdls 11-14 only), or a Digital Data Service (DDS) Adapter (#5650 or #5651), or an X.21 Adapter For Switched Networks (#5656) (mdls 11-14 only), or an X.21 Adapter for Nonswitched Networks (#5655) (mdls 11-14) is not installed, a 1200 bps Integrated Modem feature or an external IBM modem may be attached to a 3276. External modems require the External Modem Interface (#3701).

Modem	Speed (bps)
3863 mdl 1/2	2400/1200
3864 mdl 1/2	4800/1200
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

Four-wire Switched Network Back-up is available on 3863, 3864, or 3865 modems.

Switched network backup operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3865, and 3872 pages.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/ isolation and enhances the availability and serviceability of the 3276 for the above environments in BSC (except when attached to the 4331 via direct or data link attached loop) and SDLC mode. See NPDA in the Program Products Section.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of 3276.
- Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Bibliography: See *KWIC Index,* G320-1621 or specific system bibliography.

SPECIFY

Specify Codes are not normally required to order a 3276. If codes are not specified, the machine is shipped with the following specifications:

- Voltage: 120V AC, 1-phase, 3-wire 60 Hz.
- Power Cable Plug: Non-locking.
- Power Cable Length: 2.8 meters (9 feet).
- Keyboard Cable Length: 0.9 meters (3 feet).
- Communication Cable Length: 6.1 meters (20 feet) for attachment to standalone modem, or to communications facility when a DDS Adapter or an integrated modem is used.
- Loop Station Connector (LSC) cable length: 1.8 meters (6 feet) for attachment to a direct attached or data link attached loop.

Keyboard Selection defines the 3276 Character Set of EBCDIC or ASCII. A 3178, a 3230, a 3262, a 3278, a 3279, a 3287, or a 3289 must use the same Character Set as the 3276 to which it is attached. The 6580 Displaywriter System supports the EBCDIC Typewriter Keyboard.

The remainder of this Specify Section can be ignored unless special circumstances require a deviation from the standard default values.

- Power Cable Plug: Specify **#9890** for a locking plug.
- Power Cable Length: If the standard 2.8 meter (9 foot) power cable is not desired, specify **#9513** for a 4.5 meter (15 foot) cable.
- Keyboard Cable Length: If the standard 0.9 meter (3 foot) cable is not desired, specify **#9399** for 1.8 meter (6 foot) cable.
- Communication Cable: If the standard 6.1 meter (20 foot) communication cable is not desired, specify **#9061** for 3.0 meter (10 foot) cable, **#9062** for 9.1 meter (30 foot) cable or **#9063** for 12.2 meter (40 foot) cable.
- Loop Station Connector (LSC) cable: If the standard 1.8 meter (6 foot) loop station connector cable is not desired, specify **#9405** for 4.3 meter (14 foot) cable.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Address Keylock (#1009): Controls access to the unit address switches (and incidentally transmit level switches) which are located in the Operator Panel Drawer. **Maximum:** One. **Field Installation:** Yes.

APL/Text Control (#1067): Provides the control for 3230, 3262 (Text only), 3268, 3276, 3278, 3279, or 3287, with APL/Text feature, or 3289 with TEXT feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1068.

Extended Function Base (#1068): Allows the addition of APL/Text Control (#1067), or X.21 Adapter For Switched Networks (#5656) and/or Color Display Attachment (#1950) feature. **Limitations:** Cannot be installed with #6315. **Maximum:** One. **Field Installation:** RPQ 8K0900 is required.

Audible Alarm (#1090): An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. **Maximum:** One. **Field Installation:** Yes. **Note:** This feature is available for ordering for field installation until 12/3/82. Then is can no longer be ordered.

APL/Text (#1120): Provides the capability for display of 222 character APL 'Text set including the 94 character EBCDIC set. **Limitations:** This feature is only valid when installed with #1067. This feature is EBCDIC only and is NOT compatible with ASCII. Cannot be installed with #3620. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610. **Corequisite:** (#4626) or (#4629). **Note:** This feature is available for ordering for field installation until 12/3/82. Then is can no longer be ordered.

Color Display Attachment (#1950): Provides the capability of attaching 3279 mdls 2A, 3A, 2B, 3B, S2A, S2B, S3G, 02X, and 03X. For the number of attached terminals, see Terminal Adapter features

3276 Control Unit Display Station (cont'd)

(#3255, #3256, #3257). **Limitations:** (1) This feature is not available for 3276 mdl 1. (2) The 3276 does not support Programmed Symbols, Extended Color, or Extended Highlighting. 3279 Models 2B and 3B are supported on the 3276 for base color and APL/Text operation. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) #1068 (2) #1067 for use with 3279 mdls 2B, 3B for APL/Text Operation.

Extended Character Set Adapter (#3610): Provides the additional control and buffering necessary for the extended character set in #1120. **Limitations:** Cannot be installed with #3620. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1067. **Corequisite:** #1120. **Note:** This feature is available for ordering for field installation until 12/3/82. Then it can no longer be ordered.

Character Set Extension (#3620): Provides the capability for display of 222 character APL/Text including 94 character EBCDIC set, and the additional control and buffering necessary for the extended APL/Text character set. **Limitations:** (1) This feature is only valid when installed with #1067. This feature is EBCDIC only and is *NOT* compatible with ASCII. (2) Cannot be installed with #1120 or #3610. **Maximum:** One. **Field Installation:** Yes. **Corequisite:** #4626 or #4629.

Encrypt/Decrypt (#3680): Provides a hardware implementation of the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt Feature (Feature Number #6010, Program Number 5735-RC2) and the IBM Programmed Cryptographic Facility Program Product (5740-XY5), data transmitted over unprotected communication lines can be safeguarded through cryptography. **Limitations:** 3276 mdls 11-14 only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6340.

Note: A mercury battery, P/N **1743456** or equivalent is needed. A battery is shipped with this feature. Replacement of the discharged battery is the customer's responsibility. Discharged battery should be returned to IBM.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader which reads encoded information (numeric only) from a magnetic stripe. **Maximum:** One. **Field Installation:** Yes.

SDLC/BSC Switch (#6315): [Mdls 1-4] Provides SNA/SDLC transmission control in addition to BSC. SDLC or BSC can be selected by the operator with a switch on the operator panel. **Limitations:** Cannot be installed with #1068. **Maximum:** One. **Field Installation:** Yes.

** **Security Keylock (#6340):** A lock and key which prevents modification or display of data in the display terminal when in the "off" position. When the Security Keylock feature is combined with #3680, a third position of the lock permits modification of the 56-bit Encrypt/Decrypt key variable. **Maximum:** One. **Field Installation:** Yes.

Selector Light-Pen (#6360): A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is used for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a new designator character "&". When this designator is used, the Read Modified operation results in the return of both the addresses and the data of all modified fields on the screen. **Maximum:** One. **Field Installation:** Yes.

KEYBOARDS

One is needed on each 3276 for diagnostic testing. Refer to the Type Catalog section for keyboard layouts.

Limitations: Keyboards used on 3178s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. **Maximum:** One of the below. **Field Installation:** Yes. The keyboard is set up by the customer.

#4621 - 75-key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key.

#4622 - 75-key EBCDIC Data Entry Keyboard: Movable, with 35 data keys, 10 PF keys and 30 control keys.

#4623 - 75-key EBCDIC Data Entry Keyboard: Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high volume data entry.

#4624 - 75-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys through use of an alternate shift key.

#4626 - 87-key EBCDIC Typewriter/APL Keyboard: An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94 character EBCDIC set. An APL On/Off key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to #4627, this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** #3620.

#4627 - 87-key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of an alternate shift key.

#4628 - 87-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys and are available through the use of an alternate shift key.

#4629 - 87-key EBCDIC Typewriter/Text Keyboard: An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 Text specific characters in addition to the 94 character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to #4627, this keyboard has only 12 PF keys (PF 1 through PF 12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** #3620.

Keyboard Numeric Lock (#4690): Provides keyboards #4621, #4622, #4623,#4624, #4626, #4627, #4628, #4629 with the ability to lock the keyboard, if a non-numeric key [other than 0-9, minus, decimal sign, or dup] is operated in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes. Contact Field Engineering Branch Office for installation. MES number 999999 is to be used for IR (Incident Report) completion data.

COMMUNICATIONS FEATURES

For TP attachment, each 3276 must be equipped with one of the communications features (#6301 or #6302) and either the External Modem Interface (#3701), an X.21 Adapter for Switched Networks (#5656), or an X.21 Adapter For Nonswitched Networks (#5655), a DDS Adapter (#5650 for point-to-point operation, #5651 for multipoint operation), or one of the 1200 bps Integrated Modem features (#5500, #5501, #5502, #5507 or #5508). In addition, #6315 may be selected on mdls 1-4 (see above).

For loop attachment (3276 mdls 11-14) each 3276 must be equipped with #6302 and #4850.

External Modem Interface (#3701): Provides an interface for attachment to an IBM or external modem. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #6302. **Specify:** **#9490** for operation on the public switched network (mdls 11-14), or **#9491** for operation on nonswitched communications facilities.

Loop Adapter (#4850): [Mdls 11-14] Provides the capability to attach to either a direct or data link attached loop of the IBM 8100 System or a 4331/4361 Processor. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6302.

1200 bps Integrated Modem, Nonswitched (#5500): Provides an integrated modem for operation over nonswitched communications facilities at speeds of 1200/600 bps. No external modem is required. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301. **Specify:** **#9651** for use with 4-wire facility or **#9652** for use with 2-wire facility .

1200 bps Integrated Modem, Switched, Auto Answer (#5501): [Mdls 11-14] Provides an integrated modem with auto/manual answer capabilities for operation over switched communications facilities at speeds of 1200/600 bps. No external modem is required. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Field Installation:** Yes. **Prerequisite:** #6301.

Note: Attachment of this feature to the public switched telephone network requires that the customer provides an FCC registered protective circuit equivalent to the type CBS Data Access Arrangement.

1200 bps Integrated Modem, Manual Answer (#5502): [Mdls 11-14] Provides an integrated modem for communication with a remote processor at speeds of 1200/600 bps over the public switched telephone network. No external modem is required. **Limitations:** Cannot be ordered with any other Communications Interface featue. **Maximum:** One. **Field Installation:** Yes **Prerequisites:** [1] #6301. [2] **Note:** Attachment of this feature to the public switched telephone network requires that the customer provides an FCC registered protective circuit equivalent to the type CDT Data Coupler.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup (#5507): Provides an integrated modem at speeds of 1200/600 bps for operation over nonswitched communication facilities, and also provides manual switched network backup capability. No external modem is required. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Specify:**(**#9651**) for communication over 4-wire facility, or (**#9652**) for communication over 2-wire facility. **Maximum:** One. **Field Installation:** Yes.

3276 Control Unit Display Station (cont'd)

Prerequisites: [1] #6301. [2] Note: Attachment of this feature to the public switched telephone network requires that the customer provides an FCC registered protective circuit equivalent to the type CDT Data Coupler.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup, Auto Answer (#5508): Provides an integrated modem for operation over nonswitched communications facilities at speeds of 1200/600 bps and also provides auto/manual answer switched network backup capabilities. No external modem is required. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Field Installation:** Yes. **Prerequisites:** #6301. **Specify: #9651** for communications over 4-wire facility, or **#9652** for communications over 2-wire facility. Note: Attachment of this feature to the public switched telephone network requires that the customer provides an FCC registerd protective circuit equivalent to the type CBS Data Access Arrangement.

Digital Data Service (DDS) Adapter (#5650 for point-to-point operation, #5651 for multipoint operation:) An adapter for BSC and SDLC data transmission at speeds of 2400 bps, 4800 bps, and 9600 bps (mdls 11-14) over the AT&T nonswitched Dataphone® Digital data service network. The DDS Adapter interfaces to a DDS channel service unit, the customer site termination of the DDS network. **Limitations:** Cannot be ordered with any other Communications Interface feature. See "Communication Cable" of 3276 Specify section. **Maximum:** One #5650 or #5651. **Prerequisites: #6302. Specify: #9822** for 2400 bps, or **#9823** for 4800 bps, or **#9825** for 9600 bps (mdls 11-14).

X.21 Adapter For Non-Switched Networks (#5655): [Mdls 11-14] Provides an interface and cable for attachment to the X.21 Nonswitched data circuit-terminating equipment (DCE). See "Specify" for length of communication cable, which is supplied. SDLC data transmission at speeds of 2400 bps (#9822), 4800 bps (#9823), and 9600 bps (#9825) are supported. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6302.

X.21 Adapter For Switched Networks (#5656): [Mdls 11-14] Provides an interface for attachment to the X.21 switched network to transmit data at speeds of 2400 bps, 4800 bps, and 9600 bps. The X.21 interface is a recommendation from the CCITT to standardize the interface between the DTE and DCE for synchronous operation, and will be used in place of the V.24/V.28 interface. A keyfront decal and a label on the keyboard will be provided for easy operator reference in using this feature. **Limitations:** Cannot be ordered with any other Communications Interface feature. **Maximum:** One **Field Installation:** Yes. **Prerequisites:** [1] #1068. [2] #6302.

Communications Feature With Business Machine Clock (#6301): Required for attachment to communications facilities through any 1200 bps Integrated Modem, or #3701 at 1200 bps, to any external modem that does not provide its own clocking. **Limitations:** Cannot be ordered with #6302. **Maximum:** One. **Field Installation:** Yes.

Communications Feature Without Business Machine Clock (#6302): Required for attachment to communications facilities, at speeds of up to 9600 bps using SDLC, or up to 7200 bps using BSC, through #3701 and any external modem that provides its own clocking, or through the DDS Adapter, or through #5656, or through #5655 and its data circuit-terminating equipment. It is also required for attachment of the 3276 mdls 11-14 to a direct or data link attached loop of the 8100 System, at a speed of 9600 or 2400 bps respectively. **Limitations:** Cannot be ordered with #6301. **Maximum:** One. **Field Installation:** Yes.

TERMINAL ADAPTERS

Terminal Adapter No. 1 (#3255): Enables attachment of two 3178s, 3230s, 3262s, 3268s, 3278s, 3279s, 3287s, or 3289s in any combination. **Limitations:** See "Attachment Matrix" below for 3278 and 3279 mdl restrictions. **Maximum:** One. **Field Installation:** Yes.

Terminal Adapter No. 2 (#3256): Enables attachment of two 3178s, 3230s, 3262s, 3268s, 3278s, 3279s, 3287s, or 3289s in any combination. **Limitations:** See "Attachment Matrix" below for 3278 and 3279 mdl restrictions. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3255.

Terminal Adapter No. 3 (#3257): Enables attachment of two 3178s, 3230s, 3262s, 3268s, 3278s, 3279s, 3287s or 3289s in any combination. **Limitations:** See "Attachment Matrix" below for 3278 and 3279 mdl restrictions. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3256.

3178/3276/3278/3279 ATTACHMENT MATRIX

3276 Mdl	3178	3278 Mdl.....					3279 Mdl.....			
		1	2	3	4	5	2A	3A	2B	3B
1	No	Yes	No	No	No	No	No	No	No	No
11	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No
12	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
13	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

3276 Mdl	3279 Mdl.....				
	S2A	S2B	S3G	02X	03X
1	No	No	No	No	No
11	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	No	Yes	No
12	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes
13	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes	Yes

Notes:

3276 mdls 1-3 with #6315 in SDLC mode, will support the same 3278 mdls as the 3276 mdls 11-13 respectively.

A 3276 with #6315 installed, does not support attachment of the 3279.

6580 mdls A04, A06, and A10 provide 3278-2 emulation support and 6580 mdls B04, B06, B08, and B10 provide 3278-4 emulation support. Find the appropriate 3278 mdl to determine the 3276 mdl requirements in the above matrix.

The 3276 provides a display and a port for attaching one terminal; a 3178, a 3230, a 3262, a 3268, a 3278, a 3279, a 3287, or a 3289. The 3276 with the three Terminal Adapters (#3255, #3256, #3257) thus allows a maximum cluster size of eight displays or printers.

MODEL CONVERSIONS

Model changes are field installable as follows:

From/To	002	003	004	011	012	013	014
001	x	x	x	x	x	x	x
002		x	x		x	x	x
003			x			x	x
004							x
011					x	x	x
012						x	x
013							x

ACCESSORIES

The following items are available on a purchase only basis. For shipment with machine, order the Feature Number as shown below.

Item	Feature Number	Max Qty
Magnetic Slot Reader	**#9441**	*
Magnetic Reader Extension Cable:		
6 meter (20 feet)	**#9106**	**
12 meter (40 feet)	**#9107**	**

* A maximum of one Magnetic Slot Reader may be ordered.
** A maximum of one extension cable may be ordered.

Magnetic Slot Reader (#9441; P/N 4123500): A free-standing Magnetic Slot Reader (MSR) that reads encoded information from a magnetic stripe. It attaches by a 1.5 meter cable through the Magnetic Reader Control (#4999). The MSR has three lights and a buzzer which provide feedback to the user on the status of the read data. The MSR accommodates a wide range (height and length) of magnetic striped plastic cards such as: ID badges, security operator identification cards, etc. Using the 3275/3277 like 10-numeric character set, the maximum number of data characters that can be read are 7 to 37 characters at 75 bpi or 210 bpi, and 7 to 118 characters at 127 bpi. A minimum of seven characters must be encoded between the start sentinel and end sentinel characters.

The following cable assemblies can be used to extend the Magnetic Slot Reader distance. **Limitations:** Extension Cables *cannot* be plugged into other extension cables.

Item	Feature Number	P/N
6 meter (20 feet)	**#9106**	**4832986**
12 meter (40 feet)	**#9107**	**4832987**

A variety of magnetic documents, tags, and labels the MSR can read, may be obtained from SSD, some of which, depending on length, can be encoded by devices such as the IBM 3642 Encoder Printer.

3276 Control Unit Display Station (cont'd)

For complete information on the availability of pre-encoded magnetic striped plastic cards, contact a SDD Representative.

An MSR Customer Service Manual, GA24-3663, should be ordered when ordering by MES for field installation.

Note: Magnetic cards coded with the Alternate End of Message character (hexadecimal "C") cannot be read by this reader. SSCP-LU communication for MSR is not supported, when the MSR is attached to a 3276 or a 3278 which is attached to a 3276. **Limitations:** Valid for numeric-only data encoded according to the American National Standard entitled "Magnetic Strip Encoding for Credit Cards, ANSI X4.16 - 1973" when the MSR is attached to a 3276 or to a 3278 which is attached to a 3276. **Field Installation:** Yes. **Prerequisites:** #4999.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Reader Extension Cables: These cable assemblies can be used to extend the Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List. MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. **Limitations:** Extension cables cannot be plugged into other extension cables.

Item	Feature Number	P/N
6 meter (20 feet)	**#9106**	**4832986**
12 meter (40 feet)	**#9107**	**4832987**

Magnetic Reader Replacement Assemblies

Description	P/N
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader replacement assemblies which the customer may want to consider stocking.

	Magnetic Slot Reader			
Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3276 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station./The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Battery, Mercury (P/N 1743456): To provide power to sustain the master key of Encrypt/Decrypt (#3680) when normal power is not present. A 4.14 volt non-rechargable mercury battery. This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered through IBM.

Limitations: Can be installed on 3276 mdls 11-14 only. **Field Installation:** Yes. **Prerequisites:** #3680. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

Keys (P/N 2577741): The 3276 with Security Keylock (#6340) special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser).

SUPPLIES (None)

3277 DISPLAY STATION

The 3277 Model 1 is no longer available

PURPOSE

A high-performance, cathode-ray tube unit used in clusters with the 3271, 3272, or 3274 Control Unit, or Local Display Adapter (System/3 model 8 or 12), or Display Adapter (System/3 model 15), for displaying alphameric data, and for entering data into and retrieving data from a System/3, S/360, or S/370, 4300 Processor, 8100 System, or 3790 Communication System. A keyboard or light-pen or both permit an operator to display and manipulate data on the screen in a highly flexible and efficient manner. With its comprehensive and powerful set of standard and optional features, the 3277 Display Station meets both general purpose and unique display requirements.

MODELS

Model 2 002 — For use with the 3271 model 2 or 12, 3272 model 2, 3274 model 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, operator display on System/3 model 4, the Local Display Adapter (#4702 and #4705 on the System/3 Models 8 or 12) to display up to 1,920 characters ... 24 lines of 80 characters each. For use with 3790 or 8100, see below.

Maximum: Up to 32 3277s can be attached to a 3271 or 3272. Up to 16 3277s can be attached to a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A or 31D. Up to four 3277s can be attached to a 3274 mdl 51C. The maximum is reduced by one on a 3271 or 3272 for each 3284-1,2, or 3286-1,2 or 3287, or 3288-2 Printer attached. The maximum is reduced by one on a 3274 for each 3284-1,2 or 3286-1,2 or 3287 or 3288-2 or 3289 Printer attached. See M3271, 3272 or 3274 pages. Up to 24 3277 mdls 1 or 2 can be attached to the 8101 on a system. This maximum is reduced by one for each 3284, 3286, or 3288 attached to the 8101. See M8101 pages.

Prerequisitess: A 3271 mdl 2 or 12, 3272 mdl 2, 3274 with Type B Terminal Adapters, or an 8101 with #1505 or #1506. See M3271, 3272, 3274 or 8101 pages. 3277 Displays attached to the 3791 Controller must have keyboards.

HIGHLIGHTS

The 3277 displays 63 9X12 dot matrix high-quality characters (36 alphamerics, 27 special characters, including the space). The 3277 features Data-Field Organization which permits individual fields of data on the screen to be program-defined with various attributes, such as: protected or unprotected, alphameric or numeric-only, normal intensity, non-displayed, or brightened intensity, and selector light-pen detection - allowed or disallowed.

Editing Features: Typamatic cursor, tab, back-tab, protected data, insert and delete, and extended-erase (erase to end of field, erase all keyboard input data, erase entire screen) are standard features for displays equipped with a keyboard.

Input Flexibility: A choice of keyboards, a selector light-pen, a set of Program Function keys provide unmatched input flexibility. See "Special Features" below.

Output Flexibility: Information on the screen can be directed to another display or hard copy device under program control.

Security Enhancement Features: An Operator Identification Card Reader (optional) is provided to enter system user identification. This enhances the (programmed) control of the operator's access to data and audits his actions. It may also be used to enter any sequence of characters (pre-recorded on a card) for other purposes, such as transaction control and account identification.

A special Non-Displayed Keying Mode (standard): Provides for fields of data to be program-defined so they will accept security data entered from the keyboard without displaying the data on the screen. A Security Key lock (optional) provides a lock and key which prevents modification of data on the display if the key is in the "On" position. The data is not visible on the screen.

For Operator Display on System/3 Mdl 4: A 3277 mdl 1 (without keyboard) is required on the System/3 mdl 4. It functions as the operator display for the Communications Control Program (CCP). A 3271 or 3272 is not required. No cable order is required.

For Local Work Stations on System/3 Mdl 4: Up to five 3277s (mdls 1 and 2 intermixed) can be directly attached to the 5404 Processing Unit. A 3271 or 3272 Control Unit is not required. A cable is required. All 3277 "Special Features" apply. See "Specify" below for voltage and cable ordering information.

For Local Display Adapter on System/3 Mdls 8 or 12: Up to 12 3277s (mdls 1 and 2 intermixed) can be directly attached to the Local Display Adapter (#4702) with appropriate subfeatures on the 5408 or 5412. This maximum is reduced by one for each 3284 (mdl 1 or 2), 3286 (mdl 1 or 2), 3287 (mdl 1 or 2) or 3288 (mdl 2) Printer that is attached. A 3271 or 3272 Control Unit is not required. A cable is required. All 3277 "Special Features" apply with the exception of ASCII keyboards and character sets. Specify **#9089** for EBCDIC Character Set. See "Specify" for voltage and cable ordering information.

For Operator Console on System/3 Mdl 15: A 3277 mdl 1 is required on the System/3 mdl 15. It functions as an operator console and must be equipped with 78-key Operator Console Keyboard (#4632). For Character Generator Keyboard Language and nomenclature as well as complete ordering instructions for System/3 mdi 15 console, see M5415 pages "Console Ordering Instructions".

For Display Adapter on System/3 Mdl 15: Up to 30 3277s (mdls 1 and 2 intermixed) can be directly attached to the Display Adapter (#4601/#4602) on the 5415. The maximum is reduced by one for each 3284, 3286, 3287, or 3288 printer that is attached. A 3271 and 3272 is not required. A cable order is required. See "Specify" for voltage and cable ordering information. All 3277 special features apply.

For use with 3790 Communication System: For special features that are supported, see M3791 pages. A 3271 or 3272 or 3274 is not required when the 3277 mdl 2 is attached to the 3791. For character set, specify **#9089**. For power, see "Specify". For cables, see M3791 pages.

For use with 8100 System: For special features that are supported, see the M8100 pages. A 3271 or 3272 is not required when the 3277 mdl 2 is attached to the 8101 with feature #1505 or #1506. For Character Set, specify **#9089**. For power, see "Specify". For cables, see M8100 pages. Host programs written for the 3270 are not supported by the 8100 System.

Bibliography: See *KWIC Index,* G320-1621 or specific system bibliography.

SPECIFY

- Voltage (115V AC, 1 phase, 3 - wire, 60 Hz): Specify **#9880** for locking plug, **#9881** for non-locking plug. Note: The Hospital Grade Plug, RPQ #8K0696 (no-charge), is required for Hospital General Care Areas. **Field Installable.** No.

- Cables: See "Accessories" for cable ordering instructions. Refer to *3270 Installation Manual-Physical Planning,* GA27-2787.

- Character Set: Specify one of the following unless Data Analysis - APL Feature (#1066) is selected:

  #9089 -- for EBCDIC Character Set: Field Installation not recommended ... provides the 64 characters described on the EBCDIC keyboard. **Prerequisites:** If used with the 3271 mdl 1 or 2, EBCDIC Transmission Code (**#9761**) is a prerequisite on the 3271 mdl 1 or 2.

  #9091 -- for ASCII Character Set (A): Field Installation not recommended ... provides the 64 ASCII characters but substitutes the Logical OR and Logical NOT for the exclamation mark and circumflex. **Prerequisites:** If used with the 3271, ASCII Transmission Code (**#9762** or #1200) is a prerequisite on the 3271.

  #9092 -- for ASCII Character Set (B) Field Installation not recommended ... provides the standard 64 ASCII characters. **Prerequisites:** If used with the 3271 mdl 2, ASCII Transmission Code #9762 or #1200 is a prerequisite on the 3271 mdl 2. If used with the 3271 mdl 12, ASCII Transmission Code (#1200) is required on the 3271 mdl 12.

SPECIAL FEATURES

Data Analysis - APL Feature (#1066): [3272 mdl 2] Provides dual case EBCDIC, the APL set, and (for output only) 120 TN print train (see Type Catalog, S/370 Printers) characters. 93 TN characters are input and output both, 27 are output only. **Field Installation:** Yes. **Prerequisites:** #1066 on 3271 or 3272.

Audible Alarm (#1090): An alarm, sounded under program control, to alert the operator to a special condition during keyboard operation when a characterxis entered into the next-to-last position on the screen. **Maximum:** One. **Field Installation:** Yes.

Keyboards: [Maximum: One per 3277] Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

66-Key EBCDIC Typewriter Keyboard (#4630): Typewriter-like layout, movable, with 45 alphameric keys and 21 control keys. **Field Installation:** Yes. **Prerequisites:** Keyboard Language. See "Specify".

66-Key EBCDIC Data Entry Keyboard (#4631): Movable, with 36 alphameric keys and 30 control keys. **Field Installation:** Yes. **Prerequisites:** Keyboard Language. See "Specify".

78-Key Operator Console Keyboard (#4632): Operator-console layout, movable, with 45 alphameric keys, 21 control keys, and 12 program function keys. **Field Installation:** Yes. **Note:** Available only in English US except when used on a 5415 console. See M5415 pages.

3277 Display Station (cont'd)

78-Key EBCDIC Typewriter Keyboard (#4633): 66-key EBCDIC typewriter layout, movable, with 12 additional program function keys. **Field Installation:** Yes. **Prerequisites:** Keyboard Language. See "Specify".

66-Key ASCII Typewriter Keyboard (#4634): ASCII typewriter layout, movable, with 45 alphameric keys and 21 control keys. **Prerequisites: #9091** or **#9092.**

78-Key ASCII Typewriter Keyboard (#4635): 66 key ASCII typewriter layout with 12 additional function keys, movable. **Prerequisites: #9091** or **#9092.**

66-Key EBCDIC Data Entry Keyboard with Keypunch Layout (#4636): Movable with 36 alphameric keys and 30 control keys. **Field Installation:** Yes.

66-Key EBCDIC Typewriter/APL Keyboard (#4637): Movable, with 45 alphameric and 21 control keys. **Field Installation:** Yes. **Prerequisites:** #1066.

78-Key EBCDIC Typewriter/APL Keyboard (#4638): Movable with 45 alphameric keys, 21 control keys and 12 program keys. **Field Installation:** Yes. **Prerequisites:** #1066.

78-Key Text Keyboard (#4639): With 45 alphameric keys, 21 control keys and 12 program keys. **Prerequisites:** #1066 on 3277 mdl 2 as well as on a control unit (only 3271 mdl 2 or 12 or 3272 mdl 2).

Operator Identification Card Reader (#4600): Provides the capability of reading 53.9mm x 85.7mm (2-1/8 inches x 3-3/8 inches) plastic data processing card with an encoded magnetic stripe. Using the 10-numeric character set, the number of characters that can be read is 1-37 characters at 75 bpi (bits per inch).

#4600 provides 1) the ability to read an operator identification card to allow identification of the display operator, thus enhancing system data security capability and 2) the ability to read the magnetic stripe credit card (53.9mm x 85.7mm).

For complete information on the availability of pre-encoded magnetic striped plastic data processing cards, contact a SSD Representative. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Any keyboard.

Keyboard Numeric Lock (#4690): Provides the ability to lock the keyboard, if a non-numeric key, other than 0-9, minus , period, or DUP, is depressed in a predefined numeric-only field. **Field Installation:** Yes. Contact local Field Engineering Branch Office for installation.

Security Key Lock (#6340): A lock and key prevent modification of data on the display if the key is in the "Off" position. Data is not visible on the screen. **Maximum:** One. **Field Installation:** Yes.

Selector Light-Pen (#6350): A hand-held, pen-like device that permits the display operator to select fields of data from a display for computer input. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Cables and or associated parts to attach the 3277 to the 3271/3272/3274 Control Units may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors **#1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors **#1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two **#2577672** or two **#1833108** cable assemblies together.

Locks and Keys (P/N 2577741): The 3277 with Security Keylock **#6340** special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). Order Allow two to three weeks for delivery.

3277 Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3277 Display Station keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

SUPPLIES (None)

3278 DISPLAY STATION

PURPOSE

A cathode-ray tube (CRT) display station used in clusters with the 3274 Control Unit or the 3276 Control Unit Display Station for displaying alphameric data, and for entering data into and retrieving data from a System/3, S/360, S/370, a 4300 Processor, a 3081 Processor, a 3790 Communication System, a 3814 Switching Management System, or 8100 System. A Keyboard, Selector Light-Pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner. With its set of basic and optional features, the 3278 meets both general-purpose and unique display requirements.

MODELS

Model 1	001	For use with 3274 or 3276 to display up to 960 characters ... 12 lines of 80 characters each.
Model 2	002	For use with 3274 or 3276 or to attach directly to the 3082 Processor Controllers, or to attach to the 4321 Processor and the 4331 Processor, via the Standard Display/ Printer Adapter or optional Display/ Printer Adapter Expansion, or to attach to the 3814 model A Switching Management System with the Display/Printer Attachment Feature, or to attach to a 3601, 3602, or 4701 Finance Communication Controller via the Device Cluster Adapter. Displays up to 1920 characters ... 24 lines of 80 characters each.
Model 3	003	For use with 3274 or 3276 to display up to 2560 characters ... 32 lines of 80 characters each.
Model 4	004	For use with 3274 or 3276 to display up to 3440 characters ... 43 lines of 80 characters each.
Model 5	005	For use with 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C to display up to 3564 characters ... 27 lines of 132 characters each.

For use with a 3790 Communication System: The 3791 Controller only supports the 3278 Model 2. See the *3791 Configurator,* GA27-2768, for additional details.

For use with an 8100 System: see the *System Configurator,* GA27-2876.

STANDARD MODEL

The 3278 Model 2 with the basic configuration (see "Basic Configuration", below) and #9201 (Audible Alarm and Security Keylock) is designated as the standard model for this machine type. The Standard model is ordered by simply specifying the 3278 Model 2 and selecting a Standard Model Keyboard below.

STANDARD MODEL KEYBOARD CONFIGURATION

One of the following keyboard configurations must be selected when ordering a standard model.

- 75-key EBCDIC Typewriter Keyboard **#4621**
- 75-key EBCDIC Typewriter Keyboard with Keyboard Numeric Lock **#4631, #4690**
- 75-key EBCDIC Data Entry Keyboard **#4622**
- 75-key EBCDIC Data Entry Keyboard with Keyboard Numeric Lock **#4622, #4690**
- 87-key EBCDIC Typewriter Keyboard **#4627**
- 87-key EBCDIC Typewriter Keyboard with Keyboard Numeric Lock **#4627, #4690**

No accessories, additional features, RPQ's, or other alterations will be shipped with Standard Models.

HIGHLIGHTS

Displays a character within a 7 x 14 character matrix in 960, 1920 and 2560 character models; within a 7 x 12 character matrix in the 3440 and 3564 character model. The basic 26 character upper case letters are presented in a 7 x 9 character matrix for the 960, 1920 and 2560 character models, and in a 7 x 8 character matrix for the 3440 and 3564 character model. Displays a 94-character set: 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters. A monocase switch provides the capability of switching to uppercase alphameric mode for 3277 compatibility. Uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/ unprotected, alphameric, normal/ intensified, displayable/ non-displayable, and selector light-pen detection allowed/disallowed.

Extensions to the 3270 data stream supported by appropriate 3274 and 3278 features, provide the following field and character attributes:

- Extended highlighting - blink, reverse video or underscore.
- Programmed Symbols (PS) - user-defined symbols.

Special keyboards are provided to allow operator selection of these attributes.

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of a 3278. When the 3278 is attached to a 3274 Control Unit, the printer designation is controlled by operator use of the IDENT key and by:

a. a printer authorization matrix which is loaded into the 3274 Control Unit through a user written host application program, or,

b. a customer definable matrix loaded from the system diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3278 is attached to a 3276 Control Unit Display Station, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276. (The host can perform a copy in a manner compatible with existing 3271/3272 support.)

Operator Factors: The 3278 has an anti-glare screen. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Display of data on the screen is accomplished without refresh interrupt (i.e., no blinking, except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphameric, special symbol, and cursor move keys have typamatic capability. Double speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the Selector Light-Pen function. Fields of data may be selected by positioning the cursor and then using the Cursor Select key.

Input Flexibility: A choice of keyboards or the Selector Light-Pen provide input flexibility. A Magnetic Slot Reader (optional) and, for 3278's attached to a 3274 Control Unit, a Magnetic Hand Scanner (optional) provide for the input of magnetically encoded data ... see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the Selector Light-Pen. Twelve Program Function (PF) keys are basic with all typewriter keyboards.

When attached to a 3274 Control Unit with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 Sales pages for languages supported.

Entry Assist is supported for Models 2, 3, 4 and Model 5 in Model 2 mode only.

See Accessories for 3274 Entry Assist keytop kits.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions. A Magnetic Slot Reader (optional) and, for 3278s attached to a 3274 Control Unit, a Magnetic Hand Scanner (optional) are available to enter system user identification.

Audible Alarm: An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. **Maximum:** One. **Field Installation:** Yes.

When attached to a 4321 or 4331 Processor via the standard Display/ Printer Adapter or optional Display/ Printer Adapter Expansion, functional support varies from that of the 3278-2 attached to a 3274 or 3276. See M4321, M4331 for details of support.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the *Problem Determination Guide* manual that will be stored under the keyboard palm rest. Also, see "Customer Responsibilities".

3278 Display Station (cont'd)

Customer Setup (CSU): The 3278 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the General Information (GI) section.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3278.
- Physical setup, connection of cables in customer access areas, switch settings and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Prerequisites: 3278 needs a 3274, 3276, or 4321, 4331 with appropriate Terminal Adapter, or a 3814 Switching Management System with the Display/Printer Attachment Feature. The 3278 mdl 5 requires Configuration Support B **#9111**, C C **#9112**, D **#9124**, or T **#9113** on the 3274 to which it is attached ... See M3274, M3276 M4321, or M4331 pages.

When attached to the 3790 Communication System or the 8100 System via the 3276 Control Unit, all 3278 Display Stations must have a keyboard. When the 3278 model 2 is attached to a 3814 model A, one of the following keyboards is required: #4627 (preferred), #4621, #4622, or #4623. The following features are optional: #1090, #1720, #4690, and #6340. All other 3278 model 2 special features are not supported.

Bibliography: See *KWIC Index,* G320-1621 or specific system bibliography.

BASIC CONFIGURATION

Specify codes are not normally required to order a 3278. If not specified otherwise, all models of the machine are shipped with the following:

- Voltage: 120V AC, 1-phase, 3-wire, 60 Hz.
- Power Cable Plug: Non-locking **#9891**.
- Power Cable Length: 2.8 meters (9 feet).
- Keyboard Cable Length: 0.9 meters (3 feet).

SPECIFY

- Power Plug: Specify **#9890** for a locking plug.
- Keyboard Cable Length: If the standard 0.9 meter (3 foot) Keyboard cable is not desired, specify **#9399** for a 1.8 meter (6 foot) cable. **Limitations:** This feature is not available for Keyboards #4640, #4651, or #4652.
- Power Cable Length: If the standard 2.8 meter (9 foot) power cable is not desired, specify **#9513** for a 4.5 meter (15 foot) cable.
- Terminal Cables: See Accessories for ordering instructions. For cable specifications, see *3270 Installation Manual - Physical Planning,* GA27-2787.
- RPQs: Specify **#9841** if machine has any associated RPQs.
- Keyboard: Specify **#9842** if no Keyboard is attached.
- 3814 Model A Attachment: Specify **#9615** to attach 3278 Model 2 to a 3814 Model A.

MODEL CHANGES

Field installable, except that field conversion of Model 5 with serial numbers A0000 to P0000, to any other model is not recommended.

SPECIAL FEATURES

Note: 3274-21 models, models 31A, 31C or 51C may not support all desired 3278 Special Features. Before ordering any of the following special features, check the 3274 to assure that adequate storage is available.

Not all of the following special features are supported by 3278-2s attached to the 4331 system via the standard Display/Printer Adapter or the Display/Printer Adapter Expansion. See M4331 pages for a list of supported special features.

CHARACTER SET EXTENSION (#3620): Provides the capability for display of 222-character APL/Text character set, including the 94-character EBCDIC set, and for extended character and highlighting capabilities - blink, reverse video or underscore, and the control and buffering necessary for the PS (#5790) feature. **Maximum:** One. **Field Installation:** Yes. **Corequisite:** To permit operator interaction with APL/Text or highlighting, one of the following keyboards may be used. See individual descriptions for details of function(s) provided and for limitation or restrictions. Keyboards with APL capability: #4626, or #4652. Keyboard with Text Capability: #4629. Keyboards with Highlighting Capability: #4640, #4651, or #4652. **Limitations:** [1] This feature is only valid on a 3278 Display Station attached to a 3276 with APL/Text Control feature #1067, or to a 3274 Model X1A, X1C, or X1D customized to include the APL/Text control function. This feature is EBCDIC only and is *NOT* compatible with ASCII. [2] Cannot be installed with ECSA #3610. [3] Cannot be installed with APL/Text #1120.

KEYBOARDS: Refer to Type Catalog, section 200 of this sales manual for a picture of the keyboard layouts.

Keyboards are provided with a standard 0.9 meter (3 foot) attachment cable. See "Specify" section for options.

#4621 -- 75-key EBCDIC Typewriter Keyboard, typewriter-like layout, movable, with 49 data keys and 26 control keys. Twelve program function keys are included in the top row of data keys through use of an alternate shift key.

#4622 -- 75-key EBCDIC Data Entry Keyboard, movable, with 35 data keys, 10 program function keys and 30 control keys.

#4623 -- 75-key EBCDIC Data Entry Keyboard, keypunch layout, movable, with 35 data keys, 10 program function keys and 30 control keys.

#4624 -- 75-key ASCII Typewriter Keyboard, ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. Twelve program function keys are included in the top row of the data keys through use of an alternate shift key.

#4626 -- 87-key EBCDIC Typewriter/APL Keyboard. An 87-key EBCDIC typewriter keyboard (ref #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in basic EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC typewriter keyboard without APL (ref 4627), this keyboard has only twelve program function keys (PF1 through PF12) which are the group of twelve keys to the right of the main keyboard area. **Prerequisites:** APL/Text **#1120** or Character Set Extension **#3620.**

#4627 -- 87-key EBCDIC Typewriter Keyboard, typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and twelve program function keys (24 total PF keys). Twelve of the program function keys are included in the top row of data keys through the use of an alternate shift key.

#4628 -- 87-key ASCII Typewriter Keyboard, ASCII typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and twelve program function keys (24 total PF keys). Twelve of the program function keys are included in the top row of data keys and are available through the use of an alternate shift key.

#4629 -- 87-key EBCDIC Typewriter/Text Keyboard, an 87-key EBCDIC typewriter keyboard (ref FC #4627) with modified keytops to allow entry of 65 Text specific characters in addition to the 94-character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter or Text mode.

In contrast to an 87-key EBCDIC typewriter keyboard without Text (ref FC #4627), this keyboard has only twelve program function keys

(PF1 through PF12) which are the group of twelve keys to the right of the main keyboard area. **Prerequisites:** APL/Text **#1120** or Character Set Extension **#3620.**

#4640 -- 87-key EBCDIC Typewriter Overlay Keyboard. This Keyboard, without the overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Attribute Select Typewriter Keyboard (#4651) with the basic 94-character EBCDIC character set. This keyboard, however, has special narrow keytops which permit the use of customer annotated overlays. These overlays are used to show the special font symbols associated with the keys when one of the Programmed Symbols is selected. Six overlays are supplied with each Keyboard. Additional overlays can be obtained via MES. (See M10000 pages.) See Attribute Select typewriter Keyboard for additional details ... **Limitations:** Cannot be installed on a 3278 attached to a 3276 Control Unit Display Station.

#4651 -- 87-key EBCDIC Attribute Select Typewriter Keyboard. Overlay and Attribute Select Keyboards are equipped with PS, highlight and color select function Keys. They provide operator selection for data entry, under program control, of PS and

3278 Display Station (cont'd)

highlighting attributes when attached to 3278 Display Stations equipped with the appropriate features. The desired PS and highlights can be selected by the operator through use of the appropriate PF keys (13-24) in upper case and alternate shift on this Keyboard. **Limitations:** Cannot be installed on a 3278 attached to a 3276 Control Unit Display Station.

#4652 -- 87-key EBCDIC Attribute Select Typewriter/APL Keyboard. See Attribute Select typewriter keyboard for additional detail. **Limitations:** Cannot be installed on a 3278 attached to a 3276 Control Unit Display Station.

Limitations: Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. **Maximum:** One of the above. **Field Installation:** Yes. The keyboard is set up by the customer.

KEYBOARD NUMERIC LOCK (#4690): Provides keyboard #4621, #4622, #4623, #4624, #4626, #4627, #4628, #4629 with the ability to lock the keyboard if a non-numeric key [other than 0-9, minus (-), decimal sign, or dup] is operated in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes. Contact Field Engineering Branch Office for installation. MES number 999999 is to be used for IR (Incident Report) completion data. *Note:* The numeric lock function is enabled on keyboards #4640, #4651, and #4652 as an option of 3274 customization, in which case these keyboards will either all have, or all not have, the numeric lock function.

MAGNETIC READER CONTROL (#4999): Provides the capability of attaching a Magnetic Hand Scanner (MHS) or Magnetic Slot Reader (MSR) which read encoded information from a magnetic stripe. The MSR can be used when the 3278 is connected to either a 3274 or 3276, but the MHS can only be used when the 3278 is connected to a 3274 Control Unit. **Limitations:** Cannot be installed with the IBM 3278 Personal Computer Adapter Feature Code 5315 or 5316. **Maximum:** One. **Field Installation:** Yes.

IBM 3278 PERSONAL COMPUTER ADAPTER (#5315, #5316): This entry is for information purposes only; see Product Announcement letter 283-HHH for ordering instructions. Provides the capability of attaching an IBM Personal Computer to the Display Station. If the 3278 model 1-4 serial number is in the range A0000-N9999 or is in the range 9V000-9W999, order Personal Computer Option, Item #5315. For the 3278 model 5 and all other serial numbers (e.g. PO123, 1A425, 71G65), order Personal Computer Option, Item #5316. **Maximum:** One. Field Installation only. **Prerequisites:** (a) IBM Personal Computer, 5150, model X14 or X64 or X74 with Color/ Graphics Monitor Adapter (for 3278 models 1, 2, 3, 4, 5), or the Monochrome Display and Printer Adapter (for 3278 models 1, 2, 3, 4) or (b) IBM Personal Computer System Unit, 5150 with Color/ Graphics Monitor Adapter (for 3278 models 1, 2, 3, 4, 5), or the Monochrome Display and Printer Adapter (for 3278 models 1, 2, 3, 4), Diskette Drive Adapter, one Diskette Drive, and at least 64K total memory; (c) 3274 or 3276 Control Unit. **Limitations:** Cannot be installed with Magnetic Reader Control, Feature Code 4999.

PROGRAMMED SYMBOLS (PS) #5790): This feature provides the storage and accessing of 6 (six) 190-symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is 94. plus space.

Maximum: One **Field Installation:** Yes. **Limitations:** 1) Only available on Models 2, 3 and 4. 2) Can only be used with a 3274 Control Unit having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. 3) If display operator access to PS is required, the 87-key EBCDIC Typewriter Overlay Keyboard (#4640). 67-key EBCDIC Attribute Select Typewriter Keyboard (#4651) or 87-key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652) must be ordered. 4) Cannot be installed with PS-2 or PS-4 (#5781, #5782). **Prerequisites:** Character Set Extension #3620, or ECSA #3610 (if already installed. This feature is no longer available on new machines.)

SELECTOR LIGHT-PEN (#6360): A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The Selector Light-Pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector Light-Pen (and Cursor Select) operations have been expanded to include a new designator character "&". When this designator is used the Read Modified operation returns both the addresses and the data of all modified fields on the screen. The #6351 Selector Light Pen has a slightly wider field of view to facilitate operator ease-of-use. **Maximum:** One. **Field Installation:** Yes.

ACCESSORIES

The following items are available on a purchase only basis. For shipment with machine, order the Feature Number as shown below.

Item	Feature Number	Max Qty
Switch Control Unit	#9181	
Magnetic Hand Scanner	#9440	*
Magnetic Slot Reader	#9441	*
Magnetic Reader Extension Cable.... for use with Magnetic Hand Scanner or Magnetic Slot Reader		
6 meter (19.7 feet)	#9106	**
12 meter (39.4 feet)	#9107	**

* A maximum of one magnetic reader or scanner may be ordered.
** A maximum of one extension cable may be ordered.

CABLES

Cables and or associated parts to attach the subject machines to the 3271/3272/3274 Control Units and 3276 Control Unit Display Station, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
ASSM	2577672	Cable Assembly In-Door
BULK	0323921	Coax Wire (Note 2)
P/N	1836418	Connector Kit (Note 2)
ASSM	1833108	Cable Assembly Out-Door
BULK	5252750	Coax Wire (Note 3)
P/N	1836419	Connector Kit (Note 3)
P/N	2621414	Modification Kit (Note 4)
P/N	1833106	Station Protector Attachment Kit (Note 6)
P/N	5252643	Adapter (Note 8)
P/N	1830818	Station Protection Kit, Gas (Note 5)
P/N	5252899	Station Protector Element, Gas (Note 7)

Notes:

1. Order via MSORDER (Category = Bulk Cable) on AAS. Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

KEYBOARD OVERLAY

A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

LOCKS and KEYS

The 3278, with Security Keylock **#6340** special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). Order via MSORDER (Category = Supplies/Accessories; Group Code = DP Supply Order) on AAS. Allow two to three weeks for delivery.

Keys **P/N 2577741**

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper

3278 Display Station (cont'd)

encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropiate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions:

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regurlarly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner **P/N 4123495**

MAGNETIC SLOT READER

The Magnetic Slot Reader (MSR) attaches by a 1.5 meter cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR has have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature on the appropriate machine is required to use the MSR.

Ordering Instructions: For ordering for delivery with machine, see chart above. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3278

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regurlarly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

MAGNETIC READER EXTENSION CABLES:

These cable assemblies can be used to extend the Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitation: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: For ordering for delivery with the machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3278.

Cable 6 meters (19.7 feet), **P/N 4832986,**
Cable 12 meters (39.4 feet) **P/N 4832987,**

MAGNETIC READER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader replacement assemblies which the customer may want to consider stocking.

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

DISPLAY STATION KEYBOARD ACCESSORIES

The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3278 Display Station keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered by part number via a DP Supply Order from the Raleigh plant.

Legendable Keytop:

The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key)

Legendable Keytops:	Part No.
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop:

The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key)

Blank Keytops:	Part No.
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor:

The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

	Part No.
Keytop Extractor	**9900373**

3278 Display Station (cont'd)

SWITCH CONTROL UNIT

Permits switching operational control of a 3278 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by part number via MES for field installation only. For shipment with machine, by Feature Code number (see Accessories).

P/N 1743301 should be specified when ordering by MES for field installation. Enter one MES for multiple quantities of part number ordered, using serial number zero (00000) on the MES.

3278 DISPLAY CONSOLE MDL 2A

PURPOSE

A cathode-ray tube (CRT) display and accompanying keyboard that serves as the primary system console for 4300, 3081/3083/3084 processors.

4300 USAGE: The 3278-2A Display Console and its appropriate operator Control Keyboard provides for operator interaction with the processor for both normal operations and maintenance. It is used to effect the major control functions of Power On (4341 only), Power Off, Initial Microprogram Load (IML), and Start/Stop. It also serves as the primary console for all operator interaction with the System Control Program. For maintenance and service support, the console displays status of the processor complex and is used for interaction with the processor complex by service and support personnel. It is also used for controlling diagnostic tools.

3081/3083/3084 USAGE: The 3278-2A Display Console and its appropriate Operator Control Keyboard are used to effect the major control functions of Initial Microprogram Load (IML), Start/Stop, manual mode functions, configuration control, and/or activity monitoring of various elements within the processor complex. An additional device over and above the system console is required for operator dialogue with the System Control Program. The 3278-2A may be located up to 1500 meters from the 3081/3083/3084. An operator console keyboard (#4641) most be ordered for use with a 3081/3083/3084.

HIGHLIGHTS

Displays characters in a 7 x 14 matrix (uppercase alphabet is displayed in a 7 x 9 matrix), arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator, rows 21 through 24 are used for system status information. A 96 character set is used, which consists of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters, plus space and null.

The 3278-2A Display Console is used for manually effecting the stopped state functions of alteration and display of storage, address comparing, and full rate processing versus single instructing processing. The console indicates to the operator both proper operation and malfunctions, should they occur.

The 3278-2A Display Console is a prerequisite of and normally installed concurrently with the 4300 and 3081/3083/3084 processors.

Operator Factors: The 3278 has an anti-glare screen. Indicators are displayed in symbols and/or words outside the data area. The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys.

Editing: Cursor move, tab, home, back tab, insert, delete, erase to end-of-field, and erase all input keys are basic to the console keyboard. Alphameric, special symbol and cursor move keys have typamatic capability. Twelve (12) Program Function (PF) keys are basic.

Audible Alarm: An alarm sounded under program control to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen (except when attached to a 4321 or 4331 Processor). The operator may adjust the volume of the tone.

Problem Determination Procedures: Significant function has been designed into this unit to provide high availability to the customer. This high availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the *Problem Determination Guide* manual that will be stored under keyboard palm rest.

PREREQUISITES: An available console position on any 4300 processor or 3082 Processor Controller ... see M4321, M4331, M4341, or M3082 pages.

The 3278 mdl 2A requires an Operator Console Keyboard. The 3278 mdl 2A that is used as the primary console on a 4300 Processor must have an Operator Console Keyboard with an operator control panel.

SPECIFY

If specify codes are not specified, the machine is shipped with the following specifications:

- RPQ's: Machine has no associated RPQ(s).
- Voltage: 120V AC, 1-phase, 3-wire, 60 Hz.
- Power Cable Plug: Non-locking.
- Power Cable length: 2.8 meters (9 feet).

- RPQs: Specify **#9841** if machine has any associated RPQs.
- Power Cable Length: If the standrd 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) cable, or **#9513** for a 4.5 meter (15 foot) cable.
- Power Cable Plug:Specify **#9890** for a locking plug. See "Special Features" for Waterproof Connector.
- Limitation: All 3278 mdl 2A Display Consoles attached to a 4300 Processor must have the same keyboard language.

MODEL CHANGES

Not recommended for field installation.

SPECIAL FEATURES

KEYBOARD: Refer to Type Catalog, Section 200 of this sales manual for a picture of the keyboard layouts.

#4631 -- 75-Key Operator Console Keyboard with Channel to Channel (for use with 4341 only); typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate shift key. Provides 49 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel to Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, I/O Interface Disabled). Channel to Channel is required for systems having a channel to channel adapter feature

#4632 -- 75-Key Operator Console Keyboard without Channel to Channel (for use with 4341 only); same as #4631 but the operator control panel does not have the Channel to Channel control key or the Channel to Channel Disabled Indicator

#4633 -- 75-Key Operator Console Keyboard - same as 4631 but with no operator control panel. For use with 4341 only

#4634 -- 75-Key Operator Console Keyboard without Channel to Channel or Power On (for use with 4321 or 4331 only). Same as #4631 but the operator control panel does not have the Channel to Channel control key, or the Channel to Channel Disabled Indicator, or the Power On key

#4641 -- 75-Key Operator Console Keyboard (for use with 3081/3083/ 3084 only). Typewriter - like layout, moveable with 12 PF keys available on the top row through the use of the Alternate Shift Key. Provides 49 data keys and 2 control keys, and contains an operator control panel with two (2) control keys (IML, LAMP TEST) and five LED indicators (PC Power in Process, PC Power Complete. PC Power Check, Remote Support Active, IML in Process).

Limitations: Keyboards used on 3278 Model 2A are not interchangeable with keyboards used on 3278 Models 1 through 5, nor with keyboards used on 3277 Models 1, 2. **Maximum:** One of the above. **Field Installation:** Yes.

SYSTEM CABLES: For 4300 series processors, refer to the *IBM 4300 Processor Installation Manual - Physical Planning,* GA24-3667. For 3081/3083/3084 Processors, refer to the *IBM System/370 Installation Manual - Physical Planning,* GC22-7004.

SECURITY KEYLOCK #6340: A lock and key which prevents modification or display of data in the display terminal when in the "off" position. **Maximum:** One. **Field Installation:** Yes. **Limitation:** For Display Console attaching to 4300 Processor only.

WATERPROOF POWER CONNECTOR #8802: Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type termination in specific locations. **Limitations:** Available only for power cable lengths of 1.8 meters (6 feet) #9511, or 4.5 meters (15 feet) #9513. **Maximum:** One. **Field Installation:** Not recommended.

ACCESSORIES

Refer to Accessory section under 3278 Model 1. Refer to M4300 or M3081 pages for information pertaining to the 4300 Processors Console Table, or the 3081 Processor Console Table.

ACCESSORIES

CABLES: Cables and or associated parts to attach the subject machines to the 3271/3272/3274 Control Units and 3276 Control Unit Display Station, or Local Display Adapter (#4702) on the 3276 Display Station Control Unit, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787, and *Coaxial Cable and Accessories Manual,* GA27-2805. The customer is

3278 Display Console Mdl 2A (cont'd)

responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
ASSM	2577672	Cable Assembly In-Door
BULK	0323921	Coax Wire (Note 2)
P/N	1836418	Connector Kit (Note 2)
ASSM	1833108	Cable Assembly Out-Door
BULK	5252750	Coax Wire (Note 3)
P/N	1836419	Connector Kit (Note 3)
P/N	1833104	Station Protector Kit, Carbon (Note 5)
P/N	2621414	Modification Kit (Note 4)
P/N	1833106	Station Protector Attachment Kit (Note 6)
P/N	1833104	Station Protector Kit, Carbon (Note 5)
P/N	5252772	Station Protector Element Carbon (Note 7)
P/N	5252643	Adapter (Note 8)
P/N	1830818	Station Protection Kit, Gas (Note 5)
P/N	5252899	Station Protector Element, Gas (Note 7)

Notes:

1. Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

KEYBOARD ACCESSORIES, DISPLAY STATION: The following keyboard accessories allow the customer to define and change the messages on the keytops of the 3278 display station keyboards. These accessories affect keytops only and do not change any characters or functions of the display station. The accessories consist of lgendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories are ordered by part number rather than by MES.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base, and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only (for example, the Clear key).

Legendable keytop, white, **P/N 5188775** purchase only
Legendable keytop, charcoal gray, **P/N 8627192** purchase only
Legendable keytop, light gray, **P/N 8542831** purchase only

Blank Keytop: The blank keytop is for use as an unlabeled keytop or for customer engraved nomenclature. The keytop comes in three colors and is available with top keyboard row contour only (for example, the Clear key).

Blank keytop, white, **P/N 1853775**, purchase only
Blank keytop, charcoal gray, **P/N 1853567**, purchase only
Blank keytop, light gray, **P/N 1853563**, purchase only

Keytop Extractor: The keytop extractor is a small tweezer-like device which fits between keytops. With a firm squeezing grip on a keytop, it can be pulled off its stem. The customer should use the extractor whenever a keytop is to be removed from a keyboard.

Keytop Extractor, **P/N 9900373**, purchase only

KEYBOARD OVERLAY: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**
88-Keyboard Overlay **P/N 1742781**

LOCKS and KEYS: The 3278 with Security Keylock **#6340** special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). Order via MES from Kingston. A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

Keys **P/N 2577741**

MAGNETIC HAND SCANNER: The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropiate machine is required to use the Magnetic Hand Scanner.

ORDERING INSTRUCTIONS: For delivery with machine, see "Machines" pages. When ordering via MES, order from Raleigh.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regurlarly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service for the Magnetic Scanners will be preformed by the CE. The customer can obtain post-warranty maintenance on a Time and Material basis from CE. The customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner **P/N 4123495**

MAGNETIC SLOT READER: The Magnetic Slot Reader (MSR) attaches by a 1.5 meter cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature on the appropriate machine is required to use the MSR.

Ordering Instructions: For delivery with machine, see "Machines" pages. When ordering via MES, order from Raleigh.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regurlarly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service for the Magnetic Scanners will be preformed by the CE. Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE.

A Magnetic Reader attachment feature on the appropiate machine is required to use the Magnetic Slot Reader.

Magnetic Slot Reader, **P/N 4123500** or feature code **#9441**

MAGNETIC READER/SCANNER EXTENSION CABLES: These cable assemblies can be used to extend the Magnetic Hand Scanner **P/N 4123495** or Magnetic Slot Reader **P/N 4123500** distances. Additional Extension Cable lengths other than those listed below are available . See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

3278 Display Console Mdl 2A (cont'd)

Limitation: Extension cables cannot be plugged into other extension cables.

Cable 6 meters (19.7 feet), **P/N 4832986,**
Cable 12 meters (39.4 feet) **P/N 4832987,**

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

MAGNETIC HAND SCANNER

Number of MHSs P/N 4123495	Sensor Head Assemblies P/N 4832721	Handle and Feedback Assembly P/N 4832701	Amplifier Card and Cord Assembly P/N 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	CoverP/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order from CE Stockrooms. See A/FE Instruction Letter ZM77-0038, DPCE letter #27 dated October 19, 1977.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

SWITCH CONTROL UNIT: Permits switching operational control of a 3278 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by part number via MES for field installation only. For shipment with machine, by Feature Code number (see M3278).

One of the following Part Numbers should be ordered when ordering by MES for field installation.

Language	--3278-- Part Number
English	**1743301**
Canadian French	**1743306**
Japanese	**1743309**
Brazilian/Portuguese	**1743311**
Spanish	**1743312**

3279 COLOR DISPLAY STATION MDLS 2A-3B

NO LONGER AVAILABLE

The 3279 Models 2A, 2B, 3A and 3B are no longer available. MES orders for model changes, features, released RPQs, and accessories are not affected.

No new RPQs will be accepted.

See other M3279 Model pages.

PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276, or the 4321 Processor and 4331 Processor for displaying alphameric data, and for entering data into and receiving data from a S/360, S/370, 4300, 4700 Finance Communication System, or 8100 Information System. In base color mode on all models data fields may be displayed in a choice from four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models 2B and 3B of the 3279, attached to a 3274, data may be displayed at both character and field level in seven colors, with a choice of highlighting modes. APL is provided. Customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and optional features the 3279 meets both general purpose and unique display requirements.

MODELS

Base color

Model 2A A02 — Displays up to 1,920 characters in 24 lines of 80 characters each

Model 3A A03 — Displays up to 2,560 characters in 32 lines of 80 characters each

Extended color

Model 2B B02 — Displays up to 1,920 characters in 24 lines of 80 characters each

Model 3B B03 — Displays up to 2,560 characters in 32 lines of 80 characters each

For use with 8100 Information System, see the *8100 System Configurator,* GA27-2876. For use with 4700 System, refer to M4701 pages.

Prerequisites: 3279 requires a keyboard and a 3274 or 3276 with appropriate features, or a 4321 or 4331 - see M3274, 3276, 4321, or 4331 pages.

Customer Setup (CSU): The 3279 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26 character upper case letters are presented in 7x9 character matrix. A 94-character set is displayed consisting of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters. A monocase switch provides the capability of switching to uppercase alphameric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such as protected/ unprotected, normal/ intensified, displayable/ non-displayable and selector light-pen detection allowed/ disallowed. An audible alarm is provided.

All 3279 mdls use the 3270 formatting attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table.

Protected and intensified	–	White
Unprotected and intensified	–	Red
Protected and normal intensity	–	Blue
Unprotected and normal intensity	–	Green

Extensions to 3270 data stream supported by appropriate 3274 features and by 3279 mdls 2B and 3B and the optional Programmed Symbols (PS) features provide the following field and character attributes.

- Extended Color (red, blue, green, white, yellow, turquoise and pink)
- Extended Highlighting (reverse video, blink, underscore)
- Programmed Symbols (six sets with 190 loadable positions each)

Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.

Programmed Symbols can use the whole character matrix for symbol definition.

In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.

3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls 2A, 3A, 2B, 3B. The display station and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station.

3279 mdls 2B and 3B provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls 2B and 3B are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C, and on the 3276 for APL/Text operation.

APL/Text capability provides for display of a 222-character APL/Text character set including the 94 character EBCDIC set. An appropriate keyboard is available. APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.

For Extended Color and Extended Highlighting on the 3279 mdls 2B and 3B, the structured field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS features require in addition the Programmed Symbols option of 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl 2A will attach to the Display/ Printer Adapter of the 4331 Processor.

For base color mode of operation, all mdls of the 3279 will attach to all mdls of the 3274. Configuration support on the 3274 must be at the following level or higher:

Configuration A - Release 11.1
Configuration B - Release 22.0
Configuration C
Configuration D
Configuration T.

On the 3276, for base color mode, 3279 mdls 2A and 2B will attach to all 3276 mdls except mdl 1 and 3279 mdls 3A and 3B will attach to all 3276 mdls except mdls 1 and 2.

The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e., without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user written host application program, or,
2. A customer definable matrix loaded from the System Diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3279 is attached to 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen, outside the data area and provide useful operator information. These symbols, except those indicating color attributes will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 mdls 2A and 3A to run in 'monochrome mode' for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. The switch has the same function on the 3279 mdls 2B and 3B if no extended color attributes are specified in the data stream. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees, or 20 degrees from the vertical.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphameric, special symbol, and cursor move keys have repeat action capability. Double speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

3279 Color Display Station Mdls 2A-3B (cont'd)

Input Flexibility: A choice of keyboards and/or the selector light-pen provide input flexibility. A Magnetic Slot Reader (optional) and for a 3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available for the input of magnetically coded data ... see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are basic with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, workwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 Sales pages for languages supported. See "Accessories" for 3274 Entry Assist keytops kits.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the 'on' position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to help control access to data and aid audit of actions. A Magnetic Slot Reader (optional), and for 3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available to enter system user identification.

When attached to a 4321 or 4331 Processor via the Display/ Printer Adapter, functional support varies from that of the 3279-2A attached to a 3274 or 3276. See M4321 or M4331 Display/ Printer Adapter feature description for details of support.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the *Problem Determination Guide* manual that can be stored under the keyboard palm rest. Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation enhances the availability and serviceability of the 3274 and the 3276 in BSC mode. See "DEMF" in the SCP section for OS/VS1 and OS/VS2 (MVS).

Customer Responsibilities:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3279.
- Physical setup, connection of cables in customer access areas, switch setting and check out.
- Contacting Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
- Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Note: 3279 attachment to 3274 may require increments of 3274 control storage. Refer to 3274 control storage requirement tables to ensure that adequate Extended Function Store is available if required.

Bibliography: See *KWIC Index*, G320-1621, or specific system bibliography.

SPECIFY

Specify codes may not be necessary to order a 3279. If codes are not specified, the machine is shipped with the following specifications:

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Non-locking plug **#9891.**
- Power Cable Length: 2.8 meter (9 foot)
- Power Cable: If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) or **#9513** for 4.5 meter (15 foot).
- Keyboard Cable Length: 0.9 meter (3 feet).
- Terminal Cables - See "Accessories" for ordering instructions. For cable specifications, see *IBM 3270 Information Display System Installation Manual - Physical Planning*, GA27-2787.
- Power Cable Plug: If locking plug is required, specify **#9890.**

SPECIAL FEATURES

Not all of the following special features are supported for 3279-2As attached to a 4321 or 4331 processor via the Display/ Printer Adapter. See M4321, M4331 Display/ Printer Adapter feature description for details of support.

Switch Control Unit (#1720): This feature, when installed on a 3279, permits switching operational control of that display between two different control units. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Keyboard Numeric Lock (#4690): Provides keyboards #4621, #4622, #4623, #4624, #4626, #4627, #4628, #4629 with the ability to lock the keyboard, if a non-numeric key [other than 0-9, minus, decimal sign, or dup] is operated in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes. Contact local Field Engineering Branch Office for installation. MES No. 999999 is to be used for Incident Report (IR) completion data. Note: The Numeric Lock Function is enabled on Keyboards #4640, #4651, #4652 as an option of 3274 customization in which case these keyboards will either all have, or all not have, the numeric lock function.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #5325.

IBM Personal Computer Adapter (#5322, #5325, #5327): This entry is for information purposes only ... see Product Announcement Letter 183-130 for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. If only the IBM Personal Computer 5150 portion is required, order **#5322.** If only the 3279 portion is required, order **#5327.** The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option **#5322.** A user's guide without the Programming Diskette may be ordered from Mechanicsburg, Pa. using Form # SA230169. **Maximum:** One. **Prerequisities:** (1) 3279 mdls 2A or 3A or 2B or 3B. (2a) IBM Personal Computer, 5150, mdl X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit with Color/Graphics Monitor Adapter, 5-1/4 inch Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. **Limitations:** Cannot be installed with #4999, #6350 or #6351. **Field Installation:** Yes. ContactField Engineering Branch Office for installation.

Programmed Symbols (PS) (#5781 and #5782): These features provide storage and accessing for up to six 190-symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard.

The number of symbols in any one set that can accessed from the display keyboard is 94 plus space.

PS-2, (#5781) Provides PS control and storage for two 190-symbol sets. **Prerequisites:** 3279 mdl 3B.

PS-4, (#5782) Provides control and storage for four additional 190-symbol sets. Three of these symbol sets can be displayed using multiple colors within a character block. **Prerequisites: #5781.**

Limitations: Can be used only with a 3274 having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. **Maximum:** One of each. **Field Installation:** Yes. **Corequisites:** If display operator access to PS is required, #4640, #4651 or #4652 must be ordered. **Note:** If the 3279 is to be used with the Presentation Graphics Feature (PGF) of the Graphical Data Display Manager (GDDM) Program Product 5748-XXH, then both #5781 and #5782 must be installed.

Security Key Lock (#6340): A lock and key which prevents modification or display of data in the display terminal when in the 'off' position. **Maximum:** One. **Field Installation:** Not recommended.

Selector Light-Pen (#6350 mdls 3A and 3B, #6351 mdls 2A and 2B): Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a designator character "&". When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. The selector light-pen (#6351) has a slightly wider field of view to facilitate operator use. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #5325.

3279 Color Display Station Mdls 2A-3B (cont'd)

Keyboards: Refer to Type Catalog for a picture of the keyboard layouts. **Limitations:** Each 3279 Color Display Station must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. **Maximum:** One of the below. **Field Installation:** Yes. The keyboard is set up by the customer. A 0.9 meter (3 foot) keyboard cable is provided as standard. Select one of the following:

#4621 - 75-Key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key.

#4622 - 75-Key EBCDIC Data Entry Keyboard: Movable, with 35 data keys, 10 PF keys and 30 control keys.

#4623 - 75-Key EBCDIC Data Entry Keyboard: Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for data entry.

#4624 - 75-Key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys through use of an alternate shift key.

#4626 - 87-Key EBCDIC Typewriter/APL Keyboard: An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 thru PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl 2B or 3B.

#4627 - 87-Key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the alternate shift key.

#4628 - 87-Key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF Keys). 12 of the PF keys are included in the top row of the data keys and are available through the use of an alternate shift key.

#4629 - 87-Key EBCDIC Typewriter/Text Keyboard: An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 Text-specific characters in addition to the 94-character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter of Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 thru PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl 2B or 3B.

#4640 - 87-Key EBCDIC Typewriter Overlay Keyboard: This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard however, has special narrow keytops that permit the use of customer annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right hand side of the keyboard) in upper case and alternate shift of this keyboard. Enhanced functions are NOT supported on 3279 mdls 2A and 3A. **Limitations:** Cannot be installed on a 3279 that is attached to a 3276.

#4651 - 87-Key EBCDIC Attribute Select Typewriter Keyboard: A typewriter layout, movable, similar to the 87-key EBCDIC Typewriter Keyboard #4627. Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisite:** 3279 mdl 2B or 3B. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

#4652 - 87-Key EBCDIC Attribute Select Typewriter/APL Keyboard: A typewriter layout, movable keyboard, similar to the 87-key EBCDIC Typewriter Keyboard #4626. Attribute select functions are shown on the 12 PF keys at the right hand side of the keyboard. **Prerequisite:** 3279 mdl 2B or 3B. **Limitation:** Cannot be installed on a 3279 attached to a 3276.

Overlay and Attribute Select keyboards: These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of the keyboard). They provide operator selection under program control, of highlight, PS and color attributes. Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The upper case and alternate shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. **Limitations:** Attribute selection is NOT supported for keyboards on a 3279 mdl 2B or 3B attached to a 3276, OR for keyboards attached to a 3279 mdl 2A or 3A.

MODEL CONVERSIONS

Model changes from 2A to 2B and 3A to 3B are field installable. Model changes from 2A to 3A or 3B or from 2B to 3A or 3B are not recommended for field installation.

ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed descriptions below for additional information and for ordering by MES for field installation.

Item	Feature Number	P/N	Max Qty
Magnetic Hand Scanner	**#9440**	**4123495**	*
Magnetic Slot Reader	**#9441**	**4123500**	*

* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature Number	P/N	Max Qty
6 meter (20 feet)	**#9106**	**4832986**	**
12 meter (40 feet)	**#9107**	**4832987**	**

** A maximum of one extension cable may be ordered.

Item	Feature Number	P/N
Tilt/rotate accessory	N/A	**4422265**
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. **Limitations:** Extension cables cannot be plugged into other extension cables. **Prerequisites: #4999.**

Item	Feature Number	P/N
6 meter (20 feet)	**#9106**	**4832986**
12 meter (40 feet)	**#9107**	**4832987**

Both the MHS and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphanumeric character set. For a further description of both character sets, see *IBM 3270 Information Display System Character Set Reference,* GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 Control Unit Display Station and attached 3278s and 3279s support only the MSR and the 10 character numeric only set as used by the 3277.

Numeric and alphanumeric character capabilities are as follows:

MSR/MHS	Minimum number of Hex Codes between start sentinel and end sentinel characters	Maximum number of characters between start sentinel and end sentinel characters	Bit Density: Bits per inch	Bit Density: Bits per mm
3277 Like 10-numeric character set*	7 7	37 118	75 127	3 5
Alphameric character set*	7 7 7 7 7	37 numerics 18 non-numerics 118 numerics 59 non-numerics 37 numerics	75 75 127 127 210**	3 3 5 5 8.3

* 1 Hex code = 1 numeric character
2 Hex codes = 1 non-numeric character

** MSR only

Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

Limitations: 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphanumeric character set non-protected, display data entry.

3279 Color Display Station Mdls 2A-3B (cont'd)

Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from SSD, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer.

Switch Control Unit: Permits switching operational control of a 3279 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by P/N via MES for field installation only.

P/N **4419338** should be specified when ordering by MES for field installation. Enter one MES for multiple quantities of P/N ordered, using serial number zero (00000) on the MES.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. This supply item is a 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field installation:** Yes, by customer. Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

Locks and Keys (P/N 2577741): The 3279 with Security Keylock #6340 is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

Magnetic Hand Scanner (#9440, P/N 4123495): The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter (5 foot) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader (#9441, P/N 4123500): The Magnetic Slot Reader (MSR) attaches by a 1.5 meter (5 foot) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions: For ordering for delivery with machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Reader/Scanner Extension Cables: These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitations: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: For ordering for delivery with the machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279

6 meter (20 foot) **P/N 4832986**
12 meter (40 foot) **P/N 4832987**

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

MAGNETIC HAND SCANNER

Number of MHSs P/N 4123495	Sensor Head Assemblies P/N 4832721	Handle and Feedback Assembly P/N 4832701	Amplifier Card and Cord Assembly P/N 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

3279 Color Display Station Mdls 2A-3B (cont'd)

Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop Kit.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled off its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Entry Assist Keytop Kit: [Non-overlay keyboards only] This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards.

Entry Assist Keytop Kit **P/N 1742774**

Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Cables: Cables and or associated parts to attach the 3279 to the 3274 and 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

SUPPLIES (None)

3279 COLOR DISPLAY STATION MDLS S2A-03X

PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276 , or the 4331 Processor for displaying alphanumeric data and presentation graphics data, and for entering data into and receiving data from a System/3, System/360, S/370, 30XX, 4300 or 8100 Information System, or 4700 Finance Communication System. In base color mode on all models, data fields can be displayed in four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models S2B and S3G, or models 02X or 03X with Extended Function feature, attached to a 3274, data may be displayed at both character and field level in seven colors with a choice of highlighting modes. APL/Text is provided. On extended color model S3G, or model 03X with the requisite optional features, customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and extended models, the 3279 meets both general purpose and unique display requirements.

MODELS

Model S2A	Base Color	Displays up to 1,920 characters in 24 lines of 80 characters each.
Model S2B	Extended Color	Displays up to 1,920 characters in 24 lines of 80 characters each. 7 colors, extended highlighting and APL.
Model S3G	Extended Color Programmed Symbols	Displays up to 2,560 characters in 32 lines of 80 characters each. 7 colors, extended highlighting and APL, and programmed symbols.
Model 02X	Custom Model	Displays up to 1,920 characters in 24 lines of 80 characters each.
Model 03X	Custom Model	Displays up to 2,560 characters in 32 lines of 80 characters each.

For use with 8100 Information System, see the 8100 System Configurator, GA27-2876. For use with 4700 System, refer to M4701 pages. **Note:** Models 2B, 3A, 3B, S2B, S3G, and 03X are not supported by System/3.

Prerequisites: 3279 requires a keyboard and a 3274, 3276, 4321 or 4331 - see M3274, 3276, 4321 or 4331 pages.

Customer Setup (CSU): The 3279 is designated Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26 character upper case letters are presented in 7x9 character matrix. A 94 character set is displayed, consisting of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters. A monocase switch provides the capability of switching to uppercase alphanumeric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such as protected/ unprotected, normal/ intensified, displayable/ non-displayable, and selector light pen detection allowed/ disallowed. An audible alarm is provided.

All 3279 mdls use the 3270 field attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table:

Protected and intensified	White
Unprotected and intensified	Red
Protected and normal intensity	Blue
Unprotected and normal intensity	Green

Extensions to 3270 datastream supported by appropriate 3274 features and by 3279 mdls S2B, S3G, 02X and 03X provide the following field and character attributes:

- Extended Color (red, blue, green, white, yellow, turquoise and pink).
- Extended Highlighting (reverse video, blink, underscore).
- Programmed Symbols (six sets with 190 loadable positions each). (Mdls S3G or 03X with extended function feature #3850.)

Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.

Programmed Symbols can use the whole character matrix for symbol definition. In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.

3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls S2A, S2B, S3G, 02X, 03X. The 3279 and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station - see "Special Features".

3279 mdls S2B and S3G, or mdls 02X or 03X with optional feature, provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls S2B, S3G, 02X and 03X are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C and on the 3276 for APL/Text operation.

APL/Text capability provides for display of a 222-character APL/Text character set including the 94 character EBCDIC set. An appropriate keyboard is available.

APL/Text requires a 3274 mdl X1A, X1C, or X1D customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.

For Extended Color and Extended Highlighting on the 3279 mdls S2B, S3G, 02X and 03X, the Structured Field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS feature requires, in addition, the Programmed Symbols option of 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl S2A, or mdl 02X without special features, will attach to the Display/Printer Adapter of the 4331 Processor.

For base color mode of operation, all mdls of the 3279 will attach to all models of the 3274. Configuration Support on the 3274 must be at the following level or higher:

Configuration Support A - Release 11.0
Configuration Support C
Configuration Support D
Configuration Support T

On the 3276 for base color mode, 3279 mdls S2A, S2B, 02X will attach to all 3276 mdls except mdl 1, and 3279 mdls S3G or 03X will attach to all 3276 mdls except mdls 1 and 2.

The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e. without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user-written host application program; or
2. A customer definable matrix loaded from the System Diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3279 is attached to 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen outside the data area, and provide useful operator information. These symbols, except those indicating color attributes, will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 to run in "monochrome mode". In this mode, fields are displayed in green for normal intensity and white for high intensity. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing, the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. A tilt/rotate accessory (P/N 4422265) increases this range of adjustment.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphanumeric, special symbol and cursor move keys have repeat action capability. Double speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

Input Flexibility: A choice of keyboards on all mdls, and/or the selector light-pen on the mdls 02X and 03X provide input flexibility - see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key,

3279 Color Display Station Mdls S2A-03X (cont'd)

instead of using the selector light-pen. 12 Program Function (PF) keys are provided with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a Typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 sales pages for languages supported. See "Accessories" for 3274 Entry Assist Keytop kits.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the ON position. These capabilities, and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to help control access to data and aid audit of actions.

A Magnetic Slot Reader (optional on 3279 mdls 02X or 03X only.), or for a 3279 attached to a 3274 , a Magnetic Hand Scanner (optional on 3279 mdls 02X or 03X only), are available to enter system user identification data.

Audible Alarm: An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next to last position on the screen. The operator may adjust the volume of the tone.

When attached to a 4331 Processor via the Display/Printer Adapter, functional support varies from that of the 3279 attached to a 3274 or 3276. See M4331 Display/Printer Adapter feature description for details of support.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the User Reference Summary. Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF) and the Program Product, Network Problem Determination Application (NPDA), are software tools for network problem determination/isolation which can enhance the availability and serviceability of the terminals. See DEMF in the SCP section for OS/VS1 and OS/VS2 (MVS) and Program Number 5735-XX8, in the program products sections of the sales manual for NPDA.

Customer Responsibilities:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3279.
- Physical setup, connection of cables in customer access areas, switch setting and check out.
- Contacting Field Engineering to make cable connections of IBM CSU units to non CSU units where customer access areas are not provided.
- Notifying IBM of intent to relocate, and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
- Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Refer to 3274 control storage requirement tables to ensure that adequate storage is available if required.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

BASIC CONFIGURATION

The 3279 mdls S2A, S2B and S3G are only available with the following specifications. The 3279 mdls 02X and 03X will be shipped with these specifications unless alternative codes are specified.

Voltage: (120v AC 1-phase 3-wire 60Hz): non-locking plug.

Power cable length: 9 foot.

Terminal cables - see "Accessories" for ordering information. For cable specifications, see *IBM 3270 Information Display System Installation Manual - Physical Planning,* GA27-2787.

SPECIFY

- Power (AC 1-phase, 50/60 Hz).
- Power Cable: 3279 mdls 02X or 03X only, if the standard 2.8 meter (9 foot) power cable is not desired, specify: **#9511** for 1.8 metre (6 foot), or **#9513** for 4.5 metre (15 foot).
- Power cable plug: 3279 mdls 02X or 03X only, if locking plug required, specify **#9890**.

SPECIAL FEATURES

IBM Personal Computer Adapter (#5322, #5325, #5326, #5327, #5328): This entry is for information purposes only ... see Product Announcement Letter 183-130 for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. For 3279 mdlsS2A, S2B, 02x with serial numbers below E0000, and for all mdls S3G, and 03X, order **#5325**. For mdls S2A, S2B, and 02X with serial numbers above E0000, order **#5326**. #5325 and #5326 contains material for both the 3279 and the IBM Personal Computer System Unit. If only the 3279 portion is required, then for the ranges of 3279 serial numbers quoted, order **#5327 or #5328** respectively. If only the IBM Personal Computer 5150 portion is required , order **#5322**. The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option **#5322**. A user's guide without the Programming Diskette may be ordered from Mechanicsburg, Pa. using Form # SA230169. **Maximum:** One. **Prerequisities:** (1) 3279 mdls S2A or S2B or S3G or 02X or 03X. (2a) IBM Personal Computer, 5150, X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit, 5150 with Color/Graphics Monitor Adapter, 5-1/4 inch Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. **Limitations:** Cannot be installed with #4999, #6360 or #8750 ... also see M3274 pages. **Field Installation:** Yes **Note:** This feature is not available for factory installation. Contact Field Engineering Branch office for installation. For installation of the feature on other 3279 mdls, refer to other M3279 pages.

Programmed Symbols (#5790): [Provided with 3279 mdl S3G]. This feature provides storage and accessing for up to six 190-symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is 94 plus space. **Prerequisites:** 3279 mdl 03X with **#3850**. **Maximum:** One. **Field Installation:** Yes, on 3279 mdl 03X only. **Limitations:** Can be used only with a 3274 Control Unit having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. Transient patterns are displayed when data is being loaded to the Programmed Symbols buffers. **Co-requisites:** If display operator access to PS is required, one of the following keyboards must be ordered:

- 87-key EBCDIC Typewriter Overlay Keyboard (#4640).
- 87-key EBCDIC Attribute Select Typewriter Keyboard (#4651) or 87-key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652).

THE FOLLOWING SPECIAL FEATURES ARE ONLY AVAILABLE ON THE 3279 MODEL 02X OR 03X.

Inhibit Keyboard Numeric Lock (#4691): This feature prevents the action of the Keyboard Numeric Lock function which is described at the beginning of the keyboard section. **Prerequisites:** 3279 mdls 02X or 03X only, and at least one of the following keyboards: #4621, #4622, #4623, #4624, #4626, #4627, #4628, #4629, . **Maximum:** One. **Field Installation:** Yes. Contact Field Engineering Branch Office for Installation. MES Number 999999 is to be used for IR (incident report) completion data.

Extended Function (#3850): (provided with 3279 mdls S2B and S3G.) This feature provides Extended Color (red, blue, green, white, yellow, turquoise and pink) and Extended Highlighting (reverse video, blink, underscore). It also provides capability for display of 222 character APL/Text character set including the 94 character EBCDIC set. **Prerequisites:** 3279 mdls 02X or 03X. **Maximum:** One **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function feature. Extended Color and Extended Highlighting require the Structured Field and Attribute Processing option of Configuration Support C or D on the 3274.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274 Control Unit. **Prerequisites:** 3279 mdls 02X and 03X. **Maximum:** One. **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** Cannot be installed with #5325 or #5326.

Selector Light-Pen (#6360): Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include

3279 Color Display Station Mdls S2A-03X (cont'd)

a designator character '&'. When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. **Prerequisites:** 3279 mdls 02X and 03X. **Maximum:** One. **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** Cannot be installed with #5325 or #5326.

Video Output (#8750): This feature provides separate RED, GREEN, BLUE and SYNC signals to drive non-IBM devices such as monitors, large screen projection systems and hard copy units. **Prerequisites:** 3279 mdl 03X. **Maximum:** One. **Field Installation:** Yes, on 3279 mdl 03X only. Customer should read *Feature Description Manual,* GA33-3079 before ordering this feature. **Limitations:** Cannot be installed with #5325 or #5326.

SUMMARY OF SPECIAL FEATURE AVAILABILITY:

Special Features	No	S2A	S2B	S3G	02X	03X
Magnetic Rdr Ctl	**#4999**	N	N	N	O	O
Programmed Symbols	**#5790**	N	N	S	N	O(1)
Selector Light Pen	**#6360**	N	N	N	O	O
Video Output	**#8750**	N	N	N	N	O
Inhibit Kbd Numlock	**#4691**	N	N	N	O	O
Extended Function	**#3850**	N	S	S	O	O
IBM Personal	**#5325**	O	O	O	O	O
Computer Adapter	**#5326**	O	O	O	O	O

N = Not Available
S = Standard
O = Optional

Keyboards:

Keyboards #4621, #4622, #4623 #4624, #4626, #4627 #4628, #4629 are supplied with Keyboard Numeric Lock function which provides the ability to lock the keyboard if a non-numeric key (other than 0-9, minus, decimal sign or dup) is operated in a pre-defined numeric only field. Numeric lock function is enabled on keyboards #4640, #4651, #4652 as an option of 3274 customization, in which case these keyboards will either all have, or all not have, the numeric lock function. **Limitations:** Each 3279 must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. **Field Installation:** Yes. The keyboard is set up by the customer. Some keyboards may require pre-requisites which are not customer installable. A 0.9 metre (3 foot) cable is provided as standard.

SELECT AT LEAST ONE OF THE FOLLOWING:

#4621 - 75-key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through of an ALT shift key. **Prerequisites:** 3279 mdls S2A, S2B, 02X and 03X.

#4622 - 75-key EBCDIC Data Entry Keyboard: Movable, with 35 data keys, 10 PF keys and 30 control keys. **Prerequisites:** 3279 mdls S2A, 02X and 03X.

#4623 - 75-key EBCDIC Data Entry Keyboard: Keypunch layout, movable, with 35 data keys, 10 PF keys, and 30 control keys. **Prerequisites:** 3279 mdl 2A or 02X.

#4624 - 75-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys and are available through the use of an alternate shift key. **Prerequisites:** 3279 mdl 2A or 02X.

#4626 - 87-key EBCDIC Typewriter/APL Keyboard: An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94character EBCDIC set. An APL ON/OFF key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl S2B or mdls 02X or 03X with #3850.

#4627 - 87-key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the ALT shift key.

#4628 - 87-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of the data keys and are available through the use of an alternate shift key. **Prerequisites:** 3279 mdl 2A or 02X.

#4640 - 87-key EBCDIC Typewriter Overlay Keyboard: This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard, however, has special narrow keytops that permit the use of customer annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES (see "Accessories"). These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right-hand side of the keyboard) in uppercase and alternate shift of this keyboard. **Prerequisites:** 3279 mdls 02X and 03X. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

#4651 - 87-key EBCDIC Attribute Select Typewriter Keyboard: A typewriter layout, movable, similar to the 87-key EBCDIC typewriter keyboard (#4627). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisites:** 3279 mdls S3G or 02X or 03X with #3850. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

#4652 - 87-key EBCDIC Attribute Select Typewriter/APL Keyboard: A typewriter layout, movable keyboard, similar to the 87-key EBCDIC typewriter/APL keyboard (#4626). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisites:** 3279 mdls S3G or 02X or 03X with #3850. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

#4623 - 75-key EBCDIC Data Entry Keyboard: Keypunch layout, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high speed data entry. **Prerequisites:** 3279 mdl 02X or 03X.

#4624 - 75-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys through use of an alternate shift key. **Prerequisites:** 3279 mdl 02X or 03X.

#4628 - 87-key ASCII Typewriter Keyboard: ASCII typewriter-like layout, movable with 49 alphanumeric data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of the data keys and are available through the use of an alternate shift key. **Prerequisites:** 3279 mdl 02X or 03X.

#4629 - 87-key EBCDIC Typewriter/Text Keyboard: An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 text-specific characters in addition to the 94-character EBCDIC set. A Text ON/OFF key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard areas. **Prerequisites:** 3279 mdl 02X or 03X with **#3850**.

SUMMARY OF KEYBOARD AVAILABILITY:

		3279 Models				
Keyboard #	No	S2A	S2B	S3G	02X	03X
75-Key EBCDIC Tw	**#4621**	O	O	N	O	O
75-Key EBCDIC De	**#4622**	O	N	N	O	O
87-Key EBCDIC Tw/APL	**#4626**	N	O	N	O	O
87-Key EBCDIC Tw	**#4627**	O	O	O	O	O
87-Key EBCDIC Overlay	**#4640**	N	N	N	O	O
87-Key at Sel Tw	**#4651**	N	N	O	O	O
87-Key at Sel Tw/APL	**#4652**	N	N	O	O	O
75-Key ASCII Tpwr	**#4624**	N	N	N	O	O
87-Key ASCII Tpwr	**#4628**	N	N	N	O	O
75-Key EBCDIC De	**#4623**	N	N	N	O	O
87-Key Tpwr/Text	**#4629**	N	N	N	O	O

O = Optional
N = Not available

Overlay and Attribute Select Keyboards: These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of keyboard). They provide operator selection under program control of highlight, PS and color attributes. Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The uppercase and alternative shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. **Limitations:** Attribute Selection is not supported for keyboards on a 3279 attached to a 3276.

MODEL CONVERSIONS

MES orders to change models S2A or S2B to 02X and S3G to 03X will be accepted 90 days after installation.

From/To	S2A	S2B	S3G	02X	03X
S2A	--	No	No	Yes	No
S2B	No	--	No	Yes	No
S3G	No	No	--	No	Yes
02X	No	No	No	--	No
03X	No	No	No	No	--

Note: Models 2B, 3A, 3B, S2B, S3G, and 03X are not supported by System/3.

ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed description below for additional information and for

3279 Color Display Station Mdls S2A-03X (cont'd)

ordering by MES for field installation.

Item	Feature Number	P/N	Max Qty
Magnetic Hand Scanner	**#9440**	**4123495**	*
Magnetic Slot Reader	**#9441**	**4123500**	*

* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature Number	P/N	Max Qty
6 meter (20 feet)	**#9106**	**4832986**	**
12 meter (40 feet)	**#9107**	**4832987**	**

** A maximum of one extension cable may be ordered.

Item	Feature Number	P/N
Tilt/rotate accessory	N/A	**4422265**
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. **Limitations:** Extension cables cannot be plugged into other extension cables. **Prerequisites: #4999.**

Item	Feature Number	P/N
6 meter (20 feet)	**#9106**	**4832986**
12 meter (40 feet)	**#9107**	**4832987**

Both the MHS and the MSR read magnetically encoded information from an alphameric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphameric character set. For a further description of both character sets, see *IBM 3270 Information Display System Character Set Reference,* GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 and attached 3278s and 3279s support only the MSR and the 10-character numeric only set as used by the 3277.

Numeric and alphanumeric character capabilities are as follows:

MSR/MHS	Minimum number of Hex Codes between start sentinel and end sentinel characters	Maximum number of characters between start sentinel and end sentinel characters	Bit Density: Bits per inch	Bit Density: Bits per mm
3277 Like 10-numeric character set*	7 7	37 118	75 127	3 5
Alphameric character set*	7 7 7 7 7	37 numerics 18 non-numerics 118 numerics 59 non-numerics 37 numerics	75 75 127 127 210**	3 3 5 5 8.3

* 1 Hex code = 1 numeric character
2 Hex codes = 1 non-numeric character

** MSR only

Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

Limitations: 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphanumeric character set non-protected, display data entry. Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from SSD, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer. Except UK: For complete information on the availability of pre-encoded magnetic striped plastic cards, contact an SSD Sales Representative.

Switch Control Unit: Permits switching operational control of a 3279 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by P/N via MES for field installation only.

P/N 4419338 should be specified when ordering by MES for field installation. Enter one MES for multiple quantities of part number ordered, using serial number zero (00000) on the MES.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. This supply item is a 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field installation:** Yes, by customer. Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

Locks and Keys (P/N 2577741): The 3279 with Security Keylock is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

Magnetic Hand Scanner (#9440, P/N 4123495): The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter (5 foot) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions:

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader (#9441, P/N 4123500): The Magnetic Slot Reader (MSR) attaches by a 1.5 meter (5 foot) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions: For ordering for delivery with machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance

3279 Color Display Station Mdls S2A-03X (cont'd)

for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Reader/Scanner Extension Cables: These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitations: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: For ordering for delivery with the machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279

6 meter (20 foot) **P/N 4832986**
12 meter (40 foot) **P/N 4832987**

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

MAGNETIC HAND SCANNER

Number of MHSs P/N 4123495	Sensor Head Assemblies P/N 4832721	Handle and Feedback Assembly P/N 4832701	Amplifier Card and Cord Assembly P/N 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop kit.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Entry Assist Keytop Kit: [Non-overlay keyboards only] This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards.

Entry Assist Keytop Kit	P/N 1752774

Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Cables: Cables and or associated parts to attach the 3279 to the 3274 and 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.

3279 Color Display Station Mdls S2A-03X (cont'd)

3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

SUPPLIES (None)

3279 COLOR DISPLAY CONSOLE MDL 2C

PURPOSE

A cathode-ray tube (CRT) Color Display Console which attaches to the 4321, 4331/4341/4361/4381 Model Group 1, and 4331/4341 Model Group 2 and provides for operator interaction for both normal operations and maintenance. An Operator Console Keyboard with an operator control panel is available with the primary Display Console and is the means to Power On (4341 ... see Special Features) Power Off, Initial Microcode Load (IML), and Start or Stop processor operations.

MODELS

Model 2C 2C

Prerequisites: An available console position on any 4321/4331/4341 Mdl Group 1 or 4331/4341 Mdl Group 2 ... See 4321/4331/4341/4361/4381.

The 3279-2Cs require an Operator Console Keyboard. The 3279-2C that is used as the primary console on a 4321/4331/4341 Mdl Group 1/4341 Mdl Group 2 must have an Operator Console Keyboard with an operator control panel.

HIGHLIGHTS

Displays characters in a 9x12 character matrix (uppercase alphabet is displayed in a 7x9 matrix), arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator, rows 21 through 24 are used for system status information. A 96-character set is used, which consists of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters, plus space and null.

Console messages are displayed in four colors (white, red, blue, or green) according to the status of the protected and intensified attributes. This gives the operator better perception of the system status.

When the 4300 is under control of VM/SP, the screen input area is green and the output area is blue. Input data that is redisplayed in the output area may be made white with the CP TERMINAL HILIGHT ON command. In addition, messages from other users are displayed white.

In addition to Power On/Off, IML and Start/Stop, the console allows the operator to manually control such functions as storage display and operation, address comparing, and normal versus instruction step processing. The console indicates to the operator both proper operations and malfunctions, should they occur.

For maintenance and service support the console can display the status of the Processor complex and other valuable servicing information. It also provides a means for using diagnostic tools.

The 3279 mdl 2C that is used as the primary console is normally installed concurrent with the installation of the 4321/4331/4341/4361/4381 Processors.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols and/or words on the bottom row of the screen. These symbols, except those indicating color attributes, will appear in blue. The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The cursor is displayed in white on the 3279. A base color switch allows the 3279 mdl 2C to run in monochrome mode for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing: Cursor move, tab, home, back tab, insert, delete, erase to end-of-field and erase all input keys are basic to the console keyboard. Alphanumeric, special symbol and cursor move keys have typamatic capability. 12 Program Function (PF) keys are basic.

Audible Alarm: An alarm sounded under program control to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone.

Security Function: The Security Keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

Problem Determination Procedures: Significant function has been designed into this unit to provide high availability to the customer. This high availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the User Reference Summary.

Base Color Supported:

Protected and intensified	–	White
Unprotected and intensified	–	Red
Protected and normal intensity	–	Blue
Unprotected and normal intensity	–	Green

SPECIFY

BASIC CONFIGURATION

The 3279 mdl 2C will be shipped with these specifications unless alternative codes are specified:

Cabling: Fixed-length 7.6 meter (25 foot) cables from the Display Console to the Processor for Keyboards #4631, #4632 and #4634 will be furnished by IBM and shipped with the processor. For Keyboard #4633, up to 30.5 meters (100 feet) of signal cable is provided by IBM and ordered via normal procedures. Additional cable for this feature up to a maximum total cable length of 1,500 meters (4925 feet) must be provided by the customer as outlined in the 3279-2C specifications page in *IBM Input/Output Equipment Installation Manual - Physical Planning: System/360, System/370, 4300 Processors,* GC22-7064 and *Installation and Assembly of Coaxial Cable and Accessories for Attachment to IBM Products,* GA27-2805.

- Voltage (120V AC, 1-phase, 3 wire, 60 Hz): Non-locking plug.
- Power Cable Length: 2.8 meters (9 foot).
- Power Cable: If the standard 2.8 meter (9 foot) power cable is not desired, specify: **#9511** for 1.8 meter (6 foot) or **#9513** for 4.5 meter (15 foot)
- Power Cable Plug: If locking plug required, specify **#9890**.

SPECIAL FEATURES

Keyboards: Refer to Type Catalog for a picture of the Keyboard layouts.

Limitations: Keyboards used on 3279-2C are not interchangeable with keyboards used on 3279 mdls 2A, 2B, 3A and 3B. **Maximum:** One of the below. **Field Installation:** No.

#4631 - 75-Key Operator Console Keyboard with Channel-to-Channel: [4341 and 4381 only] Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate Shift key. Provides 49 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, Channel-to-Channel Disabled). Channel-to-Channel is required for systems having a channel-to-channel adapter feature.

#4632 - 75-Key Operator Console Keyboard, without Channel-to-Channel : [4341 and 4381 only] Same as #4631 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled Indicator.

#4633 - 75-Key Operator Console Keyboard: [4341 and 4381 only] Same as #4631 but without an operator control panel.

#4634 - 75-Key Operator Console Keyboard, without Channel-toChannel or Power On: [4321 or 4331 or 4361 only] Same as #4631 but the operator control panel does not have the Channel-to-Channel control key, or the Channel-to-Channel Disabled Indicator or the Power On key.

Cabling: Cables will be furnished by IBM for Features #4631, #4632 and #4634.

For Feature #4633 the cables must be supplied by the customer as outlined for the 3279 mdl 2C in the *IBM 3270 Information Display System Installation Manual Physical Planning* GA27-2787.

Waterproof Power Connector (#8802): Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type of termination in specific locations. **Limitations:** Available only for power cord lengths of 1.8 meters (6 feet) #9511, or 4.5 meters (15 feet) #9513. **Maximum:** One. **Field Installation:** No.

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Refer to M4300 pages of the Sales Manual for information pertaining to the 4300 Processors Console Table.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. A 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field Installation:** Yes, by customer. **Note:** Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

3279 Color Display Console Mdl 2C (cont'd)

Locks and Keys (P/N 2577741): The 3279, with Security Keylock, is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

3279 Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

SUPPLIES (None)

3284 PRINTER MDL 3

Models 1 and 2 have been withdrawn from marketing

PURPOSE

Provides hard copy output at a speed of 40 cps.

MODELS

Model 3 003 Attaches to and uses the storage buffer of a 3275 Display Station model 3. Also attaches to and uses the storage buffer of a 5275 Direct Numerical Control Station.

Prerequisites: A 3275 mdl 3 with Printer Adapter (#5550)or a 5275 with Printer Adapter (#5555).

HIGHLIGHTS

The 3284 printer provides hard copy output at a speed of 40 cps, using the EBCDIC character set. For ASCII character sets, see "Specify" below. Mdl 3 prints the contents of the buffer of the 3275 Display Station or the 5275 Direct Numerical Control Station, at a speed of 40 cps.

The unit has a pinfeed platen which permits the feeding of marginally punched continous forms paper. 120-, 126-, and 132-position print lines may be specified ... see "Specify". Line spacing is 6 lines/inch. Matrix characters are formed by 7 vertical wires printing dots in up to 4 of 7 possible horizontal positions. Use of the underscore in conjunction with another character will overprint the lowest dot in that character and is not recommended. Refer to GA24-3488 for forms design considerations and limitations. Up to 6-part forms can be printed with a maximum thickness of .018 inches. Forms lengths can be 3 inches to 14 inches in increments of 1/6 inch. Card stock continuous forms are not recommended.

Notes:

(1) For optimum feeding, stacking, and legibility, forms of no more than three parts should be used.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

- Voltage: 115V AC, 1-phase, 3-wire 60 Hz. Specify: **#9880** for locking plug, **#9881** for nonlocking plug.

  Note: The Hospital Grade Plug, RPQ #8K0696 (No-Charge), is required for Hospital General Patient Care Areas. Field Installation: No

- Character Set: Specify one of the following:

  #9089 -- for EBCDIC Character Set (available at time of manufacture only) ... provides the 64 characters described on the EBCDIC typewriter keyboard. **#9089** required if used with the 3275 Model 3.

  #9091 -- for ASCII Character Set (A) (available at time of manufacture only) ... provides the 64 ASCII characters but substitutes the Logical OR and Logical NOT in place of the exclamation mark and circumflex.

  #9092 -- for ASCII Character Set (B) (available at time of manufacture only) ... provides the standard 64 ASCII characters.

- Pinfeed Platen:

  #9167 for 120 print positions (12-1/2" hole-to-hole)
  #9162 for 126 print positions (13-1/8" hole-to-hole)
  #9168 for 132 print positions [uses non-standard paper] (13-7/8" hole-to-hole)

Note: Do not order **#9167** or **#9168** unless paper is available in your area.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model 3 is field-installable on the 3275 or 5275.

ACCESSORIES

The following item is available on a purchase-only basis. For shipment with machine, order the feature number indicated below.

Forms Stand (#4450): Permits placement of continuous forms (out of carton) on stand above floor and provides for stacking after printing.

SUPPLIES

Ribbons: A black ribbon (P/N 1136970), or equivalent, must be used.

3287 PRINTER MDLS 1, 2

PURPOSE

Provides hard copy output. The 3287 mdls 1 and 2 attach to a 3271 mdl 1, 2, 11 or 12, or a 3272 mdl 1 or 2, or a 3791 Controller, or a 3274 (all mdls), or a 3276 mdl 1, 2, 3, 4, 11, 12, 13 or 14, or an 8775 or 3601, 3602, 3694, or 4701 mdl 1, or 2, the 8101 Storage and Input/Output Unit of the 8100 Information System, or the 3814 Switching Management System mdl A. The 3287 mdl 1 or 2 also attaches directly to the 4321 or 4341 Processor, to the 4331 or 4361 Processor via Display Print Adapter, to the 3081/3083/3084 Processor through the 3082 Processor Controller, and to the S/370 mdl 138 or 148 via the Integrated Console Printer Adapter.

MODELS

Model 1	001	80 cps maximum bidirectional printer
Model 2	002	120 cps maximum bidirectional printer

Note: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

STANDARD MODELS

For simplified order processing, the 3287 mdl 1 and 2 with the basic configuration (see "Basic Configuration" below) are designated as "Standard Models" for this machine type. A standard mdl is ordered by simply specifying the 3287 and the mdl number (1 or 2).

Note: The operating environment temperature is 15° to 32.2°C (50° to 90°F).

Prerequisites:

Attachment	Attachment Feature Code on the 3287	Device Adapter on Control Unit
3271/3272	#8330	Available port or added #3250
3274	#8331	Type A or B Adapter or #8330 (see M3274 pages)
3276	#8331	Available port or added #3255, #3256, #3257
3791	#8330	Available port or #7911 or #7912 or added #7912
3138/3148	#8330	Integrated Console Printer Adapter
3081/3083/3084	#8331	Attaches through a 3082 Processor Controller
3601/3602/3694/4701	#8331	Dev Cluster Adpt #3101
3814	#8331	Attaches through 3814 Display/Printer Attachment #1420
4321	#8331	Available port on Display /Printer Adapter
4331/4361	#8331	Available port on Display /Printer Adapter
4341/4381	#8331	Available console position on 4341/4381
8101	#8330	Available port on Display Printer Attachment #3220 or added #1506
8775	#8331	#5580

Customer Setup (CSU): The 3287 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The 3287 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special features are available which permit tailoring of the printer to the user's requirements.

Where the 3287 replaces a 3284 or 3286, the Variable-Width Forms Tractor (special feature) is used in lieu of the Pinfeed Platen or Forms Tractor RPQ WD4031. In addition Friction-Feed Paper Handling is available as a special feature.

Control Functions: Provides the control for all online operations. This unit requires the 3271/3272 Attachment (#8330) for receiving data from a 3271/3272, or a 3790 Communications System, or a 3274 through Terminal Adapter B, or a S/370 mdl 138/148 (Integrated Console Printer Adapter), or the 3274/3276 Attachment (#8331) for receiving data from a 3274 through Terminal Adapter Type A, or through the 8101 Storage Input/Output Unit of the 8100 Information System, or the 3814 Switching Management System mdl A, or a 3276, or an 8775 or a 4361, 4321 or 4331 or 4361 Processor Display/Printer Adapter or a 4341 Processor, or a 3082 Processor Controller, or a 3601 or a 3602 Controller, or the 3694 Document Processor of the 3600 Finance Communication System, or a 4701 mdl 1 or 2 Controller of the 4700 Finance Communication System.

Printer: Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 6 and 8 lines to the inch. Up to 132 characters can be printed in a line. Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or pre-printed continuous forms the Variable-Width Forms Tractor (#8700) is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality.

The Friction-Feed Paper Handling (#4110) is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when the Variable-Width Forms Tractor (#8700) is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations.)

Audible Alarm, Mono/Dual case, Single/Double line spacing, 6 or 8 Lines Per Inch, Page Length Selector Control Switches, and Maximum Print Position are standard functions. Audible Alarm (activated under program control) and Dual Case are not supported by S/370 mdls 138/148 as a Console Printer, or when attached to any 4300 processor. Dual Case is not supported for ASCII-B when using 3271/3272 Attachment (#8330). Mono/Dual switch is inoperative when the 3287 is operating in SCS (SNA Character String) data stream mode or when copying from a display or when operating in APL or PS mode. Refer to GA27-2837, *IBM 3270 Information Display System Character Set Reference.*

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3287.
- Physical setup, connection of cables, switch settings and checkout.
- Contact Field Engineering to make cable connections of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Providing a desk or table top to support the 3287.

Forms Handling: Variable-Width Forms Tractor (#8700) or Friction Feed Paper Handling (#4110) must be ordered for each 3287 mdl 1 or 2. VWFT is recommended for the System Console Printer.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

Basic Configuration

The standard machine is shipped with the following specifications:

- Voltage: 120V AC, 1-Phase, 3-Wire, 60 Hz.
- Power Cord Plug: non-locking **#9891**.
- Power Cord Length: 2.8 meter (9 foot).
- Cables: See "Accessories".
- Character Set: EBCDIC **#9082**
- Variable-Width Forms Tractor - Paper Handling: **#9185**
- SCS Support: **#9660**
- X-Print Error Indication: **#9488**
- 1920 Character Print Operation: **#9522**
- 3274/3276 Attachment: #8331
- Variable-Width Forms Tractor: #8700

3287 Printer Mdls 1, 2 (cont'd)

SPECIFY

Specify Features (For details, see "Specify Descriptions"):

3287 ATTACHMENTS:

AA = 3271/3272 Control Unit
BB = 3274 Control Unit
CC = 3276 Control Unit Display Station or 8775 display station
DD = 3791 Controller
EE = S/370 mdl 138/148
FF = 8100 System (8101 Attach)
GG = 4321, 4331, 4341 Processor
HH = 3600 System (3601/3602/3694 Attach or 4700 System (4701 attach))
II = 3081/3083/3084 Processor
JJ =3814 Switching Management System mdl A

	No.	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
• Plugs											
Locking Plug	**#9890**	x	x	x	x	x	x	x	x	x	x
Non-locking Plug	**#9891**	x	x	x	x	x	x	x	x	x	x
• Power Cord											
2.8m (9 feet)	Default	x	x	x	x	x	x	x	x	x	x
1.8m (6 feet)	**#9511**	x	x	x	x	x	x	x	x	x	x
3.7m (12 feet)	**#9512**	x	x	x	x	x	x	x	x	x	x
4.5m (15 feet)	**#9513**	x	x	x	x	x	x	x	x	x	x
• Cables											
See Specify Descriptions			x	x	x	x	x	x	x	x	x
• Character Set (Note 1)											
EBCDIC	**#9082**	x	x	x	x	x	x	x	x	x	x
ASCII (B)	**#9084**	x	x	x	x		x	x			x
• Variable-Width Forms Tractor – Paper Handling	**#9185**	x	x	x	x	x	x	x	x	x	x
• SCS Support	**#9660**		x	x				x	x	x	x
• SCS Support for SFAP	**#9661**		x								
• X-Print Error Indication	**#9488**	x	x	x	x	x	x	x	x	x	x
• Character Print Operation (Note 2)											
480 Characters	**#9520**	x	x		x		x				
960 Characters	**#9521**		x	x							
1920 Characters	**#9522**	x	x	x	x	x	x	x	x	x	x
2560 Characters	**#9523**		x	x							
3440 Characters	**#9524**		x	x							
3564 Characters: (Note 3)	**#9525**		x								
• Blower	**#9030**	x	x	x	x	x	x	x	x	x	x

Note 1: Do not specify if Data Analysis-APL Feature (#1066) is selected for attachment to the 3271 or 3272.

Note 2: For Terminal Adapter Type B on the 3274, select from **#9520** and **9522** for Character Print Operations. Specify features **#9521**, **#9523**, **#9524**, **#9525** and **#9660** cannot be selected for Terminal Adapter Type B. For Terminal Adapter Type A, **#9520** is not available.

Note 3: Not valid when the 3287 is attached to a 3274 using Configuration Support A **#9110**.

Specify Descriptions:

- Plugs (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug (see "Limitations" and "Prerequisites") or **#9891** for non-locking plug. **Limitations: #9890** not available on machines with serial number N0000 and later. **Prerequisites: #9010**.

- Power Cord: If standard 2.8 meter (9 feet) power cord is not desired, specify: **#9511** for 1.8 meter (6 feet) power cord, **#9512** for 3.7 meter (12 feet) power cord or **#9513** for 4.5 meter (15 feet) power cord.

  Limitations: Only standard 2.8 meter power cord is available on machines with serial numbers N0000 and later. **Prerequisites: #9010** for power cords other than standard 2.8 meter. **Specify: #9010** as a prerequisite with any of the following: #1066; #1120, #3610; #5781; #5782; #8330; **#9030; #9511; #9512; #9513; #9520; 9661; #9890**.

- Cables: See "Accessories" for cable ordering instructions. See *Installation Manual - Physical Planning*, GA27-2787, for cable details. When attached as a console printer, refer to *Installation Manual - Physical Planning*, GA22-7004, for S/370 mdl 138/148 and GA24-3667 for 4300 processors, for cable details.

- Character Set: Specify one of the following: **#9082** for EBCDIC Character Set ... **#9084** for ASCII (B) Character Set.

  Note: The character set specified, EBCDIC or ASCII (B), must be the same as the transmission code/character set used on the control unit to which it is attached. Do not specify ASCII-B Character Set (**#9084**) when APL/Text (#1120) has been selected.

- Variable-Width Forms Tractor - Paper Handling (**#9185**): Specify if (#8700) is ordered and there is a requirement to handle forms with overall width from 76.2 to 203.2mm (3 to 8 inches). **Prerequisites:** #8700.

- SCS Support (**#9660**): [Required in an SNA environment/LU Type 1. This is a prerequisite for #8331, although inoperative in a non LU Type 1 Environment.] Provides the capability to receive SCS (SNA Character String) data stream from the host via a 3274 or a 3276 or a 3601/3602 Finance Communication System Controller or 3694 Document Processing System, or 4701 Finance Communication System Controller, or the 3814 Switching Management System mdl A. This feature allows the 3287 to perform such functions as:

  – Vertical forms skipping to a header or to a vertical tab position
  – Horizontal skipping to a horizontal tab stop position.

  Page length controls, vertical and horizontal tab positions are host-loaded through the 3274, 3276, 3601/3602/3694, or 4701 via application programming. Included in #9660 are Cancel and Program Attention 1/ Program Attention 2 (PA1/PA2) switches. The cancel switch allows operator termination of the current print operation. The PA1/PA2 switch allows an operator to request a specific action from the user written program in the host. Operator settings for page length control, 6 or 8 lines per inch, and Maximum Print Position are set by the host program when the 3287 has #8331 and #9660 and only when user is operating in SCS mode. SCS Mode always operates in Dual Case. **Limitations:** Cannot be installed with #8330. **Maximum:** One. **Field Installation:** Yes.

  Note: If the 3287 Page Length Control Selector Switches are required for field installation on a machine with serial number below 17000, order no-charge RPQ S30221.

- SCS Support for Structured Field and Attribute Processing (**#9661**): This is a prerequisite for #5781, although inoperative in a non-LU Type 1 environment. Required for SCS support of:

  - Extended Highlighting (underscore)
  - Programmed Symbols (PS-2 [#5781], PS-4 [#5782])
  - Decompression of PS Load Data
  - Read Partition (Query)

  Limitations: Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610, #5781, **#9010**, **#9660**.

- X-Print Error Indication (**#9488**): To indicate an error an X is printed on the print line immediately below the last line normally printed. **Limitations:** Inactive when the 3287 is in SCS mode of operation.

- Character Print Operation:

  For 3271/3272 Attachment #8330, specify one of the following:

  – **#9520** (480-character print operation) for use with a 3271 mdl 1 or 11, or a 3272 mdl 1 or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller or to the 8101 of the 8100 System when attached via #8330. **Limitations:** Not available on machines with serial number N0000 and later. **Prerequisites: #9010**.

  – **#9522** (1,920-character print operation) for use with a 3271 mdl 2 or 12, a 3272 mdl 2, or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller, or to the 8101 of the 8100 System when attached via #8330, or a S/370 mdl 138/148 Integrated Console Printer Adapter. **Limitations:** Not available on machines with serial number N0000 and later. **Prerequisites: #9010**.

  For 3274/3276 Attachment #8331, specify one of the following:

  – **#9521** (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  – **#9522** (1,920-character print operation) for use with a program which requires a printer buffer size of 1,920 bytes while using Erase/Write Alternate Command. Required when attached to a 308X processor, 3814 Switching Management System mdl A or 4300 processor as a console printer.

  – **#9523** (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command. **Prerequisites:** #3880.

  – **#9524** (3,440-character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command. **Prerequisites:** #3880.

3287 Printer Mdls 1, 2 (cont'd)

– **#9525** (3,564-character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate command. **Limitations:** This specify code is not valid when the 3287 is attached to a 3274 using Configuration Support A **#9110**. **Prerequisites:** #3880.

Note: To provide compatibility with current application programs on the 3270 Information Display System, the customer can use an Erase/Write command for #9521 to provide 480-character print operation and Specify **#9522**, **#9523**, **#9524** and **#9525** to provide 1,920-character print operation. Copy operation from larger screen display to smaller printer buffer is not acceptable.

3287 PRINTER ATTACHMENT TABLE:

3276 Mdl	3287 Character Print Operation 480/960	1,920/1,920	1,920/2,560	1,920/3,440
1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

Note: 3276 mdls 1, 2 and 3 with SDLC/BSC Switch feature installed and operating in SDLC mode will support all 3287 Character Print Operations, except 3,564-character print operation #9525. Also see Copy restrictions in Note above.

Blower (**#9030**): Must be specified for 3287 mdl 1 or 2 to be used in an environment above 32.3°C (90°F) ambient temperature [specification limits up to 40.5°C (104°F)]. **Field Installation:** Yes. **Limitations:** Not available/required on machines with serial number N0000 and later. **Prerequisites:** **#9010**.

SPECIAL FEATURES

Summary: (For details see "Special Feature Descriptions")

ATTACHMENTS:

AA = 3271/3272 Control Unit
BB = 3274 Control Unit
CC = 3276 Control Unit Display Station or 8775 Display Station
DD = 3791 Controller
EE = S/370 mdl 138/148
FF = 8100 System (8101 Attach)
GG =4321, 4331, 4341 Processor
HH = 3600 System (3601/3602/3694 Attach or 4700 System (4701 Attach))
II = 3081/3083/3084 Processor
JJ = 3814 Switching Management System mdl A

	No.	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
• 3271/3272 Attach	#8330	x	x		x	x	x				
• 3274/3276 Attach	#8331		x	x				x	x	x	x
• Friction-Feed Paper Handling	#4110	x	x	x	x	x	x				
• Variable-Width Forms Tractor	#8700	x	x	x	x	x	x	x	x	x	x
• Data Analysis-APL Feature	#1066	x									
• Extended Print Buffer	#3880		x	x							
• Extended Character Set Adapter	#3610		x	x							
• APL/Text (Note 2)	#1120		x	x							
• PS-2	#5781		x								
• PS-4	#5782		x								

Note 2: Cannot be installed on a 3287 which is attached to an 8775.

Data Analysis-APL Feature (#1066): Provides dual case US EBCDIC, the APL set and support of TN characters as defined in the Type Catalog, S/370 Printers, under "TN Text Printing". **Limitations:** Not available on machines with serial number N0000 and later. Cannot be installed with **#9082** or **#9084**, or #8330 to a 3274, or #8331. When #1066 is installed, the Page Length Control Selector Switches are inoperative. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#9010**; **#9522**; #1066 on 3271 mdl 2 or 12, or 3272 mdl 2. **Customer Setup:** No.

APL/TEXT (#1120): Provides the capability for printing the 222-character APL/Text character set including the 94-character EBCDIC set. **Limitations:** Cannot be installed with #8330, or on the 3287 which is to attach to a 3276 without #1067 or 3274 mdl 1B or 21B, or to a 3274 customized without the APL/Text control functions or when attached to an 8775 or on a 3814 Switching Management System. Not supported when attached to any 308X processor or 4300 processor as a console printer. **#9084** cannot be specified with this feature. **Limitations:** Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610, **#9010**, **#9082** . **Customer Setup:** No.

Extended Character Set Adapter (#3610): Provides the additional control and buffering necessary for the character and field attributes required for #1120 or #5781, #5782. Provides extended highlighting (underscore) when co-resident with PS-2, PS-4. **Limitations:** Cannot be installed with #8330 or or 3274 mdl 1B or 21B or when attached to an 8775. **Limitations:** Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#9010**. **Corequisites:** #1120 or #5781. **Customer Setup:** No.

Extended Print Buffer (#3880): Provides additional buffer storage which allows 2,560, 3,440 or 3,564-character print operation on the 3287. **Limitations:** Cannot be installed with #8330 or when attached to a 3814. Not supported when attached to any 308X processor or 4300 processor as a console printer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** No.

Friction-Feed Paper Handling (#4110): For friction feeding of single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 51mm (2 inches) above the print line. Feature #4110 is used interchangeable with the Variable-Width Forms Tractor and is attached and removed by the customer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Note: If forms skipping is required, it is recommended that #8700 be used.

Programmed Symbols-2 (PS-2) (#5781): Provides the storage and accessing of two 190-symbol sets whose shapes and codes are customer-definable. **Maximum:** One. **Limitations:** Can only be used with 3274 Category A terminal port with PS Control and Structured Field and Attribute Processing (SFAP) options of Configuration Support C or D. Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610, #3880, **#9010**, **#9661**. **Customer Setup:** No.

Programmed Symbols-4 (PS-4) (#5782): Provides the storage and accessing of four additional 190-symbol sets whose shapes and codes are customer-definable. **Limitations:** Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#9010**, #5781. **Customer Setup:** No.

3271/3272 Attachment (#8330): Provides one interface for attachment of a 3287 mdl 1, 2 to a 3271 mdl 1, 2, 11 or 12, a 3272 mdl 1 or 2, or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller, or an 8101 Storage and Input/Output Unit, or a 3287 mdl 1, 2 to a S/370 mdl 138 or 148 Integrated Console Printer Adapter. Provides the buffer storage required for print operation. **Limitations:** Cannot be installed with #8331 or with #1066 to a 3274. Not available on machines with serial number N0000 and later. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#9010**. For 3271/3272 -- available port or added #3250 on a 3271 mdl 1, 2, 11 or 12, or 3272 mdl 1 or 2 ... see M3271 or 3272 pages. For 3274 -- An available Type B port ... see M3274 pages. For 3791 Controller -- Device Attachment Type II (#7911/#7912) ... see M3791 pages. For 8101 Storage and Input/Output Unit -- Display and Printer Adapter (#3220) or Display and Printer add'l (#1506) ... see M8101 pages. For S/370 mdl 138 or 148 -- An Integrated Console Printer Adapter ... see M3138 or 3148 pages. **Customer Setup:** No.

3274/3276 Attachment (#8331): Provides one interface for attachment of a 3287 to a 3274 (all mdls), or to a 3276 mdl 1, 2, 3, 4, 11, 12, 13 or 14, or to an 8775 or to a 3601/3602 Finance Communication Controller, 3694 Document Processing System, 4700 Finance Communication Controller, or to the 3082 Processor Controller, or the 3814 Switching Management System mdl A, or to any 4300 processor. Provides buffer storage required for print operation. Included in this feature is Buffer Reprint support. **Limitations:** Cannot be installed with #8330 or #1066. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] #9660, [2] An available port or added #3255, #3256, #3257 on a 3276, or an available Type A port on a 3274, or an available port of a 3082 Processor Controller, or an available port on the 4321 or 4331 or 4361 Processor Display/Printer Adapter, or an available console position on a 4341 or 4381 Processor, or a Device Cluster Adapter (#3101) on a 3601/3602/3694/4701 or printer attachment (#5580) on an 8775. **Customer Setup:** No.

Variable-Width Forms Tractor (#8700): A forms feeding device for continuous margin punched forms. Overall forms width from 76.2 to 381.0mm (3 to 15 inches) can be fed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #9185 where there is a requirement

3287 Printer Mdls 1, 2 (cont'd)

to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). **Customer Setup:** Yes. Note: If forms skipping is required, it is recommended that the Variable-Width Forms Tractor (#8700) be used.

MODEL CONVERSIONS

Model 1 to 2 is field installable.

ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. **Customer Setup:** Yes.

For field installation:

Forms Stand P/N **8678375** or Feature **#4450**

Cables: Cables and or associated parts to attach the 3287 to 3271s/3272s/3274s and the 3276, or Display/Printer Attachment feature (#1420) on the 3814, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **#1836446**) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **#1836447**) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **#2577672** or two P/N **#1833108** cable assemblies.

SUPPLIES

Ribbons: A black ribbon, P/N **1136653** or equivalent, is required. Also available is a black ribbon cartridge capability; order RPQ **8Q0199**. The replacement ribbon cartridge P/Ns are **7034535** and **7032757**.

3287 PRINTER MDLS 1C, 2C

PURPOSE

Provides hard copy in black or color by using replaceable ribbon cartridges when attached to the 3274, 3276 and the 8775. Also attaches directly to all models of the 4300 processor.

MODELS

Model 1C C01 — 80 cps maximum bidirectional printing for a single color on a line

Model 2C C02 — 120 cps maximum bidirectional printing for a single color on a line

Note: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

Compared to black or monochrome printing, throughput will be reduced when printing in multi-color as a function of the number of color changes on the page due to a separate pass of the print head for each color on a line. In addition, when printing in other than the standard character format (4 of 7 horizontal x 8 vertical dots) and using the Programmed Symbols (PS) special feature (#5781, #5782, #5783), the machines will print at reduced speeds. Under these conditions, mdls 2 and 2C will print at the reduced speed of the mdls 1 and 1C. Dense printing when using the PS feature will also lessen printer throughput. The printer prints in one direction only, right to left when an all black print line exceeds 120 print positions.

STANDARD MODELS

For simplified order processing, the 3287 mdl 2C with the basic configuration (see "Basic Configuration" below) is designated as a "Standard Model" for this machine type. A standard mdl is ordered by simply specifying the 3287 mdl 2C.

Note: The operating environment temperature is 15° to 32.2°C (50° to 90°F)

Prerequisites:

Attachment	Device Adapter on Control Unit
3274	Available Category A terminal port
3276	Available port or added #3255, #3256, #3257
4321	Available port on the Display /Printer Adapter
4331/4361	Available port on the Display/ Printer Adapter
4341	Available console position on 4341
4381	Available console position on 4381
8775	Printer Attachment Feature

Customer Setup (CSU): The 3287 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The 3287 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special features are available which permit tailoring of the printer to the user's requirements.

Control Functions: Provides the control for all online operations. This unit requires receiving data from a 3274 through a Category A terminal port or a 3276 or an 8775.

Printer: Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The standard printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 6 and 8 lines to the inch. With the replaceable black ribbon cartridge, up to 132 print positions can be printed in black on a line. Using the replaceable multi-color ribbon cartridge, up to 120 print positions can be printed in the colors black, blue, green or red with 121 - 132 print positions printed in black or the whole line printed in black. With the multi-color ribbon, the machine can print in base color. Base color refers to a given color being printed at the field level as a function of the protect, intensify bit positions in the 3270 Data Stream attribute byte. Specifically, the display to printer color mapping is as follows:

3270 Attribute Byte	Color Displayed	Color Printed
Protected and Intensified	White	Black or Green
Unprotected and Intensified	Red	Red
Protected but not Intensified	Blue	Blue
Neither Protected nor Intensified	Green	Green or Black

The printing of black or green as shown in the table depends upon the Base Color - Black (**#9135**) or Green (**#9136**) specify feature selected.

Extended color printing is the term used for supporting color at the character level in addition to the field level. For any character or field, this additional facility permits the user to select a given color (black, blue, green, red) for printing. The hardware required to support this capability is the Extended Character Set Adapter (#3610) on the printer. Not supported on the 4341 Mdl Group 1, 4341 Mdl Group 2, or on a 8775. The display to printer color mapping for extended color is:

Color Displayed	Color Printed
White	Black
Red	Red
Blue	Blue
Green	Green
Turquoise	Black
Pink	Black
Yellow	Black

Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or pre-printed continuous forms, the Variable-Width Forms Tractor (#8700) is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality.

The Friction-Feed Paper Handling (#4110) is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when the Variable-Width Forms Tractor (#8700) is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for form specifications and limitations.)

Audible Alarm, Mono/Dual case, Single/Double line spacing, 6 or 8 Lines Per Inch and Maximum Print Position are standard functions. Mono/Dual switch is inoperative when the 3287 is operating in SCS (SNA Character String) data stream mode or when copying from a display or when operating in APL or PS mode.

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3287.
- Physical setup, connection of cables, switch settings and checkout.
- Contact Field Engineering to make cable connections of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Providing a desk or table top to support the 3287.

Forms Handling: Variable-Width Forms Tractor (#8700) or Friction-Feed Paper Handling (#4110) must be ordered for each 3287 mdl 1C or 2C. VWFT is recommended for the System Console Printer.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

BASIC CONFIGURATION

The standard machine is shipped with the following specifications:

- Voltage: 120V AC, 1-Phase, 3-Wire, 60 Hz.
- Power Cord plug: Non-locking **#9891**
- Power Cord Length: 2.8 meter (9 foot).
- Cables: See "Accessories"
- Character Set: EBCDIC **#9082**
- Variable-Width Forms Tractor - Paper Handling: **#9185**
- SCS Support: **#9660**
- SCS Support for Structured Field and Attribute Processing: **#9661**
- X-Print Error Indication: **#9488**
- 2560 Character Print Operation: **#9523**
- Base Color - Black: **#9135**
- Extended Character Set Adapter: #3610
- Extended Print Buffer: #3880
- Programmed Symbols - 4A (PS-4A): #5783
- Variable-Width Forms Tractor: #8700

3287 Printer Mdls 1C & 2C (cont'd)

SPECIFY

- Plugs (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug or **#9891** for non-locking plug.
- Power Cord: If standard 2.8 meter (9 feet) power cord is not desired, specify: **#9511** for 1.8 meter (6 feet) power cord, **#9512** for 3.7 meter (12 feet) power cord or **#9513** for 4.5 meter (15 feet) power cord.
- Cables: See "Accessories" for 3287 mdls 1C and 2C cable ordering instructions. See *Installation Manual - Physical Planning,* GA27-2787 or GA24-3667, for cable details.
- Character Set: Specify one of the following: **#9082** for EBCDIC Character Set ... **#9084** for ASCII (B) Character Set. The character set specified, EBCDIC or ASCII (B), must be the same as the transmission code/character set used on the control unit to which it is attached. Do NOT specify ASCII-B Character Set **#9084** when APL/Text (#1120) has been selected.
- Variable-Width Forms Tractor - Paper Handling (**#9185**): Specify if #8700 is ordered and there is a requirement to handle forms with an overall width from 76.2mm to 203.2mm (3 to 8 inches). **Prerequisites:** #8700.
- SCS Support (**#9660**): *SCS Support #9660 must be ordered for all mdl 1Cs and 2Cs:* [Required in an SNA environment/LU Type 1, inoperative in a non LU Type 1 Environment.] Provides the capability to receive SCS (SNA Character String) data stream from the host via a 3274 or a 3276. This feature allows the 3287 to perform such functions as:

  – Vertical forms skipping to a header or to a vertical tab position
  – Horizontal skipping to a horizontal tab stop position.

  Page length controls, vertical and horizontal tab positions are host-loaded through the 3274 or 3276 via application programming. Included in **#9660** are Cancel and Program Attention 1/Program Attention 2 (PA1/PA2) switches. The cancel switch allows operator termination of the current print operation. The PA1/PA2 switch allows an operator to request a specific action from the user-written program in the host. Operator settings for page length control, 6 or 8 lines per inch, and Maximum Print Position are set by the host program when the 3287 has **#9660** and only when user is operating in SCS mode. SCS Mode always operates in Dual Case. **Maximum:** One. **Field Installation:** Yes. **Limitation:** Not supported on a 4300 processor.
- SCS Support for Structured Field and Attribute Processing (**#9661**): This is a prerequisite for #5781, or #5783, although inoperative in a non-LU Type 1 Environment. Required for SCS support of:
  - Extended Color
  - Extended Highlighting (underscore)
  - Programmed Symbols (PS-2 [#5781], PS-4 [#5782], PS-4A [#5783])
  - Decompression of PS Load Data
  - Read Partition (Query)

  Maximum: One. **Field Installation:** Yes. **Prerequisites:** #3610, **#9660.**
- X-Print Error Indication (**#9488**): To indicate an error an X is printed on the print line immediately below the last line normally printed. **Limitations:** Inactive when the 3287 is in SCS mode of operation.
- Character Print Operation: Specify one of the following:

  – **#9521** (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  – **#9522** (1,920-character print operation) for use with a program which requires a printer buffer size of 1,920 bytes while using Erase/Write Alternate Command. Required when attached to a 4300 processor as a console printer.

  – **#9523** (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command. **Prerequisites:** #3880.

  – **#9524** (3,440-character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command. **Prerequisites:** #3880.

  – **#9525** (3,564-character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command. **Prerequisites:** #3880. **Limitation:** This specify code is not valid when the 3287 is attached to a 3274 using Configuration Support A **#9110.**

  Note: To provide compatibility with current application programs on the 3270 Information Display System, the customer can use an Erase/Write command for **#9521** to provide 480-character print operation and **#9522, #9523, #9524** and **#9525** to provide 1,920-character print operation. Copy operation from larger screen display to smaller printer buffer is not acceptable.

3287 PRINTER ATTACHMENT TABLE:

3276 Mdl	3287 Character Print Operation 480/960	1,920/1,920	1,920/2,560	1,920/3,440
1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

Note: 3276 mdls 1, 2 and 3 with SDLC/BSC Switch feature installed and operating in SDLC mode will support all 3287 Character Print Operations, except 3,564 character print operation **#9525.** (See also Copy restrictions in Note above.)

- Blower (**#9030**): Must be specified for 3287 mdl 1C or 2C to be used in an environment above 32.3°C (90°F) ambient temperature [specification limits up to 40.5°C (104°F)]. **Field Installation:** Yes.
- Base Color - Black **#9135**: Specified to print in black when the 3279 Display displays in green or the equivalent 3270 attribute byte code is received. The printer will print in green when the 3279s in white or the equivalent 3270 attribute byte code is received. **Limitations:** Cannot be installed with Base Color - Green (**#9136**). Applies only when printing in base color. Base color defined in the Highlights section.
- Base Color - Green **#9136**: Specified to print in green when the 3279s in green or the equivalent 3270 attribute byte code is received. The printer will print in black when the 3279 displays in white or the equivalent 3270 attribute byte code is received. **Limitations:** Cannot be installed with Base Color - Black (**#9135**). Applies only when printing in base color. Base color defined in the Highlights section.

SPECIAL FEATURES

APL/TEXT (#1120): Provides the capability for printing the 222-character APL/Text character set including the 94-character EBCDIC set. **Limitations:** Cannot be installed on the 3287 which is to attach to a 3276 without APL/Text Control Feature (#1067) or 3274 mdl 1B, or mdl 21B, or to a 3274 customized without the APL/Text control function or a 8775. **#9084** cannot be specified with this feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610, **#9082. Customer Setup:** No.

Extended Character Set Adapter (#3610): Provides the additional control and buffering necessary for the character and field attributes required for extended color (user-selected color for a given character or field), extended highlighting (underscore), #1120 and #5781, #5782 or #5783 feature. **Limitations:** Cannot be installed on the 3287 which is to attach to a 3274 mdl 1B, or 21B, or to a 8775 , or to a 3276. Not supported when attached to any 4300 processor as a console printer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** No.

Extended Print Buffer (#3880): Provides additional buffer storage which allows 2,560, 3,440 or 3,564-character print operation on the 3287. **Limitations:** Not supported when attached to any 4300 processor as a console printer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** No.

Friction-Feed Paper Handling (#4110): For friction feeding of single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 64mm (2-1/2 inches) above the print line. Feature #4110 is used interchangeable with #8700 and is attached and removed by the customer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Note: If forms skipping is required, it is recommended that #8700 be used.

Programmed Symbols-2 (PS-2) (#5781): Provides the storage and accessing of two 190-symbol sets whose shapes and codes are customer-definable. Allows printing within a character location in a selected color (black, blue, green or red). **Limitations:** Can only be used with 3274 Category A terminal port with PS Control and Structured Field and Attribute Processing (SFAP) option of Configuration Support C or D. Cannot be installed with #5783. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** No. **Prerequisites:** #3610, #3880, and **#9661.**

Programmed Symbols-4 (PS-4) (#5782): Provides the storage and accessing of four additional 190-symbol sets whose shapes and codes are customer-definable. Allows printing within a character location in a selected color (black, blue, green *or* red). **Limitations:** Cannot be installed with #5783. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5781. **Customer Setup:** No.

3287 Printer Mdls 1C & 2C (cont'd)

Programmed Symbols-4A (PS-4A) (#5783): Provides the storage and accessing of four 190-symbol sets whose shapes and codes are customer-definable. Three of the symbol sets allow printing within a character location in a selected color (black, blue, green *or* red) and the remaining set allows printing up to four colors (black, blue, green *and* red) within a given character location. Recommended for presentation graphics, reference *3270 Information Display System Color and Programmed Symbols,* GA33-3056. **Limitations:** Can only be used with 3274 Category A terminal port with PS Control and SFAP options of Configuration Support C or D. Cannot be installed with #5781 or #5782. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3610, #3880, and **#9661**. **Customer Setup:** No.

Variable-Width Forms Tractor (#8700): A forms feeding device for continuous margin-punched forms. Overall forms width from 76.2 to 381.0mm (3 to 15 inches) can be fed. **Maximum:** One. **Field Installation:** Yes. **Prerequisite: #9185** where there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). **Customer Setup:** Yes.

MODEL CONVERSIONS

Model 1C to 2C is field installable. Model changes from models 1 and 2 to models 1C and 2C are not recommended for field installation.

ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. **Customer Setup:** Yes.

For field installation:

Forms Stand P/N **8678375** or Feature **#4450**

Cables: Cables and or associated parts to attach the subject machines to the 3274 and 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **#1836446**) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **#1836447**) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **#2577672** or two P/N **#1833108** cable assemblies.

SUPPLIES

Ribbons: A black ribbon cartridge, P/N **7032482** or equivalent is required for printing only black. A multi-colored ribbon cartridge, P/N **7032483** or equivalent, is required for color printing.

3287 PRINTER MDLS 11, 12

PURPOSE

Provides hard copy output for the 8100 Information System or a 4331 Processor via Loop Attachment.

MODELS

Model 11 011 — 80 cps maximum bidirectional print.

Model 12 012 — 120 cps maximum bidirectional print

Note: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

Prerequisites: For direct attached Loop operation – #4830 or #4835 on the 8100 System, - #4830 or #4831 on the 4331 Processor. For data link attached Loop operation – #3842 or #3843 Loop Control Unit.

Customer Setup (CSU): The 3287 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The 3287 mdls 11-12 consist of LOOP communication functions, printer and indicator lights in one integrally designed desk-top unit. EBCDIC Dual Case Operation, Audible Alarm and Cancel Print are provided as standard functions. Variable-Width Forms Tractor and Friction-Feed Paper Handling are available as special features.

The printer operates in SCS mode, which provides for customer program-definable horizontal and vertical formatting, including line density (3, 4, 6 or 8 lines per inch).

Operator capability to set the page length, page depth and the line density from the operator panel is available via RPQ 8Q0070. To order an RPQ, contact IBM.

Printer: Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 3, 4, 6 or 8 lines to the inch. Up to 132 characters can be printed in a line. Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or preprinted continuous forms, #8700 is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality. Maximum width is 381mm (15 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations.)

#4110 is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when #8700 is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations.)

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3287.
- Physical setup, connection of cables, switch settings and checkout.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Providing a desk or table top to support the 3287.
- Procurement, installation and maintenance of the loop network.

Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. Standard cable is 3.7 meters (12 feet) in length.

Forms Handling: #8700 or #4110 must be ordered for each 3287 mdl 11 or 12.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

SPECIFY

- Plugs (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug or **#9891** for non-locking plug.
- Power Cord: If standard 2.8 meter (9 feet) power cord is not desired, specify: **#9511** for 1.8 meter (6 feet) power cord, **#9512** for 3.7 meter (12 feet) power cord or **#9513** for 4.5 meter (15 feet) power cord.
- Carrier Rate: One of the following must be specified: **#9825** for up to 9600 bps ... **#9829** for up to 38,400 bps.
- Variable-Width Forms Tractor Paper Handling **#9185**: Specify if #8700 is ordered and there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). **Prerequisites:** #8700.
- Blower (**#9030**): Must be specified for 3287 mdl 11 or 12 to be used in an environment above 32.3°C (90°F) ambient temperature [specification limits up to 40.5°C (104°F)]. **Field Installation:** Yes.
- Direct-Attach or Data Link-Attach: Identify Direct-Attach or Data Link-Attach by specifying one of the following:

  Direct-Attached Loop Operation **#9607**
  Data Link-Attached Loop Operation **#9608**
- Hyphenation of Control Characters: To permit hyphenation of control characters upon receipt of individual control codes, specify **#9424.**

SPECIAL FEATURES

One of the following two must be ordered, or both features may be ordered:

Friction-Feed Paper Handling (#4110): For friction feeding of a single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 51mm (2 inches) above the print line. Feature #4110 is used interchangeably with the Variable-Width Forms Tractor and is attached and removed by the customer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. **Note:** For applications that require forms skipping, #8700 is recommended.

Variable-Width Forms Tractor (#8700): A forms feeding device for continuous margin punched forms. Overall forms width from 76.2 to 381.0mm (3 to 15 inches) can be fed. **Maximum:** One. **Field Installation:** Yes. **Prerequisite: #9185** where there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). **Customer Setup:** Yes.

MODEL CONVERSIONS

Model 11 to 12 is field installable. Changes from models 1 and 2 to models 11 and 12 are not recommended for field installation.

ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450.** Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. **Customer Setup:** Yes.

For field installation:

Forms Stand P/N **8678375** or feature **#4450**

SUPPLIES

Ribbons: P/N **1136653**, or equivalent, is required. Also available is a black ribbon cartridge capability, order RPQ **8Q0199.** The replacement ribbon cartridge P/Ns are **7034535** and **7032757.**

3289 LINE PRINTER Models 1, 2 and 3

PURPOSE

A series of line printers for attachment to a 3274 Control Unit, a 3276 Control Unit Display Station, a 3601 Finance Communication Controller via the Device Cluster Adapter (#3101), or an 8100 Information System via the Loop, at carrier speed and data rate of 9600 bps maximum.

MODELS

Model 1 001

Model 2 002

Model 3 003

Prerequisites:

For Mdls 1 and 2 - a 3274 Control Unit with appropriate adapter, a 3276 Control Unit Display Station, or a 3601 Finance Communication Controller. See M3274, 3276 or 3601 for details.

For Mdl 3 - an 8100 Loop. See M8101, 8130 or 8140 for details.

Limitations: Refer to *Forms Design Printer Reference Guide* GA24-3488 for forms design considerations. Printed output is not supported for optical character reading.

Customer Setup (CSU): The 3289 mdls 1 and 2 are designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. Pre-installation Planning responsibilities are covered in *3270 Setup Planning Guide,* GA27-2827. For additional information on CSU, contact IBM.

HIGHLIGHTS

Line printing is from characters engraved on a revolving metal belt. The 3289 mdls 1, 2, and 3 operate at the following speeds:

		Maximum Lines Per Minute*	Character Set
Model 1	(001)	155	48
		120	64
		80	94
		40	125 Text
Mdls 2 & 3	(002,003)	400	48
		300	64
		230	94
		160	125 Text

* Actual printer throughput is dependent on operational and system characteristics. Maximum print speed may be degraded by such factors as communication line speed, control unit load, application program, loop speed, print line length, and multiple device operation.

Included is one interchangeable print belt (48, 64, 94 character set)–see "Specify". A variable-width forms tractor for feeding of marginally punched continuous forms (one to six parts) up to 33.1cm (15 inches) overall width is provided. The following functions are basic: paper jam detection; front forms loading; vertical forms control, Systems Printer Communications (SCS mode on mdls 1 and 2 only); end of forms detection; single/double vertical spacing on mdls 1 and 2; 132 print positions; character spacing of 10 per inch; line spacing of 6 or 8 lines per inch; 4016 byte buffer on mdls 1 and 2; 256 byte alternating buffers on mdl 3; and SNA Character String (EBCDIC only) data stream handling. Standard color accent panel will be pebble gray, any other colors are via RPQ only.

Concurrent printer (mdl 3) and card read/punch operation is possible. See "Special Features."

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibility" below.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customers receiving dock, unpacking and placement of the 3289.
- Physical setup, connection of cables, switch settings and check out (mdls 1 and 2).
- Notify IBM of intent to relocate and follow IBM instructions for relocation (mdls 1 and 2).
- Use and follow the problem determination procedures and fill out trouble report prior to calling IBM for service.
- Disconnecting, packing and removal to the customers shipping dock at the time of discontinuance. Appropriate instruction will be provided by IBM (mdls 1 and 2).
- Procurement, installation and maintenance of the loop network.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

- Plugs (120V AC, 1-phase, 3-wire, 60Hz): **#9890** for locking plug or **#9891** for non-locking plug.
- Power Cord: If standard 2.8 meter (9 feet) power cord is not desired, specify: **#9511** for 1.8 meter (6 feet) power cord, **#9512** for 3.7 meter (12 feet) power cord or **#9513** for 4.6 meter (15 feet) Power Cord.
- Print Belt Character Set:

  Specify one. Available at time of manufacture only. See *Print Belt, Additional,* in Accessory section if more than one belt is required.

  #9490 – 48-Character Set EBCDIC
  #9491 – 64-Character Set EBCDIC
  #9492 – 94-Character Set EBCDIC
  #9493 – 48-Character Set ASCII (B) *
  #9494 – 64-Character Set ASCII (B) *
  #9495 – 94-Character Set ASCII (B) *
  #9496 – 125-Character Text Print EBCDIC

  * SNA Character String Mode of Operation is not available with ASCII. ASCII Belts available for mdls 1 and 2 only.

  Note: The Character Set specified (EBCDIC or ASCII) must be the same as the Transmission Code/Character Set used on the Control unit to which it is attached.

- Cables: For mdls 1 and 2, customer is responsible for procurement, maintenance and installation of co-axial signal cable. See "Accessories". See *3270 Installation Manual-Physical Planning,* GA27-2787, for cable details.

  For mdl 3, a communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to direct attached or data link attached loop. (Standard cable is 3.4 meters [11 feet] in length.)

- Print Error Indication: An error graphic, X, is printed on line immediately below the last print line for that data buffer when the printer is used in 3270 data stream mode. Specify **#9488.** **Limitation:** mdls 1 and 2 only.
- Character Print Operation: To specify the printer buffer size when the printer is used in 3270 data stream mode. **Limitation:** mdls 1 and 2 only.
  - **#9521** (960 character print operation). For use with a program which assumes the buffer size is 960 bytes while using Erase/Write Alternate Command.
  - **#9522** (1920 character print operation). For use with a program which assumes the buffer size is 1,920 bytes while using Erase/Write Alternate Command.
  - **#9523** (2560 character print operation). For use with a program which assumes the buffer size is 2,560 bytes while using Erase/Write Alternate Command.
  - **#9524** (3440 character print operation). For use with a program which assumes the buffer size is 3,440 bytes while using Erase/Write Alternate Command.
  - **#9525** (3564 character print operation). For use with a program which assumes the buffer size is 3,564 bytes while using Erase/Write Alternate Command. **Limitation:** This specify code is not valid when the 3289 is attached to a 3274 using Configuration Support A #9110.

  Note: To provide compatibility with programs written for 3271/3272 using Erase/Write Command, **#9521** provides 480 character print operation and **#9522, #9523, #9524** and **#9525** provide 1920 character print operation. Allowable usage in SNA Character String of the full buffer varies according to the control unit (3274 or 3276) to which the printer is attached and to programming considerations. See *IBM Information Display Component Description,* GA27-2749. Copy operation from larger screen size display to smaller printer buffer is not accepted.

  System Attachment: Identify the attaching control unit by specifying the following codes:

Control Unit	Code
3274 Mdl 1A,21A,31A	**#9549**
3274 Mdl 1B,21B	**#9550**
3274 Mdl 1C,21C,31C	**#9551**
3274 Mdl 1D,21D,31D	**#9261**
3274 Mdl 51C	**#9609**
3276 Mdl 1-4	**#9552**
3276 Mdl 11-14	**#9553**
3601	**#9555**
8100	**#9606**

SPECIAL FEATURES

3289 Line Printer Models 1, 2 and 3 (cont'd)

Audible Alarm (#1090): Sounds an alarm that alerts the operator of conditions that require manual intervention. The operator can set the loudness level and, on mdls 1 and 2 only, the duration (short or continuous). **Field Installation:** Yes. **Customer Setup:** No.

Text Print Feature (#1130): For mdls 1 and 2 attached to a 3274 or 3276 Control Unit. Provides the capability to print 32 text characters in addition to 93 characters of the 94-character EBCDIC set. 3289 Line Printers with and without this feature may be mixed on the 3276 Control Unit Display with APL/Text Control feature (#1067) or on the same appropriately configured 3274 Control Unit along with 3278 Display Stations and 3287 Printers with and without the APL/Text Feature (#1120) and on the 3274 only, may be mixed with 3277 Display Stations and 3284, 3286, 3287 and 3288 Printers without the Data Analysis-APL Feature (#1066). **Limitations:** The Text Print Belt used with this feature is only interchangeable with the 48/64/94-character set EBCDIC print belt. This feature is only valid on a 3289 Line Printer attached to a 3274 mdl X1A, X1C or X1D customized to include the 3289 Text Print Control Function or to a 3276 with APL/Text Control Feature (#1067). **Maximum:** One. **Field Installation:** Yes. **Prerequisitess:** For new orders, use Print Belt Character Set specify code **#9496**. For field installation, an order for a Text Print Belt, Additional, (#5824) must accompany the MES order for feature #1130. **Customer Setup:** No.

Keylock (#4650): (mdl 3 only) Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the printer. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Field Installation:** Yes. **Customer Setup:** No.

Card Control Feature (#8010): (mdl 3 only) Provides additional storage and control for specific card I/O attachment. Required once only for any card attachment feature(s). **Field Installation:** Yes. **Customer Setup:** No.

3501 Card Reader Attachment (#8050): (mdl 3 only) To attach a 3501 Card Reader. **Limitation:** Cannot be installed with #8149. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8010. **Customer Setup:** No.

3782/2502 Card Reader Attachment (#8149): (mdl 3 only) To attach a 3782 Card Attachment Unit mdl 2 and a 2502 Card Reader mdl A1. The 2502 can be equipped with special features for 51/80 or 66/80 column cards. **Limitation:** Cannot be installed with 3501 Card Reader Attachment (#8050). Optical Mark Read Feature (#5450) on 2502 is not supported. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8010. **Customer Setup:** No.

3782/3521 Card Punch Attachment (#8150): (mdl 3 only) To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** If a 2502 or 3501 Card Reader is also attached (#8050 or #8149), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Simultaneous operation of a 3521 equipped with Card Print Feature (#1501) with a Card Reader (3501 or 2502) is not permitted. Simultaneous operation of printer, reader, and punch without Card Print is permitted. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8010. **Customer Setup:** No.

MODEL CONVERSIONS

Field changes of Model 2 to/from Model 4 are not recommended. All other 3289 model changes are not field installable.

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the feature number indicated below. Order by MES only.

Cables: Cables and or associated parts to attach the subject machines to the 3274 Control Unit and the 3276 Control Unit Display Station, or Display/Printer Attachment feature (#1420) on the 3814 Switching Management System, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning*, GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors **#1836446**) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors **#1836447**) required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two **#2577672** or two **#1833108** cable assemblies together.

Locks and Keys [3289-3]: The Keylock **#4650** special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). Order via DP Supply Order (Raleigh Plant). A customer letter of authorization with key identification number must accompany each order. Allow 6 to 7 weeks for shipment.

Print Belt, Additional: Permits customer to obtain more than one character set print belt for various applications.

A metal belt with engraved font. See appropriate "Machines" page for restrictions and limitations. The belt can be used interchangeably with the one provided on the machine.

155 LPM Max - 3289-1
400 LPM Max - 3289-2, 3, 4

Available in EBCDIC and ASCII character arrangements.

	Feature
48-character ASCII*	**#5811****
64-character ASCII*	**#5812****
94-character ASCII*	**#5813****
48-character EBCDIC	**#5821**
64-character EBCDIC	**#5822**
94-character EBCDIC	**#5823**
125-char Text Print EBCDIC*	**#5824**

* 3289 mdls 1 and 2 only.

** For 3289, SCS Operation is not available with ASCII.

SUPPLIES

Black Ribbons: Black ribbons, P/N **1136634** or equivalent for mdl 1 or P/N **1136670** or equivalent for mdls 2 and 3, are required.

3289 LINE PRINTER MODEL 4

PURPOSE

A line printer for attachment to a 4321 or 4331 System.

MODELS

Model 4 004

Prerequisites: A 4321 or 4331 Processor. See M4321, M4331 for details.

Limitations: Refer to GA24-3488 for forms design considerations. Printed output is not supported for optical character reading.

Customer Setup (CSU): The 3289 mdl 4 is designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. Pre-installation Planning responsibilities are covered in the *3289 Model 4 Site Preparation Guide,* GA27-3198. For additional information on CSU, contact IBM.

HIGHLIGHTS

Line printing is from characters engraved on a revolving metal belt. The 3289 mdl 4 operates at the following speeds:

		Maximum Lines Per Minute*	Character Set
Mdl 4	004	400	48
		300	64
		230	94

* Actual printer throughput is dependent on operational and system characteristics. Maximum print speed may be degraded by such factors as control unit load and application program.

Included is one interchangeable print belt (48, 64, 94 character set)–see "Specify". A variable width forms tractor for feeding of marginally punched continuous forms (one to six parts) up to 33.1 cm (15 inches) overall width is provided. The following functions are basic: paper jam detection; front forms loading; Universal Character Set Buffer; end of forms detection; 132 print positions; character spacing of 10 per inch; line spacing of 6 or 8 lines per inch and Vertical Channel select (under 4321 or 4331 Processor control). Standard color accent panel will be pebble gray, any other colors are via RPQ only.

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibility" below.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customers receiving dock, unpacking and placement of the 3289.
- Physical setup, connection of cables, switch settings and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to the non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling IBM for service.
- Disconnecting, packing and removal to the customers shipping dock at the time of discontinuance. Appropriate instruction will be provided by IBM.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

- Plugs (120V AC, 1-phase, 3-wire, 60Hz): **#9890** for locking plug or **#9891** for non-locking plug.
- Power Cord: If standard 2.8 meter (9 feet) power cord is not desired, specify: **#9511** for 1.8 meter (6 feet) power cord, **#9512** for 3.7 meter (12 feet) power cord or **#9513** for 4.6 meter (15 feet) Power Cord.
- Print Belt Characters Set: Specify one. Available at time of manufacture only. See Print Belt, Additional, in "Accessories" if more than one belt is required.

  #9490 – 48-Character Set EBCDIC
  #9491 – 64-Character Set EBCDIC
  #9492 – 94-Character Set EBCDIC

- Cables: Customer is responsible for procurement, maintenance and installation of coaxial signal cable. See *3270 Installation Manual-Physical Planning,* GA27-2787, for cable details.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Field changes of Model 2 to/from Model 4 are not recommended. All other 3289 model changes are not field installable.

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the feature number indicated below

Print Belt, Additional: Permits customer to obtain more than one character set print belt for various applications.

A metal belt with engraved font. See appropriate "Machines" page for restrictions and limitations. The belt can be used interchangeably with the one provided on the machine.

155 LPM Max - 3289-1
400 LPM Max - 3289-2, 3, 4

Available in EBCDIC and ASCII character arrangements.

	Feature
48-character EBCDIC	**#5821**
64-character EBCDIC	**#5822**
94-character EBCDIC	**#5823**
125-char Text Print EBCDIC*	**#5824**

SUPPLIES

Black Ribbons: P/N **1136670** or equivalent are required.

3290 INFORMATION PANEL DISPLAY STATION

PURPOSE

A high-function, large capacity, plasma-panel display station that attaches to a 3274 Control Unit. A member of the 3270 Display System family, the 3290 provides for the display of up to 9920-alphanumeric characters in multiple-screen format options for use in entering data into and retrieving data from S/370 Processors, 4300 Processors, and 8100 Information Systems.

MODELS

Model 1 001 — For use with a 3274 Mdl 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C and 61C. Comprised of a Display Panel, Power Logic Unit, and a Keyboard. Also optionally available are a PF Keypad and a Numeric Keypad which can be used in conjunction with either of the two available keyboards.

Prerequisites:

1) A 3274 mdl 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C or 61C.

2) IBM 3274 Configuration Support Requirements:

IBM 3274 Control Unit Models

FUNCTION	1A	1C	1D	31A	31C	31D	51C	41A	41C	41D	61C
3290 Base	*T	*T	*T	*T/D	*T/D	*T/D	*T/D	*D	*D	*D	*D
Cust Mod Kybd	T	T	T	T/D	T/D	T/D	T/D	D	D	D	D
Highlight Att	T	T	T	T/D	T/D	T/D	T/D	D	D	D	D
160 Column Prt	T	T	T	T/D	T/D	T/D	T/D	D	D	D	D
String/Blk Copy				D	D	D	D	D	D	D	D
Entry Assist				D	D	D	D	D	D	D	D
RTM				D	D	D	D	D	D	D	D
Alert				D	**D		**D	D	**D		**D

D = Configuration Support D (#9124) at release level 61 or higher.
T = Configuration Support T (#9113) at release level 31 or higher.
* = Configuration Support T (#9113) or D (#9124) at any release level.
** = SNA only.

3) Specify **#9301** on 3274 when Configuration Support D is used.

4) A 3178, 3278, or 3279 Display Station with keyboard must be attached to Port 0 of Control Unit as a diagnostic unit.

5) Except when ordering a 3290 Standard Model, one Display Panel (#3210), one Keyboard (#4730 or #4731) and a Keyboard Cable (#1503) or (#1506) must be selected (see "Special Features") to complete a 3290 order. Unless the 3290 unit is being ordered for use as a spare and then the specify for the Power Logic Unit only **(#9490)** must be indicated (see "Specify").

Customer Setup (CSU): The 3290 Information Panel Display Station is designed to be set up by the user, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

STANDARD MODEL

The Standard Model for this machine type consists of a 3290-1 Power Logic Unit, a Display Panel #3210, a Data/Typewriter Keyboard #4730, 0.9 meter (3 foot) Keyboard Cable #1503, 120V AC/1-phase/3-wire/60HZ power, and a 1.8 meter (6 feet) power cable with a non-locking plug.

The Standard Model is ordered by simply specifying 3290. No other features, RPQ's or other alterations will be shipped with Standard Models. Any deviations require ordering by the detailed procedures that follow.

HIGHLIGHTS

The 3290 Information Panel Display Station provides a new level of visual display function for the IBM 3270 user. A member of the 3270 family, the 3290 incorporates a flat plasma-panel as its display medium to provide a large capacity display for alphanumeric data and graphic images. The image displayed is orange on a black background and is uniform at every point of the viewing area. The 3290 utilizes microcode, loaded from the 3274 Control Unit, to provide screen-management facilities for improved operator usability. The 3290 is data-stream compatible with all models of today's 3270 displays in alphanumeric application environments and complements the 3270 product family by extending 3270 capability to include large-screen and multiple-screen application usage. Its flat panel allows compact packaging and provides a versatile display station.

- Large flat-panel viewing area in small-footprint package
  - Displays up to 9,920 characters.... 62 lines of 160 characters each. Characters are displayed within a 5x8 character matrix.
  - Alternate display of up to 5,300 characters.... 50 lines of 106 characters each. Larger characters displayed within a 7x9 character matrix.
  - Variable character spacing
  - Multiple partitions (up to 16)
- Advanced Screen Management Facilities
- Multiple display capability
- Vertical Scrolling
- 24K Character buffer
- Ruling, Row/Column Indicator, Zoom Operator Controls
- Entry Assist.

- Screen tilt
- String and Block Copy of data

- Local copy
- Response Time Monitor
- Alert
- Ability to print 160 columns of data
- 3278 function
- Audible Alarm
- Security Keylock
- Programmed Symbols (6 character sets)
- APL

Note: The Entry Assist, Response Time Monitor, Alert, String and Block Copy functions are available on a 3290 Information Panel attached at a 3274 Control Unit only with Configuration Support D at release level 61 or higher. See item 2 (3274 Configuration Support Requirements) in "Prerequisities". RTM historical data stored in the 3274 Control Unit cannot be viewed with a 3290 Information Panel but can be viewed by other authorized terminals attached to the Control Unit.

- Two keyboards with modifiable layouts.
  - Data/Typewriter
  - APL
- Optionally available keypads
  - Numeric keypad
  - P.F. keypad
- ASCII-8 Information Interchange RPQ

The 3290 Information Panel attaches to a 3274 Control Unit utilizing one physical port and up to five addresses, depending on the application. Up to 31 3290s can be attached to a 3274, depending on the application and 3274 mdl being used. The 3290 Information Panel attaches on the same coax cable that is used with other Category A terminals to attach to a 3274 Control Unit.

Customer Responsibilities: The customer is responsible for:

- Assuring that use of the equipment complies with all Federal, State and local laws, regulations and ordinance.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement.
- Performing checkout in accordance with supplied procedures for initial installation or relocation.
- Physical setup, connection of cables.
- Performing customer problem analysis and resolution (CPAR) before taking action to get the failing unit repaired or exchanged.
- Determining any required spares.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.

Maintenance: 3290 Information Panel Display Stations utilize IBM Service Center Maintenance either under "Maintenance" or "Replacement" with the option of IBM On-Site Exchange (IOE). See General Information, FE Services section (71) for description, locations and procedures associated with Service Center maintenance. **Note:** If a keyboard has been modified with unique keytops and the maintenance procedure requires the keyboard to be exchanged, it is the customer's responsibility to remove the unique keytops and to reinstall them on the new keyboard.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the unit(s) inspected. If the unit(s) require repair and the repair is requested, all time and parts will be billed at IBM's then current rates and terms. The machine is then eligible for IBM Maintenance Agreement Coverage.

Warranty Service: The warranty period is three months. Maintenance is provided during the warranty period under the terms and conditions of the Agreement for Purchase of IBM Machines and IBM On-Site Exchange. The 3290 Information Panel Display Station is eligible for

3290 Information Panel Display Station (cont'd)

IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. If maintenance agreement coverage is not contracted for immediately following expiration of the warranty and the customer subsequently wants maintenance coverage, the machine(s) must be inspected by IBM. Refer to IBM Service Center Maintenance in Field Engineering Services subsection of the General Information section of the sales manual

Customer Carry-In Repair (CCR): It is the customer's responsibility to setup the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements if such use is planned. Under Service Center Maintenance, it is the customer's responsibility to disconnect the element(s), transport them to a designated IBM location and pick them up when repair is completed. Alternately, the customer may ship them prepaid to a mail-in service location. IBM will repair the units and return them to the customer. Resetup of the element(s) is the customer's responsibility. This service is available for an annual contract charge per machine, or for customers not covered by an IBM Maintenance Agreement they may have their units repaired, if repairable, for a time and material charge. Alternately, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling inspection, cleaning, testing, estimating charges, and return shipping charges.

Customer Carry-In Exchange (CCE): Under Customer Carry-In Exchange it is the customer's responsibility to disconnect the unit(s) transport them to a designated IBM location and exchange the defective unit(s) with IBM for an equivalent unit in good working order. The defective unit becomes the property of IBM. This Service is available on a yearly contract.

IBM On-Site Exchange (IOE): A customer desiring replacement service for a defective Element may call the local IBM Service/Exchange Center to have IBM bring a replacement spare to the customer site. IBM will remove the defective element and install and test the replacement element. The defective element becomes the property of IBM. During warranty, maintenance is performed by IOE under the Agreement for Purchase of IBM Machines. After warranty IOE is available under an IBM Maintenance Agreement for an annual charge.

Customer On-Site Exchange (COE): A customer desiring this exchange service for a defective Element(s) may call a designated number and have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM. This service is available for an annual contract charge per machine.

On-Site Assistance: If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), the local IBM Service branch office may be called for IBM assistance. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. Customer-owned spare elements will be installed by IBM upon customer request. Repair or Exchange of defective element(s) is a customer responsibility. IBM assistance is billable at the current CE rates and terms.

Bibliography: See KWIC Index, G320-1621 or specific system bibliography.

BASIC CONFIGURATION

Specify codes are not normally required to order a 3290. If not specified otherwise, the 3290 will be shipped with the following:

Power Logic Unit

- Voltage: 120V AC, 1-phase, 3-wire, 60 Hz.
- Power Cable: 1.8 meters (6 feet) with non-locking plug.

To complete the order for a 3290, a Display Panel #3210, a Keyboard (#4730 or #4731), and a Keyboard Cable (#1503) or (#1506) must be ordered. See "Special Features".

SPECIFY

The specify section can be ignored unless the options provided in the "Basic Configuration" above do not meet your needs.

- Power Logic Unit: To order a Power Logic Unit only (without a Display Panel, Keyboard, and Keyboard Cable) specify **#9490** must be used.
- Terminals Cables: See "Accessories" for ordering instructions. For cable specifications, see *3270 Installation Manual - Physical Planning,* GA27-2787.

SPECIAL FEATURES

Keyboard Cables (#1503, #1506): The 3290 keyboards (#4730 and #4731) require a separate attachment cable.

Order one of the following:

#1503 - 0.9 meter (3 foot)
#1506 - 1.8 meters (6 feet)

Display Panel (#3210): A flat plasma-panel unit which provides the visual display medium. It connects to a Power Logic Unit along with a keyboard to provide a 3290 Information Panel Display Station. **Maximum:** One can be attached at a time. **Field Installation:** Yes (CSU).

Data/Typewriter Keyboard (#4730): A low profile, customer modifiable, cable attached, EBCDIC typewriter-like keyboard with keyboard slope adjustable to operator preference. There are 24 Program Function (PF) keys located in two rows across the top of the keyboard. Overlays are provided for the PF keys to permit users to identify functions assigned to PF keys. Additional overlays are available, see "Accessories". Refer to the Type Catalog for a pictorial view of the keyboard layout. **Corequisite:** A Keyboard Cable #1503 or #1506 is required to attach a keyboard. **Maximum:** One keyboard can be attached at a time. **Field Installation:** Yes (CSU). **Limitations:** Cannot be installed with #4731.

APL Keyboard (#4731): A Data/Typewriter Keyboard (Ref. #4730) allows entry of 81 APL-specific characters. An APL On/Off key controls whether the keyboard is in basic EBCDIC typewriter or APL mode. Overlays are provided for the 24 PF keys to allow user to identify functions assigned to the PF keys. Additional overlays are available via "Accessories" pages. Refer to the Type Catalog for a pictorial view of the keyboard layout. **Corequisite:** A Keyboard Cable (#1503 or #1506) is required to attach a keyboard. **Maximum:** One keyboard can be attached at a time. **Field Installation:** Yes (CSU). **Limitations:** Cannot be installed with #4730.

Customer Modifiable Keyboards: The keyboard layouts may be changed by using the keyboard utility diskette supplied with the IBM 3274 Control Unit. Keyboards may be labelled with keyboard "write-on, stick-on" labels ... see "Keyboard Accessories" for other keytop label kits. The keyboard modification function is explained in the *IBM 3290 Description and Reference Manual,* GA23-0021, and the *IBM 3290 Operators Guide,* GA23-0143.

Numeric Keypad (#4830): A keypad with the key layout in a calculator format. It is a low profile, customer modifiable keypad, with a 760mm (2.5 foot) cable which attaches to a #4730 or #4731 keyboard. Refer to the Type Catalog for a pictorial view of the keypad layout. **Corequisite:** #4730 or #4731 keyboard. **Maximum:** One keypad can be attached at a time. **Field Installation:** Yes (CSU). **Limitations:** Cannot be installed with #4831.

Program Function (PF) Keypad (#4831): A low profile, customer modifiable, keypad with 24 program function keys. It has a 760mm (2.5 foot) cable which attaches to a #4730 or #4731 keyboard. The 24 PF keys on the keypad directly correspond to the 24 PF keys on the associated keyboard (e.g., PF1 on the keypad performs the identical function of PF1 on the keyboard). Refer to the Type Catalog for a pictorial view of the keypad layout. **Corequisite:** #4730 or #4731 keyboard. **Maximum:** One keypad can be attached at a time. **Field Installation:** Yes (CSU). **Limitations:** Cannot be installed with #4830.

MODEL CONVERSIONS (None)

ACCESSORIES

Keyboard Cable: The 3290 keyboards (Data/Typewriter and APL) have a separate attachment cable. When a 3290 is ordered, a 0.9 meter (3-foot) cable is included. If a spare cable is required order the following:

Keyboard Cable - 0.9 meter (3 foot) - P/N **4804280**

Keyboard Cable - 1.8 meter (6 feet) - P/N **4804310**

Field Packaging Materials: Field packaging materials are for shipping a 3290 or individual workstation elements to and from an IBM Repair Center.

	P/N
Power/Logic Element	**2656204**
Display Element	**2656205**
Keyboard Element	**6430398**
Keypad Element	**8665739**
Master container to hold above four containers	**8665738**

Keyboard Accessories: The following accessories are available to redesignate the nomenclature on the keytops of the keyboards and keypads. Contact IBM for ordering information.

P/N	Description
1351700	Blank light colored keytops; 15 per package plus keytop removal tool.
1351701	Blank dark colored keytops; 15 per package plus keytop removal tool.
1351702	Clear keytops that will use "Write-on" labels; 15 per package plus keytop removal tool.

3290 Information Panel Display Station (cont'd)

1351709 Keytop removal tool.
4804350 White Labels to "Write-On" and "Stick-On" keytops; 100 per sheet.
6016733 PF key Overlay for use with Entry Assist, String/Block Copy and RTM (English US language).
6016734 PF key Overlay standard "Write-on".
8248324 White labels for clear keytops; 60 per sheet.

1351704 3278 Control key set: 7 keycaps: (Cursr Sel on top of keycap, Clear on front face) (Cursr Blink on top, AltCr on front) (Clicker symbol on top, Test on front) (PF21 on top, blank front) (PF22 on top, blank front) (PF23 on top, blank front) (blank on the top and front face). 2 sets per package plus keytop removal tool.
1351705 3278 Top Cursor area key set: 5 keycaps: (Dup on top of keycap, PA1 front) (Field Mark on top, PA2 front) (Jump Screen symbol on top, PA3 front) (Backtab symbol on top, Jump Partition symbol on front) (Delete symbol on top, Change screen symbol on the front). 3 sets per package plus keytop removal tool.
1351706 Lower case $ for JES2 etc: two keycaps; (SYS $ on top of keycap, front face blank) (SYS $ on top of keycap , Erlnp on front face) ... 7 sets per package plus keytop removal tool.
1351707 Numeric set: 0 thru 9 plus Backspace symbol, Front tab, Back Tab, Space, Period, Comma and Minus on top of keycaps, Front face of keycaps blank. Also 5 light and 8 dark colored blank keytops, 1 set per package plus keytop removal tool.
1351708 PF set: PF1 thru PF24 on top of keycaps, front face of keycaps blank, 1 set per package plus keytop removal tool.

SUPPLIES (None)

3299 TERMINAL MULTIPLEXER

PURPOSE

A terminal multiplexer unit which can be used when connecting Category A Terminals to a 3274 Control Unit, except for the 3274 Model 51C. Using a 3299 reduces the coax cable requirements which provides for lower subsystem coax cabling costs and improved cabling flexibility. Also the distance that a terminal may be located away from its 3274 Control Unit is increased up to a maximum of 3000 meters (9840 feet). Each 3299 Terminal Multiplexer attaches up to eight Category A Terminals; therefore, four 3299's are required when attaching 32 terminals to a 3274.

MODELS

One model is available and it is used with the 3299 Terminal Multiplexer Support specify option #9901 on 3274 Models 41A, 41C, 41D and 61C or with 3299 Terminal Multiplexer Support RPQ's 8K1155 and 8K1156 on a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C or 31D.

HIGHLIGHTS

Using a 3299 Terminal Multiplexer eliminates the requirement for individual coax cables from a 3274 Control Unit to each attached terminal. Only one coax cable is required between the 3274 and a 3299 which can be located up to 1500 meters (4920 feet) from a 3274. The 3299 can then attach up to eight (8) Category A Terminals, each with its own coax cable. Each of these coax cables between the 3299 and a terminal can also be 1500 meters (4920 feet) in length. This permits terminals to be located up to a maximum of 3000 meters (9840 feet) from a 3274 Control Unit or double the distance that is allowed when a terminal is attached directly to a 3274.

CUSTOMER SETUP (CSU): The 3299 is designated a customer setup unit. Setup instructions are included with each unit.

CUSTOMER RESPONSIBILITIES: The customer is responsible for:

- Adequate site preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Setup of unit and connection of coax cables.
- Performing customer problem analysis and resolution (CPAR).
- Isolating a defective unit, replacement of unit, and delivering the defective unit with failure analysis report to an IBM Service/Exchange Center for exchange.
- Determination of the required number of spares.

5-YEAR WARRANTY

Under the terms of the warranty, if a 3299 unit fails or is defective during the period of five (5) years from the date of purchase, it can be exchanged at an IBM Service/Exchange Center for a unit in good working order. The defective unit becomes the property of IBM. It is the customer's responsibility to install and disconnect a 3299 unit, and to determine when replacement is required and to transport it to an IBM Service/Exchange Center for exchange .

Following the expiration of the warranty coverage, maintenance service will be available through the IBM Service/Exchange Center.

SPARES

It is recommended that the customer replace a failing 3299 unit with a spare unit and that the customer be advised to purchase sufficient spare 3299 units for such use. The number of spare units recommended is dependent upon the number of 3299 units the customer has installed, the application requirements, and the physical locations. Determination of the required number of spares is a customer responsibility, however, the minimum number of spare units recommended is shown in the table below:

Recommended Minimum Number of Spare 3299's

Number of 3299's Installed	Spare 3299's
1 - 100	1
101 - 200	2
201 - 600	3
601 - 1000	5

The customer should be advised to test spares for correct operation before storing them.

Prerequisites: 1) #9901 Multiplexer Support on a 3274 Model 41A, 41C, 41D or 61C. 2) RPQ 8K1155 and/or 8K1156 on a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D. 3) One 3299 is required for each group of eight Category A Terminals to be attached to a 3274.

BASIC CONFIGURATION

Specify codes are not normally required to order a 3299. If not specified otherwise, the 3299 will be shipped with the following:

- Voltage: 120 VAC, 1-phase, 3-wire, 60HZ
- Power Cable: 1.8 meters (6 feet) with non-locking plug

SPECIFY

No Specify Codes are necessary

SPECIAL FEATURES

No Special Features are available.

3310 DIRECT ACCESS STORAGE DEVICE

PURPOSE

Direct access storage for attachment to a 4321, 4331or 4361 Processor.

MODELS

Model A1 A01 — Single-drive disk storage unit and associated control for attachment to a 4321 Processor via its standard DASD Adapter or to a 4331 4321, 4331 or 4361 Processor via its DASD Adapter (#3201).

Model A2 A02 — Two disk storage drives and associated control for attachment to a 4321 Processor via its standard DASD Adapter or to a 4331 4321, 4331 or 4361 Processor via its DASD Adapter (#3201). It also provides the logic required to support the attachment of up to two additional drives for a maximum string of four.

Model B1 B01 — Single-drive storage unit which attaches to a model A2 to provide for configurations requiring three drives.

Model B2 B02 — Two disk storage drives which attach to a model A2 to provide for configurations requiring a full string of four drives.

Maximum: See 4321, 4331 or 4361 pages.

Prerequisites: A 3310 Direct Access Storage Drive requires a 3310 mdl A1 or A2 and a position on the DASD Adapter of a 4321, 4331 or 4361 Processor. A mdl A2 is required to attach a mdl B1 or B2.

HIGHLIGHTS

The 3310 employs a fixed storage medium and features high data rate, fast access, modularity and a high degree of reliability.

Capacity: Each drive has a capacity of 64,520,192 bytes.

Format: The 3310 uses Fixed Block data structure and the cylinder concept providing the following:

Bytes per Sector	512
Sectors per Cylinder	352
Bytes per Cylinder	180,224
Cylinders per Drive	358

Access Time:

Seek Time (ms):

Minimum	9
Average	27

Rotational Delay (ms):

Average	9.6

Data Rate: 1,031,000 bytes per second.

Rotational Positioning Sensing: Permits the disk storage device to disconnect during rotational delay, thereby increasing DASD Adapter availability for other operations.

Error Correction: Provides capability of correcting single data error bursts of up to 3 bits span as well as detecting all single error bursts of up to 14 bits span.

Data Recovery: (Plant only) Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage:

  (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.

- Color (A mdls only): **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, or **#9065** for pebble gray. **Note:** One accent panel from the mdl A unit is exchanged with the outer side panel of the mdl B.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model changes between 3310 model A1 and A2 or between model B1 and B2 are field installable. Model changes between 3310 model A and model B units cannot be done.

ACCESSORIES (None)

SUPPLIES (None)

3330 DISK STORAGE

[NO LONGER AVAILABLE: Models, Model Changes, Specify Features, Special Features or Accessories. RPQs have not been withdrawn.]

PURPOSE

Large capacity fast access, high data rate. Up to three 3330 modules attach to a 3333 Storage and Control to form a facility for general purpose data storage and programming system residence.

MODELS

Model 1	001	Contains two disk storage drives ... available on S/360 mdl 195, any S/370 processor except 3115, the 4331 Model Group 2 and the 4341, 4361 or 4381 Processor.
Model 2	002	Contains one disk storage drive ... available on S/360 mdl 195, all S/370 processors except 3115, the 4331 Model Group 2 and the 4341, 4361 or 4381 Processor.
Model 11	011	Contains two disk storage drives ... available on all virtual storage S/370 processors except 3115 and 3125, the 4331 Model Group 2 and the 4341, 4361 or 4381 Processor.

Maximum: Up to four 3330 modules, in any combination of mdls 1 and 2, can be attached to the 3830 mdl 1. Up to three 3330 modules, in any combination of mdls 1, 2 or 11, can be attached to the 3333 mdl 1 or 11 ... see system availability above. On the 3125, only one 3330 module, either mdl 1 or 2, can be attached to the 3333 mdl 1. For combinations allowed on a storage director of a 3880 Storage Control, see "Maximum" in M3880 pages.

Prerequisites: The 3330 mdls 1 and 2 are designed for interconnected operation with the 3333 mdl 1, 3333 mdl 11, or the 3830 mdl 1. The 3330 mdl 11 is designed for interconnected operation with the 3333 mdl 1 or mdl 11. Customers who wish to order a 3330 for stand-alone or individual use should submit an RPQ to provide the necessary safety elements (covers, cable connectors, etc.) to complete the unit for a non-standard (i.e., not installed as part of a 3330 facility) environment. In lieu of the RPQ, the customer may provide safety elements equivalent to the standard configuration or that provided by the above RPQ. If not provided, the unit will be offered on a purchase-only basis. See "Specify". See appropriate DASD storage control feature or machine to determine prerequisite specify and/or special features to attach 3333/3330s.

Agreement for IBM to install and maintain the 3330 in any non-standard configuration must be reviewed with IBM.

Each disk storage drive requires a 3336 Disk Pack. These must be ordered separately. Contact IBM.

HIGHLIGHTS

Each drive uses an electromagnetic actuator to move and control the head assembly.

Cylinder Concept: 404 data cylinders per pack for mdls 1 and 2 ... 808 data cylinders per pack for mdl 11. Each cylinder has 19 data tracks ... up to 13,030 bytes per track ... up to 247,570 bytes available per cylinder.

Data Rate: 806,000 bytes per second.

Access Time: Average access time is 30ms with a minimum of 10ms and a maximum of 55ms.

Power Drawers: Each disk drive is mounted in a drawer ... opened or closed by a switch on the operator control panel.

Write Inhibit Switch: A toggle switch for each drive, mounted on the operator's panel, provides the means to protect packs mounted within the facility from being written upon. The switch is manually set by the system operator under instructions from the customer operating procedure. Programming Support then protects the user's data by terminating a program which attempts to write to a protected drive.

Write Format Release: Standard feature on the mdl 11, which frees the subsystem while the drive erases from the end of a "formatted" write record to the end of the track.

Rotational Position Sensing: Enables a "seek" to an explicit position on a track ... permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability ... requires one unshared subchannel on a block multiplexer channel for each drive.

Multiple Requesting: Allows multiple channel command sequences to be active, up to one sequence per drive ... permits better utilization of control unit, devices, channel and processor ... requires one unshared subchannel on a block multiplexer channel for each drive.

Disk Pack: Each drive requires a 3336 Disk Pack. The 3336 mdl 1 provides up to 100 million bytes of storage per pack. The 3336 mdl 11 provides up to 200 million bytes of storage per pack. The 3336 mdl 1 is interchangeable on all 3330 mdls 1 and 2 and 3333 mdl 1 drives; it cannot be used with the 3330 mdl 11. The 3336 mdl 11 is interchangeable on all 3330 mdl 11 and 3333 mdl 11 drives; it cannot be used with the 3330 mdl 1 or 2.

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... voltage must be consistent with that of the unit to which the 3330 is to be attached.
- Non-Standard Environment: **#9485** must be specified if the 3330 is not to be installed as part of a 3330 facility ... also see "Prerequisites" above.
- Position Designator: For cable definition and drive identification (Ready Indicator and Logical Address Plug), one position designator code must be specified for each 3330, indicating its relative position as shown in the diagram below:

3830 mdl 1	**#9491**	**#9492**	**#9493**	**#9494**
3333		**#9492**	**#9493**	**#9494**

Note: If any configuration change (increase or decrease) results in a position change of installed units, their position designator codes must be changed by MES for rental machines. For purchased machines, an RPQ must be submitted.

If an installed 3830 mdl 1/3330 configuration is being changed to a 3830 mdl 2/3330 series configuration and the 3330 with position designator code **#9493** has serial number 12490 or below, B/M 2276789 (60 Hz) must be ordered via an MES for rental machines. For purchase machines, an RPQ must be submitted.

MODEL CONVERSIONS

Model 1 to model 11 is field installable.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3333 DISK STORAGE AND CONTROL

[NO LONGER AVAILABLE: Models, Model Changes, Specify Features, Special Features or Accessories. RPQs have not been withdrawn.]

PURPOSE

Large capacity, fast access, high data rate storage for general purpose data storage and programming system residence with additional control for the attachment of up to three 3330 Disk Storage modules.

Two disk storage drives and associated control for attachment to the 3135, 3135-3, 3138 via the 3330 Series IFA (#4655), to the 3145, 3145-3, 3148 models H2, HG2, I2, IH2, and J2 via the ISC (#4660), to the 3145, 3145-3, 3148 models FED, GE, GFD, H, HG, and I via the 3345 models 3, 4, and 5, to the 3158, 3158-3, 3168, 3168-3 via the ISC (#4650), to the 3830 model 2 and to the 3880 mdl 1, 2 or 11. It provides logic and power for the attachment of up to six spindles of 3330 disk storage drives of any models.

MODELS

Model 1 001 — Contains two disk storage drives ... available on S/360 mdl 195, any S/370 processor except 3115, the 4331 Model Group 2 and the 4341, 4361 or 4381 Processor.

Model 11 011 — Contains two disk storage drives ... available on any virtual storage S/370 processor except 3115 or 3125, the 4331 Model Group 2 and the 4341, 4361 or 4381 Processor.

Maximum: 3125: one 3333 mdl 1 (with associated 3330s) ... For other systems, see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 4341, 4361, 4381, 3345, 3830-2, 3830-3 or 3880 pages.

Prerequisites: Each disk storage drive requires a 3336 Disk Pack. These must be ordered separately ... contact IBM.

See appropriate DASD storage control feature or machine to determine prerequisite specify and/or special features to attach 3333/3330s.

Each system attachment requires a specify code ... see "Specify" below.

Note: If a 3333/3330 configuration is replacing a 3830 mdl 1/3330 configuration (or any configuration change is made where installed 3330s are repositioned with respect to a 3333), the position designator specify codes of the 3330s must be changed via MES ... see M3330 pages.

HIGHLIGHTS

Each drive uses an electromagnetic actuator to move and control the head assembly.

Cylinder Concept: 404 data cylinders per pack for mdl 1 ... 808 data cylinders per pack for mdl 11. Each cylinder has 19 data tracks ... up to 13,030 bytes per track ... up to 247,570 bytes available per cylinder.

Data Rate: 806,000 bytes per second.

Access Time: Average access time is 30ms with a minimum of 10ms and a maximum of 55ms.

Power Drawers: Each disk drive is mounted in a drawer ... opened or closed by a switch on the operator control panel.

Write Inhibit Switch: A toggle switch for each drive, mounted on the operator's panel, provides the means to protect packs mounted within the facility from being written upon. The switch is manually set by the system operator under instructions from the customer operating procedure. Programming Support then protects the user's data by terminating a program which attempts to write to a protected drive.

Write Format Release: Standard feature on the mdl 11, which frees the subsystem while the drive erases from the end of a "formatted" write record to the end of the track.

Rotational Position Sensing: Enables a "seek" to an explicit position on a track ... permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability ... requires one unshared subchannel on a block multiplexer channel for each drive.

Multiple Requesting: Allows multiple channel command sequences to be active, up to one sequence per drive ... permits better utilization of control units, devices, channel, and processor ... requires one unshared subchannel on a block multiplexer channel for each drive.

Disk Pack: Each drive requires a 3336 Disk Pack. The 3336 mdl 1 provides up to 100 million bytes of storage per pack. The 3336 mdl 11 provides up to 200 million bytes of storage per pack. The 3336 mdl 1 is interchangeable on all 3333 mdl 1 and 3330 mdl 1 and 2 drives; it cannot be used with the 3333 mdl 11. The 3336 mdl 11 is interchangeable on all 3333 mdl 11 and 3330 mdl 11 drives; it cannot be used with 3333 mdl 1.

Maintenance: Agreement for IBM to install and maintain the 3333 in any non-standard configuration must be reviewed with FE Management prior to making a commitment to the customer.

Publications: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V.

  Note: The 3333 requires a 60 amp AC power cord ... consult *Physical Planning Manual.*

- System Attachment: One of the following must be specified:

Attachment	Specify	Attachment	Specify
3125 *	**#9586**	3168 ISC	**#9585**
3135, 3135-3 IFA	**#9582**	3168 ISC w #7220	**#9588**
3138 IFA	**#9579**	3345 mdls 3, 4, 5	**#9583**
3145, 3145-3 ISC	**#9583**	3830 mdl 2	**#9581**
3148 ISC	**#9580**	3830 mdl 3	**#9589**
3158 ISC	**#9584**	3880 mdl 1, 2, 11	**#9604**
3158 ISC w #7220	**#9587**		

* The 3125 is not valid for the String Switch (#8150).

SPECIAL FEATURES

Remote Switch Attachment (#6148): To attach the String Switch (#8150) to a configuration control panel. **Field Installation:** Yes. **Prerequisites:** #8150.

String Switch (#8150): To attach the 3333 to a second attachment. The two attachments may be on the same processor or different processors and may be any two of the following: 3830 Storage Control mdl 2, 3135, 3135-3, 3138 3330/3340 Series IFA (#4655), the 3345 Storage and Control Frame mdls 3, 4 and 5 or the ISC (#4660) for attachment to 3145, 3145-3, 3148, and the 3158 and 3168 ISCs (#4650) ... see appropriate machines for additional requirements. The String Switch may also be installed on a 3333 within a 3850 Mass Storage System with attachment to a 3830 mdl 3 or 3158/3168 ISC (#4650) with Staging Adapter (#7220). Installation is not recommended in a mixed 3850 MSS/non-MSS environment. If a 3333 is shared between any two ISC paths and/or 3830 mdl 3s, then any other 3333s attached to the same ISC paths and/or 3830 mdl 3s must also be shared identically. In all of the above cases, switching between the two attachments is under program control. The 3333s may also be dedicated to a single attachment with an enable/disable switch. **Field Installation:** Yes. **Specify:** To indicate the second attachment to which this feature will be made, specify one of the following:

3135, 3135-3 IFA	**#9592**	3168 ISC	**#9595**
3138 IFA	**#9601**	3168 ISC w (#7220)	**#9598**
3145, 3145-3 ISC	**#9593**	3345 mdls 3,4,5	**#9593**
3148 ISC	**#9602**	3830 mdl 2	**#9591**
3158 ISC	**#9594**	3830 mdl 3	**#9599**
3158 ISC w (#7720)	**#9597**	3880 mdl 1,2, or 11	**#9605**

NOTE: Installed 3333s retained for use with 3850 Mass Storage System:

System Attachment Specify Features must be changed on presently installed 3333s attached to a 3830 mdl 2 or 3158/3168 ISC (#4650), if the 3333s will be retained for use with a 3850 MSS when a 3830 mdl 2 is field upgraded to mdl 3 or Staging Adapter for ISC (#7220) is field installed on the 3158/3168 ISC. Submit MES(s) to effect the following:

Specify Feature Changes

Remove	Install
#9581	**#9589**
#9584	**#9587**
#9585	**#9588**

If the installed 3333s are equipped with String Switch (#8150), the Specify Features indicative of String Switch attachment are also to be changed by MES:

Specify Feature Changes

Remove	Install
#9591	**#9599**
#9594	**#9597**
#9595	**#9598**

MODEL CONVERSIONS

Model 1 to model 11 is field installable.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3336 DISK PACK

PURPOSE

Disk storage for the 3330 and 3333.

MODELS

Model 1	001	Removable and interchangeable disk storage for the 3333 Disk Storage and Control mdl 1 and 3330 Disk Storage mdls 1 and 2.
Model 11	011	Removable and interchangeable disk storage for the 3333 Disk Storage and Control mdl 11 and the 3330 Disk Storage mdl 11.

The 3336 is marketed by IBM. Contact IBM.

HIGHLIGHTS (None)

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3340 DIRECT ACCESS STORAGE FACILITY

PURPOSE

Multiple capacity, high-speed, direct access storage for attachment to a System/3 model 12 or System/3 model 15 with B, C or D model Processing Unit, System/7 with E model Processing Unit, any virtual storage S/370 or 4300 processor.

MODELS

Model A2 A02 — Two disk storage drives and associated control. For attachment to a System/3 model 15, with B, C, or D model Processing Unit via native attachment, or a System/7 equipped with a 5988-T01, 3340 Attachment Module. It provides logic and power for the attachment of up to three 3340 model B units. Also for attachment to a 3115 or 3125 via their native attachments, to the 3135, 3135-3, 3138 via the IFA (#4655), to 3145 models GE, GFD, H, HG or I via the 3345 model 3, 4 or 5, to 3145 model H2, HG2, I2, IH2, J2, JI2 or K2, 3145-3, 3148 via the ISC (#4660), to the 4321 or 4331 via the 3340/3344 Direct Attach feature (#7851), to the 3158, 3158-3, 3168 or 3168-3 via the ISC (#4650), to the 3830 model 2, and to the 3880 model 1 or 2. It provides logic and power for the attachment of up to three 3340 model B units and/or 3344 units.

Model B1 B01 — Contains one disk storage drive.

System/7, S/370 or 4300 processor: Up to three can be attached to a 3340 model A2 to provide 3-, 5- or 7-drive configurations. Can be combined with 3340 model A2, B2s and/or 3344 units for a 5-, 6- or 7-drive configuration.

System/3 model 15 with B, C, or D model processor: One can be attached to a 3340 model A2 to provide a 3-drive configuration.

Model B2 B02 — Contains two disk storage drives.

System/7, S/370 or 4300 processor: Up to three 3340 model B2s can be attached to a 3340 model A2 for a 4-, 6- or 8-drive configuration. Can be combined with 3340 model A2, B1s and/or 3344 units for a 5-, 6- or 7-drive configuration.

System/3 Model 15 with B, C, or D Model Processor: One can be attached to a 3340 Model A2 to provide a 4-drive configuration.

Model C2 C02 — Contains two disk storage drives.

System/3 Model 12: One can be attached directly to the 5412 to provide a 2-drive configuration.

Maximum:
3115-0 – four 3340 drives
3115-2 – eight 3340 drives
3125-0 – eight 3340 drives
3125-2 – sixteen 3340 drives
Other S/370s, or 4300 processors – see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 3830-2 or 3880-1,2 pages.

Maximum: System/3 mdl 12 – two 3340 drives (C2) System/3 mdl 15B, 15C, or 15D – four 3340 drives System/7 mdl E – eight 3340 drives.

Prerequisites: A 3340 facility requires: a 3340 mdl A2 (except System/3 mdl 12, which supports only 3340 mdl C2) ... a System/3 Mdl 15 with a B, C, or D mdl processor, System/7 with a 5998-T01 Module ... a S/370 or 4300 processor with appropriate attachment and features ... each 3340 drive requires a 3348 Data Module. A 3145 requires Word Buffer (#8810) to attach 3340s.

System/3: For conversion of a 5415A mdl CPU to a 5415B, 5415C, or 5415D mdl CPU, the MES must indicate deletion of **#9400**, and if a second 5444 is installed, deletion of **#9401** or **#9402**.

See appropriate DASD storage control feature or machine to determine additional prerequisite specify and/or special features to attach 3340s.

HIGHLIGHTS

Each 3340 contains an air filtration system and the load/unload mechanism for the 3348 Data Module. Features low cost, multiple capacity, fast access and high data rate ... two drives (C2 only) attach to a System/3 mdl 12 ... up to 4 drives attach to a System/3 mdl 15 B, C or D, or a 3115-0 ... up to 8 drives attach to a System/7, to a 3115-2 or a 3125-0 ... up to 16 drives to a 3125-2 with 16 Drive Expansion (**#9315**), and up to 16 drives to a 4331. See M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 4321, 4331, 4341, 3830 or 3880 pages for other S/370 or 4300 processor attachment capabilities.

The 3340 introduces a new design in which a sealed cartridge (3348 Data Module) contains the disks, access arms, read/write heads and spindle. Multiple capacity options on each drive become possible due to the modularity provided by this unique design. In addition, the 3348 mdl 70F contains fixed heads which provide low cost, fixed head capability for the 3340 user. Users may place selected components of IBM software as well as his own programs in the fixed head area to increase device performance. The 3348 mdl 70F requires the Fixed Head Feature (#4301) on the 3340. The 3348 mdl 70F is not available on the System/3 mdl 12 or mdl 15.

The 3340 supports the command set of the 3330. This is essentially the same as the 2314 command set with minor modifications.

Cylinder Concept:

	3348 mdl 35 (34.9 MB) (Note 1)	3348 mdl 70 or 70F (69.8 MB) (Note 1)	3348 mdl 70 (41.0 MB) (Note 2)
Bytes per Track	8,368	8,368	12,288
Tracks per Cylinder	12	12	20
Cylinders per Data Module	348	696	210*
Bytes per Cylinder	100,416	100,416	245,760

Note 1: Mdl 35, 70 or 70F for System/7, S/370 or 4300 processors.

Note 2: Mdl 70 on System/3 mdl 12 or mdl 15.

***Note:** For the mdl 12 or 15, these are "logical" cylinders rather than physical cylinders. For capacities on the System/7, see System/7 under 3348.

Data Rate: 885,000 bytes per second. See GA09-1004 for Data Rate on System/7.

Access Time: For the 3348 mdl 35 and 70, the average seek time is 25 ms with a minimum of 10 ms and a maximum of 50 ms. For the mdl 70F, the average seek time is 0 ms for cylinders 1 through 5 while all other cylinders retain the above seek timing. Rotation time is 20.2 ms and latency is 10.1 ms, the same as for the 3348 mdls 35 and 70.

Autoloading: Data modules are automatically loaded after the Data Module is placed in the drive, the drive cover is closed and a switch is turned on. The Data Module is a sealed unit and requires no cover removal. Start up time is less than 20 seconds.

Read-Only: A switch is provided on every 3340 drive. This switch is activated by inserting a latch in the Data Module. When the latch is *NOT* inserted, the Data Module is protected from being written upon or erased.

Data Modules: Each drive requires a Data Module to operate. These must be ordered separately ... see M3348 pages.

3348 Data Module mdl 35 provides 34,944,768 bytes of storage for the S/370 and 4300 processors.
3348 Data Module mdl 70 provides 69,889,536 bytes of storage for the S/370 and 4300 processors. For System/3 mdl 12 and mdl 15, it provides 41,041,920 bytes of main data storage plus 9,830,400 bytes for program support. **Note:** System/3 mdl 12 and mdl 15 can only utilize the 3348 Data Module mdl 70.
3348 Data Module mdl 70F provides 69,889,536 bytes of storage of which 502,080 are accessible by fixed heads.

Either the mdl 35 or 70 may operate on any drive and they are interchangeable between drives, including drives with the Fixed Head Feature (#4301, 4302) installed. The mdl 70F, however, requires the Fixed Head Feature on the drive.

Data written on a Data Module by S/3 cannot be retrieved by S/370, and vice versa. Data written on a Data Module by a System 3 Mdl 12 or 15 may be used by a 4331 using the S/3 Data Import feature (#6305).

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): [must be consistent with system voltage] **#9903** for 208V or **#9905** for 230V.
- Color: Blue **#9043** ... Gray **#9045** ... Red **#9041** ... White **#9046** ... Yellow **#9042**.
- System Attachment: One of the following must be specified on each 3340 mdl A2:

Attachment	Specify	Attachment	Specify
System/3 mdl 15*	**#9589**	3168 ISC	**#9585**
System/7 mdl E	**#9590**	3125 DDA	**#9586**
3830 mdl 2	**#9581**	3115 DDA	**#9587**
3135 IFA	**#9582**	3145 ISC	**#9588**
3135 mdl 3 IFA	**#9582**	3145 mdl 3 ISC	**#9588**
3138 IFA	**#9579**	3148 ISC	**#9580**
3345 mdls 3, 4, 5	**#9583**	4321,	
3158 ISC	**#9584**	4331 3340 Direct Attach	**#9606**
3880 mdl 1 or 2	**#9607**		

* **Note:** Specify **#9589** must also be used for a mdl B1 or B2 attached to the 3340 A2 to provide a 3 or 4-drive system.

3340 Direct Access Storage Facility (cont'd)

The following must be specified for a 3340 Mdl C2:

Attachment	Specify
System/3 mdl 12	**#9600**

- If String Switch (#8150) is ordered or installed on 3340 mdl A2, String Switch (**#9570**) must be specified on each 3340 mdl B1 or B2 in the string.

SPECIAL FEATURES

Fixed Head Feature (#4301,#4302): #4301 – for mdl A2 or B2 ... #4302 – for mdl B1. To operate the 3348 mdl 70F on the 3340. The Fixed Head Feature is available on System/7, S/370 VS systems from the 115 and up, and 4300 processors. Attachment is via the following: On System/7, via the 5998-TO1. On the 3115 and 3125 via their native attachment, the 3830 Storage Control mdl 2, the 3880 Control Unit, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage Control Frame mdl 3, 4 or 5, the ISC (#4660) on the 3145, 3145-3, 3148, the ISC (#4650) on the 3158 and 3168, and the4321 or 4331 via the 3340/3344 Direct Attach feature (#7851). See appropriate machines for additional requirements. **Limitations:** Not available on 3340s attached to System/3 mdl 12 or mdl 15. Cannot be installed with either the 2311 mdl 1/3340 Series Compatibility (#8060) or the 2314/3340 Series Compatibility (#8070) on 3115 and 3125. Cannot be installed with Two-Channel Switch, Add'l (#8171) on the 3830 mdl 2 unless specify **#9317** or **#9310** is installed on the 3830. **Field Installation:** Yes.

Remote Switch Attachment (#6148): [Mdl A2] To attach the String Switch (#8150) to the configuration control panel of a 3158MP or 3168MP. **Field Installation:** Yes.

Rotational Position Sensing (#6201,#6202): #6201 – for mdl B1 ... #6202 – for mdl A2 or B2. Permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. If required, it should be installed on every 3340 mdl A2, B2 or B1 in a string. **Limitation:** This feature may be installed but is not supported by the4321 or 4331 processor 3340/3344 Direct Attachment Feature (#7851). **Field Installation:** Yes. **Prerequisites:** A block multiplexer channel on the system.

String Switch (#8150): [Mdl A2] To attach the 3340 mdl A2 to a second attachment. The two attachments may be on the same processor or different processors and may be any two of the following: 3830 Storage Control mdl 2, the 3880 Control Unit, the 3340 Direct Disk Attachment (DDA) on the 3115-2 or 3125-2, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage and Control Frame mdl 3, 4 or 5, the ISC (#4660) for attachment to the 3145, 3145-3, 3148, the ISC (#4650) for 3158 and 3168, and the 3340/3344 Direct Attachment Feature (#7851) on the 4321 or 4331. See appropriate machines for additional requirements. Switching between two attachments is under program control. The 3340 may also be dedicated to a single attachment with an enable/disable switch. **Field Installation:** Yes. **Specify:** To indicate the attachment to which this feature will be made, specify one of the following:

Attachment	Specify	Attachment	Specify
3880 mdl 1 or 2	**#9707**	4331	**#9608**
3830 mdl 2	**#9591**	3148 ISC	**#9602**
3135, 3135-3 IFA	**#9592**	3158 ISC	**#9594**
3138 IFA	**#9601**	3168 ISC	**#9595**
3345 mdls 3, 4, 5	**#9593**	3115-2 DDA	**#9596**
3145, 3145-3 ISC	**#9593**	3125-2 DDA	**#9597**

In addition, String Switch **(#9570)** must be ordered on each 3340 mdl B1 or B2 which will be attached to the 3340 mdl A2 with String Switch (#8150).

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3344 DIRECT ACCESS STORAGE

PURPOSE

Dual drive, large capacity, direct access storage for attachment via a 3340 model A2 to a System/3 model 15D, to any virtual storage S/370 or 4300 processor.

MODELS

Model B2 B02 2-drive disk storage unit which attaches to a 3340 model A2. It may be intermixed with 3340 model B units and/or 3344 model B2F units in any combination up to three B units per 3340 model A2. On System/3 model 15D, one 3344 B2 can be attached to a 3340 A2 to make a 4-drive system.

Model B2F B2F 2-drive disk storage unit with the same attachment capabilities as the 3344 model B2. It features Fixed Heads which provide 1,004,160 bytes of zero seek time storage on each drive.

Limitations: A 3340 string containing the 3344 may not be intermixed with a 3330 string on a 3135, 3135-3, 3138 IFA or 3880 mdl 1 or 2. 3340 strings containing the 3344 cannot be intermixed with 3330 or 3350 strings on a 3145, 3145-3, 3148, 3345, 3158, 3168 ISC or 3830 mdl 2.

Data written by System/3 cannot be retrieved by S/370, 4341 or 4381 processors, and vice versa. For the 4321, 4331 or 4361, see System/3 Data Import Feature (#6305).

Maximum: One 3340 string on a 3115-2/3125-2 DDA or on a 3135, 3135-3, 3138 IFA may contain 3344s.

Up to two 3340 strings on a 3830 mdl 2, 3880 mdl 2, 3145, 3145-3, 3148 or 3345 ISC, on each path of a 3158 or 3168 ISC, on each DASD adapter of the 4321 or4331 or on each director of of 3880 mdl 1, 3880 mdl 1, may contain 3344s.

Prerequisites: A 3344 requires a 3340 mdl A2 and any virtual storage S/370 or 4300 processor with appropriate attachment and features. Control Store Extension (#2150) and Register Expansion (#6111) are prerequisite features on the 3830 mdl 2 and 3145, 3145-3, 3148, 3345, 3158, 3168 ISCs to attach 3344. On the 3115-2 and the 3125-2, 4K DASF Control Storage Extension (#4210) is required. On 3880, 3340/3344 Attachment feature is required.

For use with System/3 mdl 15D, a 5415D with specify **#9781** and **#9784** and a 3340 mdl A2 are required.

IMPORTANT: See the appropriate DASD storage control feature or machine to determine any additional prerequisite specify and/or special features to attach 3344.

HIGHLIGHTS

The 3344 features a large capacity, fixed storage medium. Each drive is equivalent in capacity and format to four logical 3348 mdl 70s. Each 3344 has two drives and requires eight logical device addresses. The Fixed Head storage capacity on the 3344 mdl B2F is associated with the first of the four logical volumes on each drive.

On S/3 mdl 15D, each drive is approximately equivalent to four logical 3348 mdl 70s - each logical volume features a larger main data area, and a smaller area reserved for simulation, than on a 3348 data module.

Cylinder concept: Except for System/3, each drive has 2,784 logical cylinders with 12 tracks per cylinder. Maximum track capacity is 8,368 bytes providing up to 100,416 bytes per logical cylinder.

For the System/3 mdl 15D, each drive has 828 logical cylinders with 20 tracks per cylinder. Maximum track capacity is 12,288 bytes providing up to 245,760 bytes per logical cylinder.

Maximum drive capacity is 203,489,280 bytes. Data Rate - 885,000 bytes per second.

The 3344 mdl B2 provides 279,558,144 bytes of storage per drive.

The 3344 mdl B2F provides 279,558,144 bytes of storage per drive of which 1,004,160 bytes are accessible by fixed heads.

Data Rate: 885,000 bytes per second.

Access Time: Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Rotation time is 20.2ms and latency is 10.1ms. For the 3344 mdl B2F, logical cylinders 1 through 10 of the first logical volume on each drive have a seek time of zero ms while all other cylinders retain the above seek timing.

Read-Only: A 2-position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.

Rotational Position Sensing (RPS): A standard feature on the 3344 which permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. Requires a block multiplexer channel on the system. If RPS is used, it is advisable for efficient operation to also have it on every 3340 in a string.

Data Recovery: [Plant only] Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Alternate Tracks: Except for System/3, there are 96 alternate tracks per drive. The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 91 alternate tracks per drive are available for customer use.

For the System/3 mdl 15D, there are 160 alternate tracks per drive (40 per logical volume). The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 155 alternate tracks per drive are available for customer use.

Bibliography: S/370 and 4300 processors -- GC20-0001 ... System/3 -- GC20-8080

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): [must be consistent with that of the unit to which the 3344 is attached] **#9903** for 208V or **#9905** for 230V.
- Color: Blue **#9043** ... Gray **#9045** ... Red **#9041** ... White **#9046** ... Yellow **#9042**.
- System Attachment: One of the following must be specified on each 3344 mdl B2/B2F.

Attachment	Specify	Attachment	Specify
3830 mdl 2	**#9581**	3168 ISC	**#9585**
3135 IFA	**#9582**	3125 DDA	**#9586**
3135 mdl 3 IFA	**#9582**	3115 DDA	**#9587**
3138 IFA	**#9579**	3145 ISC	**#9588**
3345 mdls 3, 4, 5	**#9583**	3145 mdl 3 ISC	**#9588**
3158 ISC	**#9584**	3148 ISC	**#9580**
4331/4361	**#9606**	3880 mdl 1 or 2	**#9607**
System/3	**#9589**		

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Changes from model B2 to model B2F are field installable. **Note:** Customer price quotations and customer acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3345 STORAGE AND CONTROL FRAME

[NO LONGER AVAILABLE]

PURPOSE

Additional processor storage and I/O control in a S/370 model 145.

MODELS

Model 1	001	Used with the 3145 model HG to provide 393,216 bytes of processor storage.
Model 2	002	Used with the 3145 model I to provide 524,288 bytes of processor storage.
Model 3	003	Used with the 3145 models H and below to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.
Model 4	004	Used with the 3145 model HG to provide 393,216 bytes of processor storage and to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.
Model 5	005	Used with the 3145 model I to provide 524,288 bytes of processor storage and to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.

Maximum: Only one 3345 can be attached to a 3145. For 3345 mdl 3, 4 or 5, see DASD Designation under "Specify" for maximum number of 3333/3340/3344/3350s which can be attached to the standard Integrated Storage Control.

Prerequisites: [1] Mdls 1 and 4 require a 3145 mdl HG ... mdls 2 and 5 require a 3145 mdl I ... mdl 3 is used with 3145 mdls H and below ... when 3345 mdl 3, 4 or 5 is to be installed with a 3145, **#9851** is required on the 3145 ... for mdls 1, 2, 4 and 5, a 3046 Power Unit is required. [2] For mdls 3, 4 and 5, the standard Integrated Storage Control requires an available control unit position on a system channel. A block multiplexer channel and one unshared subchannel per logical device are required for support of block multiplexing and rotational position sensing. If this support is not required, attachment to a system selector channel is permitted. Word Buffer (#8810) is prerequisite on 3145 to support 3340, or if Selector Channel, 3rd (#6983) is installed on the 3145 ... seeZM3145 pages.

HIGHLIGHTS

- 607.5 nanosecond "store" cycle with 0-4 byte capability
- 540 nanosecond "fetch" cycle with 8-byte parallel access
- Error checking with correction is an integral part of mdls 1, 2, 4, 5
- Store and Fetch Protect are provided by the 3145.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be the same as 3145 voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below floor, **#9081** for on the floor.
- DASD Configuration [Mdls 3, 4, 5]: The available combinations of storage devices which can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed.

  Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s). (Note that **#9190** is 3340 Fixed Head Attachment for **#9314** and **#9315** and is *not* specified for **#9317** or **#9318**.)

SPECIAL FEATURES

Control Store Extension (#2150): [Mdls 3, 4, 5] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Limitations:** Cannot be installed with Expanded Control Store (#2152). **Maximum:** One. **Field Installation:** Yes.

Expanded Control Store (#2152): [Mdls 3, 4, 5] Provides additional control store for microprogram use on the ISC ... see DASD Configuration under "Specify" to determine when required. **Limitations:** Cannot be installed with Control Store Extension (#2150). **Maximum:** One. **Field Installation:** Yes.

Register Expansion (#6111): [Mdls 3, 4, 5] Provides additional registers for microprogram use on the ISC ... see DASD Configuration under "Specify" to determine when required. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch (#8100): [Mdls 3, 4, 5] To attach the standard Integrated Storage Control to a second channel ... the two channels may be on the same CPU or different CPUs. An available control unit position is required on each channel. Switching is under program control. The ISC can be dedicated to a single channel by means of an Enable/Disable switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See item [2] under "Prerequisites".

MODEL CONVERSIONS

The following 3345 model upgrades are field installable: Model 1 to model 2, 4 or 5 ... model 2 to model 5 ... model 4 to model 5. Model changes involving model 3 are not recommended for field installation.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3345 Storage and Control Frame (cont'd)

3345 MDL 3, 4 or 5 WITH ONE CHANNEL OR WITH TWO-CHANNEL SWITCH (#8100)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190			+ † 9317		++ † 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s						x	x			x	x					
	String Switch (#8150) on any 3340 mdl A2				x			x		x		x					
	Fixed Head feature (#4301/4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s													x	x		
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/4302) on any 3340														x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x				
	Fixed Head feature (#4301/4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F														x	x	
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F														x		
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives															x	x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/ A2F, C2/C2F and/ or Fixed Head feature (#4301/ 4302) on any 3340																x

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** Control Store Extension (#2150) is prerequisite. With **#9315**, the ISC of the 3345 requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2152) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Note: Customers who may elect to purchase Control Store Extension (#2150) and later upgrade to Expanded Control Store (#2152) should consider the purchase of Expanded Control Store (#2152) initially because this field upgrade requires replacement of Control Store Extension (#2150) and installation of Expanded Control Store (#2152). The prerequisite of Control Store Extension (#2150) for **#9315** or **#9317** can be satisfied by Expanded Control Store (#2152).

3348 DATA MODULE

SSD Product

PURPOSE

A removable and interchangeable Data Module for the 3340 Disk Drive family.

MODELS

Model 35	035	34,944,768 bytes
Model 70	070	69,889,536 bytes on system/370 and 41,041,920 bytes of main data storage plus 9,830,400 bytes for program support on System/3 model 12 and model 15.
Model 70F	70F	69,889,536 bytes of which 502,080 are accessible by fixed heads.

System/7 Capacities	Capacity by Model (MB)		
Mode of Recording	**35**	**70**	**70F**
5022 Emulation	29.4	48.9	58.9
Native Max Record Length 7,294 bytes	30.4	60.9	60.9
Native Optimum Record Length 4,100 bytes	34.2	68.4	68.4

Limitations: System/3 model 12 and model 15 use only the 3348 model 70.

HIGHLIGHTS

Data Module Concept: -- the 3348 Data Module within a sealed cartridge, contains the disks, the spindle, the read/write heads and the access arms. The access arms and heads are not part of the drive as in previous disk pack/disk drive interfaces. The sealed module design protects the disk surfaces by reducing outside contamination. Multiple capacity options on each drive become possible due to the modularity provided by this unique design. In addition, the mdl 70F contains fixed heads which provide low cost, fixed head capability for the 3340 user. The user may place selected components of IBM software as well as his own programs in the fixed head area to increase device performance. The 3348 mdl 70F requires that the Fixed Head Feature be installed on the 3340 ... see M3340 pages.

Removable: -- can be installed and removed from the 3340 by the operator.

Interchangeable: -- the mdl 35 or the mdl 70 may operate on any drive and are interchangeable between drives, including those with the Fixed Head Feature installed. The mdl 70F, however, requires that #4301 or #4302 be installed on the drive. System/3 mdl 12 and mdl 15 use only the 3348 mdl 70.

Auto-loading: -- Data Modules are automatically loaded after the Data Module is placed in the drive, cover is closed and a switch is turned on. Start-up time is less that 20 seconds.

Flag-Free: -- Data Modules are shipped from the plant flag-free. If within 90 days after receipt the customer is required to assign an alternate track (using DOS/VS System utilities), he may return the Data Module to IBM and it will be repaired at no cost to the customer.

Capacity Upgrade: -- [Plant only] -- the customer-owned mdl 35 may be capacity upgraded to a mdl 70. Data Modules must be returned to the plant of manufacture for the upgrade service. Downgrading is not available. Recorded data will not be recoverable. Upgrade of either the mdl 35 or 70 to the mdl 70F is not available.

Dimensions:	**Mdl 35**	**Mdl 70**	**Mdl 70F**
Height (inches)	8	8	8
Width (inches)	16	16	16
Maximum Length (inches)	18	18	18
Shipping Weight (lbs)	21	23	24

Covers are sealed at the plant and are unbreakable and nonflammable. A large handle is provided for ease of installation, removal and transportation. The Data Module has an aperture that is opened (or closed) automatically by the drive during loading (or unloading). The Data Module is then connected to the drive for power and communications.

A CE cylinder is assigned to facilitate maintenance of the 3340.

Data Recovery: [Plant only] -- should data in the field, for any reason, prove unrecoverable, a method for data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Initialization: -- the Data Module will be initialized at the plant. Home addresses and record zero will be written for each track.

3348 Data Module Repair Service: (Plant only)

	Mdl 35	**Mdl 70**	**Mdl 70F**
Replace one or more damaged disks (including servo disk) and heads, clean and lubricate, and retest to new data module performance specifications. (Does not include covers.)	**	**	**
Replace one or more damaged heads (including fixed head assembly on the 70F), clean and lubricate, and retest to new data module performance specifications.	**	**	**
Clean and lubricate and retest only. (This price will be charged if no disk/heads require replacement.)	**	**	**

Refer to IBM for all prices.

SPECIFY (None)

SPECIAL FEATURES (None)

ACCESSORIES (None)

SUPPLIES (None)

3350 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large capacity, direct access storage for attachment to any virtual storage S/370 Processor (except 3115 or 3125), 4331 (Model Group 2), 4341, 4361 or 4381 Processor.

MODELS

Model A2	A02	2-drive disk storage and associated control for attachment to 3145 models GE, GFD, H, HG or I via the 3345 model 3, 4 or 5, to the 3145 models H2, HG2, I2, IH2, J2, JI2 or K2 via the ISC (#4660), to the 3145-3 or 3148 via the ISC (#4660), to the 3158 or 3168 via the ISC (#4650), to the 3830 model 2 or 3, to the 3880 model 1, 2 or 11. It provides logic and power for the attachment of up to three 3350 model B2/B2F units or up to two model B2/B2F units and one C2/C2F unit.
Model A2F	A2F	2-drive disk storage and associated control with the same attachment capabilities as the model A2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage on each drive in lieu of the same capacity under the moving heads.
Model B2	B02	2-drive disk storage unit. Up to three 3350 model B2/B2Fs can be attached to a 3350 model A2/A2F.
Model B2F	B2F	2-drive disk storage unit with the same attachment capabilities as the model B2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.
Model C2	C02	2-drive disk storage and associated control. Provides an alternate controller function within a 3350 string. The model C2 functions as a model A2 or B2 depending upon the setting of a manual switch on the unit. A 3350 string containing a model C unit requires a model A unit with Primary Controller Adapter (#1320) and may include 0, 1 or 2 model B2/B2F units.
Model C2F	C2F	2-drive disk storage and associated control with the same attachment capabilities as the model C2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.

Maximum: See M3145, 3145-3, 3148, 3158, 3168, 3345 ISCs, 3830 model 2 or 3, 3880 pages.

Prerequisites: A 3350 DAS requires -- a 3350 model A2 or A2F; any virtual storage 4331 (Mdl Group 2), 4341, 4361 or 4381 processor or S/370 processor (except 3115 or 3125) with appropriate attachment and features. A 3145 requires Word Buffer (#8810) to attach 3350s. Expanded Control Store (#2151), Control Store Extension (#2150), and Register Expansion (#6111) are required on the 3830 mdl 2 or 3158, 3168 ISCs to attach 3350. Expanded Control Store (#2152) and Register Expansion (#6111) are required on the 3145, 3145-3, 3148 or 3345 ISCs, or 3830 mdl 3 to attach 3350.

IMPORTANT: See the appropriate DASD storage control feature or machine to determine any additional prerequisite Specify and/or Special Features to attach a 3350.

HIGHLIGHTS

The 3350 features high data rate, fast access, multiple formats and low cost per byte. It employs a fixed storage medium.

Selective Format: Drive format may be 3330 model 1 or 3330 model 11 compatibility mode or 3350 native mode. Format is specified at time of order by individual drive. Format changes may be made by CE in the field. In 3330 model 1 or model 11 compatibility mode the Fixed Head storage capacity on the models A2F, B2F and C2F is 742,710 bytes per drive. In 3330 model 1 compatibility mode this Fixed Head storage capacity is associated with the first of the two logical 3330 model 1 volumes on each 3350 drive. In 3350 native mode Fixed Head storage capacity on the models A2F, B2F and C2F is 1,144,140 bytes per drive.

Cylinder Concept:	**3330 model 1 Mode**	**3330 model 11 Mode**	**3350 Native Mode**
Bytes per Track	13,030	13,030	19,069
Tracks per Logical Cylinder	19	19	30
Logical Cylinders per Drive	2x404	808	555
Approx. capacity/drive (MB)	2x100	200	317.5

Data Rate: 1,198,000 bytes per second.

Access Time: Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Average rotational delay is 8.4ms. For 3350 models A2F, B2F and C2F cylinders 1 and 2 (3350 Native Mode), or cylinders 1 through 3 (3330 model 11 compatibility mode), or cylinders 1 through 3 of the first of the two logical volumes on a drive (3330 model 1 compatibility mode), have a seek time of zero ms. All other cylinders retain the above seek timing.

Error Correction: Provides capability of correcting single data error bursts of up to four bits span as well as detecting all single error bursts of up to ten bits span.

Write Format Release: Frees the subsystem while the drive erases from the end of a formatted write record to the end of the track.

Rotational Position Sensing: Permits channel disconnect during period of rotational latency, thereby providing greater channel availability ... requires one unshared subchannel on a block multiplexer channel for each logical device.

Command Retry: Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.

Read Only: A two position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.

Data Recovery [Plant Only]: Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Flag Free: The 3350 will be shipped flag free.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Format:

	First Drive	Second Drive
3330 model 1 Compatibility Mode	**#9731**	**#9732**
3330 model 11 Compatibility Mode	**#9741**	**#9742**
3350 Native Mode	**#9751**	**#9752**

- **#9608** must be specified for attachment to a 3880 model 1 or 11 Storage Control Unit.

  Note: In addition to the standard control attachment **(#9608)** for a 3880 model 1 or 11 Storage Control Unit, models A2/A2F with string switch **(#8150)** attaching to another 3880 model 1 or 11 Storage Control Unit must specify **(#9608)** a total of twice. Mdls C2/C2F with string switch **(#8150)** attaching to a 3880 model 1 Storage Control must specify **(#9608)** only once.

SPECIAL FEATURES

Primary Controller Adapter (#1320): [Mdls A2, A2F] Permits selection/deselection of the controller of the A2/A2F unit as the online controller via a manual switch on the C2/C2F unit in the string. **Maximum:** One per A2/A2F unit. **Field Installation:** Yes. **Corequisite:** One C2 or C2F unit in the string.

Remote Switch Attachment (#6148): [Mdls A2, A2F, C2, C2F] To attach the String Switch (#8150) to the configuration control panel of a S/370 mdl 158MP or 168MP. **Field Installation:** Yes.

String Switch (#8150): [Mdls A2, A2F, C2, C2F] To link the 3350 to a second attachment. The two attachments may be on the same CPU or different CPUs and may be any two of the following: 3830 Storage Control mdl 2 or 3, 3880 Storage Control mdl 1, 2 or 11, the 3345 Storage and Control Frame mdl 3, 4 or 5, or the ISC (#4660) for attachment to S/370 mdl 145, 145-3 or 148, or the ISC (#4650) for attachment to S/370 mdl 158 or 168 ... see appropriate machines for additional requirements. Switching between the two attachments is under program control. The 3350 may also be dedicated to a single attachment with an enable/disable switch. **Limitations:** See 3880 mdl D11 for restriction on use of #8150 when attached to the paging storage director. **Field Installation:** Yes. **Specify:** The attachment to which this feature will be made must be indicated ... see "Specify" for System Attachment.

3350 Direct Access Storage (cont'd)

MODEL CONVERSIONS

Model changes between 3350 mdl A and mdl B units, or mdl C and mdl B units are available at time of manufacture only. Model changes between 3350 mdl A and mdl C units are not recommended for field installation. Model changes between A2 and A2F units, or B2 and B2F units, or C2 and C2F units are field installable. **Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this mdl change involves the removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3370 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, fixed-media, direct access storage for attachment to a 4321, 4331, 4341, 4361 or 4381 Processor or System/38 5381 System Unit.

MODELS

Model A1 A01 Single drive disk storage with two actuators and associated control for attachment to the 4321, 4331, 4341, 4361 or 4381 Processors. It provides logic for the attachment of up to three 3370 model B1 units on the 4321 and 4331, and for the attachment of up to three model B1 and/or B2 units intermixed in any combination to the 4341, 4361, or 4381 processors.

Model A2 A02 Single drive disk storage with two actuators and associated control for attachment to 4341, 4361, and 4381 Processors. The model A2 provides logic for attachment of up to three 3370 model B1 or B2 units intermixed in any combination.

Model B1 B01 Single drive disk storage with two actuators. Up to three 3370 model B1 units may be attached to a 3370 model A1 or model A2.

Model B2 B02 Single drive disk storage with two actuators. Up to three 3370 model B2 units may be attached to a 3370 model A1, when attached to a 4341, 4361, or 4381; or 3370 model A2.

Model A11 A11 Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (models 4, 5, 7 and 8 only) with a 3370 Attachment Adapter. The model A11 provides logic and power for the attachment of up to three 3370 model B11 units or B12 units intermixed in any combination.

Model A12 A12 Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (models 4, 5, 7, and 8) with a 3370 attachment adapter. The model A12 provides logic and power for the attachment of up to three 3370 model B11 or B12 units intermixed in any combination.

Model B11 B11 Single drive disk storage with two actuators. Up to three 3370 model B11 units may be attached to a 3370 Model A11 or model A12.

Model B12 B12 Single drive disk storage with two actuators. Up to three 3370 model B12 units may be attached to a 3370 model A11 or A12.

Maximum: See M3880, 4331, 4341, 4361, 4381 or System/38 5381 pages.

Prerequisites: A 3370 mdl B1 or B2 requires a 3370 mdl A1 or A2, and a 3370 mdl B11 or B12 requires a 3370 mdl A11 or A12.

For a 4321 Processor -- a 3370 mdl A1 attached via a DASD Adapter base is standard on the 4321.

For a 4331 Processor Mdl Group 1 -- a 3370 mdl A1 requires a DASD Adapter (#3201) on the 4331.

For a 4331 Processor Mdl Group 2 or 4361 Processor -- a 3370 mdl A1 requires a DASD Adapter (#3201 or #3202) on the 4331 or 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to the High-Speed Block Multiplexer Channel (#143X) on the 4331 or 4361.

For a 4331 Processor Mdl Group 11 -- a 3370 mdl A1 attaches via a DASD Adapter which is standard on the 4331 Mdl Group 11.

For a 4361 -- a 3370 mdl A1 or A2 requires a DASD/8809 Adapter on the 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to a High-Speed Block Multiplexer Channel on the 4361.

For a 4341 or 4381 Processor -- a 3370 mdl A1 or A2 requires a 3880 Storage Control mdl 1, 2 or 4 connected to a 2.0 megabyte block multiplexer channel on the 4341 or 4381.

For a System/38 -- A 3370 mdl A11 or A12 requires attachment feature #1130 on the 5381 System Unit (mdls 4, 5, 6, 7, and 8), and a second 3370 mdl A11 or A12 on the 5381 System Unit mdl 8 requires attachment feature #1132. A specify code is also required on the 5381 System Unit to designate the 3370 units to be attached. An additional feature code #3000 is required when the first 3370 mdl A12 or B12 is added to an installed 5381 System Unit. See "Specify" in M5381 pages.

A cable order is required for each A mdl ordered.

For a System/38 -- attachment feature (#1130) on the 5381 System Unit (mdls 4XX, 5XX and 7XX only), for the attachment of the first A11 and up to three B11s. On the 5381 mdl 8XX only, for an additional string of one A11 and up to three B11s, the System/38 requires a second attachment feature (#1132). A specify code is also required on the 5381 System unit to designate the 3370 units to be attached. See "Specify" in M5381 pages.

HIGHLIGHTS

The 3370 features high data rate, fast access, fixed block format, and low cost per byte. It employs a fixed, sealed Head/Disk Assembly (HDA) as the storage medium. The HDA is a field replaceable unit. Two access arms per spindle, each separately addressable with overlapped operation -- locate-locate/read/write. Each arm accesses one-half the data. Reduced power and space requirements. Fixed block architecture allows the specification of DASD space in groups of blocks, making space definition independent of tracks and cylinders.

	Mdl Series	
Fixed Block Format	**01/11**	**02/12**
Data bytes per block	512	512
Blocks per actuator	558,000	712,752
Megabytes per actuator	285.6	364.9
Megabytes per spindle	571.3	729.8

Blocks are separately addressable and jointly form a contiguous address space.

	Mdl Series	
Performance Factors	**01/11**	**02/12**
Ave. Seek (arm motion)	20 ms	19 ms
Latency	10.1ms	10.1ms
Data Rate (+ or - 3%)	1.859 MB/sec.	1.859 MB/sec.

Error Correction: Error detection codes correct error bursts occurring in nine bits or less, and detect errors that span three bytes or less.

Automatic Position Sensing: Fixed Block Architecture provides for relative block addressing, each block separately addressable. When attached to the 4321, 4331, 4341, 4361, or 4381 Processor, the channel automatically disconnects during period of rotational latency providing greater channel availability. Requires one unshared subchannel on a 4321, 4331, 4341, 4361 or 4381 block multiplexer channel for each logical address.

Command Retry: [Not available with the System/38] Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.

Write Protect Function: A switch is provided for each Drive Address to select a Write Protect function. On the 3370 mdls A01, B01, A02, B02, this function provides the means to protect data from being rewritten or erased. When the read/write switch is in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected. On the 3370 mdls A11, B11, A12, B12 (System/38), when a write operation is called for with the switch in the read-only position, the system will halt with an operator prompt to return the switch to its read/write position.

HDA Data Recovery: [Plant only] Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Bibliography: GA26-1657

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **Note:** 240V is compatible with a 230V system. Specify **#9903** for 208V, **#9915** for 240V. Specify **#9986** for power cable 6 ft., 60 Hz, Chicago only.

- Color: The color for the base enclosure is pearl white. For accent panel color (mdls A1, A2, A11 and A12) specify **#9060** for willow green, **#9061** for garnet rose, **9062** for sunrise yellow, **9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.

SPECIAL FEATURES

String Switch (#8150): [Mdl A1, A2] To attach the 3370 to a second Storage Director or DASD Adapter. The two Storage Directors may be on the same processor or different processors. Switching between the two Storage Directors or DASD Adapter is under program control. The 3370 may also be dedicated to a single attachment with an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3375 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to a 145, 148, 155-II, 158, 165-II, 168 or 3031, 3032, 3033, 3042 Attached Processor Model 2, 3081, 3083, 3084, 4341, 4331 Mdl Group 2, 4361 or 4381 Processor.

MODELS

Model A1 A01 — A disk storage unit with one head and disk assembly (HDA), two actuators and associated control for attachment to a 3880 Storage Control model 1 or 2. It provides logic and power for attachment of up to three 3375 3375 model B1 units.

Model B1 B01 — A disk storage unit with one HDA and two actuators. Up to three 3375 model B1s can be attached to a 3375 model A1.

Model D1 D01 — A disk storage unit with one HDA, two actuators, and associated control. In a 3375 string, the model D1 provides a dual controller function with a second data path to each HDA. It may be attached to the same system as the model A1, or to a different system. A 3375 string containing a model D1 requires model A1 and two B1 units.

Limitations: 3375 units may attach only to 3880 Storage Control mdls 1, 2, or 4. For systems attachment, see 3031, 3032, 3033, 3081, 3083, 3084 or 4300 pages.

The mdl A1 and mdl D1 in the same string cannot be attached to the same storage director on the 3880, nor through the same channel on the processor.

Maximum: Up to three 3375 mdl B1 storage units may be attached to one 3375 mdl A1. In a dual controller string, two mdl B1 storage units and one 3375 mdl D1 storage unit may be attached to one mdl A1. Up to four mdl A1 or mdl D1 storage units may be attached to a 3880 storage director for a maximum of 32 addresses (actuators).

Prerequisites: A 3375 mdl A1 is required to attach 3375 mdl B1s. A 3880 Storage Control mdl 1, 2, or 4 required to attach a 3375 to a processor. Attachment of 3880 to a 4341, 4331 Mdl Group 2, 4361 or 4381 processor requires a block multiplexer channel with a data rate of at least 1.86MB. Attachment to 3031, 3032 or 3033 Processors or to a 3042 Attached Processor mdl 2 requires Data Streaming (#4850) installed on processor channel groups or Speed Matching Buffer feature (#6560) installed on the 3880. Attachment to a 3081, 3083 or 3084 processor is via any block multiplexer channel. Attachment to 145, 148, 155-II, 158, 165-II or 168 Processors require a Speed Matching Buffer (#6560) installed on the 3880.

A 3375 string containing a mdl D1 requires a mdl A1 and two mdl B1s. Each mdl A1 and B1 must have a mdl D1 attachment feature installed.

Write Protect Function: A switch for each drive address provides the means to protect data from being rewritten or erased. When the read/write switch is in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected.

HIGHLIGHTS

The 3375 features high data rate, fast access and low cost per byte of storage. Each 3375 unit contains one 819.7MB sealed and permanently mounted head and disk assembly. There are two actuators per HDA, each is separately addressable and accesses one-half of the HDA storage (409.8MB). Each seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators.

With a mdl D1 installed, a data transfer operation from an actuator in any unit in the string may be overlapped with another data transfer operation from an actuator in any other unit in the string.

Characteristics:

General –		
Actuators per HDA	2	
HDAs per unit	1	
Capacity –		
per actuator	409.8	MB
per HDA	819.7	MB
per max string	3.27	GB
Access Time –		
Average seek (actuator motion)	19	ms
Average latency	10.1	ms
Data Rate –	1.859	MB/ sec.

Data Format: Count-key-data.

Error Correction: Capability is provided to correct as well as detect single data error bursts of up to sixteen bits if the burst spans no more than two contiguous bytes.

Rotational Position Sensing: Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential ... requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

Head and Disk Assembly Data Recovery: [plant only] Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. Branch Office Field Engineering will initiate the recovery procedure. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Flag Free: The 3375 will be shipped Flag Free.

Bibliography: GC20-0001

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: [mdl A1] **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.

SPECIAL FEATURES

Model D1 Attachment For Model A1 (#4951): This feature must be included on all mdl A1 boxes that are installed in a string that includes a mdl D1. **Field installation:** Yes.

NOTE: A mdl A1 with this feature installed will not operate in a string without a mdl D1.

Model D1 Attachment Feature For Model B1 (#4952): This feature must be included on all mdl B1 boxes that are installed in a string that includes a mdl D1. **Field Installation:** Yes.

NOTE: A mdl B1 with this feature installed will not operate in a string without a mdl D1.

String Switch (#8150): [mdl A1 and D1] - For use with 3880 Storage Controls mdls 1, 2 or 4 only. #8150 is used to attach the 3375 mdl A1 or mdl D1 to a second storage director. The two storage directors may be on the same processor or different processors. Switching between the two storage directors is under program control. The 3375 may also be dedicated to a single attachment through enable/disable switches. **Maximum:** One each on mdl A1 and mdl D1. **Field Installation:** Yes.

MODEL CONVERSIONS

Model changes between models A1 and B1 or between models A1 and D1 are available at time of manufacture only. A model change from a B1 to a D1 is permitted in the field. A model change from a D1 to a B1 is not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

3380 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to 4341, 4361, 4381, 3031, 3032, 3033, 3081, 3083, 3084 Processors, 3042 Attached Processor model 2 and S/370 models 158, 158-3, 168 and 168-3.

MODELS

Model A4 A04 — A disk storage unit with two head and disk assemblies (HDAs), four actuators and associated control for attachment to a 3880 model 2 or 3 storage director. It provides logic and power for attachment of up to three 3380 model B units.

Model AA4 AA4 — A disk storage unit with two HDAs, four actuators and associated controls for attachment to two 3880 model 2, 3 or 13 storage directors. 3380 actuators are arranged on multiple internal paths within a string, with up to four actuators sharing a path. Dynamic path selection controls access to the actuators. It provides access by both storage directors to all actuators in a 3380 string and enables concurrent data transfer operations, via each storage director, to actuators not sharing an internal data path. The logic and power are provided for attachment of up to three 3380 mdl B units.

Model B4 B04 — A disk storage unit with two HDAs and four actuators. Up to three 3380 model Bs can be attached to a 3380 model A.

Prerequisites: A 3380 mdl A is required to attach 3380 mdl Bs. A 3880 Storage Control mdl 2, 3 or 13 is required to attach a 3380 to a processor block multiplexer channel ... a 3380 mdl AA4 requires one storage director in a 3880 mdl 2 or 3 ... a 3380 mdl AA4 requires two storage directors that can be within the same 3880 mdl 3 or within two different 3880 mdl 2s or 3s. When attached to a 3880 mdl 13, the 3380 mdl AA4 must be attached to storage directors within the same 3880 mdl 13. Attachment of 3380 through 3880 mdl 2, 3 or 13 to 3031, 3032, 3033 Processors, and 3042 Attached Processor mdl 2 on 3.0MB/sec. block multiplexer channels requires Data Streaming (#4850) on those processor units. Operation at a 3.0MB/sec. data rate on the 4341, 4361 and 4381 Processor requires attachment to a 3.0MB/sec. channel. Attachment to 3031, 3032, 3033 Processors and 3042 Attached Processor mdl 2 without Data Streaming feature, to S/370 mdls 158, 158-3, 168 and 168-3, on 1.5MB/sec. block multiplexer channels, and to a 2.0MB/sec. block multiplexer channel on the 4341, requires Speed Matching Buffer for 3380 (#6550) on each 3880 mdl 2 or 3 storage director attaching the 3380 to a channel. Attachment to a 3081 Processor is via any block multiplexer channel for operation at 3.0MB/sec. Attachment to 4381 Processors via speed matching buffer (3380 #6550) in shared DASD environments requires attachment to a 3.0MB/sec. channel on the 4381.

Maximum: Up to three 3380 mdl B storage units may be attached to one 3380 mdl A. Two 3380 mdl A4s or two 3380 mdl AA4s can be attached to one 3880 storage director, allowing up to eight 3380 units per storage director. **Limitations:** Mdl A4 cannot be attached to same storage director as mdl AA4s ... If two mdl AA4s are attached to one storage director, they must both be attached to the same second storage director. For systems attachment, see S370 or M3880 pages.

HIGHLIGHTS

The 3380 features high data rate, fast access and low cost per byte of storage. Each 3380 unit contains two 1.26 billion byte (1.26 gigabytes) sealed and permanently mounted head and disk assemblies. There are two actuators per HDA -- each accessing one-half of the HDA storage (630 megabytes), each separately addressable. Seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators. Mdl AA4 enables attachment of a 3380 string to a second storage director with dynamic path selection controlling access to the actuators, providing access via both storage directors to all data and storage control status in a string.

Characteristics:

General –		
Actuators per HDA	2	
HDAs per unit	2	
Capacities –		
per actuator	630	MB
per HDA (two actuators)	1.26	GB
per unit (four actuators)	2.52	GB
per max string (sixteen actuators)	10.08	GB
Access Times –		
Average seek (actuator motion)	16	ms
Average latency	8.3	ms
Data Rate –	3.0	MB/sec.

Processor Attachment Data Rate: The data transfer rate of the 3380 is 3.0MB/sec. This 3.0MB/sec. data rate can be attained on 3031, 3032 and 3033 Processors and 3042 Attached Processor mdl 2 that have the Data Streaming feature (#4850) installed or on a 3.0MB/sec. block multiplexer channel on a 3081/3083/3084 Processor, a 4341/4361/4381 Processor.

Attachment of the 3380 to 1.5MB/sec. block multiplexer channels on 3031, 3032 and 3033 Processors and 3042 Attached Processor mdl 2 that do not have the Data Streaming feature installed, to S/370 mdls 158, 158-3, 168 & 168-3 and to a 2.0MB/sec. block multiplexer channel on the 4341 is supported with installation of the Speed Matching Buffer for 3380 feature (#6550) on the 3880 mdls 2 and 3. Attachment of the 3380 to 4381 Processors in shared DASD environments via speed matching buffer (#6550) is supported only on 4381 3.0MB/sec. channel.

The Speed Matching Buffer for 3380 feature supports two speeds: 1.5MB/sec. and 3.0MB/sec, and may be installed on each 3880 storage director that attaches to a 3380. The Speed Matching Buffer for 3380 feature may be used for 3380 attachment to the processors having 1.5MB/sec. channel capability while also providing (using the optional switch features on the 3880 mdls 2 and 3) for 3380 attachment to the processors having 3.0MB/sec. channel capability. Establishment of either the 1.5 or 3.0MB/sec. data rate with the block multiplexer channel is done in the 3880. This dual-speed capability of the speed matching buffer retains the advantages of higher speed channels while sharing 3380 by processors having different channel speeds.

See 3880 mdls 2 and 3 with Speed Matching Buffer for 3380 feature for additional details and system performance considerations.

Data Format: Count-key-data provides format continuity with current IBM large systems direct access storage products.

Dynamic Path Selection: Incorporated in model AA4, which attaches to two 3880 storage directors. Dynamic path selection controls access to the actuators, providing paths via both storage directors to all actuators in a 3380 string ... designed to allow concurrent data transfer operations to actuators on different internal data paths in a 3380 string. When Dynamic Path Selection is used with the 370-XA channel subsystem, the 3380 can dynamically reconnect to the first available channel path identified by the originating processor. This has the potential of increasing effective throughput or improving response time.

Error Correction: Capability is provided to correct single data error bursts contained within three bytes as well as detecting all single data error bursts contained within five bytes.

Rotational Position Sensing: Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential ... requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

Format Write Release: Enables channel and storage director to disconnect while the remainder of a track is being erased following the end of a format written record.

Separate Actuator Maintenance: Enables the associated logic and controls of each actuator to be serviced independent of and concurrent with customer operation of the other actuators within the same HDA and string.

Head and Disk Assembly Data Recovery: [plant only] Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning Head and Disk assembly to the plant for data recovery.

Flag Free: The 3380 will be shipped with all tracks flag free.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Tool Kit: Required for CE maintenance. Contact the account Field Manager for requirements.

  For Rental Customer: Specify **#9750** for first 3380 A04 or AA4 ordered for a customer. If required for a multiple machine installation, because of physical machine locations, an additional Tool Kit(s) is available on no-charge MES.

  For Purchase Customer: Specify **#9750** on each 3380 A04 and AA4 machine order. When installed 3380 A04s or AA4s are purchased, a Tool Kit is to be ordered on no-charge MES for each machine.

SPECIAL FEATURES (None)

3380 Direct Access Storage (cont'd)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3410 MAGNETIC TAPE UNIT
3411 MAGNETIC TAPE UNIT and CONTROL

PURPOSE

Magnetic tape units and controls for a System/3 models 8/10/12/15, System/38 or 3790 Communication System, S/370 models 115 through 158, a 3031 Processor, or a 4331, 4341 or 4361 Processor ... the 3410 model 1 can be used with a 3881 Optical Mark Reader model 2 or a 3886 Optical Character Reader model 2 ... the 3411 and 3410 model 3s can be used with a 3800 Printing Subsystem ... the 3411 model 1 can be used with a 3776 Communication Terminal model 3 or 4, or a 3777 Communication Terminal model 3 or 4.

MODELS

Model 1	001	20,000 8-bit bytes per second (1600 bpi)
Model 2	002	40,000 8-bit bytes per second (1600 bpi)
Model 3	003	80,000 8-bit bytes per second (1600 bpi)

Maximums: Interconnected 3410s and 3411s must be of the same mdl ... mdls cannot be intermixed. The maximum number of tape units (3410s) per 3411 are:

Mdl 1 - up to three 3410 mdl 1s ... a total of 4 drives.*
Mdl 2 - up to five 3410 mdl 2s ... a total of 6 drives.*
Mdl 3 - up to five 3410 mdl 3s ... a total of 6 drives.*

* For System/3 mdls 8/10/12/15 or S/38: Maximums for mdls 2 and 3 are the same as mdl1.

Limitations: A maximum of one 3410 mdl 1 can be attached to a 3881 or 3886; no 3411 is required. A maximum of 4 tape drives (any mdl) can be attached to a System/3 mdl 8/10/12/15 or System/38.

Prerequisites: Each 3411 requires the following:

For System/3 mdl 10/15: A 3411 Magnetic Tape attachment (#7951) on the 5410 or 5415 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

For System/3 mdl 8: A 3411 Magnetic Tape Attachment (#7960) on the 5408 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

For System/3 mdl 12: A Basic Attachment Feature (#4701) and a 3411 Magnetic Tape Attachment (#7960) on the 5412 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features".

For System/38: A 3411 Magnetic Tape Adapter (#7960) on the System/38 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features". Each 3410 requires and appropriate model of the 3411, except when a 3410 mdl 1 is attached to a 3881 or 3886.

For S/370 mdl 115, 125: A 3411 Magnetic Tape Adapter (#4675) on the 3115 or 3125 and S/370 mdl 115/125 Attachment (#7361) on the 3411 except with 3115 mdl HG2, 3125 mdl HG2 and I2. When attached to 3115 mdl HG2, or 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features".

For S/370 mdl 135 and up, and all 4300 processors: A control unit position on a system channel, plus S/370 Attachment (#7360) on the 3411 ... see "Special Features".

S/370 mdl 135: Multiplexer channel (standard), selector or block multiplexer channels (special features) ... see M3135 pages. *NOT* supported on byte multiplexer channel for concurrent operation with Integrated File Adapter, Integrated Communications Adapter or Selector Channel.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter or Block Multiplexer Channel.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter, or Block Multiplexer Channel.

S/370 mdl 145: Multiplexer channel (standard), selector channels (one is standard), or block multiplexer channel (special feature) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Block multiplexer channel (first two are standard) ... see M3155, 3158 pages.

3031 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 pages.

4300 Processors: Byte multiplexer channel ... block multiplexer channel ... see M4331, 4341, 4361, 4381 pages.

3776 Communication Terminal mdl 3 or 4, or 3777 Communication Terminal mdl 3 or 4: 3411 Magnetic Tape Unit and Control mdl 1 Attachment feature (#7801) on the terminal ... see "Special Features" in M3776 or 3777 pages. The 3411 requires System/3-3770/3790 Communication System Attachment feature (#7003).

3790 Communication System: A Magnetic Tape Attachment feature (#7840) on the 3791 Controller. The 3411 requires a 3790 Attachment feature (#7003).

3800 Printing Subsystem: Tape-to-Printing Subsystem Feature (#7810) on the 3800 ... see "Special Features" in M3800 pages. **Note:** A control unit position is not required. 3410 and 3411 mdl 3s only may be attached. Up to eight tape control units may be attached provided that power sequencing and control connection for all other than one are provided by a system.

3881 Optical Mark Reader: A 3881 mdl 2. One 3410 mdl 1 only may be attached.

3886 Optical Character Reader: A 3886 mdl 2. One 3410 mdl 1 only may be attached.

Magnetic Tape: IBM Multi-System Tape (MST) or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006-5.

HIGHLIGHTS

The 3410 is a single tape unit controlled by a 3411. The 3411 is a single channel control unit with one tape drive.

- Efficient, compact, space-saving design.
- Dual Density feature ... allows processing of data recorded at 1600 bpi PE or 800 bpi NRZI.
- 7-Track feature ... tape written in 7-track format compatible with tapes written at 200, 556, 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415/3420 tape drives equipped with 7-track read/write heads. **Note:** 7-track tapes cannot be read with a 3776 mdl 3 or 4, or a 3777 mdl 3.
- Radial attachment of tape unit permits limited off-line servicing.
- Simplified tape threading path.

Checking: During write operations, both parity and signal amplitude are checked. (When utilized with a 3881 Optical Mark Reader and the 3886 Optical Character Reader, both are checked in 800 bpi NRZI ... signal amplitude only in 1600 bpi.) During read operation, parity is checked.

Error Correction: In 1600 bpi PE recording format, single-track error correction in flight takes place. For 9-track 800 bpi NRZI, track in error (T.I.E.) is provided (not applicable when utilized with 3881 Optical Mark Reader and the 3886 Optical Character Reader).

Functions: The following table indicates feature numbers for corresponding functions:

Subsystem Function	Feature Name	3411 Control Unit	3410* Tape Unit (includes tape unit on 3411)
1600 bpi 9-track only	Single Density	Standard	#3211
1600 bpi PE/800 bpi NRZI 9-track	Dual Density	**#9150**	#3211 or #3221
1600 bpi PE/200-556-800 bpi NRZI 7-track	7-track	**#9160****	#3211 or #6550

* Tape units must all be same mdl as 3411.
** Feature #9160 not available on System/38.

Characteristics	Mdl 1	Mdl 2	Mdl 3
Data rate (kb/sec)			
at 1600 bpi (PE)	20	40	80
at 800 bpi (NRZI)	10	20	40
at 556 bpi (7-track)	6.9	13.9	27.8
at 200 bpi (7-track)	2.5	5.0	10.0
Recording Density (bpi)	1600/800/556/200 (all mdls)		
Tape Speed (ips)	12.5	25	50
Nominal IBG (inch) -- 9-track	0.6	0.6	0.6
Nominal IBG (inch) -- 7-track	0.75	0.75	0.75
Nominal IBG Time (ms) -- 9-track	48	24	12
Nominal IBG Time (ms) -- 7-track	60	30	15
Nominal Rd/Wr Access Time (ms)	15	12	6
Rewind Time 2400 ft. Reel (min.)	3	3	2

3410/11 (cont'd)

Publications: S/370 -- GC20-0001, 3881 -- GA21-9127 and GA21-9143, System/3 -- GC20-8080, System/34 -- GC21-5754. Also, *IBM 3410/3411 Component Summary,* GA32-0015, GA32-0022.

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, or **#9904** for 230V. If used with a 3881 Optical Mark Reader, a 3886 Optical Character Reader, or a 3800 Printing Subsystem, voltage must be consistent.
- Dual Density, Control (3411 only) - **#9150**: Permits attachment of 3410s equipped with Dual Density, Tape Unit (#3221) and installation of Dual Density, Tape Unit (#3221) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. **Limitations:** Cannot be installed on same 3411 with **#9160**. **Field Installation:** Yes.
- 7-Track, Control (3411 only) - **#9160**: Permits attachment of 3410s equipped with 7-Track, Tape Unit (#6550) and installation of 7-Track, Tape Unit (#6550) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. **#9160** includes the translator function which, when used, causes 8-bit bytes from the I/O interface to be written on tape as 6-bit BCD characters and 6-bit characters read from tape to be translated into their EBCDIC equivalents. The Data Conversion function, also included, allows reading and writing of 8-bit bytes on 7-track tape by converting four tape characters to three storage bytes and vice versa. **Limitations:** Cannot be installed with **#9150**. Cannot be used with a 3776 mdl 3 or 4, or a 3777 mdl 3 or 4, not available on System/38. **Field Installation:** Yes.
- Additional Tape Units (3411 only) - **#9001**: Required if the number of tape drives is to exceed four (one 3411 plus three 3410s). **Field Installation:** Yes.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Density Formats: The 3410/3411 subsystem can operate in three density formats - 1600 bpi PE, single density ... or 1600/800 bpi, dual density ... or 200/556/800 bpi, 7-track. With the exception of single density, which is standard on the control unit of the 3411, a feature number for the format desired must be specified for each tape unit and the control unit ... see "Special Features" for limitations. Dual Density, Control (**#9150**) is required on the 3411 for Dual Density, Tape Unit (#3221) on the 3411 and attached 3410s ... see Specify **#9150** above. 7-Track, Control (**#9160**) is required on the 3411 for 7-Track, Tape Unit (#6550) on the 3411 and attached 3410s ... see Specify **#9160** above.
- System Attachments: #7003 is required on all System/3 mdls 8/10/12/15, and S/38 Attachment S/370 Mdl 115/125 (#7361) is required for attachment to a 3115 (except mdl HG2) or 3125 (except mdl HG2 and I2). When attached to 3115 mdl HG2, 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features". S/370 Attachment (#7360) is required for attachment to a S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor, and for attachment to a 3800 mdl 3. System/3-3770/3790 Communication System Attachment (#7003) is required for attachment to a 3776 mdl 3 or 4, or a 3777 mdl 3, or a 3790 system.

  Note: Not available without specifying one of the system attachments listed above.

SPECIAL FEATURES

Single Density, Tape Unit (#3211): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 1600 bpi PE only. **Limitations:** Cannot be installed with #3221 or #6550. **Field Installation:** Yes. **Prerequisites:** If installed on the 3886 Optical Character Reader, #6490 on the 3886.

Dual Density, Tape Unit (#3221): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 mdl 1,2, or 3 to operate at 800 bpi NRZI as well as 1600 bpi PE. **Limitations:** Cannot be installed with #3211 or #6550. **Field Installation:** Yes. **Prerequisites:** **#9150** on the 3411 (see "Specify") or #3550 on the 3881 or #6485 on the 3886.

7-Track, Tape Unit (#6550): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 200, 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335 and 2401, 2402, 2403, 2404, 2415, 3420 tape units equipped with 7-track read/write heads. Tape units with this feature will only read or write 7-track tape. **Limitations:** Cannot be installed with #3211 or #3221, or on System/38. Cannot be used with a 3776 mdl 3 or 4 or a 3777 mdl 3. **Field Installation:** Yes. **Prerequisites:** **#9160** (see "Specify") on the 3411.

System/3 mdls 8/10/12/15/ and System/38 - 3770/3790 Communication System Attachment (#7003): [3411 mdl 1, 2, 3] To attach a 3411 with up to three 3410s to a System/3 mdl 8, 10, 12, 15 or System/38, or to a 3791 Controller, or to attach one 3411 mdl 1 to a 3776 Communication Terminal mdl 3 or 4, or a 3777 Communication Terminal mdl 3 or 4. **Prerequisites:** 3411 (#7960) on 5408 and 5412, or 3411 (#7951) on the 5410 and 5415, or 3411 (#7960) on System/38, or #7801 on the 3776 mdl 3, or 4 or 3777 mdl 3. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #7360 or #7361.

S/370 - 3800 Attachment (#7360): [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor.
[3411 mdl 3] To attach the 3411 mdl 3 to a 3800 Printing Subsystem. Up to eight control units may be attached to the 3800 provided that power sequencing and control connection for all other than one are provided by the system. **Limitations:** Cannot be installed with #7003 or #7361 or RPQ 870061. **Field Installation:** Yes. **Prerequisites:** A control unit position on a system channel of the 3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155 or 3158.

S/370 Mdl 115/125 Attachment (#7361): [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 115 (except mdl HG2) or 125 (except mdl HG2 or I2). When attached to 3115 mdl HG2 or 3125 mdl HG2 or I2, RPQ 870061 is required. **Limitations:** Cannot be installed with #7003, #7360 or RPQ 870061. **Field Installation:** Yes. **Prerequisites:** #4675 on 3115 or 3125.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3420 MAGNETIC TAPE UNIT MDLS 3, 5, 7

PURPOSE

Magnetic tape unit for S/360, S/370 or 4300 processors.

MODELS

Model 3	003	120,000 8-bit bytes/second; for use with any S/370 Processor, with all 4300 processors or 3800 Printing Subsystem.
Model 5	005	200,000 8-bit bytes/second; for use with any S/370 Processor, with all 4300 processors or 3800 Printing Subsystem.
Model 7	007	320,000 8-bit bytes/second; for use with any S/370 Processors except 3115 and 3125, with all 4300 Processors or 3800 Printing Subsystem.

Prerequisites: A 3803 Tape Control.

Limitations: 3420 mdl 7 cannot be attached to the S/370 mdl 115 or 125.

If the 3420 mdl 5 is to be ordered for attachment to a selector subchannel feature of the 2870, consult IBM.

Programming support for the extended diagnostic capabilities of the 3420 requires a minimum system size of 32K.

HIGHLIGHTS

Radial attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability. MST circuitry reduces card count while increasing functions: Expanded sense data, better diagnostic capability, unique device identification, EC level and feature identification.

Limitations: IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006.

Automatic Threading and Cartridge Loading: Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

9-track 1600 bpi Phase-encoding Operation: Data is recorded parallel by bit, serial by byte, at 1600 bytes/inch, phase-encoded, in nine tracks across the width of the tape. The data format uses eight of the nine bits for data; the ninth bit is a parity bit. Data is recorded in odd parity. The eight bits of one byte can represent an alphabetic character, zoned decimal digit, two decimal digits (packed), a special character, or eight binary bits. The recording format is compatible with the 1600 bpi PE recording of tape units 2401, 2402, 2403, 2404, 2415 mdls 4, 5 and 6, and 2420 mdls 5 and 7. For 9-track 1600 bpi PE operation only, specify Single Density, #6631. See "Special Features". **Prerequisites:** One of the following must be specified on the 3803 Tape Control: **#9570** ... #3551 ... #6407.

9-track 800 bpi NRZI Operation: Tape is written at 800 bpi in the 9-track NRZI format as well as in the 1600 bpi PE format. Data representation is the same as for 1600 bpi PE operation. For 9-track 800 bpi NRZI capability, Dual Density (#3550) is required on the tape unit. See "Special Features".

7-track Operation: Tape is written in the 7-track format compatible with tapes written at either 556 or 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415 tape drives equipped with 7-track read/write heads. For 7-track operation, Seven-Track (#6407) is required on the tape unit. See "Special Features".

Checking: Each byte is parity-checked while tape is being read. Data written on tape is read back instantly and checked as in reading, with full parity check.

Error Correction: Single track drop-out errors are corrected "in flight" during 1600 bpi read operations.

Read Backward: All tapes (9- or 7-track) written on a 2401/2402/2403/2404/2415/2420 can be read by the 3420 in a forward or backward direction. The Data Conversion function is inoperative during backward read of 7-track tapes.

Characteristics	Mdl 3	Mdl 5	Mdl 7
Nominal Data Rate (Kb/sec)			
At 1600 bpi PE	120	200	320
At 800 bpi NRZI	60	100	160
At 556 bpi (7-tr.)	41.7	69.5	111.2
(Bytes/Inch) (1600/800/556)	Yes	Yes	Yes
Tape Speed (Inches/Sec.)	75	125	200
Nominal IBG (Inches)			
9-track	0.6	0.6	0.6
7-track	0.75	0.75	0.75
Nominal IBG Time (ms)			
9-track	8.0	4.8	3.0
7-track	10.0	6.0	3.8
Rewind Time (2400 ft. Reel, Seconds)	60	60	45
Rewind-Unload Time (2400 ft. Reel, Sec.)	66	66	51
Auto Threading Time* (Seconds)	10	10	7
Nominal Read/Write Access** Time (ms)	4.0	2.9	2.0

* From initiation (using mounted supply reel) to "Tape Drive Ready".

** Access time is the interval from initiation of a write or forward read command until the first data byte is read or written when tape is brought up to speed from a stopped status.

Publications: GC20-0001

SPECIFY

- Tape Density: One, and only one, of the following must be specified for each tape unit. This applies to MES orders (for field changes) as well. See "Special Features".
  - Single Density **#6631** for 9-track 1600 bpi PE operation only.
  - Dual Density **#3550** for 9-track 800 bpi NRZI operation as well as 1600 bpi PE.
  - Seven-Track **#6407** for 7-track 556 or 800 bpi NRZI operation.

  Note: MES orders for these features to effect field changes should consider that one of these three features **must** be installed on the 3420 or it is incomplete.
- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), **#9830** must be specified.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Dual Density (#3550): Permits the tape unit to operate at 800 bpi NRZI 9-track as well as at 1600 bpi PE. **Limitations:** Cannot be installed with either Single Density (#6631) or Seven-Track (#6407). **Field Installation:** Yes, except for machines with serial #9XXXX. **Prerequisites:** #3551 on the 3803 Tape Control.

Seven-track (#6407): Permits the tape unit to operate at either 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335, and 2401, 2402, 2403, 2404, 2415 tape units equipped with 7-track heads. **Field Installation:** Yes, only to replace Dual Density (#3550) ... otherwise available at time of manufacture only. **Limitations:** Cannot be installed with either Single Density (#6631) or Dual Density (#3550). **Prerequisites:** #6408 on the 3803.

Single Density (#6631): Permits the tape drive to read or write tapes at 1600 bpi PE. **Prerequisites:** One of the following features must be specified for the 3803 Tape Control Unit: **#9570**, #3551 or #6408. **Field Installation:** Yes. **Limitations:** Cannot be installed with either Dual Density (#3550) or Seven-Track (#6407).

MODEL CONVERSIONS

Can be made in the field.

From To	Mdl 4	Mdl 5	Mdl 6	Mdl 7	Mdl 8
Mdl 3	X	X	X	X	X
Mdl 5	X		X	X	X
Mdl 7	X		X		X

ACCESSORIES (None)

SUPPLIES

One standard 10-1/2" reel of magnetic tape in a wraparound cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

3420 MAGNETIC TAPE UNIT MDLS 4, 6, 8

PURPOSE

Magnetic tape unit for S/370 and 4300 processors.

MODELS

Model 4	004	470,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, any 4300 Processor and with a 3800 Printing Subsystem.
Model 6	006	780,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor and with a 3800 Printing Subsystem.
Model 8	008	1,250,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor and with a 3800 Printing Subsystem.

Limitations: 3420 mdls 4, 6 and 8 via a 3803 Control Unit mdl 2 are not supported on byte multiplexer, multiplexer or 2870 selector subchannels at either 1600 bpi or 6250 bpi.

3420 Models 6 or 8 cannot be attached to a S/360 mdl 50. When contemplating the attachment of 3420 mdls 6 or 8 to S/370 mdls 135, 135-3, 145 or 145-3, consult *System/370 Model 135 Channel Characteristics,* (GA33-3010), *System/370 Model 138 Channel Characteristics, System/370 Model 145 Channel Characteristics,* GA24-3573, or *System/370 Model 148 Channel Characteristics, IBM 4331 Channel Characteristics,* GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2) or GA33-1550 (Mdl Group 11).

Prerequisites: A 3803 Tape Control mdl 2.

HIGHLIGHTS

Nominal recording density of 6250 user bytes per inch with a 0.3-inch inter-block gap.

Radial Attachment: Attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability.

Cleaning Mechanism: A new cleaning mechanism is engaged during auto-threading, rewinding, and unloading operations to remove loose contaminants from the tape surface and to protect the recording head. This new cleaning mechanism makes tape cleaning a byproduct of tape processing. The cleaning mechanism does not, however, replace drive cleaning performed by the operator, nor does it replace the need for normal library maintenance.

Automatic Threading and Cartridge Loading: Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

Automatic Read Amplification: Automatically adjusts the amplifier gain in the tape drive to each individual reel of tape when operating at 6250 bpi.

Checking: Data written on tape is read back instantly to ensure later readability.

Read Backward: Tapes written at 6250 bpi mode can be read in a forward or backward direction. Tapes written at 1600 bpi (phase-encoded) mode can be read in a forward or backward mode if the 3420 mdl 4, 5 or 8 is equipped with the 6250/1600 optional feature.

6250/1600: Optional feature allows the 3420 mdls 4, 6 or 8 to read and record at 1600 bpi (phase-encoded) density as well as 6250 bpi density.

Tape Media: IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006.

Characteristics	Mdl 4	Mdl 6	Mdl 8
Tape Speed (ips)	75	125	200
Recording Density 6250/1600	Yes	Yes	Yes
Nominal Data Rate			
at 6250 Kb/sec.	470	780	1250
at 1600 Kb/sec.	120	200	320
Nominal IBG (in)			
at 6250	0.3	0.3	0.3
at 1600	0.6	0.6	0.6
Nominal Read/Write Access (ms)*			
at 6250	2.3/ 2.1	1.6/ 1.5	1.1/ .95
at 1600	4.0/ 3.0	2.6/ 2.0	1.7/ 1.3
Maximum Rewind Time (seconds)	70	60	45
Maximum Rewind-unload (seconds)	76	66	51
Maximum Auto Thread (seconds)**	10	10	7

* Access time is the time required to read or write the first byte of data in a block after a read/write instruction has been initiated from a stopped position (read/write head positioned in the IBG).

** From initiation (using mounted supply reel) to "Tape Drive Ready".

SPECIFY

- Tape Density: One and only one of the following must be specified for each tape unit (see "Special Features"):

  #6420 for 6250 bpi density only.

  #6425 for 1600 bpi density (phase-encoded) as well as 6250 bpi density.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), **#9830** must be specified.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

6250 Density (#6420): Permits the tape unit to operate at 9-track 6250 bpi. **Limitations:** Cannot be installed with 6250/1600 density (#6425).

6250/1600 Density (#6425): Permits the tape unit to operate at 6250 bpi density as well as 1600 (phase-encoded) density either this feature or #6420 must be specified. **Limitations:** Cannot be installed with 6250 Density (#6420).

MODEL CONVERSIONS

From To	Model 6	Model 8
Model 4	X	X
Model 6		X

ACCESSORIES (None)

SUPPLIES

One standard 10-1/2 inch reel of magnetic tape tested for 6250 bpi in an easy-load cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

3430 MAGNETIC TAPE SUBSYSTEM

PURPOSE

Magnetic tape Subsystem for System/38 models 4, 5, 7, and 8, Virtual Storage S/370 models 135 - 168, 4321, 4331, 4341, 4361, 4381, 3031, 3032, and 3033.

MODELS

Model A01	Tape control and a single tape unit.
Model B01	Second, third, or fourth tape units which attach to the model A01.

Maximum Configuration: Up to three 3430 mdl B01s may be attached to a 3430 mdl A01 for a total of four drives.

Prerequisites:

- A 3430 mdl A01 must be the first drive of the string.
- 4321,4331 Mdl Group 1 and 2, 4361 - Block Multiplexer Channel (#1421).
- System/38 - 3430 Attachment (#7970).

The 3430 Tape Subsystem attaches via the selector, or the block multiplexer channels of 370 mdls 135 - 168, 4321, 4331, 4341, 4361, 3031, 3032 or 3033.

HIGHLIGHTS

- Dual-density 246/63 bytes per mm (6250/1600 bytes per inch).
- LSI components for improved reliability.
- Instantaneous data rate of 312,500 bytes per second at 246 bytes per mm (6250 bytes per inch).
- Radial attachment of tape drives for ease of service.
- Space saving as a result of compact packaging and control unit housed in first drive.
- Microdiagnostic package for offline diagnosis and repair verification.

Checking: During a write operation, both parity and signal amplitude are checked. During a read operation, parity is checked.

Error Correction: Reading at 246 bytes per mm (6250 bytes per inch), double-track errors are corrected automatically "in flight". Reading at 63 bytes per mm (1600 bytes per inch) single-track errors are corrected automatically "in flight".

Characteristics:

Data Rate, Instantaneous	
63 B/mm (1600 Bpi)	80 kb/sec
246 B/mm (6250 Bpi)	312.5 kb/sec
Recording Density	246/63 B/mm (6250/1600 Bpi)
Tape Speed	127 cm/s (50 ips)
Nominal IBG	
63 B/mm (1600 Bpi)	15 mm (0.6 in.)
246 B/mm (6250 Bpi)	
Write	11 mm (0.45 in.)
Read	8/11 mm (0.3/0.45 in.)
Nominal Read/Write Access Time *	
63 B/mm (1600 Bpi)	6.0 ms
246 B/mm (6250 Bpi)	6.0 ms
Rewind Time per Reel	
610 meters (2,400 feet)	2.7 minutes

* Access time is the time required to read or write the first byte of data in the block after a read/write instruction has been initiated from a stopped position in the IBG.

Magnetic Tape: IBM Multi-System Tape (MST), or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units* (GA32-0006).

Publications:

IBM 3430 Magnetic Tape Subsystem Introduction (GA32-0069),
IBM I/O Equipment Installation Manual, Physical Planning for System/360 and System/370 (TNL to GC22-7064),
IBM Input/Output Device Summary (TNL to GA32-0039),
IBM 3430 Operator's Guide (Booklet) (GA32-0079),
IBM 3430 Magnetic Tape Subsystem Description (GA32-0076),
Tape Requirements for IBM One-Half Inch Tape Units (GA32-0006),
IBM System/38 Installation Manual - Physical Planning (GA21-9293),
IBM System/370 Installation Manual - Planning (GC22-7004).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9065** for Pebble Gray, **#9061** for Garnet Rose, **#9063** for Classic Blue, **#9060** for Willow Green, **#9064** for Charcoal Brown, **#9062** for Sunrise Yellow.

SPECIAL FEATURES

Multiple Drive Attachment Feature (#4991): If the number of tape units in the string exceeds two tape units (i.e., the second mdl B01 is to be attached), the multiple drive attachment feature must be specified to be installed in mdl A01, one feature per mdl A01. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3501 CARD READER

PURPOSE

Punched card input unit for the 3770 Data Communication System or 8100 Information System via 3289 Printer model 3.

MODELS

		Rated 80-column Card Speed
Model 1	001	50 cards/minute

Prerequisites: 3501 Card Reader Attachment (#8050) on the 3289 mdl 3, 3771, 3774, 3775 or 3776.

Limitations: Cannot be installed on a machine with a 2502 Card Reader.

HIGHLIGHTS

Used for automatic entry of punched card data. The 3289 Printer mdl 3 or 3770 System performs all format control and analysis.

Cards are read serially by a sensing mechanism which is checked for proper functioning in every card cycle. EBCDIC or ASCII (3770 System only) code can be read. Hopper and stacker capacity is approximately 400 cards.

The 3501 is packaged as a table-top device.

Card Limitationa: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

External Scores (after separation): Column 1 edge: M-3, M-4, M-5. Column 80 edge: M-7. All edges: CF-11.

Corner Cuts: Any corner: C5. Upper left and upper right corners: C1, C2, C3.

Verified Cards: Approved cards with verify notch between rows 0 and 1, column 80 edge; or verify punch 2 and 3 in column 81 area.

Card Stock: Regular, edge-coated and heavy duty.

All other special feature cards may result in unsatisfactory performance.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901**.
- Documentation: One must be specified. **#9101** for use with a 3771 ... **#9102** for use with a 3289 mdl 3, 3774 or 3775 ... **#9103** for use with a 3776.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3505 CARD READER

PURPOSE

Punched card input unit for a S/360 model 195, or all S/370, 4300 processors.

MODELS

	Rated 80-Column Card Speed
Model B1 B01	800/minute
Model B2 B02	1200/minute

HIGHLIGHTS

The 3505 is a high-speed, fully buffered, card reader, containing its own control unit. With appropriate adapter and control features installed (see "Special Features"), the 3505 provides the power and logic to control one 3525 Card Punch.

All mdls have a 3,000-card capacity file feed and two 1,750-card capacity non-programmable stackers, which operate in an alternating mode. Feeding from the file feed hopper is by means of friction feed rolls with vacuum assist. Failure to feed a card from the hopper is followed automatically by up to three retries before the machine stops.

All mdls have read-column-eliminate capability, which provides the user with the ability, under program control, to suppress the reading of selected card columns. It is recommended to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores.

Holes in the card are read by a light-sensing mechanism, which is checked for correct operation in every card cycle. Cards punched in either the Extended BCD Interchange Code (Data Mode 1) or Card Image (Data Mode 2) can be read. Machine checks are made for invalid codes (Data Mode 1 punching only), off-punching, and mispositioned cards.

Maximum: The number of 3505 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available.

Prerequisites: Each 3505 requires an available control unit position on a system channel.

S/360 and S/370 mdl 195: Selector channel of 2860, basic multiplexer channel of 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Byte multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), or block multiplexer channels (special feature) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), or block multiplexer channels (standard) ... see M3148 pages.

S/370 mdls 155, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155 and 3158 pages.

S/370 mdls 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channel (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, 3083, 3084 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel. See M4331, 4341, 4361, 4381 pages.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following card features has been approved:

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. **Note:** When using OM-2 or OM-3, either reading must be terminated prior to the column that is scored, or, reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled Read Column Eliminate feature (see "Special Features"). S-2 may be used prior to folding, and after folding if the card is properly flattened.

External Scores (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A. When using CF-1/9A scores on 51-column cards, consult IBM.

Corner Cuts: Any corner: C1, C2, C3, and C5.

Card Stock: Regular, edge-coated, and heavy duty.

Port-A-Punch®: Can be processed.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- High Altitude Group: **#9220** is to be specified when card reader is to be installed at an altitude exceeding 4,300 feet.

SPECIAL FEATURES

Interchangeable Read Feed, 51/80-Column (#3921): [mdl B2] For feeding and reading 51-column cards. The 51 columns of data appear in positions 1 through 51 of the 80-position buffer. A special card weight, file feed, hopper liners and stacker guide assemblies are provided so that the operator can adjust for 80- or 51-column operations. Intermixed cards on the same operation are not supported. Reading speed of the 3505 is maintained. With this feature installed, the capacity of each stacker is permanently reduced to 1,500 cards. Can be used with all other 3505 features. **Field Installation:** Not recommended.

Optical Mark Read (#5450): For reading up to 40 columns of marked data. Marked and/or punched-hole data can be read from a card. Columns in which marks are unacceptable are transmitted as Hex '3F' characters. Same validity checking applies as for holes. Can be used in Card Image Mode, in which case the validity check is suspended. **Note:** See GA21-9124 for card and format specifications. It is recommended that Selective Stacker (#6555) be installed for program-selecting poorly marked cards. **Limitations:** Cannot be used simultaneously with the Read Column Eliminate function. **Field Installation:** Yes.

Selective Stacker (#6555): Provides a third stacker (second logical stacker), which permits time-independent card selection under program control. Card capacity is 1,750 cards. When actually using this feature under DOS, the maximum speed of mdl B2 on the 3115 or 3125 is approximately 1,150 cards/minute. **Field Installation:** Yes.

3525 Card Print Control (#8100): Provides control for Basic Card Print (#1421) installed on a 3525 Card Punch. **Specify:** Either **#9791** for two-line, or **#9792** for multiline. **Prerequisites:** Either #8103 or #8105. **Field Installation:** Yes.

3525 Punch Adapter (#8103): Permits attachment of the 3525 Card Punch without Card Read (#1533). **Limitations:** Cannot be installed with #8105. **Field Installation:** Yes.

3525 Read Punch Adapter (#8105): Permits attachment of the 3525 Card Punch equipped with Card Read (#1533). **Limitations:** Cannot be installed with #8103. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

3521 CARD PUNCH

PURPOSE

Punched card output for the 3770 Data Communication System or 8100 Information System (via 3289 Printer Model 3).

MODELS

Model 1 001

Prerequisites: A 3783 Card Attachment Unit mdl 1 for attachment to a 3289 mdl 3, 3771, 3774, 3775, 3776 or 3777 mdl 2, 3 or 4 equipped with 3782/3521 Card Punch Attachment (#8150).

HIGHLIGHTS

Used primarily for punched card output on the 3770 System or 8100 System, but can, when equipped with appropriate optional features, be used alternatively as a card reader and/or to print information on a card. The 3289 mdl 3, 3771, 3774, 3775, 3776 or 3777 mdl 2, 3 or 4 performs all format control and analysis.

Rated 80-column card speed is 50 cards per minute. Hopper and stacker capacity is approximately 400 cards. The 3521 is a table-top unit that is placed on top of the 3782 Card Attachment Unit mdl 1.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

External Scores (after separation): Column 80 ends only: M-4 and M-6.

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3, S-1, S-2 may be used prior to folding. **Note:** Also see limitations that apply for Card Read/Punch Check (#1521).

Corner Cuts (any corner): C1, C2, C3 and C5. **Note:** The use of corner cuts C1, C2, C3 in the lower left and lower right corners of the card is not recommended since these cards cannot be read by the 3501 Card Reader.

Card Stock: Regular, edge-coated, and heavy duty.

Verified Cards: Approved cards with verify notch between rows 0 and 1, column 80 edge; or verify punch 2 and 3 in column 81 area.

Color: Brown, red, blue, white, yellow, salmon, green and natural. With Card Print (#1501), print contrast will be reduced on brown, red, blue, salmon and green cards.

All other specify feature cards may result in unsatisfactory performance.

Publications: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901**.
- Documentation [One must be specified]: **#9101** for use with a 3771, or **#9102** for use with a 3289 mdl 3, 3774, 3775, 3776 or 3777 mdl 2 or 3.
- Cabling: Fixed length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

SPECIAL FEATURES

Card Print (#1501): For printing up to 80 positions along the top edge of the card. A 64-character set (including blank) is provided. Orders must specify **#9491** for EBCDIC or **#9494** for ASCII (3770 System only). Uses a black ink roll replaceable by the customer. See IBM. **Field Installation:** Yes.

Card Read/Punch Check (#1521): Allows the 3521 to be used alternatively as either a card punch or card reader. Read speed is the same as punch speed (50 cpm). This feature also provides for detection of punching errors by comparing the data read from the card with the punch data for each column. When an error is detected, the machines stops and an error indicator is lit. **Field Installation:** Yes. **Limitations:** [1] Punch checking must be inhibited using 3770 or 8100 job control when punching cards with internal scores or cards that have been prepunched ... [2] This feature is limited to the Punch Checking function only if the host 3289 mdl 3, 3774, 3775, 3776 mdl 1 or 2 is also equipped with a 2502 or 3501 Card Reader ... [3] This feature is limited to the Punch Checking function only when the 3521 is attached to a 3776 mdl 3 or 4, or a 3777 mdl 2, 3 or 4.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3525 CARD PUNCH

PURPOSE

Punched card output unit for a S/360 mdl 195, any S/370 processor, 4331 or 4341 Processor.

MODELS

		Rated 80-column Card Speed
Model P1	P01	100/minute
Model P2	P02	200/minute
Model P3	P02	300/minute

Maximum: S/360 mdl 195 and any S/370 (except mdl 125), 4300 processor: One 3525 can be attached via each 3505 Card Reader mdl B1 or B2. **S/370 mdl 125:** One 3525 can be natively attached via the appropriate adapter on the 3125 ... see M3125 pages.

Prerequisites: S/360 mdl 195 and any S/370, 4331 or 4341 processor: A 3505 Card Reader mdl B1 or B2 with a 3525 Punch Adapter (#8103), or 3525 Read Punch Adapter (#8105). **S/370 mdl 125:** Native attachment via the Integrated 3525 Card Punch Attachment (#4685) on the 3125.

HIGHLIGHTS

The 3525 is a full-function card punch which, when equipped with the appropriate special features, can read and/or print as well as punch 80-column cards in a single pass through the machine. The 3525 attaches natively to a S/370 mdl 125, or via (and within 20 feet of) a channel-attached 3505 Card Reader mdl B1 or B2 to a S/360 mdl 195, or any S/370, 4300 processor ... see "Prerequisites" above.

The basic unit has a 1,200 card capacity hopper and two 1,200 card capacity stackers. Either the EBCDIC (256 codes) or Card Image (Data Mode 2) can be punched. Punches parallel, row by row. Cards go to stacker 1 unless program directed to stacker 2.

Card punching is checked by monitoring the movement of all 80 punches. A card in which a punching error is detected is automatically directed to a dedicated 200-card capacity error stacker and followed by two automatic punching retries ... the first prepunched card is directed to the error stacker for analysis purposes ... the second prepunched card is directed to the stacker originally selected for the error card. Note: Because of automatic punch retry, it is recommended that prepunched or serially numbered preprinted cards not be used in a punch-only mode. When operating in a read/punch mode ... see Card Read in "Special Features" ... detected punching errors do not result in an automatic punching retry and prepunched or serially numbered preprinted cards can be used. In a read/punch mode, a detected punching error causes the machine to stop and manual error recovery procedures are required.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. When reading cards with internal OM-2 or OM-3 scores (Card Read feature installed), either reading must be terminated prior to the column that is scored, or reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled read-column-eliminate feature function provided standard with Card Read. S-2 may be used prior to folding, and after folding if the card is properly flattened.

External Scores (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A.

Corner Cuts (any corner): C1, C2, C3 and C5.

Card Stock: Regular, edge-coated, and heavy duty.

Port-A-Punch®: Can be punched in unscored fields of the card. Scored columns of these cards cannot be read. If reading capability is required, contact IBM.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

Publications: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

SPECIFY

- Voltage (AC, 60 Hz power provided by the 3125 for native attachment or by the 3505 mdl B1 or B2 for channel attachment): **#9903** for 208V or **#9905** for 230V ... must be consistent with 3505 or system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- S/370 mdl 125 Adapter (**#9690**): Required if the 3525 is to be attached via an Integrated 3525 Punch Attachment (#4685) on a 3125. **Field Installation:** Yes.

Print Character Set: Required when Multiline Card Print (#5273) or two-line Card Print (#8339) is ordered. **#9677** -- for EBCDIC or **#9671** -- for ASCII. **Field Installation:** Yes.

Card Code	EBCD Code 0100-	EBCDIC	ASCII	Card Code	EBCD Code 0110-	EBCDIC	ASCII
12-8-2	1010	¢	[	11	0000	/	/
12-8-3	-1011	.	.	0-1	-0001	blank	\
12-8-4	-1100	<	<	12-11	-1010	,	,
12-8-5	-1101	(	(	0-8-3	-1011	%	%
12-8-6	-1110	+	+	0-8-4	-1100	—	—
12-8-7	-1111	|	|	0-8-5	-1101	>	>
	0101-			0-8-6	-1110	?	?
12	0000	&	&	0-8-7	-1111		
11-8-2	-1010	!	]		0111-	:	:
11-8-3	-1011	$	$	8-2	1010	#	#
11-8-4	-1100	*	*	8-3	-1011	@	@
11-8-5	-1101	)	)	8-4	-1100	'	'
11-8-6	-1110	;	;	8-5	-1101	=	=
11-8-7	-1111	¬	¬	8-6	-1110	"	"
				8-7	-1111		

SPECIAL FEATURES

Basic Card Print (#1421): Provides a print station following the punch station. Print mechanism consists of a print chain, 64 hammers, and a card stepping device. **Field Installation:** Not recommended. **Prerequisites:** #8100 on 3505 or #4693 on 3125. Also requires #8339 or #5273 on 3525.

Card Read (#1533): Provides an optical hole-sensing station ahead of the punch station. Permits cards to be read in EBCDIC (Data Mode 1) or Card Image (Data Mode 2). Cards are read in parallel fashion (row by row) while the previous card is being punched. Data read is fully buffered and can be used to control later operations on the same card such as punching, printing, and stacker selection.

Read-column-eliminate is standard with the feature. Provides the ability, under program control, to suppress the reading of selected card columns. May be used to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores. See Port-A-Punch under "Card Limitations" for restrictions. **Field Installation:** Yes. **Prerequisites:** #8105 on the 3505 mdl B1 or B2, or **#9794** on the 3125.

Multiline Card Print (#5273): Provides the ability to print, under program control, on any or all of 25 printing lines on the card. Each print line is 64 characters long and print locations are identical to that of the 2560 MFCM. Maximum speed, in cards/minute, when printing, is dependent upon the machine mdl, the average number of lines printed and the location of the printed lines. Typical speeds are as follows:

	P1	P2	P3
1 Line	100 cpm	200 cpm	300 cpm
2 Lines	100 cpm	200 cpm	240 cpm
3 Lines	67 cpm	133 cpm	150 cpm
4 Lines	67 cpm	114 cpm	133 cpm
6 lines	57 cpm	89 cpm	100 cpm
10 Lines	44 cpm	62 cpm	67 cpm
25 Lines	24 cpm	29 cpm	30 cpm

Limitations: Cannot be installed with #8339. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

Two-Line Card Print (#8339): Identical in function to Multiline Card Print (#5273) with the exception that printing is limited to lines 1 and 3 (above the 12 punching row and between rows 12 and 11). Maximum speed in cards/minute, when printing, depends upon the machine mdl only. Speeds are as follows:

	P1	P2	P3
1 line	100 cpm	200 cpm	300 cpm
2 lines	100 cpm	200 cpm	300 cpm

Limitations: Cannot be installed with #5273. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

3602 Finance Communication Controller (cont'd)

tions Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System or for local attachment to the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor without requiring modems ... see M3704, 3705, 3725 or 4331 pages, feature #4716. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with a 1200 bps Integrated Modem (#5500) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501 ... #6302 or #4502.

SDLC Communications With Business Machine Clocking (#4501): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking or for local attachment to a 3704, 3705, or 3725 at 1200 or 2400 bps (#4716). The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregrate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4502 (unless #4502 has **#9551** for controller attachment). **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800 or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** For host connection without **#9551**. Cannot be installed with #6301, #6302 or #4501. **Maximum:** One for host connection (without **#9551**) plus two with **#9551** for controller attachment. **Field Installation:** Yes. **Prerequisites:** #3701 when ordered without **#9551** and Fan-Out Communication Adapter #1551 when order with **#9551**. **Specify:** When used in conjunction with #1551 for attachment of 3601s, specify **#9551**.

1200 bps Integrated Modem (#5500): An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to a host processor through the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System. This integrated modem must communicate with another IBM 1200 bps Integrated Modem. **Limitations:** Cannot be installed with EIA Interface (#3701) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501. **Specify:** **#9651** for 4-wire strapping, or **#9652** for 2-wire strapping.

SDLC Communications With Business Machine Clocking (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking, or for local attachment to the 3704, 3705, or 3725 at 1200 or 2400 bps (#4716) or for communications to an 8100 Information System. **Limitations:** Cannot be installed with #6302, #4501 or #4502 (unless #4502 has **#9551** for controller attachment). **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#6302): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 a Processor (#4801) at 1200, 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #6301, #4501 or #4502 unless #4502 has **#9551** for controller attachment. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Loop Integrated Modem (#8001): An integrated modem for transmission to remotely located 3600 Finance Communication System Terminals. Operates at 1200 bps over nonswitched normal quality voice-grade lines. **Note:** Several remote loop configuration variations can be realized; e.g., see the *IBM 3600 FCS Configurator,* GA19-0063. However, facilities are always point-to-point circuits, either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop. **Maximum:** One per Add'l Loop (#4735). **Field Installation:** Yes. **Prerequisites:** #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with a 1200 bps Loop Integrated Modem (#8001 or #8002), a 3614 or 3624 Consumer Transaction Facility with a 1200 bps Loop Integrated Modem (#8001) or a 3603 as the first attached remote unit in each physical (geographic) location.

MODEL CONVERSIONS

Model 1A can be changed to model 1B. This upgrade requires replacement of the disk storage (not diskette) device. Adequate provision must be made for retaining data contained on disk storage and elimination of user proprietary information. **Limitations:** If model 1A does not have Add'l Disk Heads (#1010) installed, field installation of the Add'l Disk Heads - for model 1B (#1011) concurrently with a model change from model 1A to model 1B requires the submission of an RPQ.

Attachment Factor Functions

Data Sequencing: Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette: Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements: Provides the user application with the following new instructions:

- Bit Manipulation - Test and Branch (LIFON, LIFOFF) - provide a test, set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.
- Logical Compare Data Immediate (CCDI) - compares immediate data to data in a specified field.
- Move Data Immediate (MVDI) - moves immediate data to a specified field.
- Load Data Immediate (LDDI) - loads immediate data into specified register.
- SCALE- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instructions required to process monetary input.
- Segment Indexing (SETX, TESTX, SETXREG) - provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instructions may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variable displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.
- Branch on Index (BRANX) - provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.
- Execute (LEXEC) - provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching: Provides the ability to specify the order in which 3601/2 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate: The LTRT instruction processes an input data stream against user specifiable translate tables(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Extended Statistical Counter Recording: Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consist of multiple remote locations.

Multiple Block I/O - Diskette: Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than three blocks are read or four blocks are written.

3602 Dynamic Sector Relocate: This facility provides a means of recovery when a Write Sector CRC check occurs. This facility, in most cases, replaces the offline manual procedure which requires a special test diskette to reassign failing sectors.

3270/3600 Datastream Mapping: Provides, via four 3600 assembler language instructions, 3600 controller assistance in converting 3270 output display datastreams into an output datastream processable by 3600 attached devices, and 3604 input datastreams into 3270 input datastreams. Additionally, these instructions can aid in converting 3604 output display datastreams into 3270 output display datastreams.

Extended 3270/3604 Keyboard Mapping: Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.

LSEEKP Instruction: Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

3540 DISKETTE INPUT/OUTPUT UNIT

PURPOSE

Input/output device for use with any virtual storage S/370 processor except a 3081, 3083 or 3084 Processor.

MODELS

Model B1 B01 Has one drive.

Model B2 B02 Has two drives.

Limitations: The use of a 3540 on a S/370 and the 4300 processors does not eliminate the minimum configuration requirements for a card reader, except in a S/370 mdl 115 or 125 cardless configuration.

Maximum: The number of 3540 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available.

Prerequisites: Each 3540 requires an available control unit position on a channel.

HIGHLIGHTS

The 3540 provides the ability to read or write IBM Diskettes on S/370 systems, 4300 processors. The diskette is the same recording medium used by the 3740 Data Entry System, and, as such, the 3540 provides a facility for entering data recorded by the 3740 directly into a S/370, 4300 processors. The IBM Diskette is organized into 75 tracks, 26 sectors per track, 128 bytes per sector. 73 tracks are used for data. The data capacity of the diskette is, therefore, 1,898 sectors, or 242,944 bytes.

The mdls provide a choice of one or two diskette drives. Each drive uses a stepping motor to control the positioning of its associated read/write head assembly. Each drive also has an associated diskette hopper and stacker. Diskettes are fed, one at a time, from the hopper and automatically mounted on a drive spindle for read/write operations. Following completion of reading or writing, the diskette is automatically removed from the spindle and stacked. Hopper and stacker capacities are 20 diskettes each. Disk speed is 360 revolutions/minute.

The 3540 has a self-contained control unit and provides double 128-byte buffers associated with each drive. The control unit operates the drives in a now-shared mode and thus each drive requires a separate subchannel when attached to a byte multiplexer channel. Effective speed depends upon the number of sectors read or written per revolution and upon the average number of sectors recorded on the diskettes. Maximum speeds per drive, including program Open Time (2 seconds/disk for Read; 10 seconds/disk for Write), and including time to feed and stock diskettes, are shown below for several combinations. For simultaneous processing on both drives, the realizable speed per drive is a function of the type of channel, speed of the channel, type of operating system, and the application programs.

Sectors/ Revolution	Sectors/Minute (read)			Sectors/Minute (write)		
	Full Disk	1/2 Disk	1/5 Disk	Full Disk	1/2 Disk	1/5 Disk
1	600	575	520	170	165	155
2	600	575	520	310	295	265
13	2620	2255	1595	1500	1250	835
26	3635	2970	1925	2210	1710	1020

The 3540 is supported as a sequential DASD device only.

S/370 mdl 115, 125: Byte multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155II, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

S/370 mdl 165II, 168: Selector channel of 2860, basic multiplexer channel of 2870, shared or non-shared subchannel of 2880 (non-shared is recommended) ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

4300: Byte multiplexer channel, block multiplexer channel ... see M4331, 4341, 4361, 4381 pages.

Publications: S/370--GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

MODEL CONVERSIONS

All model changes are field installable.

ACCESSORIES (None)

SUPPLIES

IBM Diskettes: Contact IBM. Refer to DMC.

3601 FINANCE COMMUNICATION CONTROLLER

THE 3601 IS NO LONGER AVAILABLE ... FEATURES AND ACCESSORIES MAY BE ORDERED.

PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to System/34 or System/36 (using the appropriate licensed programs), System/3 model 15 processors or to S/370, 303X, 308X or 4300 processors using appropriate virtual storage system control programs; or for attachment of certain 4700 Finance Communication System terminals to S/370, 303X, 308X, or 4300 processors using appropriate virtual storage system control programs, a 3602 Finance Communication Controller, System/34 or System/36 (using the appropriate licensed programs, or an 8100 Information System using DPPX licensed programs.

Attachment to System/34 is via SDLC transmission over various common carrier- or user-owned facilities.

Attachment to System/3 model 15 is via Binary Synchronous Communications (BSC) – see 3601/3602 RPQ 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, 4331, 4341, 4361 or 4381 processor attachment is via a 3704, 3705, or 3725 Communications Controller using synchronous data link control (SDLC) transmission over various common carrier or user-owned transmission facilities. Attachment is also possible via the Communications Adapter feature on a 4321, 4331 or 4361. See M4321, 4331 or 4361 pages for details. **Note:** See "Programming" and "SCP" pages for attachment capability.

8100 Information System attachment is via the 8130, 8140 or 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities. Attachment to a System/34 or System/36 is via communication adapter using SDLC transmission protocol over various common carrier facilities. Attachment to a 3602 is via the Fan-Out Communication Feature. See M3602 pages for details.

MODELS

[NO LONGER AVAILABLE]

Model 1 001 — A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of six loops and a maximum of 56K bytes of user programmable storage.

Remote terminal attachments* are available.

Note: Mdl 1 not for System/34 or System/3.

Model 2A A02 — A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments* are available.

Model 2B B02 — A programmable controller with a diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments* are available.

Model 3A A03 — A programmable controller with a maximum of two diskette drives which accommodates 1-sided removable diskettes, a maximum of six loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments* and a Local device cluster attachment are available.

Model 3B B03 — A programmable controller with a maximum of two diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of six loops and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments* and a Local cluster attachment are available.

* Remote terminal attachments can be achieved on total number of loops indicated by one or a combination of the following as applicable:

Device or Feature	Device or Feat. #	1	3601 2A	3601 2B	3601 3A	3601 3B
1200 bps Loop Int Modem	#8001	5	–	–	5	5
Terminal Attach Unit	3603-1,2	6	3	3	6	6
EIA Interface	RPQ	5	2	2	5	5

Prerequisites: Communications Controller equipped with appropriate features (see M3704, 3705, 3725 or 4331 for Communications Adapter feature #1601 on the 4331 Processor), or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages) , or via System/34 or System/36 with appropriate features (see M5340 or 5360 pages).

HIGHLIGHTS

Controls all the functions of 3600 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communications features are available, one of which is required for transmission to and from the Host. An SDLC Communications feature at speeds from 1200 bps to 4800 bps or an SDLC Communications (mdl 3A or 3B for System/34 or System/3) feature at speeds from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature to 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed. See "Communications Features". For System/34 and System/3, for Binary Synchronous Communications (BSC) – see 3601/3602 RPQs 8K0598 and 8K0623.

Mdl 1 -- Contains approximately 24K bytes of programmable storage. Four additional increments of 8K bytes of programmable storage (for a total of 56K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. See Add'l Storage Feature (#1005).

Mdls 2A, 2B, 3A and 3B -- Contain approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32 bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. (See Add'l Storage Feature, #1006 or #1007.) For System/34 or System/3, specify **#9591** for Control Storage, specify **#9592** for User-Programmable Storage.

Mdls 1, 2A and 3A -- House a direct access diskette drive with a 1-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). The mdl 3A allows the attachment of two 1-sided diskette drives.

Mdls 2B and 3B -- House a direct access diskette drive with a 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user date (sequential logging, random retrieval of data records, etc.). The mdl 3B allows the attachment of two 2-sided diskette drives.

All 3600 system terminals are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 and 2400 bps for remotely attached terminals The base unit provides one loop. Two additional loops are available on mdls 2A and 2B while five additional loops are available on mdls 3A and 3B. 1200 bps loop integrated modems are available on mdls 1, 3A and 3B only. See "Special Features". **Note:** Either one or two 4800 loops per 3601 may be specified.

The device cluster adapter feature may be attached to the 3601 mdls 3A and 3B.

For the System/34 and System/3:

Communication between the controller and the host may be through an external modem with Interface (#3701), or 1200 bps Integrated Modem (#5500). See "Modems" and "Special Features" below. Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line (one 3601 transmitting while the other receives).

For attachment to System/3 mdl 15 – see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

Can be programmed to operate independently when the CPU is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the CPU. A keylock is provided for the removable diskette. One key is provided.

For the 3600 or 4700:

Communication between the 3601 and the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through the 1200 bps Integrated Modem (#5500) on the 3601

or through an external modem using the Interface (#3701) on the 3601 at speeds up to 9600 bps. Local attachment can be made to a 3704, 3705, or 3725 via its local attachment feature using #3701 on the 3601 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3601 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Local attachment to a controlling 3602 at 9600 bps is via its Fan Out Communication Adapter Feature (#1551). Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line, one 3601 transmitting while the other receives.

Can be programmed to operate independently when the S/370, 303X, 308X, 4300 Processor, controlling 3602, or 8100 Information System is unavailable. Capable of controlling all terminal functions,

3601 Finance Communication Controller (cont'd)

executing arithmetic, and capturing data from the terminals for later transmission to the S/370, 303X, 308X, or 4300 Processor, controlling 3602, or 8100 Information System.

A keylock is provided for the removable diskette. One key is provided.

Transmission: The 3601 operates over common carrier-provided or equivalent customer-owned communications facilities. For information concerning these facilities, see M2700 pages.

Modems: External modems operating at speeds up to 9600 bps may be used with SDLC features.

Modem	Speed (bps)	Facility
3863	2400	Switched or nonswitched voice-grade lines
3868-1	2400	Nonswitched voice-grade line
3864	4800	Switched or nonswitched voice-grade lines
3868-2	4800	Nonswitched voice-grade line
3865	9600	Nonswitched voice-grade line
3868-3,4	9600	Nonswitched voice-grade line
3872	2400	Switched or nonswitched voice-grade lines
*	9600	Nonswitched digital data service

* See RPQ for IBM DDSA.

Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

Note: Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

Publications: GC20-0370 -- *IBM S/370 Bibliography* and GC27-0001 -- *IBM 3600 Finance Communication System, System Summary.*

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. **Field Installation:** Not recommended.
- Controller Designation: Media distribution of Controller Data. Specify **#9491** to identify the initial 3601 or 3602 ordered for use with a host system location, or specify **#9492** to identify additional 3601s per host system.

  If **#9491** is specified for the 3601, specify: **#9494** if there is no 3614/3624 with a first position designator attached to any 3601 on the same host system, or ... **#9493** if there is a 3614, with a first position designator and **#9002**, attached to any 3601 on the same host system, and/or ... **#9495** if there is a 3614 with a first position designation and **#9001** or a 3624 with a first position designator attached to any 3600 Controller on the same host system or if encryption capability via the Data Encryption Standard (DES), is desired on any 3600 Controller in the system. See 3614 Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designation under "Specify" for the 3624.

  If **#9491** is specified, select the specify number of the desired media.

  #9412 9/800 Magnetic Tape
  #9413 9/1600 Magnetic Tape
  #9414 9/6250 Magnetic Tape

  If magnetic tape is not available on designated CPU, then select one of the following media. [DOS/VS users only]

  #9431 80-Column Cards
  #9432 96-Column Cards

  If card or tape inputs are not available at the host location, contact IBM.

  When feature **#9491** is specified, additional shipping information is required.

  Supplementary Specifications (via AAS MES entry) are to be entered exactly as follows to indicate shipping address of the HOST SYSTEM LOCATION.

  Line 1 -- IBM Programming Support Representative (PSR)
  Line 2 -- C/O (Name of customer)
  Line 3 -- Street Address (or P.O. Box)
  Line 4 -- City, State, Zip Code

  This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with **#9491**. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

  Caution: Specify code **#9491** is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify **#9491** for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.
- Cables: See Accessories for ordering instructions. Also see *Installation Manual - Physical Planning,* GA27-2766.
- If ordering a 3614 or 3624 with 1st position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designator under "Specify" for the 3624) to be added to any existing 3601, an MES order transaction should be used against the initial controller (3601 or 3602 with **#9491** and **#9494**) requesting to delete **#9494** and add **#9493** and/or **#9495** for the initial controller.

  Refer to IBM for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of **#9001** on a loop-attached system.

  If all installed or on order 3614s or 3624s for loop attachment to the 3601 are removed or cancelled, an AAS order transaction should be used against the initial controller (3601 or 3602 with **#9491** and **#9493** and/or **#9495** requesting to delete **#9493** and/or **#9495** and add **#9494** for the initial controller.
- Note: The following specify features are field installable: **#9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.**

SPECIAL FEATURES

Non-Communications Features

Add'l Storage Feature (#1005): [Mdl 1] Provides an additional 8,192 bytes of control storage for device attachment or an additional 8,192 bytes of user-programmable storage. Specify: **#9581** for Control Storage for Device Attachment. Any combination of device types: 3603, 3604, 3606, 3608, 3610, 3611, 3612, 3614, 3615, 3616, 3618, 4704 mdl 1, 4710, 4720, and/or 3624 may be attached. Some combinations will require an optional 8,192 bytes of control storage provided by the use of feature #1005. To determine if #1005 is required, refer to the "Device Attachment Table - A" below. Calculate the sum of the attachment factors for the combination of devices to be attached. Add the attachment factor one time only for each device type. If the attachment factor sum is 3 or less, feature #1005 and **#9581** are not required. If the attachment factor sum is greater than 3 but does not exceed 11, #1005 and **#9581** are required. If the sum is greater than 11, but does not exceed 14, two #1005s and two **#9581**s are required. An attachment factor of greater than 14 is not allowed.

Note: Device Attachment table A is applicable to Controller data EC levels prior to EC749167.

Device Attachment Table - A

Device Type/Feature/Function	Attachment Factor
3604, 4704 mdl 1	0
Mag. Stripe Encoder-Reader (#4905/#4906)	0.6
3606	3.0
3608	5.8
3610, 3611 and/or 3612	2.4
3614 [with AET only]	2.2
3618	3.0

If additional function is required, or Controller data EC749167 or later is installed, utilize Device Attachment Table - B to determine if #1005 is required. Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type. If the attachment factor sum is 2 or less, neither #1005 nor **#9581** is required. If the attachment factor sum is greater than two but does not exceed 10, #1005 and **#9581** are required. If the sum is greater than 10, but does not exceed 14, two #1005s and two **#9581**s are required. An attachment factor of greater than 14 is not allowed.

Device Attachment Table - B

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section (See "Attachment Factor Functions".)

Device Type/Feature/Function	Attachment Factor
3603 or 3604 mdls 1-6, 4704 mdl 1	0
SDLC (#4501 or #4502)	0.7
Multiple Block I/O - Diskette	3.0
3614 or 3624 [Note 1]	1.2
3616, 4710, 4720 Part 1 [Note 5,6]	0.5
Optional Instruction Locator	0.3
Instruction Enhancements	1.7
Address Sharing [Note 5,8,9]	0.6
Secondary Logical Unit (LU) Assignment	0.5
3606 [Note 8,9]	2.4
LSEEKP [Note 2]	1.8
Translate Instruction (LTRT) [Note 2]	1.2
3270/3600 Datastream Mapping	8.0
Extended 3270/3600 Keyboard Mapping (Note 7)	1.5
Data Decompression/Decompression [Note 2]	1.2
Data Compression/Compaction [Note 2]	1.6
SCRPAD Instruction [Note 2]	1.7
Extended LLOAD Instruction	0.3
INTMR Instruction [Note 2]	1.0
Data Encryption Standard (DES) [Note 1]	1.5

3601 Finance Communication Controller (cont'd)

Alternate Encryption Technique (AET) [Note 1]	1.0
Priority Dispatching (LCHAP) [Note 2]	0.3
Data Sequencing	1.6
Extended Statistical Counter Recording [Note 2]	1.3
3618	3.0
3615	3.2
3616, 4710, 4720 Part 2 [Note 5,6]	3.0
3610, 3611 and/or 3612 [Note 3]	2.6
3608 Printer [Note 9]	2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]	0.7
Set Diskette	0.9
3604 mdl 7	0.5

Notes

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be included if the Extended 3270/3600 Keyboard Mapping is used.

[8] Address sharing must be included if a 3606 is used.

[9] Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

Maximum: For #1005 with **#9581** -- Two. **Field Installation:** Yes. **Specify: #9581** for user-programmable storage Add'l Storage Feature (#1005) provides an additional 8,192 bytes of user-programmable storage. **Maximum:** For #1005 with **#9582** -- Four. **Field Installation:** Yes.

Add'l Storage (#1006): Provides an additional 16,384 bytes of control storage for device attachment (mdls 2A, 2B, 3A and 3B only); or an additional 16,384 bytes of user-programmable storage (mdls 2A, 2B, 3A and 3B only).

This additional storage can be used for the following four purposes: (1) User-Programmable Storage, (2) User-Programmable Storage Expansion, (3) Control Storage, or (4) Control Storage Expansion. See below for description and limitations: **Specify: #9591** for Control Storage, or **#9592** for user-programmable storage.

Add'l Storage (#1007): [Mdls 2, 2B, 3A, 3B] Provides an additional 32,768 bytes of user-programmable storage. This additional storage can be used for (1) User-programmable storage, or (2) User-programmable storage expansion. See below for description and limitations. **Specify: #9602.**

[1] User-Programmable Storage: Used for configuration data and application programs.

Feature #1006, Specify **#9592** - Provides an additional 16,384 bytes of user-programmable storage. **Maximum:** For #1006 with **#9592** - Two. **Field Installation:** Yes.

Feature #1007, Specify **#9602** - Provides an additional 32,768 bytes of user-programmable storage. **Maximum:** For #1007 with **#9602** - One. **Field Installation:** Yes. **Prerequisites:** On controllers shipped prior to EC 745887, #6501 is required.

[2] User Programmable Storage Expansion: [Mdls 2A, 2B, 3A, 3B] Used in addition to two #1006 and two **#9592** increments or one #1007 and one **#9602** increment of user-programmable storage, described above, for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in expanded user-programmable storage.

Feature #1006, Specify **#9592** - Provides an additional 16,384 bytes of user-programmable storage. **Maximum:** (For user-programmable storage plus user-programmable storage Expansion): For #1006 with **#9592** specified and with Storage Expansion Features (#6501) - six. **Prerequisites:** If more than two Add'l Storage Features (#1006) with **#9592** are ordered, #6501 is required. **Field Installation:** Yes.

Feature #1007, Specify **#9602** - Provides an additional 32,768 bytes of User Programmable Storage. **Maximum:** (for user-programmable storage plus user-programmable storage expansion) For #1007 with **#9602** with Storage Expansion Feature (#6501) - three. **Field Installation:** Yes. **Prerequisites:** If more than one Add'l Storage Feature (#1007 with **#9602**) are ordered, or if in conjunction with any Add'l Storage Feature (#1006 with **#9592**), then #6501 is required.

[3] Control Storage: Used for attachment of any combination of device types/functions/features which have associated attachment factors. See "Device Attachment Table - C" below. Some combinations of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage.

Feature #1006, Specify **#9591** [Mdls 2A, 2B, 3A, 3B] - Provides one increment of 16,384 bytes of Control Storage for device attachment.

Two additional increments, for a total of 3 are available with Control Storage Expansion (see below). To determine whether and how many control storage increments (#1006 with **#9591**) are required, refer to "Device Attachment Table - C" below. Calculate the sum of the attachment factors for the combination of devices and/or functions required. Add the attachment factor one time only for each device type, feature or function. If the attachment factor sum is 10 or less, feature (#1006 with **#9591**) is not required. If the attachment factor sum is greater than 10, feature (#1006 with **#9591**) is required. An attachment sum greater than 22 is not allowed in this base attachment factor calculation. **Maximum** (for control storage): For #1006 with **#9591** -- One. **Field Installation:** Yes.

[4] Control Storage Expansion (CSE): [Mdls 2A, 2B, 3A, 3B] Feature #1006 with **#9591**. - Provides a greater attachment factor capability for certain features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second and third increments of additional storage. An additional attachment factor capability of 12 can be obtained by utilizing the second increment of #1006 with **#9591** or 28 by utilizing the second and third increments of #1006 with **#9591**. Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability. (See "Device Attachment Table - C" below.)

While Control Storage Expansion provides additional attachment factor capability, the CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the attachment factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. **Maximum** (for Control Storage plus Control Storage Expansion): For #1006 with **#9591** specified and with Storage Expansion Feature (#6501) -- Three. **Field Installation:** Yes. **Prerequisites:** If more than one #1006 with **#9591** is ordered, then #6501 is required.

Limitations: The maximum number of #1006s (whatever the combination of **#9591** and **#9592**), is nine for controllers with serial numbers of 13100 or higher, or if the controller is a reconditioned unit incorporating EC 745887. For units with lower serial numbers, without EC 745887, the maximum number of #1006s is seven. The maximum number of #1006s commencing with units with EC 745887 is nine.

The maximum number of #1007s is three.

The maximum number of #1007 plus #1006 (whatever the combination of **#9602, #9591, or #9592**) for controllers shipped prior to 13100 without EC 745887 is:

	Feature Code #1007		Feature Code #1006
Qty	3	+	1
Qty	2	+	3
Qty	1	+	5
Qty	0	+	7

The maximum number of #1007 plus #1006 for controllers with serial numbers 13100 or higher, or reconditioned units with EC 745887 is:

Qty	3	+	3
Qty	2	+	5
Qty	1	+	7
Qty	0	+	9

Device Attachment Table - C

In the following table, attachment factors in the column labeled "Base" are applicable to the base attachment factor calculation only. Attachment factors in the column labeled "Base or Expanded" are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the *IBM 3600 Finance Communication System Configura-*

3601 Finance Communication Controller (cont'd)

tor (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to extend control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the *3600 Finance Communication System Configurator,* GA27-2762 for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

Device Type/Feature/Function	Attachment Factor	
	Base	Base Or Expanded
3603 or 3604 mdls 1-6, 4704 mdl 1	0	
SDLC (#4501 or #4502)	0.7	
Multiple Block I/O-Diskette	3.0	
3614 or 3624 [Note 1]	1.2	
3616, 4710, 4720 Part 1 [Note 5,6]	0.5	
Optional Instruction Locator	0.3	
Instruction Enhancements	1.7	
Address Sharing [Note 5,12,13]	0.6	
Secondary Logical Unit (LU) Assignment	0.5	
3606 [Note 12,13]	2.4	
Device Cluster Adapter [Note 8,9]		5.0
3278-2 Attachment [Note 9]		4.5
LSEEKP Instruction [Note 2]		1.8
Translate Instruction (LTRT) [Note 2]		1.2
3270/3600 Datastream Mapping		8.0
Extended 3270/3600 Keyboard Mapping [Note 7]		1.5
Data Decompression/Decompaction [Note 2]		1.2
Data Compression/Compaction		1.6
Extended LLOAD Instruction		0.3
SCRPAD Instruction [Note 2]		1.7
INTMR Instruction [Note 2]		1.0
Data Encryption Standard (DES) [Note 1]		1.5
Alternate Encryption Technique (AET) [Note 1]		1.0
Priority Dispatching (LCHAP) [Note 2]		0.3
Data Sequencing		1.6
Extended Statistical Counter Recording [Note 2]		1.3
Extended Diskette Access Method (EDAM) Base		5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 10]		1.7
EDAM Temporary File Support [Note 11]		1.5
3616, 4710, 4720 Part 2, 3262/3287/3289 Part 1 [Note 5,6,8]		3.0
3262/3287/3289 Part 2 [Note 8]		1.5
3618		3.0
3615		3.2
3610,3611 and/or 3612 [Note 3]		2.6
3608 Printer [Note 12]		2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]		0.7
Set Diskette		0.9
3604 mdl 7		0.5

Notes

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included if one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be concluded if extended 3270/3600 Keyboard Mapping is used.

[8] The Device Cluster Adapter, 3262/3287/3289 Part 1, and 3287/3289 Part 2 must be included if a 3262, 3287 or a 3289 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.

The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287/3289 Part 1 need be included only once if more than one of these device types is used.

[9] Both the Device Cluster Adapter and 3278-2 Attachment must be included if a 3278-2 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.

[10] The EDAM Base must be included if the Allocate/Deallocate function is used.

[11] The EDAM Base must be included if EDAM Temporary File Support is used.

[12] Address sharing must be included if a 3606 is used.

[13] Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

Auxiliary Diskette Drive .25 Megabyte (#1025): [Mdl 3A] Provides approximately 280,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes.

Auxiliary Diskette Drive .5 Megabyte (#1035): [Mdl 3B] Provides approximately 560,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes.

Note: Support for #1025 and #1035 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction) and EDAM Temporary File Support. Refer to "Device Attachment Table - C" and "Attachment Factor Functions" section.

This feature requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the installation of this feature.

Device Cluster Adapter (#3101): [Mdls 3A, 3B] Provides for the local attachment of a mix of 3278-2 display stations, 3287 printers, 3262-3, 13 Printers and 3289-1, 2 printers up to a maximum of eight devices. When attaching the 3278-2 display station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. **Limitations:** Maximum distance from controller to terminal is 1.5 KM (4,920 ft). When the device cluster adapter is installed, Loop number four is no longer available. The maximum number of loops available on the 3601-3 is therefore reduced to five. **Maximum:** One. **Field Installation:** Yes.

Loop Feature, Add'l (#4735): Provides the ability to attach additional 3600 Finance Communication System terminals. **Limitations:** A maximum of two loops (including the provided local loop) operating at 4800 bps per 3601 are allowed when one of the SDLC communication features (#4501 or #4502) are specified. Otherwise, the maximum is one loop operating at 4800 bps (including the provided local loop). Loop Integrated Modem (#8001) cannot be installed on mdls 2A and 2B. **Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps. When SDLC feature (#4501 or #4502) is installed, the sum of all loops cannot exceed 12,000 bps (do not use the host link speed). **Maximum:** Two per mdls 2A and 2B. Five per mdls 1, 3A and 3B. **Field Installation:** Yes. **Prerequisites:** For each loop with any remotely attached terminals, 1200 bps Loop Integrated Modem (#8001) on a terminal or a 3603 is required.

Storage Expansion Feature (#6501): [Mdls 2A, 2B, 3A, 3B] Provides capability of (1) expanding user-programmable storage (#1006) with **#9592** or #1007 with **#9602** beyond 56K bytes, and/or (2) adding add'l increments of #1006 with **#9591**, beyond 16K bytes. **Limitations:** If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the controller will work properly with the Storage Expansion Feature (#6501) installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage Feature (#1006) with **#9591** should be installed. **Maximum:** One. **Field Installation:** Yes. **Note:** #6501 is required when more than one Add'l Storage Features (#1006) with **#9592** and/or when more than one Add'l Storage Feature (#1006) with **#9591** are ordered. #6501 is required when more than one Add'l Storage Feature (#1006 with **#9591**), or more than two Add'l User-Programmable Storage Features (#1006 with **#9592**), or more than one Add'l Storage Feature or Add'l Storage Feature (#1007 with **#9602**) with User-Programmable Storage Feature (#1006 with **#9592**).

3601 Finance Communication Controller (cont'd)

Prerequisites: #6501 is a prerequisite for any #1007 on mdls 2A, 2B, 3A and 3B shipped prior to EC 745887.

Communications Features

Each 3601 must be equipped with one of the following SDLC features and either the EIA Interface (#3701) or the 1200 bps Integrated Modem (#5500) for communication with the host processor.

EIA Interface (#3701) : Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705, 3725, or the communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System or for local attachment to the controlling 3602, 3704, 3705, 3725, or 4331 without requiring modems. See M3602, 3704, 3705, 3725, or 4331 pages for details. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with a 1200 bps Integrated Modem (#5500) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501 ... or #6302 or #4502.

SDLC Communications Feature With Business Machine Clocking (#4501): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), oran EIA Interface (#3701) with any external modem which does not have internal clocking at 1200 bps or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps. The SDLC link speed of this feature need not be included when calculating the sum of the speeds not to exceed the aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Feature Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps. Also required for attachment to a controlling 3602 or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800, or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4501. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Integrated Modem (#5500): An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to the processor through the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System. **Limitations:** Cannot be installed with Interface (#3701) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4501 or #6301. **Specify: #9651** for 4-wire strapping, or **#9652** for 2-wire strapping.

SDLC Communications Feature With Business Machine Clocking (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), oran EIA Interface (#3701) with any external modem which does not have clocking at 1200 bps, or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps, or for communications to an 8100 Information System. **Limitations:** Cannot be installed with #6302, #4501 or #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#6302): Required for attachment to communications lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 Processor (#4801) at 1200, 2400 or 4800 bps. **Limitations:** Cannot be installed with #6301, #4501 or #4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Loop Integrated Modem (#8001): [Mdls 1, 3A, 3B] An integrated modem for transmission to remotely located 3600 Finance Communication System terminals. Operates at 1200 bps over nonswitched normal quality voice grade lines. **Note:** Several remote loop configuration variations can be realized; e.g., see the *IBM 3600 FCS Configurator,* GA27-2762. However regardless of configuration, the interconnecting common carrier facilities are always point-to-point circuits; either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop. **Maximum:** One per Add'l Loop Feature (#4735). **Field Installation:** Yes. **Prerequisites:** #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with #8001 or #8002, a 3606 mdl 2, a 3608 mdl 2, a 3614 consumer Transaction Facility with #8001 or a 3603 as the first attached remote unit in each physical (geographic) location.

MODEL CONVERSIONS

The following model changes are field installable:

From \ To	2B	3A	3B
2A	x*	x	x*
2B			x
3A			x*

* Requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the start of any conversion. **Field Installation:** Yes.

Attachment Factor Functions

Data Sequencing -- Allows user application to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette -- Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements -- Provides the user application with the following new instructions:

Bit Manipulating - Test and Branch (LIFON, LIFOFF) - Provides a test set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.

Logical Compare Data Immediate (CCDI) - Compares immediate data to data in a specified field.

Move Data Immediate (MVDI) - Moves immediate data to a specified field.

Load Data Immediate (LDDI) - Loads immediate data into specified register.

SCALE - Formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instruction required to process monetary input.

Segment Indexing (SETX, TESTX, SETXREG) - Provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.

Branch on Index (BRANX) - Provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.

Execute (LEXEC) - Provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching - Provides the ability to specify the order in which 3601/3602 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate - The LTRT instruction processes an input data stream against user specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Extended Statistical Counter Recording - Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consists of multiple remote locations.

Multiple Block I/O - Diskette - Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than 3 blocks are read or 4 blocks are written.

3270/3600 Datastream Mapping - Provides, via four new 3600 assembler language instructions, 3600 controlier assistance in converting 3270 output display datastreams into an output datastream processable by 3600 attached devices, and 3604 input datastreams into 3270 input datastreams. Input and output screen sizes are suported as specified by the application programmer. The 3270 Tab, Clear, PA and PF keys are simulated.

Extended 3270/3600 Keyboard Mapping - Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.

LSEEKP Instruction - Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Table may be included in the

3601 Finance Communication Controller (cont'd)

instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

SCRPAD Instruction - Provides access to optional global work areas distant from segment storage which may reside in base or expanded user programmable storage.

Data Compression/Compaction - This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction - This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

Extended Diskette Access Method (EDAM) Base - Provides the capability to open, access (via the LREAD, LWRITE or REPLACE instructions) and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instructions) - Provides the capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support - Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

INTMR Instruction - Permits the collection of elapsed time for events initiated and terminated by a controller application program.

Extended LLOAD Instruction - Allows a controller application program to load data overlays into segments other than segment 14.

Secondary Logical Unit (LU) Assignment - Allows a controller application program to change the logical unit address associated with a given workstation.

ACCESSORIES

Cables (3600): Cables to attach 3600 units may be purchased from IBM or a customer-selected source. (See *Physical Planning Manual,* GA27-2766 for cable and connector specifications.) The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of six weeks 120 days.

Item No.	Description	Maximum Length
1563155	Loop Cable Assembly	609.6m (2,000')
4474809	Cable Assy (3609-2 to Modem)	2.08m (82 in)
1745372	Cable Assy (Loop Repeater to Loop Terminal Box)	7.62m (25 ft)
1745350	Cable Assy (3603 to Leased Lines)	7.62m (25 ft)
1745349	Cable Assy (DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy (joining 2 telephone lines)	N/A
1142961	Bulk Cable (12 Conduct.)	N/A
5252781	Bulk Cable (4 Conductor)	N/A
5252920	Bulk Cable (2 Conductor)	N/A
765294	Connector Assy (EIA)	N/A
5252769	Bulk Cable (2 Conductor)	N/A
5252913	Bulk Cable (4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

Locks and Keys: The 3601 is shipped with two keys. Additional keys may be purchased from IBM. Indicate serial number of lock.

Loop Repeater (P/N 4400002): Plugs into the Loop cable and redrives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. Prerequisites: An operating 3600 System Local Loop or Remote Subloop. Publications: GC22-0005.

Customer Responsibilities: The customer may be advised that: (1) The customer is responsible for making certain that the use of the equipment complies with all Federal, State, and Local Laws, Regulations, and Ordinances; (2) The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service; (3) The customer is responsible for the set-up of the unit; (4) The customer will determine the failing unit (see "Maintenance" below); (5) The customer is responsible for determining the required number of spares.

Physical Planning and Setup: Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent. (See *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766.)

Spares: The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

# of Loop Repeaters Installed	Minimum # Spares Recommended
100	2

Warranty: Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units. Maintenance agreements are not available. FE on-site service will not be provided.

Ordering: Order P/N **4400002** .

Diskettes: The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602
256 byte format **P/N 2305845**
128 byte format **P/N 2305830**

Diskette 2 (double-sided) 3601-2B/3B, 3602-1A/2A
256 byte format **P/N 2736700**
128 byte format **P/N 1766870**

SUPPLIES (None)

3602 FINANCE COMMUNICATION CONTROLLER

PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to System/34 and System/3 model 15 processors and for attachment of 3600 Finance Communication System terminals or certain 4700 Finance Communication Systemterminals and to S/370, 303X, 308X, or 4300 processors using appropriate virtual storage system control programs or an 8100 Information System using DPPX licensed programs.

Attachment to System/34 is via SDLC transmission over various common carrier or user-owned facilities.

Attachment to System/3 model 15 is via Binary Synchronous Communications (BSC) - see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, or 4300 Processor attachment is via a 3704, 3705, or 3725 Communications Controller or the Communications Adapter (#1601) feature on the 4331 Processor using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities. 8100 Information System attachment is via the 8130, 8140 and 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities.

Note: See "Programming" and "SCP" pages for attachment capability.

MODELS

Model 1A A01 — A large-file programmable controller with a 5.2 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

Model 1B B01 — A large-file programmable controller with a 9.3 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

Prerequisites: Communications with a S/370, 303X, 308X, or 4300 processor with virtual storage capability via 3704, 3705, or 3725 Communications Controller equipped with appropriate features or the Communications Adapter (#1601) feature on the 4331 Processor (see M3704, 3705, 3725, or 4331 pages) or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages).

HIGHLIGHTS

Controls all the functions of the 3600 Finance Communication System or certain 4700 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communication features are available, one of which is required for transmission to the host. An SDLC Communications feature at speeds of from 1200 bps to 4800 bps or an SDLC Communications feature at speeds of from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature that is used at 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed ... see "Communication Features". For Binary Synchronous Communications (BSC), see RPQs 8K0598 and 8K0623.

Contains approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32K bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment ... see Add'l Storage (#1006 or #1007) under "Special Features".

Houses a direct access diskette (contact head) drive with 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). With Auxiliary Diskette Drive .5MB (#1015), the 3602 permits attachment of two 2-sided diskette drives.

Houses a floating head disk storage device for storage of user data. This storage device is not removable except by service personnel. Includes a fixed head feature which will provide eight additional heads with access to disk data on eight tracks ... see Add'l Disk Heads (#1010, #1011) under "Special Features".

All 3600/4700 (except 4704-2) system terminals are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 or 2400 bps for remotely attached terminals. The base unit provides one loop. Seven additional loops are available. Integrated modems are available on both mdls ... see "Special Features". Note: Either one or two 4800 bps loops per 3602 may be specified. Note: Only one 4800 bps loop per 3602 may be specified for System/3 Host attachment.

Can serve as a cluster controller for attachment of the 3600 Controllers, attachment of 3662 or 3287 Printers for full-page high-speed printing or attachment of 3278 mdl 2 Display Stations.

Communication between the controller and the 3704, 3705, or 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through an integrated 1200 bps modem or through an external modem using Interface (#3701) on the 3602. Local attachment can be made to a 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor via its local attachment feature using #3701 on the 3602 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3602 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Each 3602 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601/3602s attached to the line ... 3602 transmitting while the other receives. For attachment to System/3 mdl 15, see 3601/3602 RPQ 8K0598 and 5415 RPQ S40156.

Can be programmed to operate independently when the processor is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the S/370, 303X, 308X, or 4300 processor or 8100 Information System.

Transmission: The 3602 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

Modems: External modems operating speeds up to 9600 bps may be achieved with SDLC feature. External modems operating at up to 4800 bps may be attached when used with SDLC Feature #6301 or #6302. Speeds up to 9600 bps may be achieved with SDLC Feature #4501 or #4502.

Modem	Speed bps	Facility
3863	2400	Switched or nonswitched voice grade lines
3864	4800	Switched or nonswitched voice grade lines
3865	9600	Nonswitched voice grade lines
3872	2400	Switched or nonswitched voice grade lines
*	9600 bps	Nonswitched digital data service

* See RPQ for IBM DDSA.

See M2700 pages for further information. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy.

Note: Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

Bibliography: *IBM System/370 Bibliography,* GC20-0370, and *IBM 3600 Finance Communication System, System Summary,* GC27-0001.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V. **Field Installation:** Not recommended.
- Controller Designation: Media distribution of Controller Data. Specify **#9491** to identify the initial 3601 or 3602 ordered for use with a host system location, or specify **#9492** to identify additional 3602s per host system.

  If **#9491** is specified for the 3602, specify:

  a. **#9494** if there is no 3614 or 3624 with a first position designator attached to any 3602 on the same host system, or

  b. **#9493** if there is a 3614 with a first position designator and **#9002** attached to any 3602 on the same host system, and/or

  c. **#9495** if there is a 3614 with a first position designator and **#9001** or a 3624 with a first position designator attached to any 3602 on the same host system; or if encryption capability, via the Data Encryption Standard (DES), is desired in the 3600 Controller.

  See 3614 Host Attachment Designation under "Specify" for the 3614.

  If **#9491** is specified, select the specify number of the desired media.

  9/800 Magnetic Tape (**#9412**)
  9/1600 Magnetic Tape (**#9413**)
  9/6250 Magnetic Tape (**#9414**)

  If magnetic tape is not available on designated processor, then select one of the following media (DOS/VS users only):

  80-Column Cards (**#9431**)
  96-Column Cards (**#9432**)

  If card or tape inputs are not available at the host location, contactIBMfor guidance. When feature **#9491** is specified, additional shipping information is required. Supplementary specifications are to be stated exactly as follows to indicate shipping address of the host system location:

3602 Finance Communication Controller (cont'd)

Line 1 -- IBM Programming Support Representative (PSR)
Line 2 -- C/O (Name of customer)
Line 3 -- Street Address (or P.O. Box)
Line 4 -- City,State, Zip Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with specify **#9491**. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

Caution: **#9491** is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify **#9491** for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.

- Cables: See "Accessories" for ordering instructions. Also see *Installation Manual-Physical Planning,* GA27-2766.
- If ordering a 3614 or 3624 with first position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller - Data Designation under "Specify" for the 3624) to be added to any existing 3602, an order transaction should be used against the initial Controller (3601 or 3602 with **#9491** and **#9494** requesting to delete **#9494** and add **#9493** and/or **#9495** for the initial Controller.

  If all installed or on order 3614s or 3624s for loop attachment to the 3602 are removed or cancelled, an AAS

  order transaction should be used against the initial Controller (3601 or 3602 with **#9491** and **#9493** and/or **#9495** requesting to delete **#9493** and/or **#9495** and add **#9494** for the initial controller).

  Refer to DP Letter 275-43 and 276-102

  for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of feature **#9001** on a loop-attached 3614.
- The following specify codes are field installable: **#9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.**

SPECIAL FEATURES

Non-Communications Features

Add'l Storage (#1006): Provides an additional 16,384 bytes of control storage for device attachment or an additional 16,384 bytes of user-programmable storage. Additional storage can be utilized for the following purposes: (1) User-Programmable Storage, (2) User-Programmable Storage Expansion, (3) Control Storage and (4) Control Storage Expansion (see below for description and limitations). **Specify:** **#9591** for Control Storage -- **#9592** for User-Programmable Storage.

Add'l Storage (#1007): Provides an additional 32,768 bytes of User-Programmable Storage. Additional storage can be used for (1) User-Programmable Storage or (2) User-Programmable Storage expansion (see below for description and limitations). Specify **#9602.**

[1] User-Programmable Storage: Used for configuration data and application programs.

Feature #1006, specify **#9592** - Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** for #1006 with **#9592** - two. **Field Installation:** Yes.

Feature #1007, specify **#9602** - Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** for #1007 with **#9602** - one. **Field Installation:** Yes.

[2] User-Programmable Storage Expansion: - Used in addition to two #1006 and two **#9592** increments or one #1007 with one **#9602** increment of User-Programmable Storage described above, for the instruction sections of application programs, and a limited amount of configuration data and application program constants. Most configuration data and application program constants *CANNOT* reside in expanded user-programmable storage.

Feature #1006, specify **#9592** - Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1006 with **#9592** and with Storage Expansion Feature (#6501) - six. **Prerequisites:** If more than two additional Storage Features (#1006 with **#9592**) are ordered, #6501 is required. **Field Installation:** Yes.

Feature #1007, specify **#9602** - Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1007 with **#9602** and with Storage Expansion Feature (#6501) - three. **Prerequisites:** If more than one Add'l Storage Feature (#1007 with **#9602**) is ordered, or if in conjunction with any Add'l Storage Feature (#1006 with **#9592**), then #6501 is required. **Field Installation:** Yes.

[3] Control Storage: Feature #1006, specify **#9591.** Used for the attachment of any combination of device types/functions/features, which have associated attachment factors (see "Device Attachment Table"). Some combination of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage provided by the use of feature #1006 with **#9591.** One additional increment of control storage is available without utilizing Control Storage Expansion. Three additional increments, for a total of four, are available with Control Storage Expansion. To determine whether and how many control storage increments (#1006 with **#9591**), refer to the "Device Attachment Table" (below). Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type, feature, or function. If the attachment factor sum is 10 or less, feature #1006 or **#9591** is not required. If the attachment factor sum is greater than 10, features #1006 and **#9591** are required. An attachment factor greater than 22 is not allowed in this base attachment factor calculation.

[4] Control Storage Expansion (CSE): Feature #1006, specify **#9591.** Used to provide a greater attachment factor capability for those features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second, third and fourth increments of Add'l Storage (#1006 with **#9591**). An additional attachment factor capability of 12 can be obtained by utilizing the second increment of Add'l Storage, or 28 by utilizing the second and third increments, or 44 by utilizing the second, third and fourth increments of Add'l Control Storage. Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability (see "Device Attachment Table" below). While Control Storage Expansion provides additional attachment factor capability, the CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the Attachment Factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. Maximum (for Control Storage plus Control Storage Expansion): For #1006 with **#9591** and without #6501 ... one. For #1006 with **#9591** and with #6501 ... four . **Limitations:** The maximum number of #1006s (with any combination of **#9591** and **#9592**) is ten . The maximum number of #1007s is three. **Field Installation:** Yes. **Prerequisites:** If more than one Control Storage Feature (#1006 with **#9591**) is ordered, the Storage Expansion Feature (#6501) is required.

The maxiumum number of #1007s plus #1006s, whatever the combination of **#9602, #9591** or **#9592**, is:

	Feature Code #1007		Feature Code #1006
Qty	3	+	4
Qty	2	+	6
Qty	1	+	8
Qty	0	+	10

In the following table, attachment factors in the column labeled 'Base' are applicable to the base attachment factor calculation only. Attachment factors in the column labeled 'Base or Expanded' are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the *IBM 3600 Finance Communication System Configurator* (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to expanded control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the *3600 Finance Communication System Configurator* (GA27-2762) for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

Device Attachment Table

Device Type/Feature/Function	Attachment Factor	
	Base	Base or Expanded
SDLC (#4501 or #4502)	.7	–
Multiple Block I/O Diskette	3.0	–
3614 or 3624 [Note 1]	1.2	–
3616, 4710, 4720 [Note 5,6]	3.5	–
Optional Instruction Locator	.3	–
Instruction Enhancements	1.7	–
Address Sharing [Note 5,14,15]	–	.6
Secondary Logical Unit (LU) Assignment	–	.5
3606 [Note 14,15]	2.4	–
Alternative Line Attachment Base [Note 8]	–	5.4
Dynamic Control [Note 9]	–	1.5
SDLC Link Diagnostics [Note 8]	–	0.8

3602 Finance Communication Controller (cont'd)

SDLC/SNA Attachment Part 1 [Note 8]	–	8.0
SDLC/SNA Attachment Part 2 [Note 8]	–	5.8
Device Cluster Adapter [Notes 10,11]	–	5.0
3278 Mld 2 Attachment [Note 11]	–	4.5
LSEEKP [Note 2]	–	1.8
Translate Instruction (LTRT) [Note 2]	–	1.2
3270/3600 Datastream Mapping	–	8.0
Extended 3270/3600 Keyboard Mapping [Note 7]	–	1.5
Data Decompress/Decompaction [Note 2]	–	1.2
Data Compression/Compaction [Note 2]	–	1.6
SCRPAD Instruction [Note 2]	–	1.7
Extended LLOAD Instruction	–	.3
INTMR Instruction [Note 2]	–	1.0
Data Encryption Standard (DES) [Note 1]	–	1.5
Alternate Encryption Technique (AET) [Note 1]	–	1.0
Priority Dispatching (LCHAP) [Note 2]	–	.3
Data Sequencing	–	1.6
Extended Statistical Counter Recording [Note 2]	–	1.3
Disk File (5.2 or 9.3 meg)	–	10.0
Extended Diskette Access Method (EDAM) Base	–	5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 12]	–	1.7
EDAM Temporary File Support [Note 13]	–	1.5
3616, 4710, 4720 Part 2, 3262/3287 Part 1 [Note 5,6,10]	–	3.0
3262/3287 Part 2 [Note 10]	–	1.5
3618	–	3.0
3615	–	3.2
3610, 3611 and/or 3612 [Note 3]	–	2.6
3608 Printer [Note 15]	–	2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]	–	.7
Set Diskette	–	.9
3604 mdl 7	–	.5

Notes:

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address Sharing must be included if a 3616, 4710, 4720 or 4704 mdl 1 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be included if the extended 3270/3600 Keyboard Mapping is used.

[8] The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2 together comprise the SNA Primary Interface support required in the controlling 3602 for controller to controller (3600 to 3602) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., Base or Expanded). This SNA primary function is used in conjunction with the Fan-Out Communication Adapter (#1551) and the SDLC Communications Feature Without Business Machines Clocking (#4502) with specify **#9551** for Controller Attachment.

[9] The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., Base or Expanded) if Dynamic Control is used.

[10] The Device Cluster Adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of the 3278 mdl 2, or 3262/3287 is used. The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287 Part 1 need be included only once if more than one of these device types is used.

[11] Both the Device Cluster Adapter and 3278 mdl 2 Attachment must be included if a 3278 mdl 2 is used. The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3278 mdl 2, 3262 or 3287 is used.

[12] The EDAM Base must be included if the Allocate/Deallocate function is used.

[13] The EDAM Base must be included if EDAM Temporary File Support is used.

[14] Address sharing must be included if a 3606 is used.

[15] Address sharing must be included if a 3608 is used. The 3606 must also be included to use the 3608 Keyboard/Display. Address sharing need be included only once to utilize both the 3608 Printer and Keyboard/Display.

Add'l Disk Heads (#1010, #1011): (#1010 for mdl 1A ... #1011 for mdl 1B.) Provides eight additional disk heads for the disk file as specified by mdl type selected. **Maximum:** One. **Field Installation:** Not recommended.

Auxiliary Diskette Drive (#1015): Provides approximately 560,000 bytes of additional diskette storage capacity via a second diskette drive. No area on the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** No **Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDET) instruction), and EDAM Temporary File Support. Refer to Device Attachment Table and Attachment Factor Functions section. The EDAM function is not required to use the Auxiliary Diskette Drive feature. The level of support provided without EDAM is limited to direct (absolute) addressing at the track and sector level.

Fan-Out Communication Adapter (#1551): Required to attach 3600 System Controllers (3601/3602) to a controlling 3602. Up to nine controllers may be attached per feature. (See M3601 pages for features required on the attaching 3601s.) **Limitations:** (1) Can only be installed on 3602s with B/M 4406687 installed. (2) Attached controllers must be within 30.4m (100 cable-feet) of the 3602. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Each Fan-Out Communications feature #1551 requires special feature SDLC Communications Without Business Machines Clocking (#4502) with specify #9551 for controller attachment. **Note:** Support for feature #1551 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Table", above.

Device Cluster Adapter - DCA (#3101): Provides for local attachment of a mix of up to eight 3262 or 3287 printers and 3278-2 display stations on a 3602. The number operable in a given application is dependent upon the user application program. When attaching the 3278 mdl 2 to the Device Cluster Adapter, no-charge RPQ 8K0880 is required. **Limitations:** (1) Maximum distance from controller to terminal is 1,500m (4,920 ft.). (2) When the Device Cluster Adapter feature is installed, loops number 4 and 8 are no longer available. **Maximum:** One. **Field Installation:** Yes.

Add'l Loop (#4735): Provides the ability to attach additional 3600 Finance Communication System terminals. **Limitations:** A maximum of two loops (including the provided local loop) operating at 4800 bps per 3602 are allowed when one of the SDLC communication features (#4501 or #4502) are specified and Fan-Out Communications Adapter (#1551) is not specified. Otherwise the maximum is one 4800 bps loop. **Maximum:** Seven without #3101, five with #3101. **Field Installation:** Yes. **Prerequisites:** For each loop with any remotely attached terminals, #8001 or #8002 on a terminal, or a 3603 is required. **Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps (each Fan-Out Communications Adapter (#1551) reduces the 12,000 bps limit by 1200 bps). When SDLC feature #4501 or #4502 (without **#9551**) is installed, the sum of all loops cannot exceed 12,000 bps.

Storage Expansion (#6501): Provides capability of (1) expanding user-programmable storage (#1006 with **#9592** or #1007 with **#9602**) beyond 56K bytes; and/or (2) adding additional increments of #1006 with **#9591**, beyond 16K bytes. **Limitations:** If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the Controller will work properly with #6501 installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage feature (#6501 with **#9591**) should be installed. **Maximum:** One. **Field Installation:** Yes. **Note:** #6501 is required when more than 16K of additional control storage, Add'l Storage Feature (#1006 with **#9591**) or more than 32K of additional user-programmable storage, Add'l Storage Feature (#1006 with **#9592**) or Add'l Storage Feature (#1007 with **#9602**) are ordered.

Communications Features

Each 3602 must be equipped with one of the following SDLC features and either the EIA Interface (#3701) or the 1200 bps Integrated Modem (#5500) for communication with the host processor.

EIA Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705, 3725 or the Communica-

3602 Finance Communication Controller (cont'd)

SCRPAD Instruction: Provides access to optional global work areas distinct from segment storage which may reside in base or expanded user programmable storage.

Data Compression/Compaction: This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction: This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

INTMR Instruction: Permits the collection of elapsed time for events initiated and terminated by controller application program.

Extended Diskette Access Method (EDAM) Base: Provides the capability to open, access and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instruction): Provides, via the LDKT Instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support: Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

Dynamic Control: Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3602 through the SNA Primary interface.

Extended LLOAD Instruction: Allows a controller application program to load data overlay into segments other than segment 14.

Secondary Logical Unit (LU) Assignment: Allows a controller application program to change the logical unit address associated with a given workstation.

ACCESSORIES

Cables: Cables to attach 3600 units may be purchased from IBM or a customer-selected source ... see *Physical Planning Manual,* GA27-2766 for cable and connector specifications. The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of six weeks .

Item No.	Description	Maximum Length
1563155	Loop Cable Assembly	609.6m (2,000')
4474809	Cable Assy (3609-2 to Modem)	2.08m (82 in)
1745372	Cable Assy (Loop Repeater to Loop Terminal Box)	7.62m (25 ft)
1745350	Cable Assy (3603 to Leased Lines)	7.62m (25 ft)
1745349	Cable Assy (DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy (joining 2 telephone lines)	N/A
1142961	Bulk Cable (12 Conduct.)	N/A
5252781	Bulk Cable (4 Conductor)	N/A
5252920	Bulk Cable (2 Conductor)	N/A
765294	Connector Assy (EIA)	N/A
5252769	Bulk Cable (2 Conductor)	N/A
5252913	Bulk Cable (4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

For attachment of a 3262 or 3287 to a 3694 or a 3602:

2577672 or	Cable Assy Indoor	1,500m(4,920ft)
323921 and	Coax Wire	1,500m(4,920ft)
1836418	Connector Kit	N/A

Loop Repeater (P/N 4400002): Plugs into the Loop cable and redrives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. **Prerequisites:** An operating 3600 System Local Loop or Remote Subloop. **Publications:** GC22-0005.

Customer Responsibilities: The customer may be advised that: (1) The customer is responsible for making certain that the use of the equipment complies with all Federal, State, and Local Laws, Regulations, and Ordinances ... (2) The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service ... (3) The customer is responsible for the set-up of the unit ... (4) The customer will determine the failing unit (see "Maintenance" below) ... (5) The customer is responsible for determining the required number of spares.

Physical Planning and Setup: Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent ... see *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766.

Spares: The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

# of Loop Repeaters Installed	Minimum # Spares Recommended
100	2
200	2
300	3
500	4
1000	6
1500	9
2000	10
2500	12
3000	14
3500	16
4000	18
4500	19
5000	21

Warranty: Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units. Maintenance agreements are not available. CE on-site service will not be provided.

Ordering: Order P/N 4400002 .

Diskettes: The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602
256 byte format **P/N 2305845**
128 byte format **P/N 2305830**

Diskette 2 (double-sided) 3601-2B/3B, 3602-1A/2A
256 byte format **P/N 2736700**
128 byte format **P/N 1766870**

SUPPLIES (None)

3603 TERMINAL ATTACHMENT UNIT

PURPOSE

Attaches all 3600 System Controllers or 4700 Systems and terminals to the communication facilities. The 3603 enables remote subloop operation by connecting the controller loop feature to the communication facilities which connect to a remote 3603 with the subloop of terminals.

MODELS

Model 1	001	Provides 1200 bps integrated circuitry for attachment to communication facilities and has switched network backup capability for use if the nonswitched communication line fails.
Model 2	002	Provides an EIA RS232C interface to an external asynchronous modem (1200, 2400 bps), or with clocking feature (#6352) to an external synchronous modem (1200, 2400 bps).

Prerequisites: A 3601 or 3602 with an Add'l Loop Feature (#4735) or a 4701 with or without Add'l Loop (#4745) is required for each remote loop that is attached with a 3603.

The 3602 mdl 2 without clocking requires an asynchronous modem. The 3603 mdl 2 with Clocking (#6352) requires a synchronous modem that accepts Transmit Signal Element Timing from the 3600 System or 4700 System equipment. Before ordering the 3603 mdl 2, customer must check with modem manufacturer to determine their mode of operation. As an alternate to a 3603, a 1200 bps Loop Integrated Modem (#8001) in the 3601 or 3602 may be used.

Note: The loop is unidirectional. Therefore, if there is only one 3603 attached, there must be a 4-wire duplex communication channel interconnecting the 3601/3602/4701 and the 3603. If there is more than one 3603 location attached to a single loop, there must be a 2-wire line linking all the 3603s in the loop, plus a 2-wire line from the 3601/3602/4701 to the first 3603 and from the last 3603 to the 3601/3602/4701. The 3603 attaches to normal quality voice grade lines. When using a 3603 on a loop, it is recommended that a 3603 be used at the 3601/3602/4701 to maximize backup capabilities.

HIGHLIGHTS

- Can be physically installed on a wall.
- Has self-test facilities to establish valid operation of the 3603 on a remote/local loop exclusive of the nonswitched network.

Publications: GC20-0370

Customer Responsibilities: The customer must be advised that:

(1) He is responsible to make certain that the use of the equipment complies with all Federal, State,

and local laws, regulations, and ordinances.
(2) He is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
(3) He is responsible for setup of the unit.
(4) The customer will determine the failing unit (see "Maintenance" below).
(5) He is responsible for ascertaining the number of spares required.
(6) The purchaser agrees that IBM is relieved of responsibility for all claims including, but not limited to, loss of funds contained in, dispensed by or associated with the 3603.

The customer is also responsible for the provision of a telephone local loop conditioned for data above 300 bps, for FCC registered protective circuitry of the CDT type (or equivalent) in order to use the Switched Network Backup function and, with the 3603 mdl 2, an appropriate modem. A cable is available from IBM for a fee, for the protective circuitry attachment. A similar cable is available, also for a fee, to connect the 3603 to the nonswitched line connector. Installation of the cable is also a customer responsibility.

The *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766, and the *IBM 3600 Finance Communication System Services Terminal - Terminal Installation Guide,* GA27-2796, should be ordered for each customer installation.IBM Financial Services Terminals: Complementing the *IBM 3600 Finance Communication System Summary* GC27-0001.

Spares: The customer may wish to replace a failing 3603 with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, his application requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of 3603s Installed	Minimum Number of Spares Recommended	
	Mdl 1	Mdl 2
100	2	3
200	3	4
300	4	6
500	6	8
1000	10	14
1500	14	19
2000	17	24
2500	20	28
3000	23	33
3500	27	38
4000	30	42
4500	33	47
5000	36	51

Maintenance: Maintenance of the 3603 will normally be at a designated IBM Repair Center. All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Repair Center. It shall be the customer's responsibility to set up the equipment and to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing unit, pack the unit in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will pay the transportation charges for return of the repaired unit. There is no regularly scheduled preventive maintenance recommended by IBM on these units.

The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Agreement or on a time and material basis.

IBM Repair Center Service: The 3603 is eligible for maintenance coverage immediately following expiration of the service and parts warranty at the monthly charge shown under MMMC in Price List.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer now wants maintenance coverage, he may ship the machine(s) to the designated IBM Repair Center for an inspection.

If, on the basis of an inspection, the repair center concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer without charge.

In all other cases, a minimum charge per machine to cover handling, inspection, cleaning, adjustments, and testing will be applied. In addition, all aprts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates. The machine will then be eligible for maintenance coverage. Maintenance of the 3603 will normally be at a designated IBM Repair Center.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair under the IBM Machine Repair Authorization Form, GX27-2981, in which case repair will be made (if the machine is repairable). Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, and estimating of repair charges.

IBM Repair Center Service: The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Parts Agreement at the applicable MMMC, or on a time and material basis.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901. Field Installation:** Not recommended.
- Cables: See M3601 and 3602 pages for prices and ordering instructions. See also *3600 Installation Manual, Physical Planning,* GA27-2766.

SPECIAL FEATURES

Clocking (#6352): [Mdl 2] Provides Transmit Signal Element Timing to synchronous modems (1200, 2400 bps). This feature is required for all synchronous modems (including Western 201C and equivalent modems). **Field Installation:** Not recommended.

MODEL CONVERSIONS (None)

ACCESSORIES

Accessories for the 3603 may be purchased from IBM or a customer selected source. Allow a lead time of 120 days.

P/N	Description
78999	Fuse (0.5 Slow Blow)
1745353	Jumper Assembly (Signal Attenuation or Loop Speed)
5929886	Loop Plate (Loop Connector Assy)

SUPPLIES (None)

3604 KEYBOARD DISPLAY MDL 6

PURPOSE

A combination keyboard and gas-panel display terminal for input and output in interactive banking application.

MODELS

Model 6 006 — Displays 240 characters - six rows of 40 characters. The same 45-key keyboard is available as described above on the model 5. (Model 6 is also used as a Control Terminal on a 3631/3632 Plant Communications Controller and 3630 System and the 3814 Switching Management System.)

Limitations: When used as a control station terminal with a 3631 or 3632 Plant Communication Controller, the use of the keyboard, indicators and the optional Audible Alarm (#1050) are modified.

Maximum: Two on the 3814 Switching Management System.

Prerequisites: For 3600 or 4700 System, an available position on a local or remote loop of a 3601, 3602 or 4701 Controller. If located remotely from the Controller, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 mdl 3, 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem. If both a 3614 or 3624 and a 3604 mdl 2, 3 or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614 or 3624 since the 3614 or 3624 will often be operating when the 3604 mdls 2, 3 or 4 is not.

For 3814 Switching Management System, an available position on the loop of the 3814 Controller mdl A. The 3814 does not support the Magnetic Stripe Reader (#4903) or the Magnetic Stripe Encoder-Reader (#1501).

HIGHLIGHTS

The 3604 Keyboard Display mdl 6 displays characters using a 7x9 dot matrix.

A 45-key keyboard is standard. Can be equipped to read a magnetic stripe on either a plastic card or a passbook. Can be equipped to encode magnetic stripe on a passbook. Can be equipped with an audible alarm which is activated under program control. Dimensions are: 247.67mm (9.75 in.) high x 457.2mm (18.0 in.) wide x 190.5mm (7.5 in.) deep. May be either locally or remotely (see "Prerequisites") attached to the 3601, 3602, or 4701.

Keyboard: The 45-key keyboard contains three clusters of 15 keys. The layout of each cluster is a matrix of five rows, with three keys in each row. The keyboard includes a blank overlay which may be designated with any notation the customer desires. A second overlay identifies the ten numeric keys in a blue field, which may be placed in any of the three 15-key clusters the customer desires. Covering these overlays is a clear plastic, protective overlay. See M10000 pages, 3600 Accessory Group, for pricing and ordering instructions for additional overlays.

Indicator Lights: Five indicator lights are provided, three of which can be lighted under program control.

Magnetic Stripe Read Capability: The 3604 mdl 6 can be equipped with a Magnetic-Stripe Reader which is located in front of the display panel, to the left of the keyboard, or with a Magnetic Stripe Encoder-Reader attached by a 30-inch cable. To use these features, an operator manually passes a magnetic striped plastic identification card or credit card (for reading), or a passbook with a magnetic stripe label attached (for reading or encoding), through a slot. The 3604 encoding is in a unique format at 210 bits per inch. Standard ABA encoding is at 75 bits per inch; therefore, credit cards cannot be encoded to ABA specifications, and thus must be used as "read-only" documents. The 3604 is capable of reading either the standard ABA format or the 3604 passbook format. Encoding requires low coercivity magnetic stripe material. IBM self-adhesive magnetic stripe labels are available . These mylar base labels are approximately 12.7mm (0.50") by 91.4mm (3.6") and are easily applied by hand to passbooks.

Customer Setup (CSU): The mdl 6 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section.

Customer Responsiblities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3604.
- Physical setup, connection of cables in protected customer access areas, switch settings, and checkout.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Limitations: The customer should complete the setup and check out of the 3604 mdl 6 prior to calling the CE to adjust the audible alarm feature (#1050). #1050 requires tools and special skills for initial installation.

Publications: GC20-0370

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, or **#9881** for nonlocking plug. **Field Installation:** Not recommended.
- Color: The standard color for this unit is pearl white. The accent color must be specified, either **#9065** for pebble gray or **#9068** for raven black.
  Field Installation: Not recommended.
- 3630 Control Station: **#9701** for 3604 mdl 6 attachment to 3631 or 3632 Plant Communication Controller.
- When attaching to a 3814 Switching Management System, if 4.2m (14 ft) power cord is required, order RPQ 8P0898 which is factory only.
- Cables: See "Accessories" section in M3601 pages for ordering instructions. See also *3600 Installation Manual-Physical Planning,* GA27-2766.
- Specify **#9701** for 3604 mdl 6 attachment to 3631 or 3632.
- Specify **#9711** for 3604 mdl 6 attachment to 3814 (for scheduling purposed).

SPECIAL FEATURES

Audible Alarm (#1050): Provides an audible alarm which can be enabled or disabled under program control. The audible alarm can be programmed to work with any of the programmable indicator lights. **Limitations:** Cannot be used in a 3630 System. **Maximum:** One. **Field Installation:** Yes.

Magnetic Stripe Encoder-Reader (#1501): Has encode and read capability. **Limitations:** Cannot be installed with Magnetic Stripe Reader (#4903). Cannot be used in a 3630 System. Not available with the 3814. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Depending upon the configuration, #1005, (#1006 or #1007on the 3601 (#1006 or #1007) on the 3602, on (#1008) on the 4701 may be required on the 3600 or #1008 on 4700 ... see M3600 or 4700 pages.

Magnetic Stripe Reader (#4903): Has read capability only. **Limitations:** Cannot be installed with Magnetic Stripe Encoder-Reader (#1501). Cannot be used in a 3630 system. Not available with the 3814. **Maximum:** One. Cannot be used in a 3630 System. **Field Installation:** Yes.

MODEL CONVERSIONS: None

Repair Center Maintenance

For the 3604 mdl 6, an alternative maintenance plan is offered at a repair center. Under this plan, maintenance, parts replacement, adjustments, and repair of the applicable keyboard displays will be performed at a designated IBM Repair Center.

Mdl 6 is CSU. During the warranty period for purchased machines, IBM will provide on-site maintenance or, at the customers' option, repair center maintenance under the terms and conditions of the repair center offering. For lease customers repair center maintenance is available immediately following execution of the repair center amendment to the agreement for lease or rental of IBM machines. The customer utilizing repair center maintenance is responsible for:

1. Determining when remedial maintenance is required:

   To verify that remedial maintenance is required, the customer should replace a suspected 3604 with one known to be operational. The customer may wish to replace a failing machine with a spare unit; sufficient spare units must be on hand for such use. The number of spare units recommended is dependent upon the number of machines installed, application requirements, physical locations and layouts. The minimum number of spare units recommended is:

Number of Machines	3604-6
50	2
100	2
200	2
300	3
500	3
1000	5

3604 Keyboard Display Mdl 6 (cont'd)

2. Removing and replacing machines in the operational environment.
3. Checking machine performance while machines are installed in the operational environment.
4. Shipping machines prepaid to the IBM Repair Center and utilizing designated containers available from IBM for such shipment.

IBM will prepay return shipping charges from the IBM Repair Center to locations within the United States and Puerto Rico. IBM will not be responsible for loss or damage to customer-owned machines during the period the machines are in transit to and from an IBM Repair Center or in IBM's possession at an IBM Repair Center, except for loss or damage caused by IBM's negligence. Replaced parts become the property of IBM.

The 3604 Repair Center Maintenance Plan applies to the base machine and, except for the Limitations noted below, features and RPQs installed on the base machine. Under this plan, charges for the base machine have been reduced; charges for features and RPQs remain unchanged. Should a customer operating under this plan desire repair service on the customer's site, IBM will provide this service at a charge for the time required. No additional charge, however, will be made for parts.

Field installable features and RPQs will be installed by IBM at the standard field install prices.

Installation of field installable features will normally be done by IBM on the customer's site. Should a customer operating under this plan desire installation of the featureat the repair center, IBM must be notified that this has been selected. The customer must coordinate the shipment of machines and feature packages with the IBM Repair Center.

Repair Center maintenance for the 3604 mdl 6 is available under the following agreements:

Deferred Central Facility Maintenance Service (DCFM):

The 3604 mdl 6 qualifies for DCFM. The customer will provide a facility at which the machines will be serviced.

The customer is responsible for determining when remedial maintenance is required and for transporting the machines to and from the facility.

A specified minimum number of machines must require remedial maintenance before the customer places a call for maintenance service. For the minimum numbers, refer to the Machines pages under "Terms and Conditions" of the machine type and mdl in question. If the customer places a call for remedial maintenance involving fewer than the specified number of machines, the customer will be charged an additional service charge which is determined by multiplying the additional service charge period (currently one-half hour) specified on the machine list, by IBM's applicable per-call rate then in effect. IBM may increase the additional service charge period upon prior written notice to the customer.

IBM will normally respond to requests for service on the IBM business day following the day on which the call was placed.

Purchased machines: IBM Maintenance Service Option Amendment to IBM Maintenance Agreement.

Rented or leased machines: Amendment to the Agreement for Lease or Rental or Rental of IBM Machines.

Limitations

1. Machines under the Pilot Test Plan (PTP) will not be accepted for repair center maintenance.
2. The 3604 mdl 2 with Line Feature Base (#4751 or #4752) will not be accepted for repair center maintenance.
3. Each RPQ installed on the base machine must be evaluated individually to determine acceptability for repair center maintenance. Contact FE Services Planning, Charlotte, North Carolina, to determine acceptability.

The following RPQs have been reviewed and are acceptable for repair center maintenance:

RPQ 8K0648 Keyboard
RPQ MG1586 Address Sharing
RPQ 8K0567 Audible Alarm
RPQ 8K0596 Audible Alarm mdl A02
RPQ 8K0597 Pin Pad 3604 mdl 6
RPQ S25148 3790 Support
RPQ S25150 Series 1 Support

The following RPQs have been reviewed and are not acceptable for repair center maintenance:

RPQ 8K0552 Loop EIA Interface with Clock
RPQ 8K0595 Loop EIA Interface with Clock
RPQ 7B0184 Optical Scanner
RPQ 8K0903 Optical Scanner
RPQ EJ3715 Power 50 Hz 220V
RPQ X47766 Keyboard w/o Keytops
RPQ YA2300 Keyboard w/o Keytops

Designated Repair Centers: The 3604 Repair Center Maintenance Plan is available at the Paramus, Chicago, or Los Angeles Repair Centers.

ACCESSORIES

See M3601 pages.

SUPPLIES (None)

3606 FINANCIAL SERVICES TERMINAL

PURPOSE

A keyboard display terminal for use with the 3600 Finance Communication System in point of sale or other applications.

MODELS

Model 1 001 — Attaches to the 3601 or 3602 Finance Communication Controller local or remote loop. If located remotely from the 3601 or 3602, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 model 2, 3 or 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem.

Model 2 002 — Attaches to the 3601 or 3602 Finance Communication Controller remote loop.

Prerequisites

Model 1: If located remotely from a 3601 or 3602, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 mdl 2, 3 or 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem. If both a 3614 or 3624 and a 3604 mdl 2, 3 or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614 or 3624 since the 3614 or 3624 will often be operating when the 3604 mdl 2, 3 and 4 is not.

Model 2: Common carrier termination at location of installation.

HIGHLIGHTS

Has 8-position numeric display, nine message indicators, a numeric keyboard, six function keys and a magnetic stripe reader capable of reading either standard ABA format (75 bpi) or the 3604 passbook format (210 bpi).

The 3606 is used as an interactive terminal in point of sale and other applications (credit authorization, data capture, check verification, funds transfer(s).)

Publications: GC20-0370

Customer Responsibilities: The customer must be advised that: (1) He is responsible to make certain that the use of the equipment complies with all Federal, State, and Local Laws, Regulations, and Ordinances ... (2) He is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service ... (3) He is responsible for the installation of the unit ... (4) He will determine the failing unit (see "Maintenance" below) ... (5) He is responsible to determine required spares ... (6) Purchaser agrees that IBM is relieved of responsibility for all claims including, but not limited to, loss of funds contained in, dispensed by, or associated with the 3606.

Spares: The customer may wish to replace a failing 3606 with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, his application requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of 3606s Installed	Minimum Number of Spares Recommended Mdl 1	Mdl 2
100	2	2
200	3	4
300	4	5
500	5	6
1,000	8	10
1,500	11	14
2,000	14	18
2,500	16	21
3,000	19	25
3,500	21	28
4,000	24	31
4,500	26	34
5,000	29	37

Maintenance: All maintenance of the 3606, parts replacement, and repair shall normally be performed at the designated IBM Repair Center.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair under the IBM Machine Repair Authorization Form, GX27-2981, in which case repair will be made (if the machine is repairable). Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, and estimating of repair charges.

IBM Repair Center Service: The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Agreement at the MMMC shown, or on a time and material basis. Refer to Repair Center Service/Maintenance Program in the FE Services subsection of the GI section.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901. Field Installation:** Not recommended.
- Cables: See M3601 or 3602 pages for pricing and ordering instructions. Also see *Installation Manual - Physical Planning,* GA27-2766.
- Terminals are shipped with standard keyboard and indicator light nomenclature. See *Financial Services Terminals Complementing Manual,* GC27-0002, unless specified as follows: **#9031** for a black filter panel, or **#9481** for a numerics only keyboard overlay. The customer may choose the nomenclature to suit an application. All keyboard overlays and filter panels are available for a fee. See "Accessories" for pricing and ordering instructions.
- Keyboard Arrangement: Specify **#9390** for a reverse or calculator formatted keyboard (top row -- 7,8,9; second row -- 4,5,6; third row -- 1,2,3; bottom row -- 0). **Field Installation:** Not recommended. **Note:** If **#9390** is not specified, the standard keyboard arrangement will be shipped (top row -- 1,2,3; second row -- 4,5,6; third row -- 7,8,9; bottom row -- 0).

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

Accessories for the 3606 may be purchased from IBM or a customer selected source. Allow a lead time of 120 days.

P/N	Description
111262	Fuse (0.4 Slow Blow)
1652103	Fuse Holder Assembly
1702817	Display Filter - Standard Keyboard Overlay
1702847	- Standard
1702848	- Blank except for Numerics
1702849	- Protective Cover
1702867	- Std Fctn Key Nomenclature Calculator Numeric Arrangement
1702904	Display Filter - Blank Red
1702934	Keyboard Overlay - Blank Fctn Key Nomenclature Calculator Numeric Arrangement
6812758	Cap-Fuse Holder

SUPPLIES (None)

3608 PRINTING FINANCIAL SERVICES TERMINAL

PURPOSE

A keyboard display terminal, with printer, for use with the 3600 Finance Communication System in point of sale or other applications.

MODELS

Model 1 001 — Attaches to the 3601 or 3602 Finance Communication Controller local or remote loop. If located remotely from the 3601 or 3602, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 model 2, 3 or 4 equipped with a Line Feature (#4751 or 4752) and appropriate modem.

Model 2 002 — Attaches to the 3601 or 3602 Finance Communication Controller remote loop.

Prerequisites:

Mdl 1 - if located remotely from the 3601 or 3602, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 mdl 3 or 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem. If both a 3614 or 3624 and a 3604 mdl 2, 3 or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614 or 3624 since the 3614 or 3624 will often be operating when the 3604 mdl 3 or 4 is not.

Mdl 2 - common carrier termination at location of installation.

HIGHLIGHTS

- Can print three lines of alphameric data on sales slips, charge receipts, or other documents used in point of sale applications. Line positions must be specified. See "Specify".
- Has 45-character set. Optional 10-character numeric OCR 7B font for upper-most print row is available as a special feature. See "Special Features".
- Document to be printed is inserted into the chute at the right of the terminal, is fed past print wheels, printed, and ejected at the left side of the terminal.
- Has 8-position numeric display, nine message indicators, a numeric keyboard, six function keys, and a magnetic stripe reader capable of reading either standard ABA format (75 bpi) or the 3604 passbook format (210 bpi).
- Used as interactive terminal in point of sale applications (e.g., credit authorization, data capture, check verification, funds transfers).

Publications: GC20-0370

Customer Responsibilities: The customer must be advised that: [1] He is responsible to make certain that the use of the equipment complies with all Local Laws, Federal, State Regulations, and Ordinances. [2] He is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service. [3] He is responsible for the installation of the unit. [4] The customer will determine the failing unit (see "Maintenance" below). [5] He is responsible for determining required spares. [6] Purchaser agrees that IBM is relieved of responsibility for all claims including, but not limited to, loss of funds contained in, dispensed by or associated with the 3608.

Spares: The customer may wish to replace a failing 3608 with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, his application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of 3608s Installed	Minimum Number of Spares Recommended	
	Mdl 1	Mdl 2
100	5	5
200	8	9
300	11	12
500	16	17
1000	27	30
1500	38	43
2000	49	55
2500	59	67
3000	70	78
3500	80	90
4000	90	102
4500	100	113
5000	110	124

Maintenance: All maintenance of 3608s, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Repair Center.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair under the *IBM Machine Repair Authorization Form* (974-02A), in which case repair will be made (if the machine is repairable). Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, and estimating of repair charges.

IBM Repair Center Service: The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Agreement at the MMMC shown, or on a time and material basis. Refer to "Repair Center Service/Maintenance Program" in the Field Engineering Services subsection of the GI section.

Forms Characteristics: Printing on the standard 3608 is possible on single part forms of the following dimensions: From 69.9mm (2.75") up to 82.6mm (3.25") high by 147.3mm (5.8") to 215.9mm (8.5") wide by 0.10mm (.004") to 0.28mm (.011") thick. In addition, the following dimensions apply to multi-part charge forms: 82.6mm (3.25") high by 121.9mm (4.8") wide by 0.2mm (.008") to 0.43mm (.017") thick. Refer to the *IBM Forms Design Reference Guide for Printers* (GA24-3488) for additional information. OCR 7B (not inked) printing is intended for two and three part charge forms. Due to variations in card, paper, and carbon stock, the customer should evaluate his printed forms to determine if they meet his performance objectives. An optional feature to allow printing of documents up to 88.9mm (3.5") in height is available.

Character Sets:

OCR 7B is 0-9.

10-pitch is 0-9, A-Z, and special characters number sign (#), at sign (@), comma (,), minus (-), dollar ($), period (.), ampersand (&), slash (/), and percent sign (%).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901. Field Installation:** Not recommended
- Cables: See M10000 pages forpricing and ordering instructions. Also see *Installation Manual - Physical Planning,* (GA27-2766).
- Terminals are shipped with standard keyboard and indicator light nomenclature unless specified as follows: Specify **#9031** for blank filter panel or **#9481** for a numerics-only keyboard overlay. The customer may choose the nomenclature to suit an application. See *Financial Services Terminals Complementing Manual,* (GC27-0002). Additional quantities of all keyboard overlays and filter panels are available for a fee. See "3600 Accessories" in M10000 pages for pricing and ordering instructions.
- Print Line Positions [at time of manufacture only]: The following are standard combinations. See "Line Position Chart".

  #9540 for 1, 4, 10
  #9541 for 1, 5, 10
  #9542 for 1, 3, 6
  #9543 for 1, 7, 10
  #9544 for 4, 7, 10

- Keyboard Arrangement: Specify **#9390** for a reverse or calculator formatted keyboard (top row -- 7,8,9; second row -- 4,5,6; third row -- 1,2,3; bottom row -- 0). **Note:** If **#9390** is not specified, the standard keyboard arrangment will be shipped (top row -- 1,2,3; second row -- 4,5,6; third row -- 7,8,9; bottom row -- 0). **Field Installation** not recommended.
- Document Chute **(#9701)**: ... for a document chute capable of handling documents up to 88.9mm (3.5") in height. This feature shifts the print line positions up so that the distance from the bottom of the form to the nominal center location of the print line is increased by 3.5mm (.125"). It is only available with 4, 7, 10 print line positions **(#9544)**. See Line Position Chart B. It is not available with OCR 7B Font (#5454). **Field Installation:** Available at time of manufacture only.

3608 Printing Financial Services Terminal (cont'd)

Line Position Chart A [Standard 82.6mm (3.25") Chute]

Line Pos.	Font	Nominal Center Line Location, distance from bottom edge of document	Note
OCR	OCR 7B	77.0mm(3.031")[5.56mm, .219" from top edge] 82.6mm (3.25") doc	Available as Special Feature (#5454) only
1	10-pitch	77.0mm (3.031")	Not with #5454
2	10-pitch	71.9mm (2.831")	Not with #5454
3	10-pitch	66.8mm (2.631")	
4	10-pitch	61.7mm (2.431")	
5	10-pitch	56.7mm (2.231")	
6	10-pitch	51.6mm (2.031")	
7	10-pitch	46.5mm (1.831")	
8	10-pitch	41.4mm (1.631")	
9	10-pitch	36.3mm (1.431")	
10	10-pitch	31.3mm (1.231")	
11	10-pitch	26.2mm (1.031")	Only with #5454
12	10-pitch	21.1mm (0.831")	Only with #5454

If a customer desires three print lines positioned in locations other than the five feature combinations shown, an RPQ may be submitted at order time. PRQs to change print line positions or to add the OCR print feature will not be accepted after manufacture and shipment to the customer.

Line Position Chart B [88.9mm (3.5") Chute only]: See **#9701** above.

Line Pos.	Font	Nominal Center Line Location, distance from bottom edge of document
4	10-pitch	64.9mm (2.556")
7	10-pitch	49.7mm (1.956")
10	10-pitch	34.4mm (1.356")

SPECIAL FEATURES

OCR 7B Font (#5454): The 10-character OCR 7B font can be substituted for the standard font in the uppermost print row. The three print line positions, when this feature is installed, are OCR, 3 and 5. The OCR 7B characters impact printed when #5454 is used can be read on a 1287 Optical Character Reader equipped with the OCR 7B special feature (#3945). **Field Installation:** No.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3610 DOCUMENT PRINTER MDL 4

PURPOSE

A printer for use with the 3600 or 4700 Finance Communications System to provide a hardcopy output of banking transactions.

MODELS

Model 4 004 Prints on a cut form and on a journal roll/audit roll.

Prerequisites: [1] An available position on a local or remote loop of a 3601, 3602 or 4701 Controller. If located remotely from the 3601 or 3602, the remote location must have either a 3603 Terminal Attachment Unit, a 3614 or 3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 mdl 2, 3 or 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem. If both a 3614 or 3624 and 3604 mdl 2, 3 or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614 or 3624, since the 3614 or 3624 will often be operating when the 3604 mdl 2, 3 or 4 is not. [2] Depending upon the configuration, an Add'l Storage feature (#1005, #1006 or #1007 on the 3601, #1006 or #1007 on the 3602, or #1008 on the 4701 Controller). See M3601, 3602 or 4701 pages.

HIGHLIGHTS

The 3610 Document Printer mdl 4 provides a hardcopy output on a variety of cut forms and paper stock to meet the customer's printing requirements in banking applications. In addition, the 3610 mdl 4 has the capability of printing single or multiple lines as well as being able to print on a 1- or 2-part journal roll. When a single line document is used, a lever is provided to engage a document stop which positions the bottom of the printed line 19.4mm ± 1.65mm (0.765 in. ± 0.065 in.) from the bottom of the document. A cut form can be positioned in front of the journal roll so that printing can occur simultaneously on the cut form and journal roll, provided that appropriate carbon or impact paper is used.

Printing occurs at 10 characters per inch, and 5 or 6 lines per inch. At time of installation the customer engineer will set the line spacing at 5 or 6 lines per inch as requested by the customer. The 3610 mdl 4 prints at speeds up to 30 characters/second. Forms control capabilities include a right-hand forms-advance knob, and a forms tear bar located 66.675mm ± 6.35mm (2.625 in. ± 0.25 in.) above the print line.When one part of the journal paper is attached to the take-up roll, the forms-advance knob may be used to advance the paper. Otherwise, the paper must be advanced manually.

The size of the 3610 mdl 4 is 266.7mm (10.5 in.) high x 457.2mm (18.0 in.) wide x 266.7mm (10.5 in.) deep. When used with the 3604 Keyboard Display mdl 5 or 6 it provides a teller with a workstation which fits within a work area with dimensions of 266.7mm (10.5 in.) high x 457.2mm (18.0 in.) wide x 457.2mm (18.0 in.) deep.

Journal Take-up With Locked Cover: Provides a journal take-up roll for accumulating one part of a two-part journal after it is printed. (The other part of the journal exists from the printer past a tear bar.) A locked cover is also provided to prevent unauthorized access to the take-up roll. Two keys are provided for the lock. When a single-part journal is used, it must exit from the printer past the tear bar (cannot be accumulated on the take-up roll). The journal take-up roll can accommodate up to a maximum of 15.24m (50 ft) of paper.

48-Character Set: Provides a 48-character set consisting of 47 printable graphics and a space (blank).

Publications: GC20-0370

Forms Specifications: Refer to *Forms Design Reference Guide for Printers* (GA24-3488).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug. **Field Installation:** Not recommended.
- Color: The standard color for this unit is pearl white. The accent color must be specified, either **#9065** for pebble gray or **#9068** for raven black.

  Field Installation: Not recommended.
- Cables: See M3601 pages for ordering instructions. Also see *3600 Installation Manual - Physical Planning* (GA27-2766).

SPECIAL FEATURES

Shared Terminal (#6350): Provides two pushbuttons for teller identification to the 3601, 3602 or 4701 Controller when two tellers are sharing one printer. **Limitations:** Cannot be installed with the Address Sharing RPQ (MG 1586). **Maximum:** One. **Field Installation:** Yes.

Deferred Central Facility Maintenance (DCFM): The 3610 mdl 4 qualifies for DCFM. See M3600 pages for details.

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): A 1-shelf forms stand that permits placement and feed of continuous forms from the carton and provides for forms stacking after printing.

Locks and Keys: [Mdl 4] The 3610 with the Journal Takeup with Locked Cover **#4651** special feature is shipped with two keys. Additional keys may be purchased from IBM. Indicate serial number of lock.

SUPPLIES (None)

3614 CONSUMER TRANSACTION FACILITY

[*The 3614 is no longer available ... special features are on an "as available" basis for field installation.*]

PURPOSE

An unattended self-service banking terminal that issues variable amounts of money, accepts deposits, and performs other transactions, and attaches to a 3601 or 3602 Finance Communications Controller or directly to any virtual storage S/370 or 4300 processor via a 3704, 3705 or 3725 Communication Controller or the Communications Adapter on a 4321 or 4331. See M3704, 3705, 3725, 4321 or 4331 pages.

MODELS

Model 1	001	Consumer Transaction Facility Lobby. Designed for use inside a building. Consists of the basic unit with protective covers, a protective front panel, and a bezel around the front panel. The protective cover contains provision for customer insertion of two keylock cylinders.
Model 2	002	Consumer Transaction Facility, Through the Wall. Designed for use through the wall of a building. Has a motorized protective door over the keyboard/guidance area for outdoor environmental protection. Can be attached to a heavy duty enclosure, through-the-wall bezel, and mounted on a 4", 7" or 10" high mounting stand. The heavy duty enclosure contains a combination lock and provision for customer insertion of bank examiner's type keylock for locking the combination dial.
Model 11	011	Same as model 1 with a capability of issuing two denominations during one transaction. Can also be loaded with a single denomination, doubling the bill capacity currently available in the 3614 model 1.
Model 12	012	Same as model 2 with a capability of issuing two denominations during one transaction. Also can be loaded with a single denomination, doubling the bill capacity currently available in the 3614 model 2.

Prerequisites: Each 3614 must have loop attachment to a 3601/3602, or SDLC attachment to a S/370, 4331, 4341, 4361 or 4381 via a 3704, 3705 or 3725 or a Communications Adapter on a 4321 or 4331.

For Attachment to a 3601/3602: There must be an available position on a local or remote loop of a 3601/3602. The 3614 must have Terminal Loop Feature (#7820). If located remotely from the 3601/3602, the remote location must have a 3614/3624 with Loop Integrated Modem (#8001), a 3604 mdl 2, 3 or 4 with Line Feature Base (#4751 or #4752) and appropriate modem, or a 3603 Terminal Attachment Unit. If a 3603 is at the remote location, the 3614 or 3624 does not require Loop Integrated Modem (#8001). If both a 3614 or 3624 and a 3604 mdl 2, 3 or 4 are installed in the same remote location without a 3603, it is recommended that the loop modem be located with the 3614 or 3624 since the 3614 or 3624 might often be operating when the 3604 is not, e.g., weekends, holidays.

For Attachment to a S/370 or 4300 Processor: With virtual storage capability via a 3704, 3705 or 3725 Communications Controller equipped with the appropriate features or the Communications Adapter on a 4321 or 4331, see M3704, 3705, 3725, 4321 or 4331. The 3614 must have SDLC Communications Feature With Clocking (#6301) or SDLC Communications Feature Without Clocking (#6302).

Depending upon the configuration, the Add'l Storage Feature (#1005, #1006 or #1007) may be required on the 3601, or the Add'l Storage Feature (#1006 or #1007) may be required on the 3602. See M3601 or 3602 pages.

Logo Panel (**#9401** or **#9402**). See "Specify". Purchase only.

The 3614 mdl 2 and 12 require mdl 2/12 Accessory Group **#9571**. See "Specify". Purchase only.

HIGHLIGHTS

Issues Cash: Withdrawal transaction issues single (mdl 1 or 2) or dual denominations (mdl 11 or 12) denomination up to a maximum of 20 bills from a single account. Withdrawal is from a choice of four accounts.

Accepts Deposits: Deposit transaction and depository with controlled access slot allows users to deposit to checking or savings accounts.

Accepts Payments: Allows user to make various payments by depositing cash or check. User may also deposit payment coupon and have financial institution deduct funds from his account.

Cash Check: A single transaction that allows cash to be issued to a user following deposit of a check drawn on another institution.

Additional Transactions: The 3614 also provides a general purpose special transaction, and account inquiry transaction, and a funds transfer transaction.

Transaction Chaining: A series of multiple transactions can be performed with a single insertion of magnetic stripe card and single keyed entry of personal identification number.

Issues Statements: Can print and issue a statement or message to user.

Journaling: Transaction documents can be printed and retained in the 3614, as an aid in machine balancing.

3704/3705 Attachment: Can attach via communications link directly to a 3704 or 3705 Communications Controller.

Communications Adapter Attachment: Can attach via Communications link directly to a 4331 Processor with Communications Adapter feature.

Keyboard/Guidance: Guidance display steps user through a transaction. Customer can specify messages to be displayed.

Encrypt/Decrypt Features: Encryption/decryption of sensitive data during communication line transmission ... provision for one of two encryption algorithms; the proposed U.S. Federal Information Processing Data Encryption Standard (DES) or the original 3614 Alternate Encryption Technique (AET) ... see "Specify".

Multi-Institution Usage: Provision to accept magnetic stripe cards for 50 different card issuer identifiers with Data Encryption Standard (DES) technique.

Off-Host Operation: Offline operation via 3601 or 3602 controller possible. Transactions limited to cash issue and special transactions (input of special transaction codes with resultant customer preprogrammed response).

Customizing Capability: Customer can customize terminal operation (within limits) and change guidance messages.

Identification: The user is identified through the reading of his ABA-standard magnetic stripe card. As a second check, the user is verified by a comparison of a keyed personal identification number.

Installation: Can be installed for use inside the building or through-the-wall for outside use.

Bill Issue: Issued bills directly. No packets or cartridges are used.

Heavy Duty Enclosure: A strong steel protective enclosure to protect bills that is available for purchase on mdls 2 or 12. See "Accessories".
Logo Panel: A personalization panel on front of the 3614 for financial institution advertising that is available for purchase on mdls 1 or 2. See "Accessories".

Publications: GC20-0370

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9901** for 115V.
- Cables: See M3601 or 3602 pages for ordering instructions. Also see *Installation Manual - Physical Planning*, GA27-2766.
- Currency Denomination: **#9091** for $5, $10, $20.
- Keyboard: Specify one of the following. All are field installable.

3614 Consumer Transaction Facility (cont'd)

Specify Number	Mdl 1 & 2	Mdl 11 & 12	Transaction Type: Withdrawal	Special	Balance	Transfer	Deposit	Pmt Enclosed	Payment from Acct	Cash Check	Prerequisites: Depository (#3322) Change Making (Note 1)	From/To Account: Checking	Savings	Credit Card	Other		
#9351	0	0	*								*						
#9352	0	0	*								0	0	0				
#9353	0	0	0		0						0	0	0				
#9354	0	0	0	0							0	0	0	0			
#9355	0	0	0	0	0						0	0	0				
#9356	0	0	0	0	0						0	0	0	0			
#9357	0	0	0	0	0	0	0	0	0		0	0	0	0		0	
#9358	0	0	0	0	0		0				0	0	0	0		0	
#9359	0	0	0	0	0	0					0	0	0	0			
#9360	0	0	0	0	0		0				*					0	
#9361	0	0	0	0	0						*						
#9362	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
#9363	0	0	0	0	0		0			0	0	0	0	0		0	
#9364	0	0	0	0	0		0			0	*					0	
#9451		0	*								*				0		
#9452		0	*								0	0	0		0		
#9453		0	0		0						0	0	0		0		
#9454		0	0	0							0	0	0	0	0		
#9455		0	0	0	0						0	0	0		0		
#9456		0	0	0	0						0	0	0	0	0		
#9457		0	0	0	0	0	0	0	0		0	0	0	0	0	0	
#9458		0	0	0	0		0				0	0	0	0	0	0	
#9459		0	0	0	0	0					0	0	0	0	0		
#9460		0	0	0	0		0				*				0	0	
#9461		0	0	0	0						*				0		
#9462		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
#9463		0	0	0	0		0			0	0	0	0	0	0	0	
#9464		0	0	0	0		0			0					0	0	

* Does not have any transaction select or 'from Account' keys.

Note 1: Two currency denominations must be specified.

- Logo Panel (purchase only): **#9401**, if ordered with the machine, or **#9402** if ordered for shipment prior to machine
- Mdl 2/12 Accessory Group (purchase only): **#9571**
- 3614 Host Attachment Designation: 1st and 2nd position designation is required to control distribution of 3614 controller-data media to host system location.

  1st Position Designator: Identifies first 3614 of each different Controller Data Version attached to a host system ... used to limit distribution of controller-data media to one copy of each version per host system location.

  2nd Position Designator: Identifies additional 3614s of each version ... controller-data media is not distributed to host system location for 2nd position designated 3614s.

  The following matrix identifies individual Controller Data Versions and their corresponding 1st and 2nd position specify codes. **Limitations:** Each 3614 must have either 1st or 2nd position specified ... one 1st position must be specified for each version ... only one 1st position may be specified for each version.

Specify either 1st or 2nd Pos Code below: 1st	2nd	Version	Host Attachment: Loop-3601/2 Direct-SDLC	Encryption Technique DES (#9001) AET (#9002)
#9701	#9702	3	Loop	Alternate
#9703	#9704	3	Direct	Alternate
#9801	#9802	5	Loop	DES
#9803	#9804	5	Direct	DES

When 1st position (**#9701, #9703, #9801** or **#9803**) is specified, also specify one of the following to indicate magnetic tape density (media) used at the host system location:

#9412 9-track 800 bpi
#9413 9-track 1600 bpi
#9414 9-track 6250 bpi

If magnetic tape is not used at the host system location, select one of the following media (DOS/VS users only):

#9431 80-column cards
#9432 96-column cards

In order to apply 3601, 3602 or 3614 controller-date code from cards, it is necessary to have applied an Independent Component Release (ICR) to Subsystem Support Services (SSS) in DOS/VS Release 31. Contact IBM for ordering instructions.

If card or tape inputs are not available at the host location, contact IBM.

When 1st position (**#9701, #9703, #9801** or **#9803**) is specified, additional information is required. Supplemental Specifications are to be entered exactly as follows to indicate shipping address of host system location:

Line 1 – IBM Programming Support Representative (PSR)
Line 2 – c/o (Name of Customer)
Line 3 – Street Address (or P.O. Box Number)
Line 4 (etc.) – City, State, Zip code.

- Specify one of the following:

  DES **#9001** – provides the data encryption technique (DES) proposed as a U.S. Federal Information Processing Data Processing Standard by the U.S. National Bureau of Standards. DES facilitates multi-institution usage by providing for personal identification number (PIN) validation based on individual issuer PIN encryption keys for 50 different card issuer identifiers ... PIN offset value may be recorded on magnetic stripe to be used to validate PINs in 3614 which were not based originally on DES technique ... accepts 4- to 16-digit fixed or variable length PINs ... option to load PIN encryption keys via communication line from host. **Fieid Installation:** Yes. **Limitations:** Cannot be specified if **#9002** is specified.

  AET **#9002** – provides the Alternate Encryption Technique (AET) which is the original 3614 encryption technique. **Limitations:** May not be specified if **#9001** is specified.

  Prerequisites: DES and/or AET encryption capability required on the 3601 or 3602 and in host system ... see M3601 and 3602 pages. DES and AET are used to determine 3614 Host 1st and 2nd Position Host Attachment designation ... see "Host Attachment Designation" above.

Customer Responsibilities: Because the 3614 mdl 2 and 12 is attached to a customer premise, installation of cables, base plate, mounting stand, enclosure and bezel are a customer's responsibility. The customer is also responsible for site preparation, such as cutting a hole in the wall for mounting of the 3614 mdl 2 or 12. Installation of cables and site preparation is also a customer responsibility for the 3614 mdl 1 and 11. IBM is not responsible for any loss of money incurred through the use of the 3614.

Sub host operation under control of the 3601 or 3602 Finance Communication Controller requires special customer systems design and support. Maintenance of system integrity in the sub host mode is a customer responsibility.

IBM is not responsible for intentional damage to the 3614 mdls 1, 2, 11 or 12. Repair of such damage is not covered under the IBM Rental Agreement of Maintenance Contract. Repair of such damage at cost of time and materials will be made to rental machines and can be provided for purchased machines.

Customer Responsibilities - Currency Sorting: The general condition of used currency may vary. To achieve satisfactory operation, the customer must ensure that only *GOOD QUALITY* used currency is loaded into the 3614. Used or recirculated currency must be inspected to remove excessively worn, damaged or torn notes. The 3614 *Operator's Guide*, GA66-0001, included with each 3614, contains procedures for preparation of new currencies and inspection of used currencies for loading the 3614. For the 3614 mdl 11 and 12 the customer must ensure that each hopper is loaded with the proper denomination currency.

SPECIAL FEATURES

3614 Consumer Transaction Facility (cont'd)

Depository (#3322): Provides a controlled access slot in the front of the 3614 leading to an internal deposit receptacle for the collection of deposit documents. In addition to the controlled access slot, the chute is designed to discourage tampering with previously inserted deposits. **Field Installation:** Yes. **Prerequisites:** One of the following keyboards -- **#9357, #9358, #9360, #9457, #9458** or **#9460.**

EIA Interface #3701: Provides an interface for external modems. **Limitations:** Not available on Terminal Loop feature (#7820). **Field Installation:** Yes. **Prerequisites:** SDLC Communications feature.

Expanded Function Feature (#3895): Provides the options of transactions chaining, journal printing and cash check transactions. **Limitations:** May not be ordered with **#9002.** Equivalent capability is available via RPQ MG3758 for customers ordering 3614s with **#9002.** **Field Installation:** Yes ... any of the individual functions may be field installed. **Prerequisites: #9001. Specify:** Any combination of the following functions may be specified with #3895. Specify at least one:

- Transaction Chaining (**#9721**) - allows a series of multiple transactions with single insertion of magnetic stripe card and single keyed entry of PIN.
- Journal Printing (**#9722**) - print statement documents and retain in 3614 ... can be used as an aid in machine balancing and settlements. **Prerequisites:** #7900.
- Cash Check (**#9723**) - in single transaction, cash is issued to user following deposit of check drawn on other institution. **Prerequisites:** #3322 and one of the following keyboards ... **#9362, #9363, #9364, #9462, #9463** or **#9464.**

IBM 1200 bps Integrated Modem (#5500): Provides an integrated 1200 bps modem for use with leased half-duplex or duplex normal quality voice grade lines for communication to processor through the 3704/3705 ... see M2700 pages. This integrated modem must communicate with another 1200 bps integrated modem. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301. **Specify: #9651** for 4-wire strapping or **#9652** for 2-wire strapping.

SDLC Communications Feature With Clocking (#6301): Provides communications capability to communicate with the same S/370 mdls listed below for #6302. Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any external modem which does not have internal clocking. **Limitations:** Cannot be installed with Terminal Loop Feature (#7820) or SDLC Communications Feature without Clocking (#6302) . **Field Installation:** Yes. **Transmission:** This feature operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

SDLC Communications Feature Without Clocking (#6302): Provides communication capability to communicate with any Virtual Storage S/370 or 4300 processor (except 3115) via a 3704/3705 ... see M3704, 3705 pages. Attachment is also possible via the Communications Adapter feature on the 4321 or 4331. See M4321 or M4331 pages for details. Required for attachment to communications lines through an external modem which does have internal clocking. **Limitations:** Cannot be installed with Terminal Loop Feature (#7820) or SDLC Communications Feature with Clocking (#6301) **Field Installation:** Yes. **Prerequisites:** #3701. **Transmission:** This feature operates over common carrier-provided or equivalent customer-owned facilities. For information concerning these facilities, see M2700 pages. **Modems:** External modems operating at up to 4800 bps may be attached: ... 3863 Modem ... 3864 Modem ... 3872 Modem ... 3874 Modem.

Terminal Loop Feature (#7820): Provides the capability to attach either to a local or remote 3601/3602 Finance Communication Controller loop directly; or to a remote 3601/3602 loop via a 3603 or 3604 mdl 2, 3 or 4, or a 3624 with 1200 bps Loop Integrated Modem (#8001). **Limitations:** (1) Cannot be ordered with SDLC Communications with Clocking (#6301) or SDLC Communications without Clocking (#3602) ... (2) Remote loop speed is 1200 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) Available positions on the loop ... (2) Depending on the configuration, the Add'l Storage Feature (#1005 or #1006) may be required on the 3601/3602 ... see M3601 or 3602 pages ... (3) Attachment to remote 3601/3602 loop directly requires a Loop Integrated Modem - #8001 for 1200 bps. **Specify:** If loop attachment is without Loop Integrated Modem (#8001), specify one of the following loop speeds: (1) For local loop attachment to 3601/3602, specify local loop speed: **#9062** for 1200 bps, **#9063** for 2400 bps or **#9064** for 4800 bps ... (2) For remote loop attachment via a 3603 or 3604 mdl 2, 3 or 4 or 3624, specify loop speed: **#9062** for 1200 bps.

Transaction Statement Printer (#7900): Prints a statement showing the record of the transaction and passes the printed statement to the customer through the cash issue slot. Data is printed on 96-column card stock (2-5/8" by 3-1/4"). A 57-character set is provided consisting of 56 printable graphics and a space (blank). Four lines, one character per line, are printed simultaneously, for up to 34 characters per lines ... a total of 136 characters on each statement. The data to be printed is determined by the host application program and by the data stored in the 3614. Printing is overlapped with the cash issue cycle and the user deposit cycle. **Limitations:** the 96-column card stock used in the transaction statement printer must not have the optional 60 degree corner cuts. Detailed disclosure specifications describing the 96-column card stock are available from IBM Corporation, Commercial Development Office, Armonk, N. Y. Card configurations or card stocks which do not conform to these specifications may result in unsatisfactory machine performance. Contact IBM for available configurations. **Field Installation:** Yes. **Prerequisites:** If a statement is to be issued for any transaction on a given keyboard, then the Transaction Statement Printer is required.

1200 bps Loop Integrated Modem (#8001): Provides an integrated 1200 bps modem for use over leased normal quality voice grade lines. **Limitations:** If a 3604 mdl 2, 3 or 4 and a 3614 or 3624 are located at the same remote loop location, it is recommended that the loop modem be located on the 3614 or 3624 because the 3614 or 3624 will often be operating when the 3604 mdl 2, 3 or 4 is not (e.g., weekends). **Field Installation:** Yes. **Prerequisites:** #7820.

MODEL CONVERSIONS (None)

ACCESSORIES

Mdls 2 and 12 Accessory Group (#9571): (Purchase only) The Mdl 2 and 12 Accessory Group consists of a heavy duty enclosure, a through-the-wall bezel, and a mounting stand. **Note:** These items are provided as accessories to the 3614 mdls 2 and 12 to facilitate their installation through-the-wall. Installation, checkout, and maintenance of these items will not be provided by IBM. All responsibility and expenses involved must be borne by the customer.

Heavy Duty Enclosure: Provides a strong steel enclosure for the through-the-wall configuration. This enclosure has a rear access door with a resettable combination lock and a provision for a keylock. The combination for the combination lock is set by the customer. The customer must provide the actual keylock cylinder and the key.

Through-the-Wall Bezel: Provides a frame around the through-the-wall portion of the 3614 mdls 2 and 12 and provides a casement for the hole in the wall.

Mounting Stand: Provides a support stand for the 3614 mdls 2 and 12, that comes in three different heights. Order one per order by height: 4 inches **(#9572),** 7 inches **(#9573)** or 10 inches **(#9574).**

Warranty: For 90 days commencing on the date of installation or thirty (30) days after shipment, whichever comes first, these accessories are warranteed free from defects in material and workmanship. IBM's obligation is limited to providing replacement parts on an exchange basis.

Delivery Instructions: Supplemental Specs for the Accessory Group must be submitted at least 90 days prior to the 3614 DP Friday schedule date. Because of installation requirements, the Accessory Group will generally be shipped three weeks prior to the 3614. Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate shipping destination of these items:

Line 1 - c/o (Name of Customer)
Line 2 - Customer Designated Delivery Point (Note special considerations described below)
Line 3 - Street Address
Line 4 (etc.) - City, State, Zip

The "Heavy Duty Enclosure" included in this Accessory Group is, in effect, a steel safe with dimensions of approximately 43" x 28" x 63" and weighing approximately 2,800 lbs. It does not have casters and will be transported on a skid. The item will be shipped via common carrier to the delivery point designated by the customer and will probably require special handling or rigging at destination. The customer should be advised that it is suggested this item be delivered directly to a local drayman that has the facilities to move an item of these dimensions and weight. The customer should then make local provisions to have the Accessory Group delivered for physical installation at the selected site. The plant will notify the DP Branch, via ITPS message, of shipment to destination indicated in the Supplemental Specs. Close coordination should be maintained with the customer, the appropriate physical planning groups, and Field Engineering.

Logo Panel (P/N 2750814): This is a purchase-only accessory. The personalization panel provides an area on the top half of the front of the 3614 that can be personalized by the customer (silk-screened, painted, etc.). The area is provided for customer name and/or advertising purposes. Additional logo panels may be ordered. If **#9401** is specified, logo panel will be shipped with 3614. If **#9402** is specified, logo panel will be shipped prior to 3614.

SUPPLIES (None)

3615 ADMINISTRATIVE PRINTER

PURPOSE

A printer for use with the 3601, 3602 or 4701 Finance Communication System to provide a hard-copy output of banking transactions.

MODELS

Model 1	001	Prints at 60 cps (local or remote loops)
Model 2	002	Prints at 120 cps (local loops only)

Prerequisites

1) An available position on a local or remote loop of a 3601, 3602 or 4701 Controller. If located remotely from the Controller, the remote location needs either a 3603 Terminal Attachment unit, a 3614/3624 Consumer Transaction Facility equipped with a terminal loop feature (#7820) and an appropriate modem, or a 3604 mdl 2, 3, or 4 equipped with a Line Feature Base (#4751 or #4752) and appropriate modem. If both a 3614/3624 and a 3604 mdl 2, 3, or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614/3624 since the 3614/3624 will often be operating when the 3604 mdl 2, 3, or 4 are not. (The 3615 mdl 1 will attach to local or remote loops. The 3615 mdl 2 will attach to local loops only).

2) Depending upon the configuration, the Add'l Storage Feature (#1005, #1006 or #1007) may be required on the 3601, 3602 Controller or #1008 on the 4701 Controller. See M3601, 3602 or 4701 pages.

HIGHLIGHTS

The 3615 printer provides a hard-copy output on a variety of cut forms and fan-fold continuous forms to meet the customer's printing requirement in banking applications. When combined with a 3604 Keyboard Display or 4704 Display Terminal, the 3615 provides a bank teller or officer with a workstation to use in performing banking administrative transactions. The 3615 printer can also be used alone for administrative printing of required reports. The forms can be those usually used for printing of one line or a number of lines. Speed ranges from 60 cps for the mdl 1 to 120 cps for the mdl 2. This microprocessor controlled printer is a bidirectional matrix printer with high-speed tabulation (mdl 1 only) and indexing capability to avoid unnecessary print head movement. The printer dot matrix is 4 to 7 wide by 8 high. The 3615 prints up to 132 print positions with character spacing at 10 to the inch. Line Spacing is 6 lines to the inch. Up to 6-part forms (total thickness -- 0.18") may be used. 5- and 6-part forms should be tried on an individual basis for acceptable feeding registration and print quality. For continuous fan-fold forms, the Variable-Width Forms Tractor (#8700) is required. Maximum overall width is 381mm (15") for continuous forms and 355.6mm (14") for cut forms. Card stock forms are not recommended.

Forms Specification: Refer to *Form Design Reference Guide for Printers,* GA24-3488.

Publications: GC20-0370

SPECIFY

- Voltage (115V, 1-phase, 60 Hz): **#9880** for locking plug **#9881** for non-locking plug. **Field Installation:** Not recommended.
- Cables: See M3601 or 3602 pages for ordering instructions. Also see *Installation Manual - Physical Planning,* GA27-2766.

SPECIAL FEATURES

Variable-Width Form Tractor (#8700): A forms feeding device for continuous edge-punched fan-fold forms. Overall forms width from 3 to 15 inches can be fed. This feature is required for use of continuous forms. Friction fed cut forms may also be used without removing the forms tractor. In this case, printing is limited in 127 print positions. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

The following item is available on a purchase-only basis. For shipment with the machine, order the feature number indicated below.

FORMS STAND (#4450): Permits feed of continuous forms from the carton and provides for forms stacking after printing. This accessory is a one-shelf forms stand.

SUPPLIES

Ribbons: P/N 1136653, or equivalent, is required.

3616 PASSBOOK AND DOCUMENT PRINTER

PURPOSE

A matrix printer used on the 3601, 3602 or 4701 Finance Communication System to print on passbooks, journal, and a variety of forms and documents.

MODELS

Model 1 001 Maximum print speed of 120 cps

Prerequisites:

1. An available position on a local or remote loop of a 3601, 3602 or 4701 Controller. If located remotely from the Controller, the remote location must have either a 3603 Terminal Attachment Unit, a 3614/3624 Consumer Transaction Facility equipped with a Terminal Loop Feature (#7820) and an appropriate modem, or a 3604 Keyboard Display mdl 2, 3 or 4 equipped with a Line feature Base (#4751 or 4752) and appropriate modem . If both a 3614/3624 and a 3604 mdl 2, 3 or 4 are installed in the same remote location, it is recommended that the loop modem be located with the 3614/3624 since the Consumer Transaction Facility may be operating when the 3604 mdl 2, 3 or 4 is not.
2. Depending upon the configuration, an Additional Storage Feature #1005, 1006 or #1007 on the 3601, #1006 or #1007 on the 3602, or #1008 on the 4701 Controller may be required ... see M3601, 3602 or 4701 pages.

HIGHLIGHTS

The 3616 printer provides the ability to print on a variety of forms and passbooks to meet printing requirements of financial applications. The printer, when combined with a 3604 Keyboard Display or 4704 Display provides a teller or other operator with a full function workstation capable of handling a wide range of financial transactions. The printer is a bi-directional matrix printer. The printer dot matrix is 4 of 7 wide by 8 high.

The printer has two separate print stations serviced by one print head. The passbook print station can print up to 100 characters on passbooks or single or multipart cutforms requiring single or multi-line printing. The basic machine accepts horizontal fold passbooks of a variety of sizes. Print spacing and line indexing are both program selectable, spacing at 10 or 12 characters per inch, indexing at 5 or 6 lines per inch. (**Note**: For Vertical Fold Passbook Feature (#8701) limitations. see *Forms Design Reference Guide,* GA24-3488.)

The journal print station prints up to 57 characters on a 1-part or 2-part journal paper, with a locked internal take-up roll. Journal entries are visible after the entire line is printed, and remain visible for several entries thereafter. The journal may be manually advanced, but not reversed. Cutforms may be inserted in front of the journal for validation type printing of one line of print in a fixed location on the lower left-hand corner of the document. Print spacing is program selectable at 10 or 12 characters per inch. Journal indexing is nominally 6 lines per inch.

In either station, wide bold characters may be printed at 5 or 6 characters per inch. The customer may define and use up to 16 special characters, addressable separately from the basic character set, by defining their matrix character patterns via CPGEN.

The printer has eight operator status lights, including three user programmable. The machine has two separated Start pushbuttons which may be used to identify individual tellers to the 3601, 3602 or 4701 controller when two tellers are sharing the printer.

The 3616 provides address sharing between like and unlike devices. That is, two 3616s or a 3616 with a 3604 (that has RPQ MG1586) or a 3616 with a 4704.

Forms Specifications: Refer to *Forms Design Reference Guide for Printers,* GA24-3488.

Publications: GC20-0370

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug or **#9891** for nonlocking plug. **Field Installation:** Not recommended.
- Color: The standard color for this unit is pearl white. The accent color must be specified, either **#9065** for pebble gray or **#9068** for raven black.

  Field Installation: Not recommended.
- Cables: See M10000 pages for ordering instructions. Also see *Installation Manual - Physical Planning,* GA27-2766.
- Journal Security Feature: Provides a change in the covers so that a cutform cannot be inserted in front of the journal. Specify **#9351. Limitations:** Not compatible with Two Part Journal. **Field Installation:** Not recommended.

SPECIAL FEATURES

Vertical Fold Passbook (#8701): Provides modifications to basic machine to enable it to accept a single size of vertical fold passbook in the passbook station. The size is adjustable by CE at initial installation. (For details and limitations, see *Forms Design Reference Guide,* GA24-3488). **Maximum:** One. **Field Installation:** No.

TERMS and CONDITIONS

Plan Offering: Plan D
Purchase Option: 55%
Base Term: 60 months
Machine Group: D
Warranty: B
Per Call: 1
Termination Charge Percent: 20%
Termination Charge Months: 6
Upper Limit Percent: 5%
Initial Period of Maintenance Service: 3 months
Educational Allowance: None
Customer Setup: No
Pre-Installation Test Allowance: None
Non-field Installable Feature/Model Conversions: Yes
Repair Center Service: No
Central Facility Maintenance Service: No
Deferred Central Facility Maintenance Service: No
Pilot Test Plan: Yes

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Ribbon: A black ribbon, P/N 7034635 or equivalent, is required.

Paper: 100 foot single journal roll action paper P/N 7034705 or 50 foot 2-part journal roll action paper P/N 7034707. **Note:** A journal roll installed in place is required at all times.

3624 CONSUMER TRANSACTION FACILITY

PURPOSE

An unattended self-service banking terminal that issues variable amounts of money, accepts deposits, and performs other financial transactions . Other documents, such as travelers checks, may be dispensed if they complete a document issue qualification test successfully . Attaches to a 3601 or 3602 or 4701 Finance Communication Controller via loop or to a virtual storage S/370 or 4331 or 4341 processor via SDLC through a 3704, 3705 or 3725 Communications Controller. Communication is also possible via a Communications Adapter feature on a 4321 or 4331 Processor. A virtual storage S/370 attachment is also available via BSC through a 3704, 3705 or 3725.

MODELS

Model 1 001 — Lobby - Single Document Feed Mechanism. For use inside a building in a secure attended location. The basic model includes a single cartridge feed station, card reader, user guidance keyboard and display unit and is suitable for counter-top or free-standing mounting Also includes covers and front trim paneling. The covers contain locking handle, with a standard key, and provision for customer insertion of an additional keylock cylinder. A backlighted logo panel, required for installation of lobby mdl, is available as a purchase accessory. A pedestal is available as a purchase accessory to mount the basic lobby model. A pedestal base is included as part of the depository special feature when the depository is added to the basic mdl.

Model 2 002 — Through the Wall - Single Document Feed Mechanism. For outdoor, vestibule, drive-up, and otherwise less secure, unattended locations to provide availability on a 24-hour basis. The basic mdl includes a single cartridge feed station, card reader, user guidance keyboard, and display unit and has provision for mounting the currency dispensing and depository mechanisms inside a heavy-duty security enclosure. Covers are provided for the components not contained within the heavy-duty enclosure. A heavy-duty enclosure, pedestal base for mounting the enclosure, through-the-wall bezel, front trim paneling, and logo panel, for through-the-wall installation are available as purchase accessories.

Model 11 011 — Same as model 1 but with dual document feed mechanism. Provides capability to issue the same or two different denominations in a single transaction; to load the same denomination in both dispensers, effectively doubling the bill capacity of a single denomination model 1 3624; or to issue currency and other documents as separate transactions (e.g., cash and travelers checks).

Model 12 012 — Same as model 2 but with dual document feed mechanism. Provides capability to issue the same or two different denominations in a single transaction; to load the same denomination in both dispensers, effectively doubling the bill capacity of a single denomination model 2 3624; or to issue currency and other documents as separate transactions (e.g., cash and travelers checks).

Prerequisites: Each 3624 must be either loop-attached to a 3600/4700 or direct-attached to a S/370 or 4300 processor via SDLC communications through a 3704, 3705 or 3725 or to a S/370 via BSC Communication through a 3704, 3705 or 3725. Also attaches via a Communications Adapter feature on the 4331 Processor.

For Loop Attachment to a 3600/4700 -- there must be an available position on a local or remote loop of a Controller. The 3624 must have Terminal Loop Feature (#7820). If located remotely from the Controller, the 3624 can be attached to a remote loop via any of the following: [1] Directly, using 1200 bps Loop Integrated Modem (#8001). [2] Via subloop through a 3603 mdl 1 or 2 Terminal Attachment Unit for 1200 bps or 3603 mdl 2 for 2400 bps. [3] Via subloop through a 3604 mdl 2, 3, or 4 that is equipped with Line Feature Base (#4751 or #4752) and an appropriate modem. [4] (3600 Controller only) Via subloop through a 3614 that is equipped with Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001). [5] Via subloop through another 3624 that is equipped with Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001). **Note:** The 3624 does not require the 1200 bps Loop Integrated Modem (#8001) if the 3624 is attached to a remote loop via subloop through a 3603, 3604, 3614, 3624 or if the 3624 is attached to a local loop. It is recommended that the 3624 not be attached through a 3604, as the 3624 might often be operating while the 3604 is not, e.g., weekends and holidays.

For Direct Attachment to a S/370 or 4300 Processor -- S/370 or 4300 Processor requires a virtual storage processor and a 3704, 3705 or 3725 Communications Controller or via the Communications Adapter feature on the 4331 that is equipped with appropriate features to communicate with 3624 via SDLC (see M3704, 3705, 3725 or 4331 pages). The 3624 must have SDLC Communications feature (#6301 or #6302) for S/370 or 4300 Processor attachment or BSC Communications feature (#1421 or #1422) for S/370 attachment.

Encryption modules BQKDES is required with 3600 or 4700 Host Support Independent Release program. See HONE for the feature numbers used to order these modules on the 3600 or 4700 Host Support IR. Source listings are not orderable for, nor supplied with, these modules. Customers should be informed of this fact before the 3624 is ordered.

Depending on the configuration, Add'l Storage Feature (#1005, #1006 or #1007) may be required on the 3601; or Add'l Storage Feature (#1006 or #1007) may be required on the 3602 or Add'l Storage (#1008) may be required on the 4701. See M3601 or 4700 pages.

For 3624 mdls 1 and 11: Pedestal, Lobby (#5510) is available as an option for free-standing lobby configuration without depository feature (see "Accessories"). Purchase only. **Note:** A pedestal is included with the Depository special feature.

For 3624 mdls 2 and 12: The following units are required for through-the-wall installation: [1] Heavy-Duty Enclosure, Single Function (#3901) or Dual Function (#3902). **Note:** Single function enclosure cannot be field-modified to a dual function enclosure. [2] Bezel, Through-the-Wall, recessed or non-recessed. Recessed Bezel (#1490) is recommended for walk-up configuration. Non-recessed Bezel (#1491) is recommended for drive-up configuration, [3] Front Dress Panel (#3951). Front Trim Border, With Envelope Holder (#3961) or Without Envelope Holder (#3962). [4] Pedestal for single function heavy-duty enclosure (#4901) or dual function heavy-duty enclosure (#4902) is optional for mounting heavy-duty enclosure at appropriate height for walk-up or drive-up use. Storage Cabinet (#4903) is optional when mounting dual function heavy-duty enclosure without pedestal. **Note:** Storage cabinet is included with Pedestals (#4901 and #4902). (See "Accessories" for descriptions and ordering information.) Purchase only.

Logo Panel -- Required on all 3624 mdls. Shipment of logo panel is determined by the following specify codes: [1] Specify **#9401** if panel is to be shipped with the 3624. [2] Specify **#9403** if panel is not to be ordered with the 3624 as it will either be ordered separately by P/N through an MES or ordered under specify code **#9402** on another 3624. [3] Specify **#9402** if panel(s) to be shipped prior to the 3624. **Note:** Specify code **#9402** can be used to order more than one panel if customer desires to have several panels delivered before the 3624 (e.g., for customization at one time). See "Specify" and "Accessories". Purchase only.

Currency Cartridge -- For 3624 mdls 1 and 2: One is required. For 3624 mdls 11 and 12: Two are required. Currency cartridges are not included with basic 3624 and must be ordered separately. Spare cartridges are recommended for convenience of operation; a minimum of one spare cartridge for mdls 1 and 2 and two spare cartridges for mdls 11 and 12 must be made available by the customer to the CE for normal 3624 maintenance. Purchase only. See Customer Responsibilities in "Accessories" for installation and maintenance requirements.

HIGHLIGHTS

Cartridge Loading -- currency cartridge provides for quick, easy loading and convenient, tamper-resistant transportation of the currency.

Issues Cash -- issues one (mdls 1 and 2) or two (mdls 11 and 12) denominations up to a maximum of 20 bills from a choice of accounts. Issues all bills at one time in a single stack; no pre-packaging or packets are used.

Individual Document-Feed Control -- allows each cartridge drive station on dual-feed mdls 11 and 12 to be associated with separate transactions (e.g., cash or travelers checks).

Accepts Deposits -- allows user to make a deposit to choice of accounts. Built-in depository envelope holder available as an accessory on mdls 2 and 12. Envelope holder included with depository on mdls 1 and 11.

Cash-Check -- a single transaction that allows cash to be issued to user, following deposit of a check.

Accepts Payments -- allows user to make various payments by depositing cash or check or by having funds deducted from user's account.

Depository Cartridge Locking System -- depository cartridge and locking mechanism prevents removal of cartridge from machine unless cartridge is closed and locked; reduces need for dual-custody depository servicing.

Depository Envelope Printer -- prints unit and sequence number on envelope as it is deposited.

3624 Consumer Transaction Facility (cont'd)

Additional Transactions -- provides account balance inquiry, funds transfer transaction, and special transactions.

Keyboard/Guidance -- comprehensive set of function keys and customized display messages step a user through a transaction. Keyboard and transaction functions can be modified through programming. Option for either numeric or alphameric keypad.

Multiline Display -- special feature provides 240-character, 6-line display. Includes additional display-related user response capability for expanded interaction between user and machine.

Transaction Chaining -- allows user to perform a series of transactions with a single insertion of a magnetic stripe card.

Transaction Statements -- can print and issue individual statements or messages to user.

Journaling -- can print and retain documents within the 3624.

Backlighted Logo -- backlighted logo panel that can be customized, extending across full width of the front panel.

Host/Subhost Attachment -- allows attachment to host CPU either directly via SDLC/BSC or through subhost 3600 or 4700 Controller via loop communications. Offhost operation at 3600 or 4700 is possible.

Encrypt/Decrypt -- encryption of sensitive data for communication line transmission. Uses the U.S. Federal Information Processing Data Encryption Standard (DES) algorithm.

Multi-institution Usage -- provision to accept magnetic stripe cards of many different card issuers. Base capacity of issuer identifier table within 3624 can be expanded by table overflow request message to host or with Add'l Storage special feature in 3624.

Personal Identification -- user account is identified through reading magnetic stripe card. To validate the identity of the person using the card, a personal identification number (PIN) is used. Validation of PIN (up to 16 digits) may be performed in the 3624 and/or host/subhost support system.

Installation Configurations -- can be installed inside a building, for lobby use; or through-the-wall of a building, for walk-up or drive-up use.

Multiple Languages -- capability to display different languages based on identifier code recorded on magnetic stripe card.

Third Track -- special feature provides reading and writing third track data recorded on magnetic stripe card.

Add'l Storage -- special feature provides additional memory for expanding the number of custom messages and Financial Institution Table entries.

Modular Packaging -- for mdl 2 or 12 through-the-wall installation; currency dispenser and depository mechanisms are housed in a heavy-duty enclosure independent of other functional modules.

Compatibility -- 3614 family compatibility, designed to minimize transition requirements.

Security -- Mdls 2 and 12 installed with heavy-duty enclosure and through-the-wall installation accessories meet security requirements of UL291 and comply with the intent of U.S. Federal Regulation P for unattended automated paying and receiving machines used when banking offices are closed.

Installation Units and Accessories: Heavy-duty enclosure, through-the-wall bezel, optional pedestal base, front dress panel and front trim border are required for installation of through-the-wall mdls 2 and 12 and are available as purchase-only accessories.

Walk-up Configuration: Recessed through-the-wall bezel, designed to provide a shelf surface for the user, is recommended for walk-up use.

Drive-up Configuration: Non-recessed through-the-wall bezel, designed to position the user area nearer the outer wall surface, is recommended for drive-up use.

Pedestal for mounting lobby mdls 1 and 11 is available as an optional purchase-only accessory.

Logo panel and cartridges are required for installation of all mdls and are available as purchase accessories.

Customer Responsibilities, Installation Facilities -- Because the 3624 mdl 2 or 12 attaches to customer premises, installation of cables, pedestal, heavy-duty enclosure, through-the-wall bezel, front dress panel, front trim border, and logo panel are customer responsibilities; the customer is also responsible for site preparation, such as cutting a hole in the wall. Installation of cables and site preparation are customer responsibilities also, for 3624 lobby mdls 1 and 11.

Keylocks -- Covers included with lobby mdls 1 and 11 have a locking handle, with a standard key, and provide for customer insertion of an additional keylock cylinder. Covers included with through-the-wall mdls 2 and 12 have a keylock cylinder, with a standard key. Cabinet doors, included in all pedestals, have a keylock cylinder, with a standard key. The Dial Keylock available for the combination lock on the heavy-duty enclosure includes standard key. Currency cartridges provide for customer insertion of a keylock. Depository cartridge used with depository cartridge locking feature requires customer insertion of the depository keylock. Depository locking mechanism in 3624 requires customer installation of the depository cartridge locking key. If the customer desires to change the locks and/or keys included with these units or to install additional keylock cylinders where provided for, he is responsible for their procurement and installation.

Machine Maintenance -- IBM will not provide warranty or maintenance service on a 3624 containing money. The customer will be responsible for removing, controlling, and reloading all money in the 3624 so that IBM can fulfill its warranty and maintenance obligations.

Accessories Maintenance -- The customer is responsible for maintenance and parts procurement on all accessories.

If requested by the customer, FE will provide on-site service (on a per call billable basis) for the door mechanism (excluding lock) in the heavy-duty Enclosure. The FE can also perform (on a per call billable basis) the replacement of the following accessories: front dress panel, bezel and trim border, logo lamps, logo lamp ballast assembly, currency area lockoff panel, currency area lockout panel lock assembly, storage cabinet, storage cabinet lock assembly, storage cabinet door hinges, logo panel, envelope holder lock and heavy-duty enclosure combination lock (lock replacement available only where licensing and bonding requirements permit). IBM services for repair or replacement of the above accessories will be on a per call billable basis. During the warranty period, parts for all accessories will be provided (when required), by IBM at no cost to the customer. For the post-warranty period, all accessory parts can be purchased by the customer through IBM. Currency and depository cartridge servicing can also be provided by FE on a per call billable basis.

> **Notes:** (1) Customer must arrange for DFM removal prior to CE replacement of DFM Slides. (2) Replacement of the heavy-duty enclosure door or door hinges remains a customer responsibility.

Currency Cartridge -- The 3624 Currency Cartridge is a purchase-only accessory and not included with the basic 3624. One cartridge for mdls 1 and 2 and two cartridges for mdls 11 and 12 are necessary for installation check-out and operation of 3624. Mdls 11 and 12 may also be operated with a single cartridge only. Cartridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machine. The customer is responsible for determining if the cartridge is the failing unit; for providing cartridge for CE 3624 maintenance and testing (a minimum of one spare cartridge for mdls 1 and 2 and two spare cartridges for mdls 11 and 12 must be made available by customer to the CE for normal 3624 maintenance) and for setting the keying system on the cartridges and drive stations so that there is the desired match of currency denomination to drive station. See Customer Responsibilities in "Accessories" for installation and maintenance requirements.

Currency Sorting -- To achieve satisfactory operation, the customer must ensure that only new currency and good-quality used currency are used in the 3624. The general condition of used currency may vary. Used currency must be inspected to remove excessively worn, damaged, or torn bills. The *IBM 3624 Operator's Guide,* GA66-0006, and *IBM 3624 Cartridge Owner's Manual,* GA66-0005, contain procedures for preparation of new currency and inspection of used currency for operation in the 3624. For the 3624 mdls 11 and 12, the customer must ensure that each feed mechanism is loaded with the proper denomination currency. The cartridges contain a keying mechanism which can be set by the customer to ensure a match between specific cartridges and cartridge drive stations.

Printer Ink Rolls -- The customer is responsible for procurement and replacement of ink rolls in transaction statement and depository printers.

Logo Lamp -- The customer is responsible for procurement and replacement of the lamp in the logo panel light assembly.

Damage -- IBM is not responsible for intentional damage to the 3624 or any 3624 accessories. Repair of such damage is not covered under the IBM Maintenance Contract, Lease Agreement or Pilot Test Plan. Repair of such damage at cost of time and materials will be made to leased and pilot test machines and can be provided for purchase machines.

System Integrity -- Subhost operation, under control of the 3600 or 4700 Finance Communication Controller, requires customer systems design and support. Maintenance of system integrity in the subhost is a customer responsibility.

IBM is not responsible for any loss of money to the financial institution or its customers through the use of the 3624.

Third Track System Security Statement -- Customers ordering Third Track feature (#7950) must be advised that:

"IBM believes that the system security is optimized in an online environment, where PIN validation and transaction authorization can be performed in conjunction with positive-file data bases. The scope of

3624 Consumer Transaction Facility (cont'd)

security exposure expands with the degree of offline implementation, for which the Third Track might be used. The U.S. Federal Information Processing Data Encryption Standard (DES) algorithm is utilized to provide cryptographic security in the 3624 and may be used in conjunction with the third track application. IBM recommends that the customer consider using DES for this purpose. An optional security feature of the proposed ANSI/ISO Third Track Data Content standard is a Crypto Check Digits (CCD) field in the card, which may be used to relate the data elements of track 3 to the magnetic stripe. This does not imply, however, that its use is not subject to fraud techniques. ANSI/ISO has not prescribed using the optional CCD field or any specific CCD implementation technique. IBM recommends that the customer consider its value in his application, weighing possible enhancements in security with economic and performance implications for his system. IBM will continue to pursue a course of action with customers and industry to maintain a high level of system security.

IBM reserves the right to modify the parameters of the Third Track functions if the parameters of the final ANSI/ISO standard differ from those now in the process of standardization. However, this reservation of rights is not intended nor should it be construed as a commitment by IBM to support parameters different from those published by ISO/DIS 4909-June 1976."

Publications: GC20-0370

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9911** for 120V (usable on 115V).
- Cabling: Refer to *Installation Manual-Physical Planning,* GA27-2766 and GA26-1658. Also see M3601 and 3602 pages.
- Numeric or Alphameric Keyboard Arrangement:

  Specify **#9301** for numeric-only keypad. Specify **#9302** for alphameric keypad. Alphameric arrangement is the basic touch-pad telephone format with the Q and Z added over the numeric "0" and no alpha over the numeric "1" or Specify **#9303** for alphameric keypad. Alphameric arrangement is the *American Banking Association Standard* format with the Q and Z over the numeric "1" and no alpha over the numeric "0". All are field installable.
- Currency Cartridge: See "Accessories" for ordering instructions.
- Currency Denomination: **#9091** U.S. 5, 10, 20 dollar.
- Keyboard: Specify one of the following for standard keyboard; an RPQ should be submitted for any keyboard not shown below. All are field installable. The Change key allows the user to request a change in the denomination mix to be issued on mdls 11 and 12. The change key is used also, on all mdls, to page displays with the Multiline Display feature (#4750).

Specify Number		Transaction Type									From Acct/ To Acct			
Without Change Key (all mdls)	With Change Key (mdls 11/12) or All Mdls with #4750	Withdrawal	Special (3)	Balance	Transfer	Deposit (2)	Pmt Enclosed (2)	Pmt from Acct (2)	Cash Check (2)		Checking	Savings	Cr Card	Other
#9351	#9451	(1)									(1)			
#9352	#9452	(1)									0	0	0	
#9353	#9453	0		0							0	0	0	
#9354	#9454	0	0								0	0	0	0
#9355	#9455	0	0	0							0	0	0	
#9356	#9456	0	0	0							0	0	0	0
#9357	#9457	0	0	0	0	0	0	0			0	0	0	0
#9358	#9458	0	0	0		0					0	0	0	0
#9359	#9459	0	0	0	0						0	0	0	0
#9360	#9460	0	0	0		0					(1)			
#9361	#9461	0	0	0							(1)			
#9362	#9462	0	0	0	0	0	0	0	0		0	0	0	0
#9363	#9463	0	0	0		0			0		0	0	0	0
#9364	#9464	0	0	0		0			0		(1)			

Notes:
(1) Key position does not appear on the keyboard panel; single function is selected automatically.
(2) Prerequisites: Depository #3233, #3234, #3243 or #3244.
(3) Prerequisites: Depository #3233, #3234, #3243 or #3244 if any Special transactions are customized to require a deposit step.

- Logo Panel Group: Specify **#9401** if logo panel is to be shipped with the 3624. Specify **#9402** if logo panel(s) is to be shipped prior to the 3624. (**Note**: More than one panel may be ordered on specify code **#9402** if customer desires to have several panels delivered before the 3624 (e.g., for customization at one time). Specify **#9403** if logo panel is not to be ordered with 3624 and will be ordered separately by P/N through MES or has been ordered through specify code **#9402** on another 3624. See "Accessories" for ordering information. Purchase only.
- Controller-Data Designation: 1st and 2nd position designation is required to control distribution and maintenance of controller-data media necessary for 3624 load images. Specify either **#9491** or **#9492** as follows:

  1st Position Designator (**#9491**). Used to determine controller-data set to be distributed to host-system location. One 3624 attached to a host-system processor is specified **#9491**.

  2nd Position Designator (**#9492**). Used to identify additional 3624s attached to host-system. Controller-data set media are not distributed to host-system location for any 2nd position designated 3624s.

  When 1st position **#9491** is specified, also specify one of the following:

  If magnetic tape is used at the host system location:

#9412	9-track	800 bpi
#9413	9-track	1600 bpi
#9414	9-track	6250 bpi

  If magnetic tape is not used at the host system location (DOS/VS users only):

#9431	80-Column cards
#9432	96-column cards

  When 1st position **#9491** is specified, additional information is required to determine the shipping address of the controller-data media. Supplemental Specifications are to be entered exactly as follows to indicate the shipping address of the host system location:

3624 Consumer Transaction Facility (cont'd)

Line 1--IBM Programming Support Representative (PSR)
Line 2--C/O (Name of Customer)
Line 3--Street Address (or PO Box Number)
Line 4 (etc.)--City, State, Zip Code

This is the address to which controller-data media will be automatically shipped after the first 3624 is ordered.

Changes to 1st Position Designators for On-order and Installed 3624s: If a 1st position **#9491** 3624 is deferred, cancelled, or discontinued and 2nd position **#9492** 3624s have been specified, then one 2nd position 3624 must be altered from 2nd to 1st position (from **#9492** to **#9491**) to ensure continued distribution of controller-data media to host system location. When altering a 3624 to 1st position, include all items as required to be specified when **#9491** is specified (items specified on previous 1st position 3624). If the host system location changes the input medium (e.g., from 1600 bpi to 6250 bpi tape), the media specify code must be changed on the 3624 with **#9491** specified. In this case, the former media specify code must be deleted and the new one added by MES.

SPECIAL FEATURES

Add'l Storage (#1301): Provides an additional 2,048 bytes of storage. The user can utilize this to increase the number of custom messages, entries in Financial Institution Table, and as might be necessary for RPQs. To determine the number of additional storage features required, see GC66-0009, *IBM 3624 Programmer's Reference Manual and Component Description.* **Maximum:** Two if without Multiline Display (#4750). Five if with Multiline Display (#4750). **Field Installation:** Yes. **Prerequisites:** Storage Expansion Feature (#6501) is required for either: [1] First Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and SDLC Communications Feature (#6301 or #6302) [2] Or third Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and Terminal Loop Feature (#7820) , [3] Or first Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and BSC Communications feature (#1421 or #1422).

BSC Communications With Clocking (#1421): Provides capability to attach to a host system (e.g., S/370) via BSC. Required for attachment to communications facilities through the IBM 1200 bps Integrated Modem (#5500), or through the EIA Interface (#3701) to any 1200 bps external modem which does not have internal clocking. **Limitations:** Cannot be installed with Terminal Loop (#7820), SDLC Communications feature (#6301 or #6302), BSC Communications Without Clocking (#1422), or 1200 bps Loop Integrated Modem (#8001). **Maximum:** One. **Field Installation:** Not recommended for field installation if Terminal Loop (#7820) or SDLC Communications feature (#6301 or #6302) is installed. Can be changed from BSC Communications Without Clocking (#1422) to BSC Communications With Clocking (#1421). **Prerequisites:** IBM 1200 bps Integrated Modem (#5500) if no external modem, or EIA Interface (#3701) if external modem. **Transmission:** This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages.

BSC Communications Without Clocking (#1422): Provides capability to attach to a host system (e.g., S/370) via BSC through 3704, 3705 or 3725. Required for attachment to communications facilities through the EIA Interface (#3701) to any external modem which provides internal clocking speeds up to 4800 bps. **Limitations:** Cannot be installed with Terminal Loop (#7820), SDLC Communications feature (#6301 or #6302), BSC Communications With Clocking (#1421), IBM 1200 bps Integrated Modem (#5500), or 1200 bps Loop Integrated Modem (#8001). **Maximum:** One. **Field Installation:** Not recommended for field installation if Terminal Loop (#7820) or SDLC Communications feature (#6301 or #6302) is installed. Can be changed from BSC Communications With Clocking (#1421) to BSC Communications Without Clocking (#1422). **Prerequisites:** #3701. **Transmission:** This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages. **External Modems:** IBM external modems that may be attached are:

3863 Mdls 1	2400/1200	bps	Nonswitched
3864 Mdls 1	4800/2400	bps	Nonswitched
3872 Mdls 1	2400/1200	bps	Nonswitched

Depository Cartridge Locking (#3150): [Mdls 2, 12] Provides locking mechanism in the depository that prevents removal of the depository cartridge unless it is closed and locked. Operates with Depository Cartridge (#3155). See "Accessories" for purchase of cartridges. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3243. Minimum of one #3155 is required for operation.

Depository Cartridge (#3155): [Mdls 2, 12] Portable container for receiving and transporting deposits. Required for operation with Depository Cartridge Locking Feature (#3150).

Depository, Lobby (#3233): [Mdls 1, 11] Provides envelope transport mechanism leading from a controlled access slot to deposit receptacle inside the 3624. The depository transport is designed to discourage tampering with previously inserted deposits. Includes a pedestal stand, with lockable rear access door and standard key, and a built-in depository envelope holder. Deposit envelopes may vary in size from 88.9mm x 152.4mm (3.5 x 6.0 in.) to 114.3mm x 247.7mm (4.5 x 9.75 in.) and shall be constructed of paper having basis weight of sub 20 through sub 28. Maximum thickness of a deposit envelope and its contents is 12.7mm (0.5 in.). **Limitations:** Cannot be installed in Pedestal, Lobby (#5510). **Maximum:** One. **Field Installation:** Yes.

Depository, Through-The-Wall (#3243): [Mdls 2, 12] Provides envelope transport mechanism leading from a controlled access slot in the security enclosure to deposit receptacle inside the 3624. In addition to the controlled access slot in the security enclosure, the depository transport is designed to discourage tampering with previously inserted deposits. Deposit envelopes may vary in size from 88.9mm x 152.4mm (3.5 x 6.0 in.) to 114.3mm x 247.7mm (4.5 x 9.75 in.) and shall be constructed of paper having basis weight of sub 20 through sub 28. Maximum thickness of a deposit envelope and its contents is 12.7mm (0.5 in.). **Limitations:** Cannot be installed with Heavy-Duty Enclosure, Single Function. **Maximum:** One. **Field Installation:** Yes. **Note:** Field installation requires Heavy-Duty Enclosure, Dual Function to have been initially ordered. **Prerequisites:** Heavy-Duty Enclosure, Dual Function.

Depository Printer (#3245): Prints sequence number on envelope as it passes through the depository throat. Six numeric digits are printed horizontally at repeated intervals along the envelope. Three digits are set by customer engineer to identify unit, and three digits are automatically sequenced when envelope passes print station. The depository ink roll is P/N 457149. It is customer's responsibility to purchase and replace the ink roll when required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3233 or #3243.

Currency Area Lockoff (#3312): [Mdls 2, 12] Provides a security panel to enclose the currency area. Enables the document feed mechanism to be locked in the machine. When used with the Depository Cartridge Locking feature (#3150), it restricts access to the currency area during normal operational servicing of the depository and/or other areas of the 3624. Includes keylock and standard key. Available only when installed with the Heavy-Duty Enclosure, Dual Function (#3902).

EIA Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external modem for communications attachment to the processor via BSC through the 3704, 3705 or 3725 SDLC through the 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500) or Terminal Loop Feature (#7820). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #6302 or BSC Communications Feature (#1421 or #1422).

Multi-line Display (#4750): Displays up to 240 characters (six lines of 40 characters each). Characters are presented in predefined 7x9 and 7x7 dot matrices for upper-case alphameric, special characters, and language-unique characters, including the Hebrew alphabet. Additional interactive functions are provided for expanded communications between the user and the attached host. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] The change key is required if display paging. See "Keyboard Specify". [2] Increased storage may be required to support larger size of display and additional interaction function. See Add'l Storage Feature (#1301) and Storage Expansion Feature (#6501).

IBM 1200 bps Integrated Modem (#5500): Provides an internal modem for communications attachment to the processor via SDLC /BSC at 1200 bps over nonswitched half-duplex or duplex voice-grade lines. **Limitations:** Cannot be installed with Interface (#3701), SDLC Communications Feature Without Clocking (#6302), BSC Communications Without Clock (#1422), Terminal Loop Feature (#7820), or 1200 bps Loop Integrated Modem (#8001). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 , #1421. **Specify:** **#9651** for 4-wire strapping or **#9652** for 2-wire strapping.

SDLC Communications With Clocking (#6301): Provides capability to attach to a host system via SDLC, e.g., S/370 or 4300 processor through 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Required for attachment to communications facilities through the IBM 1200 bps Integrated Modem (#5500), or through the Interface (#3701) to any 1200 bps external modem which does not have internal clocking. **Limitations:** Cannot be installed with Terminal Loop Feature (#7820), SDLC Communications Without Clocking (#6302) or 1200 bps Loop Integrated Modem (#8001) or BSC Communications Feature (#1421 or #1422). **Maximum:** One. **Field Installation:** Not recommended for field installation if Terminal Loop Feature (#7820) or BSC Communications Feature (#1421 or #1422) is installed. Can be changed from SDLC Communications without Clocking (#6302) to SDLC Communications With Clocking (#6301). **Prerequisites:** #5500 if no external modem, or #3701 if external modem. **Transmission:** This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages.

3624 Consumer Transaction Facility (cont'd)

SDLC Communications Without Clocking (#6302): Provides capability to attach to a host system via SDLC, e.g., S/370 or 4300 Processor through 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Required for attachment to communications facilities through the Interface (#3701) to any external modem which provides internal clocking speeds up to 4800 bps. **Limitations:** Cannot be installed with Terminal Loop Feature (#7820), SDLC Communications with Clocking (#6301), IBM 1200 bps Integrated Modem (#5500) or 1200 bps Loop Integrated Modem (#8001) or BSC Communication Adapter (#1421 or #1422). **Maximum:** One. **Field Installation:** Not recommended for field installation if Terminal Loop Feature (#7820) or BSC Communications Feature (#1421 or #1422) is installed. Can be changed from SDLC Communications With Clocking (#6301) to SDLC Communications Without Clocking (#6302). **Prerequisites:** #3701. **Transmission:** This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages.

External Modems: IBM external modems that may be attached are:

3863 mdl 1	2400/1200 bps nonswitched
3864 mdl 1	4800/2400 bps nonswitched
3872 mdl 1	2400/1200 bps nonswitched

Note: 4-wire Switched Network Backup is available on 3863 and 3864. For communications capability, product utilization, and features, see M2700, 3863 and 3864 pages.

Storage Expansion (#6501): Provides capability to add increments of Add'l Storage Feature (#1301) if Multiline Display (#4750) is installed. Required for either: The first Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and SDLC Communications Feature (#6301 or #6302), or Multiline Display (#4750) and BSC Communication Storage Feature (#1421 or #1422), or #1301 increment when ordered with Multiline Display (#4750) and Terminal Loop Feature (#7820). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4750.

Terminal Loop (#7820): Provides capability to attach to a 3600 or 4700 loop. Attachment to local loop is directly. Attachment to remote loop can be either directly or via remote subloop through a 3603, a 3604 mdl 2, 3 or 4, a 3614 or another 3624. **Limitations:** [1] Cannot be installed with SDLC Communications (#6301 or #6302) or BSC Communications Feature (#1421 or #1422) or Interface (#3701) or IBM 1200 bps Integrated Modem (#5500). [2] Remote loop speed is 1200 bps maximum when attached directly or via subloop through 3603 mdl 1, 3604, 3614 or 3624; is 2400 bps maximum via subloop through 3603 mdl 2. [3] Loop Integrated Modem (#8001) is not required if 3624 is attached to local loop, or via subloop to remote loop through 3603, 3604, 3614 or another 3624. **Maximum:** One. **Field Installation:** Not recommended for field installation if SDLC Communications (#6301 or #6302) or BSC Communications Feature (#1421 or #1422) is installed. **Prerequisites:** [1] Available position on the loop. [2] Depending on the configuration, the Add'l Storage Feature (#1005 or #1006 or #1007) may be required on the 3600 Controller, or Add'l Storage (#1008) may be required on the 4700 Controller. See M3600 or 4700 pages. [3] Attachment to a 3600/4700 local loop directly does not require additional feature. [4] Attachment to a 3601/3602 remote loop directly requires 1200 bps Loop Integrated Modem (#8001). [5] Attachment to a 3601/3602 remote loop via remote subloop requires one of the following: (1) 3603 Terminal Attachment Unit 3603 mdl 1 or 2 for 1200 bps; 3603 mdl 2 for 2400 bps; (2) 3604 mdl 2, 3, or 4 with Line Feature Base (#4751 or #4752) and appropriate modem; (3) 3614 with Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001); or (4) another 3624 with Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001). **Specify:** [1] For attachment to a 3601/3602/4701 local loop specify one of the following loop speeds: **#9062** for 1200 bps, **#9063** for 2400 bps or **#9064** for 4800 bps. [2] For attachment to 3601/3602 remote loop via subloop through 3603 mdl 1 or 2 at 1200 bps, specify **#9062**. [3] For attachment to 3601/3602/4701 remote loop via subloop through 3603 mdl 2 at 2400 bps, specify **#9063**. [4] For attachment to 3601/3602 remote loop via subloop through 3604, 3614, or 3624, specify **#9062** for 1200 bps.

Third Track (#7950): Provides for reading data on track 2 and/or both reading and writing data on track 3 of magnetic stripe card. Presently conforms to ISO/3554/AD1 Third Track Standard, and proposed Data Content Standard ISC/DIS 4909. Can read tracks 2 and 3 independently or in conjunction with each other. **Maximum:** One. **Field Installation:** Not recommended.

1200 bps Loop Integrated Modem (#8001): Provides an internal modem for attachment to 3601/3602 remote loop. Operates at 1200 bps over nonswitched unconditioned voice-grade lines. **Limitations:** Not required if 3624 is attached to a 3600 or 4700 remote loop through a 3603, 3604 mdl 2, 3 or 4, 3614 or another 3624, or if attached to a 3600 or 4700 local loop. If there are both a 3604 and a 3624 located at the same remote loop location that does not have a 3603 or 3614, it is recommended that the loop modem (#8001) be located on the 3624 because the 3624 might often be operating while the 3604 is not, e.g., weekends. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7820.

Transaction Statement Printer (#8201): Prints document showing record of transaction and issues to user through the transaction statement slot; prints documents for audit use that can be retained in a journal stacker in the 3624. Print feed hopper has capacity of 2,000 documents. Journal stacker has capacity of 400 documents. Data is printed on 96-column card stock 66.7mm x 82.6mm (2-5/8 x 3-1/4 in.). Provides a 57-character set consisting of 56 printable graphics and space (blank). Four lines can be printed with up to 34 characters per line (maximum of 136 characters on each document). The data to be printed is determined by the host application program. Printing is overlapped with currency issue and user deposit cycles. **Card Limitations:** The 96-column card stock used in the statement printer must not have corner cuts. Detailed disclosure specifications describing 96-column card stock are available from IBM Corporation, Commercial Development Office, Armonk, N.Y. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Installation Accessories: [Mdls 2, 12] (Purchase only) Provide heavy-duty steel enclosure. through-the-wall bezel, front trim border, front dress panel, and pedestal base for installation of mdls 2 and 12 in configurations suitable for walk-up or drive-up use.

A heavy-duty enclosure is required. Two heavy-duty enclosures are available. A single function enclosure houses the currency dispensing mechanism on mdls 2 and 12 that do not have a depository. A dual function enclosure houses both the currency dispensing and the depository mechanisms on mdls 2 and 12 that have a depository. The dual function enclosure can also be used to house the currency dispensing mechanism only, on mdls 2 and 12 that do not have a depository. Both enclosures have a single rear access door that includes a combination lock and provides for a dial lock. The combination of the combination lock is set by the customer. The dial lock must be procured by the customer. A second combination lock is available as an optional feature. Both enclosures have a penetration-detection alarm grid across the inside of the front face. Construction of the heavy-duty enclosures meets requirements of UL291 and complies with the intent of U.S. Federal Regulation P for unattended paying and receiving machines.

Pedestal bases are available in a number of sizes to mount the enclosure at a height most suitable for walk-up or drive-up use. The recommended nominal mounting heights are 1,308mm (51.5 in.) from keyboard centerline to walkway for walk-up use and 1,079mm (42.5 in.) from keyboard centerline to driveway for drive-up use. The difference in elevation between walkway or driveway and the mounting surface should be considered in selecting the pedestal height. Refer to *Installation Manual -- Physical Planning*, GA27-2766 and GA26-1658. A lockable storage cabinet with standard key is included in the pedestal base. A lockable storage cabinet only is also available that can be used with the dual function heavy-duty enclosure to mount the enclosure directly to a floor surface where a pedestal is not required.

A through-the-wall bezel, front trim border that fits around the bezel, and front dress panel that fits within the bezel are required. Two through-the-wall bezels are available: one with a recessed bezelproviding a convenient shelf surface for user and recommended for a walk-up installation, and another with a non-recessed bezel positioning the user guidance area near the outside wall surface for more convenient use by a vehicle occupant and recommended for a drive-up installation. Two front trim borders are available: one with an envelope holder for depository transactions, and another without an envelope holder.

Warranty: These accessories are warranted free from defects in materials and workmanship for 90 days, commencing on the day Monday through Friday, following the later of: 1) one month from the accessories estimated date of shipment, or 2) one month from the actual date of shipment, or 3) the date the 3624 is installed, as specified by IBM. IBM's obligation is limited to providing replacement parts on an exchange basis during the warranty period.

Delivery Instructions: Supplemental Specs for installation accessory items must be submitted at least 90 days prior to the 3624 Friday schedule date. Because of installation requirements, the heavy-duty enclosure and pedestal items will generally be shipped three weeks prior to the 3624. Other accessories will be shipped with the 3624. Supplemental Specs (via terminal entry) are to be entered exactly as follows to indicate destination of these items:

Line 1 - c/o (Name of Customer)
Line 2 - Customer Designated Delivery Point (Note special considerations described below)
Line 3 - Street Address
Line 4 (etc.) - City, State, Zip Code

The 3624 mdls 2 and 12 will be shipped as three separate packages. The first package includes the heavy-duty enclosure, pedestal/storage cabinet and I/O module. This unit will be shipped on a pallet and will be 45"x 55"x 83" in total size. The total weight

3624 Consumer Transaction Facility (cont'd)

of the unit with pallet is approximately 3,500 lbs (3,100 lbs for 3624 without pallet).

The second package will contain the bezel and trim border. This is a palletized container weighing approximately 190 lbs and has dimensions of 59 x 45 x 24 in., including pallet.

The third package will contain miscellaneous ship items. This is a palletized container which may weigh as much as 250 lbs (depending on features and quantities ordered) and has dimensions of 50 x 42 x 40 in. including pallet.

The item will be shipped via common carrier to the delivery point designated by the customer and may require special handling or rigging at destination. The customer should be advised that it is suggested this item be delivered directly to a local drayman that has facilities to move an item of these dimensions and weight. The customer then should make local provisions to have the enclosure delivered for physical installation at the selected site. The plant will notify the Branch, via ITPS message, of shipment to destination indicated in the Supplemental Specs.

Close coordination should be maintained with the customer, the appropriate physical planning group, and Field Engineering. Customer installation responsibilities should be noted as described in this section.

Heavy-Duty Enclosure, Single Function (#3901): [Mdls 2, 12] Used to enclose currency dispensing mechanism on 3624 mdls 2 or 12 that do not have a depository. **Prerequisites:** Bezel, Through-The-Wall (#1490 or #1491), Front Dress Panel (#3951), and Front Trim Border Without Envelope Holder (#3962). **Note:** Pedestal (#4901), that includes a lockable storage cabinet, is available in several heights to mount the single function enclosure. **Limitations:** Cannot be installed with Depository, Through-The-Wall (#3243 or #3244), Pedestal for Dual Function Heavy-Duty Enclosure (#4902), Storage Cabinet for Dual-Function Heavy-Duty Enclosure (#4903), or Front Trim Border with Envelope Holder (#3961). Single Function Heavy-Duty Enclosure (#3901) cannot be field upgraded to a Dual Function Heavy-Duty Enclosure (#3902).

Heavy-Duty Enclosure, Dual Function (#3902): [Mdls 2, 12] Used to enclose the currency dispensing and the depository mechanisms on mdls 2 and 12 that have a depository. May also be used to enclose the currency dispensing mechanism only and provide spare lockable storage space on mdls 2 or 12 that do not have a depository. **Note:** Pedestal (#4902), that includes a lockable storage cabinet, is available in several heights to mount the dual function enclosure. A lockable storage cabinet only (#4903) is also available to mount dual function enclosure directly to a floor surface where a pedestal is required. **Limitations:** Cannot be installed with Pedestal for Single Function Heavy-Duty Enclosure (#4901), Heavy-Duty Enclosure (#3902). **Prerequisites:** Bezel, Through-The-Wall (#1490 or #1491), Front Dress Panel (#3951), and Front Trim Border, with or without Envelope Holder (#3961 or #3962).

Dial Lock (#3310:) [Mdls 2, 12] (Optional) Provides keylock for the combination dial on a heavy-duty enclosure. Can be used where dual control and/or bank examiner type lock is desired. When locked, the combination dial cannot be turned. **Specify: #9251** for key removable when locked or unlocked, dial must be locked by key or **#9253** for key removable when locked only, dial must be locked by key. **Limitations:** Installed on only one combination dial when Dual Lock (#3374) is also ordered. **Maximum:** One. **Field Installation:** No.

3624 Currency Area Lockoff (#3312): [Mdls 2, 12] (Purchase only) Provides a security panel to enclose the currency area. Enables the document feed mechanism to be locked in the machine. When used with the Depository Cartidge Locking Feature (#3150), it restricts access to the currency area during normal operational servicing of the depository and/or other areas of the 3624. Includes keylock and standard key. **Note:** This accessory does not change the customer's responsibility to remove any currency in the 3624 when the unit has to be serviced by a CE if customer desires to change lock and/or key provided, customer is responsible for their procurement and installation. **Limitations:** Cannot be installed with Heavy-Duty Enclosure, Single Function (#3901). **Maximum:** One. **Field Installation:** Yes.

Dual Lock (#3375): [Mdls 2, 12] (Optional) A second combination-lock for the rear access door of a Heavy-Duty Enclosure (#3901 or #3901). **Field Installation:** No.

Bezel, Through-The-Wall, Recessed (#1490), Non-Recessed (#1491): [Mdls 2, 12] Bezel for thorugh-the-wall installation of 3624, #1490 is recessed, providing a shelf surface, and is recommended for walk-up installation. #1491 is non-recessed, placing the user guidance area nearer the outside wall surface for convenience of a vehicle occupant, and is recommended for drive-up installation. **Prerequisites:** Heavy-Duty Enclosure, Single or Dual Function (#3901 or #3902). Front Dress Panel (#3951), and Front Trim Border with or without Envelope Holder (#3961 or #3962).

Pedestal, for Heavy-Duty Enclosures (#4901 or #4902): [Mdls 2,12] A mounting stand to locate the 3624 at a height most convenient for user operation. Includes a lockable storage cabinet. Available for single and dual function heavy-duty enclosures in heights appropriate for walk-up or drive-up use. Recommended nominal keyboard heights are 1,321mm (52.0 in.) for walk-up; 1,067mm (42.0 in.) for drive-up. #4901 is for 3624s that use the single function enclosure (#3901) and #4902 is for 3624s that use the dual function enclosure (#3902). **Specify:** For keyboard centerline height from mounting surface: **#9701** for 1,079mm (42.5 in.), **#9702** for 1,206mm (47.5 in.), or **#9703** for 1,308mm (51.5 in.).

Notes: (1) If single function enclosure is installed without a pedestal, the keyboard centerline is 368mm (14.5 in.) from mounting surface. (2) See storage cabinet for dual function heavy-duty enclosure (#4903) for installing with keyboard centerline height lower than 1,067mm (42.0 in.) from mounting surface.

Storage Cabinet for Dual Function Heavy-Duty Enclosure (#4903): [Mdls 2, 12] (Optional) Lockable storage cabinet only, for mdls 2 or 12 dual function enclosure mounted directly to floor surface without pedestal. The keyboard centerline height is 965mm (38 in.) from mounting surface. A standard key is provided. **Limitations:** Cannot be installed with Heavy-Duty Enclosure, Single Function (#3901). **Prerequisites:** Heavy-Duty Enclosure. Dual Function (#3902). **Note:** Storage cabinet is included with the Pedestal for dual Function Heavy-Duty Enclosure (#4902).

Front Dress Panel (#3951): [Mdls 2,12] Provides panel to cover face of heavy-duty enclosure and I/O module. **Prerequisites:** Bezel, Through-The-Wall Recessed or Non-Recessed (#1490 or #1491), and Heavy-Duty Enclosure, Single or Dual Function (#3901 or #3902).

Front Trim Border, With Envelope Holder (3961), Without Envelope Holder (#3902): [Mdls 2,12] Provides trim paneling around the bezel to seal through-the-wall installation. #3961 includes built-in depository envelope holder and is available only when the depository feature is installed. #3962 does not include a depository envelope holder. **Prerequisites:** (1) Bezel, Through-the-Wall, Recessed or Non-recessed (#1490 or #1491). (2) Front Trim Border, With Envelope Holder (#3961) requires Depository, Through-the-Wall (#3243 or #3244).

Depository Cartridge (#3155): [Mdls 2,12] (Purchase only) Portable container for receiving and transporting deposits. Required for operation with Depository Cartridge Locking Feature (#3150). Capacity of approximately 300 deposited envelopes (certain conditions could cause capacity to vary). Cartridge case is made of a high impact resistant, fire retardant material. Built-in carrying handle provides ease of loading transportation. Locking mechanism provides for customer insertion of keylock. The cartridge is loaded into the 3624 depository in the closed and locked condition. During loading, the locking mechanism in the depository unlocks and slides the cartridge door open without allowing access to the contents of the cartridge. During unloading, the locking mechanism slides the cartridge door closed and locks it before the cartridge may be removed from the 3624. Cartridges can be opened only by a companion key corresponding to the key in the 3624. There is also provision for affixing a seal to the locked cartridge. A mechanical counter, enclosed within the cartridge, is incremented each time the door is partially opened, providing an audit against unauthorized access.

Customer Responsibilities: The customer must be advised that: (1) The customer is responsible for procurement and installation of cartridge lock and for installation of the companion cartridge lock key in the 3624 depository locking mechanism. (2) The customer is responsible for determining required spare (see "Spares" below). (3) The customer is responsible for determining if the cartridge is the failing unit. (4) The customer is responsible for providing cartridge when required for CE 3624 depository maintenance and testing. (5) The Customer is responsible for replacement if required of the cartridge audit counter. (6) Purchaser agrees that IBM is relieved of responsibility for claims, including but not limited to, loss of currency or documents contained in or associated with the depository cartridge. (7) The Customer will be responsible for removing, controlling, and reloading all money and deposits in the 3624 when the unit has to be serviced by a CE.

Maintenance: Cartridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machines. Replacement, if required, of the security lock and the internal audit counter in the cartridge is the responsibility of the customer. IBM Maintenance Agreements are not available. If requested by the customer, CE can provide on-site service of the cartridge on a per call billable basis. CE can perform those maintenance operations (normally performed by the customer) that are described in the 3624 Cartridge Owners Manual (GA66-0005). IBM Repair Center service is not available.

Spares: To maintain continual depository operations at the ATM, at least two cartridges are required. Additional spares may be required, depending upon deposit, volume between scheduled unloadings such as over weekends, physical location of 2624s, where cartridge

3624 Consumer Transaction Facility (cont'd)

contents are removed, where temporarily stored, and the needs for problem determination in the event of depository malfunctioning. A recommended nominal quanity of cartridges per 3624, including spares is shown below. It assumes for every depository cartridge loaded in a machine, another cartridge has been unloaded, emptied and made available. In addition, approximately one spare is available for every five 3624s. This should provide sufficient quantities of spares for customer and CE 3624 testing and for replacement of inoperative cartridges. These quantities should be adjusted to the customer's particular system requirements.

Recommended Quantity:

3624s	Cartridges (including Spares):
1	3
2	5
3	7
4	9
5	11
6	14
7	16
8	18
9	20
10	22

Cartridges required for more than ten 3624s can be extrapolated from the above table by taking a multiple of these numbers.

Warranty: The cartridge is warranted free from defects in workmanship and material for a period of 90 days, commencing on the day, Monday through Friday, one month following the *later* of: 1) the estimated date of shipment, or 2) the actual date of shipment. Defective cartridges will be replaced under the warranty provisions.

Ordering: Order by feature number and specify quantity.

Accessory Repair Parts: Repair parts, including the belts mentioned below, are referenced in:

- *IBM 3624 Consumer Transaction Facility Cartridge Owner's Manual,* GA66-0005.
- *IBM 3624 Consumer Transaction Facility Accessories Owner's Manual,* GA66-0012.

IBM will not order customer requested parts, if these parts are not available at IBM.

Pedestal, Lobby (#5510): [Mdls 1, 11] (Purchase only) A mounting stand for free-standing configuration of lobby mdl without the depository feature. Note: **#5510** is not required if customer intends to install a mdl 1 or 11 without the depository feature on an alternative mounting surface or stand. **#5510** is not required if a mdl 1 or 11 is installed with a depository feature (#3233), since a pedestal base is included in #3233.

Logo Panel (#9401, #9402, or #9403): (Purchase only) Backlighted Logo Panel, suitable for customization by silkscreening or other acceptable process.

If **#9401** is specified, logo panel will be shipped with 3624.

If **#9402** is specified, logo panel will be shipped approximately three weeks prior to 3624. Note: More than one panel may be ordered when **#9402** is specified (e.g., customer may desire to order spares or to arrange to have several panels delivered for customization at one time). When more than one panel is ordered using **#9402**, then **#9403** should be specified on the other 3624s to avoid duplicating orders for logo panels.

If **#9403** is specified, logo panel will not be ordered with 3624 and must have been ordered separately by P/N through MES or as **#9402** on another 3624.

Note: Additional Logo Panels can be ordered by P/N from IBM.

	Machine	P/N
Logo Panel	3624 mdl 1 or 11	945618
Logo Panel	3624 mdl 2 or 12	945617

Currency Cartridge (#9110): (Purchase only) Portable currency container, interchangeable between 3624s. Cartridge case is made of a high-impact resistant, fire retardant material. Removable access cover and built-in carrying handle, for ease of loading and transportation. Locking mechanism provides for customer installation of keylock and affixing security seals to transport of the cartridge. The cartridge is connected to a cartridge drive station in the 3624 for power and communication of cash-low and cash-out currency levels. A keying system is provided so that a match between the cartridge and the cartridge drive station must be satisfied before the cartridge can be properly loaded in the drive station. The maximum new bill capacity is 2,300 bills. The used bill capacity is approximatley 2,000.

Customer Responsibilities: The customer must be advised that: (1) The customer is responsible for determining if the cartridge is the failing unit. (2) The customer should schedule the frequency of cleaning and belt replacement procedures for optimum cartridge performance according to the usage, to maintain maximum machine availability. (3) The customer may repair the cartridge or he may send it back to the Repair Center (see "Maintenance" below. (4) The customer is responsible for determining required spares (see "Spares" below). (5) The customer is responsible for providing cartridges for CE 3624 maintenance and testing; a minimum of one spare cartridge for mdl 1 and two spare cartridges for mdls 11 and 12 must be made available by the customer to the CE for normal 3624 maintenance. (6) The customer is responsible for setting the keying system on the cartridges and drive stations so that there is the desired match of currency denomination to drive station. (7) Purchaser agrees that IBM is relieved of responsibility for all claims, including, but not limited to, loss of curency or documents contained in, dispensed by, or associated with the cartridge.

Spares: The customer may wish to replace (1) an empty or partially loaded cartridge with a fully loaded cartridge, (2) a failing cartridge with a spare for problem determination or while malfunctioning cartridge is being repaired, (3) A cartridge to enable the IBM CE to perform 3524 maintenance and testing. The customer should be advised to purchase sufficient cartridges to cover the above uses. The number of cartridges recommended is dependent upon the total number of cartridge drive stations the customer has installed, application requirements, physical location of 3624s, and location where cartridges are temporarily stored and loaded. The customer must be advised that it is recommended that spare cartridges should remain in use and not be stored for extended periods. A recommended quantity of spare cartridges and spare replacement belts per cartridge drive station is shown below. It assumes for every loaded cartridge installed in a cartridge drive station, another cartridge for the same currency denomination is available for currency replenishment. In addition, approximately one spare is available for every three cartridge drive stations of the same currency demonination. This should provide sufficient quantity of spares for customer and CE 3624 testing and for temporary replacement of cartridges in repair. These quantities should be adjusted to the customer's particular application requirements once he understands how his physical environment and usage affect cartridge and belt wear. The customer can replace separator and restraint belts in conjunction with performing the recommended operator cleaning and belt replacement procedure. Additional belts can be ordered from the normal DP Supply Order procedures.

		RECOMMENDED MINIMUM QUANTITY OF SPARE REPLACEMENT BELTS	
CARTRIDGE DRIVE STATIONS *	RECOMMENDED QUANTITY OF CARTRIDGES **	SEPARATION BELT P/N 945307	RESTRAINT BELT P/N 945242
1	3	1	1
2	5	1	1
3	7	1	1
4	10	2	2
5	12	2	2
6	14	2	2
7	17	3	3
8	19	3	3
9	21	3	3
10	23	3	3

* 3624 Mdls 1 and 2 have one cartridge drive station and Mdls 11 and 12 have two cartridge drive stations.

** Including Spares

Cartridges and belts required for more than ten drive stations can be extrapolated from the above table by taking a multiple of these numbers. Additional quantities over the recommended minimum quantity of spare replacement belts should be ordered as required as part of the customer's periodic belt inspection and replacement schedule for cartridges (in conjunction with IBM's general recommendation).

Maintenance: Cartridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machine. A recommended operator cleaning and belt replacement procedure is provided in the *IBM 3624 Cartridge Owner's Manual,* GA66-0005. Under adverse operating conditions, it is the customer's responsibility to modify the procedure to meet his own particular requirements. The customer can replace separator and restraint belts in conjunction with performing the recommended procedure. If the cartridge is in need of repair, the cartridge can be sent to the designated IBM Repair Center. It is the customer's responsibility to package the unit in the designated shipping container and ship it prepaid to the designated IBM Repair Center.

If requested by the customer, CE can provide on-site service of the cartridge on a per call billable basis. CE can perform those maintenance operations (normally performed by the customer) that are described in the 3624 Cartridge Owners Manual (GA66-0005). CE can also provide maintenance services that are provided by the

3624 Consumer Transaction Facility (cont'd)

Repair Center. For the CE to provide this service the customer must provide the CE contents of B.M. 4801538 which includes the MIMS package, throat adjusting tool and cassette diagnostic tape. For IBM to provide cartridge servicing, the customer must provide a 3624 for testing of the repaired cartridge. It is recommended that the customer provide IBM with repair service facilities at a central site (rather than at a branch location). **Note:** Currency cartridge warranty service must be performed at the IBM Repair Center only.

IBM Repair Center Service: For cartridge repair, the customer will fill out an *IBM Repair Authorization Form*, GX27-2981, pack it and the defective cartridge inthe designated shipping container, and ship it to the designated IBM Repair Center, where repair will be made if the cartridge is repairable. The charge for the repair of the cartridge at IBM repair Center will cover handling, inspection, cleaning, repair, adjustment, testing, and return shipping. Billing will be at IBM's applicable hourly rates. In addition, all parts needed will be billed at IBM's prevailing parts prices. Alternately upon request, the IBM Repair Center will provide, for a minimum charge, an estimate of repair charges.

If, on the basis of an inspection, the repair center concludes that a cartridge is not repairable, no further work will be performed and the cartridge will be returned to the customer with a minimum charge to cover handling, inspection, testing, and return shipping charges.

Warranty: The cartridge is warranted to be free from defects in workmanship and material for a period of 90 days commencing on the day, Monday through Friday, one month following the *later* of: 1) the estimated date of shipment, or 2) the actual date of shipment. Warranty service for the cartridge will be performed at the IBM Repair Center.

If warranty service is performed at an IBM Repair Center, the customer will fill out an *IBM Repair Authorization Form,* GX27-2981, pack it and the defective cartridge in the designated shipping container, and ship it prepaid to the designated IBM Repair Center.

Ordering: Order by Feature Number below and specify quantity.

CURRENCY CARTRIDGE SUMMARY

		FEATURE
USA	5,10,20 dollar	**#9110**

Note: For cartridge parts, refer to the *IBM 3624 Cartridge Owners Manual*, GA66-0005.

SUPPLIES (None)

3631 PLANT COMMUNICATION CONTROLLER

PURPOSE

A programmable controller for attachment of 3640 terminals to S/370 or 4300 processors using appropriate virtual storage system control programs or an 8100 Information System using the Distributed Processing Program Executive (DPPX).

S/370 or 4300 Processor attachment is via a 3704, 3705 or 3725 Communications Controller using synchronous data link control (SDLC) transmission protocols over various common carrier or user-owned transmission facilities. The 8100 system attachment is via the 8130, 8140, and/or 8101 data link using various common carrier or user-owned transmission facilities. Communication is also possible via a Communications Adapter on the 4321 or 4331 Processor.

Terminal attachment is via directly attached or data link attached loops which utilize synchronous data link control (SDLC) transmission protocols. The loops are user-owned transmission facilities which are constructed from IBM accessories - see "Accessories" below.

MODELS

Model 1A A01 — Includes a diskette drive which accommodates a Diskette 1 diskette of 250K byte capacity.

Model 1B B01 — Includes a diskette drive which accommodates a Diskette 2 diskette of 500K byte capacity.

Prerequisites: Communications with a virtual storage host S/370 or 4300 processor via a 3704, 3705, 3725 or Communications Adapter on the 4321 or 4331 Processor equipped with appropriate features ... see M3704, 3705, 3725 or 4331 pages.

A 3604 mdl 6 Keyboard Display or its equivalent is required as a control station and is directly attached to the controller. Two 10-foot cables will be supplied with the 3631. The magnetic stripe features are not supported.

HIGHLIGHTS

Controls the functions of a 3630 Plant Communication System. Customers, utilizing SCP programs on virtual storage S/370 or 4300 Processor systems , will prepare user-written application programs which direct system operation. The controller can be programmed to operate independently when the Host System is unavailable. It is capable of controlling terminal functions, executing arithmetic and logic functions, and capturing data from the terminals for later transmission to the Host System. A keylock is provided for locking access to the diskette drive.

The mdl 1A accommodates Diskette 1 of 250K byte capacity. The mdl 1B accommodates Diskettes 1 or 2 having 250K and 500K byte capacities. The diskette provides permanent storage for system microcode and application programs, plus permanent and temporary storage for user data. Data required to be on the diskette, exclusive of customer data, will often exceed 200K bytes. During normal operation performance characteristics of the diskette drive dictate that that device be used primarily for infrequent data logging.

IBM and customer code is transmitted to the controller where it is written on a diskette. The diskette may also be used to hold application data in the space not required for the system microcode. At controller start-up, diagnostics, system microcode and application code are read from the diskette into control and application storage. During system operation the diskette may be used to access data and code.

Storage included in the controller is used for system microcode, and application control data and instructions. The amount of storage available for application programming depends on the attached terminal configuration and user environment. Included in the basic machine is 65,536 bytes of application storage. Both control and application storage may be extended in 16,384 byte increments -- see "Special Features".

All 3640 terminals are attached to customer-owned loops. A variety of accessories and wire are available for the construction of the loops (see "Accessories" below. Up to two Loop Adapters may be installed to directly connect one loop each. The Loop Adapters each provide two loop lobes. Each lobe may extend up to 3.2 cable-kilometers (2 cable-miles). Directly attached loops are operated at 9600 bps. A loop, consisting of one lobe, may be connected to the 3842 or 3843 Loop Control Unit. The 3842 can be connected multipoint or point-to-point on a common carrier or customer-owned transmission facility to a 3872 modem at the 3631 site for operation at 2400 bps. The 3843 supports point-to-point or multipoint telecommunication links via a synchronous modem transmitting at 2400, 4800, or 9600 bps. A loop can accommodate a number of loop-terminal connections - see the *IBM 3630 Plant Communication System Description* for additional information.

Communication with a virtual storage host S/370 or 4300 Processor is via a 3704, 3705, 3725 or a Communications Adapter on the 4331 Processor using SDLC and SNA protocols. The EIA/CCITT Interface - Host (#3701), and either an external modem or the #4716 Medium Speed, Local Attachment feature on the 3704, 3705 or 3725 are required (on 4331, the Local Attachment Interface feature #4801) for host communication. See M2700 and 4331 pages for Communications Adapter features on 4331. Each 3631 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3631s and 3632s attached to the line ... one 3631/3632 transmitting while the other receives. See M2700 pages for available modems and communication services. Communication with an 8100 system is via the 8130, 8140, and/or the 8101 data link using the SDLC protocol. The 3631 feature #3701, EIA/CCITT Interface - Host, is used on an SDLC data link facility provided by the 8100. Each 3631 operates in half-duplex mode.

IBM External Modems are:

3863 Mdl 1	2400/1200 bps	Nonswitched
3868 Mdl 3/4	9600/4800 bps	Nonswitched
3864 Mdl 1	4800/2400 bps	Nonswitched
3868 Mdl 2	4800/2400 bps	Nonswitched
3865 Mdl 1/2	9600/4800 bps	Nonswitched
3868 Mdl 1	2400/1200 bps	Nonswitched
3872 Mdl 1	2400/1200 bps	Nonswitched

Note: 4-wire Switched Network Back-up is available on 3863, 3864, and 3865. For communications capabilities, product utilization, and features, see M2700, 3863, 3864 and 3872 pages.

Supplies: The customer-owned diskettes may be ordered from your SSD Sales Representative for initial and replacement quantities.

Model 1A: IBM Diskette 1, P/N 2305845
Model 1B: IBM Diskette 2, P/N 2736700 or IBM Diskette 1, P/N 2305845

For further information contact IBM .

The 3631 Controller and 3604 control terminal have been designed for operation in physical environments characteristic of office areas. See *3630 Plant Communication System Installation Manual - Physical Planning,* GA24-3675, for further information.

One host communication feature: #6301, #6302 or #4502.

A 3630 Test Loop (specify **#9445**) for installation with the first 3631 at each site.

Two wrap-type Loop Station Connectors for each local adapter (#4780).

3631/32 programming support material must be ordered from PID and installed on the host computer.

Loop Continuity and Relay Testers, P/N 1657420, should be purchased by the customer for testing his loop wiring. One tester should be available at each physical location of controller(s) loops or data link attached loop(s) that will require loop cable testing.

Telephone communication should be available at the controller site for communication with the host, data link attached, and key locations along loops.

A 3643 Keyboard Display terminal should be located in close physical proximity to 3842 and 3843 Loop Control Units for data link attached loop and connected terminal testing.

Publications: *IBM 3630 Plant Communication System, System Description,* GA24-3652 ... *Introduction to the IBM 8100 Information System,* GA27-2875 ... *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675 ... *IBM Multi-use Communication, Loop Planning Guide,* GA23-0038 ... *IBM Multi-use Communication, Loop Installation Guide,* GA23-0039 ... *IBM 3630 Plant Communication System, Controller Operating Guide,* GA24-3678

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (115V AC, 1-phase, 60 Hz, 1.8m (6.0 ft) cable): **#9880** for locking plug (usable on 120V AC systems), or **#9881** for non-locking plug (usable on 120V AC systems).
- **Distribution of Microcode:** One copy of the 3631 system microcode is required for each S/370 attaching a 3631. The address for the initial shipment must be supplied as a Supplementary Specification via AAS entry as shown below. Specify **#9491** for the initial 3630 system ordered for attachment to the S/370, or specify **#9492** for any additional 3630 system ordered for attachment to the S/370.

  For distribution of microcode to the S/370 location, specify the medium:

  #9412 - 9/800 Magnetic Tape
  #9413 - 9/1600 Magnetic Tape
  #9414 - 9/6250 Magnetic Tape
  #9431 - 80-Column Cards
  #9432 - 96-Column Cards

  If card or tape input is not available on the S/370, contact your Industry Support Center.

  Shipping address for the 3630 system microcode must be supplied exactly as follows:

3631 Plant Communication Controller (cont'd)

Line 1 -- IBM Programming Support Representative
Line 2 -- c/o (Name of Customer)
Line 3 -- Street Address (or P.O. Box)
Line 4 (etc.) -- City, State, Zip Code

Note: This is the address of the 3631 Controller location and the address to which the microcode automatically will be sent for the 3630 system (designated **#9141**). Whenever a 3630 is updated by an EC, the microcode will be sent to the current TPC (Teleprocessing Control Number) address. The TPC address is supplied and controlled by the Field Engineering Branch Office.

- **Loop Accessories and Loop Cable:** Ten Loop Accessory Keys are shipped with the 3631. See "Accessories" below.
- **3630 Test Loop:** Specify **#9445** on the first 3631 or 3632 to be installed at each site. **Field Installation:** Yes.

SPECIAL FEATURES

Additional Storage Feature (#1006): Provides an additional 16,384 byte increment of storage for device attachment or application storage. To determine the number and type of storage features required, see the table below or the configurator in the *3630 Plant Communication System Description*. **Maximum:** 5. **Field Installation:** Yes. **Specify: #9591** for Additional Device Attachment Control Storage. Maximum one. Field Installation: Yes. Specify **#9592** for Additional Application Storage. Maximum four. Field Installation: Yes.

Note: The quantity of feature #1006 must equal the combined quantities of Specify **#9591** and **#9592**.

Attachment Factor Table

Control storage for the 3631 controller is divided into two definable areas, Base and Extended. In the following table attachment factors labeled "Base" are applicable to the base attachment factor calculation only. Attachment factors in the column labeled "Base or Extended" are applicable to either the base or extended attachment factor calculation.

Device Type/Feature/Function	Attachment Factor	
	Base	Base or Extended
3604 (MDL 6)	0	–
SDLC (#4502)	0.7	–
BSC RPQ	2.0	–
Multiple Block I/O-Diskette	3.0	–
3641 and/or 3647	–	5.4
3642	–	4.1
3643	–	7.0
3644	–	1.9
3645	–	3.0
3646	–	2.2
Priority Dispatching	–	0.3
Translate Instruction	–	1.2
LSEEK Instruction	–	1.8
Data Decompression/Decompaction	–	1.2
Data Compression/Compaction	–	1.6
Scratch Pad Function	–	1.7
Set Diskette	–	0.9
Data Sequencing	–	1.6

The base area has an attachment factor value total of 8.0 The extended area has a minimum attachment factor value of 15.5. Support for the items listed above as "Base" items is loaded into the Base area. Support for those listed on "Base or Extended" items begins loading into the Extended area. If the attachment factor value of 15.5 for the extended area is exceeded, one additional 16,384 byte increment of storage (Feature #1006 and Specify **#9591**) may be required, resulting in a maximum attachment factor value total for the extended area of 31.8. Unused space in the base area can be used should the extended area become full.

Summary	Maximum Load Factor
Base Area	8.0
Extended Base	15.5
Extended Additional	16.3
Total Maximum Load Factor	39.8

For additional information, see the Configuration section of the *3630 Plant Communication System - System Description* (GA24-3652).

Attachment Factor Function

Data Sequencing: Allows user application to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette: Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Priority Dispatching: Provides the ability to specify the order in which workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate: The LTRT instruction processes an input data stream against user specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Multiple Block I/O - Diskette: Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than 3 blocks are read or 4 blocks are written.

LSEEKP: Locates a table entry which is "equal to", "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program, thereby permitting the tables to reside in extended user programmable storage.

Scratch Pad Function: Provides access to optional global work areas distinct from segment storage which may reside in base or extended user programmable storage.

Data Compression/Compaction: This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction: This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

Host Communications Features

For communication with the host processor, each 3631 must be equipped with EIA/CCITT Interface - Host (#3701) and one of the following SDLC features: #4502, #6301 or #6302.

EIA/CCITT Interface - Host (#3701): Provides the appropriate cables and interface logic necessary to attach an external modem for communications to the host processor through the 3704, 3705 or Communications Adapter on the 4331 Processor or for local attachment to the 3704, 3705 or Communications Adapter on the 4331 without requiring modems. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4502, #6301 or #6302.

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which provides clocking at speeds up to 9600 bps. **Limitations:** Cannot be installed with #6301 or #6302. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701.

Host Communications With Business Machine Clocking (#6301): Required for attachment to communication lines through any external modem which does not provide clocking for speeds of 600, 1200 and 2400 bps, or for local attachment to the 3704, 3705 -- see M3704, 3705 pages, feature #4716. **Limitations:** Cannot be installed with #6302 or #4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701.

Host Communications Without Business Machine Clocking (#6302): Required for attachment to communication lines through an external modem which provides clocking at speeds up to 4800 bps. **Limitations:** Cannot be installed with #6301 or #4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701.

Terminal Attachment

The Data Link Adapter (#3211), Loop Adapter (#4780), and EIA/CCITT Interface (#3703) features enable the 3631 Controller to attach 3640 terminals. Data link terminal attachment capability is provided by selection of the EIA/CCITT Interface - Data Link (#3703) with the Data Link Adapter (#3211). Direct terminal attachment capability is provided by selection of the Loop Adapter (#4780) and the Data Link Adapter (#3211). A maximum of two directly attached loops and two data links for attachment of 3842s or 3843s may be installed.

The data links are used to provide point-to-point or multipoint facilities for the connection of the 3842 Loop Control Units. The 3842 attaches at the remote ends of the data link where it establishes a remote loop. The 3872 modem connects the EIA/CCITT Interface - Data Link (#3703) and the data link at the controller. Other synchronous modems with clocking, transmitting at 2400, 4800, or 9600 bps, and the 3843 Loop Control Unit may replace the 3872 and 3842. The loop operates at the same speed as the data link.

Customer Responsibilities For Loops: The customer must purchase, install, and maintain loops for terminal attachment. See *IBM 3630 Plant Communication System Description* for further information. See *IBM Multi-use Communications Loop Planning Guide* (GA23-0038) and *IBM Multi-use Communications Loop Installation Guide* (GA23-0039) for further planning and installation information on: loop components, loop cable, loop wiring configurations, Continuity and Relay Tester, and maintenance and test procedures. See

3631 Plant Communication Controller (cont'd)

"Accessories" below. Contact IBM for information concerning contracts available to assist the customer with installation.

Data Link Adapter (#3211): Provides the control logic to establish SDLC communications for terminal attachment. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** Required once for each Loop Adapter (#4780) and once for each EIA/CCITT Interface - Data Link (#3703).

EIA/CCITT Interface - Data Link (#3703): Provides an EIA/CCITT interface for attachment of an IBM 3872 Modem for the connection of the 3842. Other synchronous modems with clocking, transmitting at 2400, 4800, or 9600 bps, and the 3843 Loop Control Unit may replace the 3872 and 3842. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Data Link Adapter #3211.

Loop Adapter (#4780): Allows direct attachment of a loop with one or two lobes to the controller operating at a speed of 9600 bps. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Data Link Adapter #3211, and a wrap type Loop Station Connector in each connected lobe.

MODEL CONVERSIONS

Model 1A can be changed to Model 1B. Model 1A to 1B requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the customer remove it prior to the start of any conversion. All replaced parts become the property of IBM.

ACCESSORIES

Cables: Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multi-use Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

Bulk Loop Cable Description	P/N
Indoor Cable: UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.	**1657265**
Indoor Cable: UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.	**7838694**
Indoor Cable: UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.	**7838695**
Outdoor Cable: For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.	**1657267**
Outdoor Cable: For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.	**1657268**

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 ft). Additional lengths up to 609.6m (2000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8m (1,000 ft).

Exterior cable (P/Ns 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 ft), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

Loop Accessories

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multi-use Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 X 4 Adapter Plate (2AP): The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity and Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	P/N
Loop Splice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330) *	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares) **	1657379
2 X 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for outdoor cable to environmental box)	1657377

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 3631. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions:

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories

3631 Plant Communication Controller (cont'd)

for terminal attachments. However, contact IBM for details of IBM services available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories. See *IBM Multi-use Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops, it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

Locks and Keys : The 3631 is shipped with two keys. Additional keys may be purchased from IBM. Indicate serial number of lock.

SUPPLIES (None)

3632 PLANT COMMUNICATION CONTROLLER

PURPOSE

A programmable controller for attachment of 3640 terminals to S/370 or 4300 processors using appropriate virtual storage system control programs or an 8100 Information System using the Distributed Processing Program Executive (DPPX).

S/370, 4331, 4341, 4361 or 4381 processor attachment is via a 3704, 3705, 3725 or Communications Adapter on the 4321, 4331 or 4361 processor using synchronous data link control (SDLC) transmission protocols over various common carrier or user-owned transmission facilities. The 8100 system attachment is via the 8130, 8140, and/or 8101 data link SDLC transmission protocols using various common carrier or user-owned transmission facilities.

Terminal attachment is directly attached or data link attached loops. The loops are user-owned transmission facilities which are constructed from IBM accessories - see "3630 Loop Accessories" in "Accessories". The loops are connected via common carrier or user-owned transmission facilities.

MODELS

Model 1A A01 — A programmable terminal controller with a 5 megabyte disk.

Model 1B B01 — A programmable terminal controller with a 9.2 megabyte disk.

Prerequisites: Communications with a virtual storage S/370, or 4331, 4341, 4361 or 4381 processor via a 3704, 3705, 3725 or Communications Adapter on 4321, 4331 or 4361 equipped with appropriate features ... see M3704, 3705, 3725, 4321, 4331 or 4361 pages. Communications with the 8100 system via the 8130, 8140, and/or 8101 data link using the appropriate features ... see M8130, 8140 and 8101 pages.

A 3604 Model 6 Keyboard Display or its equivalent is required as a control station and is directly attached to the controller. Two 10-foot connecting cables will be supplied with the 3632. The magnetic stripe features are not supported. The 3632 Controller and 3604 control terminal have been designed for operation in physical environments characteristic of office areas. See *3630 Plant Communication System, Installation Manual - Physical Planning* , GA24-3675, for further information.

One host communication feature: #6301, #6302, or #4502.

A 3630 Test Loop (specify **#9445**) for installation with the first 3632 at each site.

Two wrap type Loop Station Connectors for each local adapter (#4780).

3631/32 programming support material must be ordered from IBM and installed on the host computer.

Loop Continuity and Relay Testers, P/N 1657420, should be purchased by the customer for testing his loop wiring. One tester should be available at each physical location of controller(s) loops or data link attached loop(s) that will require loop cable testing.

Telephone communication should be available at the controller site for communication with the host, data link attached, and key locations along loops.

A 3643 Keyboard Display terminal should be located in close physical proximity to 3842 and 3843 Loop Control Units for data link attached terminal testing.

HIGHLIGHTS

Controls the functions of a 3630 Plant Communication System. Customers, utilizing SCP programs on virtual storage S/370 or 4300 systems will prepare user-written application programs which direct system operation. The controller can be programmed to operate independently when the Host System is unavailable. It is capable of controlling terminal functions, executing arithmetic and logic functions, and capturing data from the terminals for later transmission to the Host System. Information may be stored on the disk for use in responding to terminal inquiries.

Houses a disk storage device (5 or 9.2 MB capacity) for storage of user data. This storage device is not removable except by service personnel. A fixed head feature is available which will provide 8 additional heads with access to data on 8 tracks ... see "Additional Disk Heads Feature (#1010, #1011)".

Houses a direct access diskette drive which accepts both IBM Diskette 1 and 2 having respectively 250K and 500K byte capacities. The diskette provides permanent storage for system microcode and application programs, plus permanent and temporary storage for user data. Data required to be on the diskette, exclusive of customer data, will often exceed 200K bytes. During normal operation performance characteristics of the diskette drive dictate that the device be used primarily for infrequent data logging.

IBM and customer code is transmitted to the controller where it is written on a diskette. The diskette may also be used to hold application data in the space not required for the system microcode. At controller start-up, diagnostics, system microcode and application code are read from the diskette into control and application storage. During system operation both the disk and the diskette may be used to access data and code.

Storage included in the controller is used for system microcode, and application control data and instructions. The amount of storage available for application programming depends on the attached terminal configuration and user environment. Included in the basic machine is 65,536 bytes of application storage. Both control and application storage may be extended in 16,384 byte increments -- see "Special Features".

All 3640 terminals are attached to customer-owned loops. A variety of accessories and wire are available for the construction of the loops (see "Loop Accessories - 3630, 4331, 4361 and 8100 Systems" in "Accessories"). Up to two Loop Adapters may be installed to directly connect one loop each. The Loop Adapters each provide two loop lobes. Each lobe may extend up to 3.2 cable-kilometers (2 cable-miles). Directly attached loops are operated at 9600 bps. A loop, consisting of one lobe, may be connected to the 3842 or 3843 Loop Control Unit. The 3842 can be connected multipoint or point-to-point on a common carrier or customer-owned transmission facility to a 3872 modem at the 3632 site for operation at 2400 bps. The 3843 supports point-to-point or multipoint telecommunication links via a synchronous modem transmitting at 2400, 4800, or 9600 bps. A loop can accommodate a number of loop-terminal connections - see *IBM 3630 Plant Communication System Description* for additional information.

Communication with a virtual storage host S/370 or 4331, 4341, 4361 or 4381 processor is via a 3704, 3705, or Communications Adapter on the 4321, 4331 or 4361 processor using SDLC and SNA protocols. The EIA/CCITT Interface - Host (#3701), and either an external modem or the #4716 Medium Speed, Local Attachment feature on the 3704/3705. On the 4331 or 4361, the Local Attachment feature (#4801) is required for host communication. See M2700, 4331 and 4361 pages for Communications Adapter features on 4331. Each 3632 operates in half-duplex mode. *Duplex communication line operations are possible with multiple 3631s and 3632s attached to the line ... one 3631/3632 transmitting while the other receives. See M2700 pages for available modems and communication services. Communication with an 8100 system is via the 8130, 8140, and/or 8101 data link using the SDLC protocol. The 3632 feature #3701, EIA/CCITT Interface - Host is used on an SDLC data link facility provided by the 8100. Each 3632 operates in half-duplex mode.

IBM External Modems are:

3863 Mdl 1	2400/1200 bps Nonswitched
3868 Mdl 3/4	9600/4800 bps Nonswitched
3864 Mdl 1	4800/2400 bps Nonswitched
3868 Mdl 2	4800/2400 bps Nonswitched
3865 Mdl 1/2	9600/4800 bps Nonswitched
3868 Mdl 1	2400/1200 bps Nonswitched
3872 Mdl 1	2400/1200 bps Nonswitched

Note: 4-wire Switched Network Back-up is available on 3863, 3864, and 3865. For communications capabilities, product utilization, and features, see M2700, 3863, 3864 and 3872 pages.

Publications: *IBM 3630 Plant Communication System, System Description,* GA24-3652 ... *Introduction to the IBM 8100 Information System,* GA27-2875 ... *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675 ... *IBM Multi-use Communication loop Planning Guide,* GA23-0038 ... *IBM Multi-use Communication Loop Installation Guide,* GA23-0039 ... *IBM 3630 Plant Communication System, Controller Operating Guide,* GA24-3678.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 60 Hz):
  115V (usable on 120V): **#9880** for locking plug or **9881** for non-locking plug.
  208V: **#9884** for locking plug or **#9885** for non-locking plug.
  230V: **#9886** for locking plug or **#9887** for non-locking plug.
- Distribution of Microcode: One copy of the 3631 system microcode is required for each S/370 attaching a 3631. The address for the initial shipment must be supplied as a Supplementary Specification via AAS entry as shown below. Specify **#9491** for the initial 3630 system ordered for attachment to the S/370, or specify **#9492** for any additional 3630 system ordered for attachment to the S/370. **Field Installation:** Yes.

  For distribution of microcode to the S/370 location, specify the medium:

  #9412 - 9/800 Magnetic Tape
  #9413 - 9/1600 Magnetic Tape
  #9414 - 9/6250 Magnetic Tape
  #9431 - 80-Column Cards
  #9432 - 96-Column Cards

3632 Plant Communication Controller (cont'd)

If card or tape input is not available on the S/370, contact your Industry Support Center.

Shipping address for the 3630 system microcode must be supplied exactly as follows:

Line 1 -- IBM Programming Support Representative
Line 2 -- c/o (Name of Customer)
Line 3 -- Street Address (or P.O. Box)
Line 4 (etc.) -- City, State, Zip Code

Note: This is the address of the 3632 Controller location and the address to which the microcode automatically will be sent for the 3630 system (designated **#9141**). Whenever a 3630 is updated by an EC, the microcode will be sent to the current TPC (Teleprocessing Control Number) address. The TPC address is supplied and controlled by the Field Engineering Branch Office.

- Loop Accessories and Loop Cable: Ten Loop Accessory Keys are shipped with the 3632. See "Accessories" for descriptions and ordering instructions for 3630 and loop Accessories.
- 3630 Test Loop: Specify **#9445** on the first 3631 or 3632 to be installed at each site. **Field Installation:** Yes.

SPECIAL FEATURES

Additional Storage (#1006): Provides an additional 16,384 byte increment of storage for device attachment or application storage. To determine the number and type of storage features required see the table below and/or the configurator in the *3630 Plant Communication System Description*. **Maximum:** 5. **Field Installation:** Yes. **Specify: #9591** for Additional Device Attachment Control Storage. Maximum 1. Field Installation Yes. Specify **#9592** for Additional Application Storage. Maximum 4. Field Installation Yes.

Note: The quantity of feature #1006 must equal the combined quantities of specify **#9591** and **#9592**.

Attachment Factor Table

Control storage for the 3632 controller is divided into two definable areas, Base and Extended. In the following table attachment factors labeled "Base" are applicable to the base attachment factor calculation only. Attachment factors in the column labeled "Base or Extended" are applicable to either the base or extended attachment factor calculation.

Device Type/Feature/Function	Attachment Factor	
	Base	Base or Extended
3604 (MDL 6)	0	–
SDLC (#4502)	0.7	–
BSC RPQ	2.0	–
Multiple Block I/O-Diskette	3.0	–
3641 and/or 3647	–	5.4
3642	–	4.1
3643	–	7.0
3644	–	1.9
3645	–	3.0
3646	–	2.2
Disk File	–	10.0
Dynamic Sector Relocate	–	0.6
Priority Dispatching	–	0.3
Translate Instruction	–	1.2
LSEEK Instruction	–	1.8
Data Decompression/Decompaction	–	1.2
Data Compression/Compaction	–	1.6
Scratch Pad Function	–	1.7
Set Diskette	–	0.9
Data Sequencing	–	1.6

The base area has an attachment factor value total of 20.0. The extended area has a minimum attachment factor value of 15.5. Support for the items listed above as "Base" items is loaded into the Base area. Support for those listed on "Base or Extended" items begins loading into the Extended area. If the attachment factor value of 15.5 for the extended area is exceeded, one additional 16,384 byte increment of storage (Feature #1006, specify **#9591**) may be required, resulting in a maximum attachment factor value total for the extended area of 31.8. Unused space in the base area can be used should the extended area become full.

Summary	Maximum Load Factor
Base Area	20.0
Extended Base	15.5
Extended Additional	16.3
Total Maximum Load Factory	51.8

For additional information, see the Configuration section of *3630 Plant Communication System - System Description*, GA24-3652.

Attachment Factor Function

Data Sequencing - Allows user application to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette - Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Priority Dispatching - Provides the ability to specify the order in which workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate - The LTRT instruction processes an input data stream against user specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Multiple Block I/O - Diskette -Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than 3 blocks are read or 4 blocks are written.

LSEEKP - Locates a table entry which is "equal to", "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program, thereby permitting the tables to reside in extended user programmable storage.

Scratch Pad Function - Provides access to optional global work areas distinct from segment storage which may reside in base or extended user programmable storage.

Data Compression/Compaction - This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction - This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

3632 Dynamic Selector Relocate - This facility provides a means of recovery when a write sector CRC check occurs. This facility, in most cases, replaces the off line manual procedure which requires a special test diskette to reassign failing sectors.

Additional Disk Heads (#1010, 1011): (1010 for mdl 1A ... 1011 for mdl 1B) Provides additional disk heads (8) for the disk file as specified by model type selected. **Maximum:** One. **Field Installation:** Not recommended.

Host Communications Features

For communication with the host processor, each 3632 must be equipped with EIA/CCITT Interface - Host (#3701) and one of the following SDLC features: #4502, #6301 or #6302.

EIA/CCITT Interface - Host (#3701): Provides the appropriate cables and interface logic necessary to attach an external modem for communications to the host processor through the 3704/3705, or Communications Adapter on the 4321 or 4331 Processor or for local attachment to the 3704/3705 or Communications Adapter on the 4331 without requiring modems. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A Communications Feature (#4502, #6301 or #6302).

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which provides clocking at speeds up to 9600 bps. **Limitations:** Cannot be installed with #6301 or 6302. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** EIA/CCITT Interface - Host (#3701).

Host Communications With Business Machine Clocking (#6301): Required for attachment to communication lines through any external modem which does not provide clocking for speeds of 600, 1200 and 2400 bps, or for local attachment to the 3704/3705 -- see M3704/3705 pages, feature #4716. **Limitations:** Cannot be installed with #6302 or 4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** EIA/CCITT Interface - Host (#3701).

Host Communications Without Business Machine Clocking (#6302): Required for attachment to communication lines through an external modem which provides clocking at speeds up to 4800 bps. **Limitations:** Cannot be installed with #6301 or 4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** EIA/CCITT Interface - Host (#3701).

Terminal Attachment

The Data Link Adapter (#3211), Loop Adapter (#4780), and EIA/CCITT Interface (#3703) features enable the 3632 Controller to attach 3640 terminals. Data link terminal attachment capability is provided by

3632 Plant Communication Controller (cont'd)

selection of the EIA/CCITT Interface - Data Link (#3703) with the Data Link Adapter (#3211). Direct terminal attachment capability is provided by selection of the Loop Adapter (#4780) and the Data Link Adapter (#3211). A maximum of two directly attached loops and two data links for attachment of 3842s or 3843s loops may be installed.

The data links are used to provide point-to-point or multipoint facilities for the connection of the 3842 or 3843 Loop Control Units. The 3842 attaches at the remote ends of the data link where it establishes a remote loop. The 3872 modem connects the EIA/CCITT Interface - Data Link (#3703) and the data link at the controller. Other synchronous modems with clocking, transmitting at 2400, 4800, or 9600 bps, and the 3843 Loop Control Unit may replace the 3872 and 3842. The loop operates at the same speed as the data link.

Customer Responsibilities For Loops: The customer must plan, purchase, install, and maintain loops for terminal attachment. See *IBM 3630 Plant Communication System Description* for further information. See *IBM Multi-use Communications Loop Planning Guide* (GA23-0038) and *IBM Multi-use Communications Loop Installation Guide* (GA23-0039) for further planning and installation information on: loop components, loop cable, loop wiring configurations, Continuity and Relay Tester, and maintenance and test procedures. See "Accessories" for bulk cable and accessories. See GI section 71 for FE contracts available to assist the customer with installation.

Data Link Adapter (#3211): Provides the control logic to establish SDLC communications for terminal attachment. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** Required once for each Loop Adapter (#4780) and once for each EIA/CCITT Interface - Data Link (#3703).

EIA/CCITT Interface - Data Link (#3703): Provides an EIA/CCITT interface for attachment of a 3872 Modem for the connection of the 3842. Other synchronous modems with clocking, transmitting at 2400, 4800, or 9600 bps, and the 3842 Loop Control Unit may replace the 3872 and 3842. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Data Link Adapter #3211.

Loop Adapter (#4780): Allows direct attachment of a loop with one or two lobes to the controller operating at a speed of 9600 bps. **Limitations:**The sum of the bps operating rates for all EIA/CCITT Interface (#3701 and #3703) and the Loop Adapters (#4780) can not exceed 28,800 bps. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Data Link Adapter #3211, and a wrap type Loop Station Connector in each connected lobe.

MODEL CONVERSIONS

Model 1A can be changed to Model 1B. **Limitations:** Field installation of the additional disk heads for Model 1B (#1011) concurrently with a model change from Model 1A to Model 1B requires the submission of an RPQ.

Model 1A to 1B requires replacement of the disk storage device. Adequate provision must be made for retaining data contained on the disk and for the removal of any proprietary data prior to the start of any conversion. All replaced parts become the property of IBM.

ACCESSORIES

Cables: Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multi-use Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

Bulk Loop Cable Description	P/N
Indoor Cable: UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.	**1657265**
Indoor Cable: UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.	**7838694**
Indoor Cable: UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.	**7838695**
Outdoor Cable: For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.	**1657267**
Outdoor Cable: For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.	**1657268**

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1000 to 2000 feet). Additional lengths up to 609.6m (2000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1000 ft).

Exterior cable (P/Ns 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided.

Order from IBM. Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

Loop Accessories

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multi-use Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 X 4 Adapter Plate (2AP): The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity and Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	P/N
Loop Splice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330) *	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420

3632 Plant Communication Controller (cont'd)

Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares) **	1657379
2 X 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for outdoor cable to environmental box)	1657377

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 3631. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: Order from IBM. When ordering, use Machine type 3631. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see GI section 71 for FE contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories. See *IBM Multi-use Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SUPPLIES

The customer-owned diskettes may be ordered from IBM for initial and replacement quantities.

Mdl 1A:	IBM Diskette 1, P/N 2305845
Mdl 1B:	IBM Diskette 1, P/N 2305845
	IBM Diskette 2, P/N 2736700 or

For further information consult IBM. None required with machine order.

3641 REPORTING TERMINAL

PURPOSE

The 3641 Reporting Terminal models 1 and 2 are interactive workstations with a wide range of options to meet individual customer requirements for data entry and response.

MODELS

Model 1 001 — Has a 22-character alphameric display. Either a 35-key numeric keyboard or 70-key alphameric keyboard feature must be specified. Optional features include a Magnetic Reader Attachment and a Digital Input/Digital Output with 32 input and 8 output points.

Model 2 002 — Has a 22-character alphameric display. Either a 35-key numeric keyboard or 70-key alphameric keyboard feature must be specified. Optional features include a Magnetic Reader Attachment, a Numeric Punched Hole Badge Reader, an 80-Column Punched Card Reader, and Digital Input/Digital Output with 32 input and 8 output points.

Prerequisites:

1. Either the 35-key numeric keyboard **(#4652)** or the 70-key alphameric keyboard **(#4653)** must be specified on both the 3641 mdls 1 and 2.
2. A Loop Station Connector on a 3631/3632 or 3842/3843 loop, 4331 Loop Adapter or 8100 system loop.
3. The Punched Card/Punched Badge Adapter feature **(#5781)** must be specified if either Numeric Punched Hole Badge Reader **(#5801)** or 80-Column Punched Card Reader **(#5802)** is specified. [Mdl 2 only]
4. Magnetic Reader Attachment **(#4910)** must be specified if either the Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader is ordered.

Note: When ordering this machine for attachment to an 8100 system, "Terminal Requirements" under the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 3641 is an interactive workstation terminal that is designed to be used on a table, counter, work bench or mounted via an accessory bracket on a wall or column. Its capability includes:

- An easy-to-read display for input verification of keyed data and alphameric operator messages of up to 22 characters.
- Display of alphameric and special characters.
- Function keys for user-defined transactions.
- Special features for fixed data input include: A 10-column numeric punched hole badge reader, an 80-column card reader, and a magnetic reader adapter.
- A Digital Input/Digital Output feature for the exchange of data between the 3641 and customer devices.
- A removable keyboard overlay and function key mask which can be customized by the customer.

Customer Setup: The 3641 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

Customer Responsibilities:

The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3641 at time of delivery or when relocating the 3641.
- Removing and packing of the 3641 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3641 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network. See loop cable and loop accessories in "Accessories".

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: Maintenance of the 3641 terminals will normally be performed at the installed location.

There is no regularly scheduled IBM preventive maintenance. If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Physical Environments: The 3641 mdls 1 and 2 and accessories may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

IBM 3630 Plant Communication System, System Description, GA24-3652,
Introduction to the IBM 8100 Information System, GA27-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3641 Reporting Terminal Operating Guide, GA24-3679

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.8 meter (6 foot) cable - **#9986**
  4.3 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065.**

MODEL CONVERSIONS

Available at time of manufacture only.

SPECIAL FEATURES

Digital Input/Digital Output (#3251): Provides 32 bits of TTL compatible digital input and 8 bits of TTL compatible digital output on the 3641 mdl 1 and 2. **Maximum:** One. **Field Installation:** Yes.

35-Key Numeric Keyboard (#4652): Provides 15 customer-defined function keys, 5 control keys, 10 numeric keys and 5 special character keys. **Limitations:** Cannot be installed with #4653. **Maximum:** One. **Field Installation:** No.

70-Key Alphameric Keyboard (#4653): Provides 20 customer-defined function keys, 5 control keys, 10 numeric keys, A-Z, and 9 special character keys. **Limitations:** Cannot be installed with **#4652.** **Maximum:** One. **Field Installation:** No.

Magnetic Reader Attachment (#4910): Used to attach a Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader on the 3641 mdl 1 and 2. The two magnetic readers are plug compatible. **Limitations:** Cannot be installed with both **#5801** and **#5802** on mdl 2. **Maximum:** One. **Field Installation:** Yes.

Punched Card/Punched Badge Adapter (#5781): [Mdl 2] Required if either Numeric Punched Hole Badge Reader **(#5801)** or 80-Column Punched Card Reader (#5802) is specified. **Maximum:** One. **Field Installation:** No.

Numeric Punched Hole Badge Reader (#5801): [Mdl 2] Provides a badge reader which can read up to 10 digits of numeric information. **Limitations:** Cannot be installed with both **#4910** and **#5802.** **Maximum:** One. **Field Installation:** No. **Prerequisites: #5781.**

80-Column Punched Card Reader (#5802): [Mdl 2] Allows the reading of 80-column tab cards. **Limitations:** Cannot be installed with both **#4910** and **#5801.** **Maximum:** One. **Field Installation:** No. **Prerequisites: #5781.**

3641 Reporting Terminal (cont'd)

ACCESSORIES

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair *Authorization Form*, GZ27-2981, pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 .

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form*, (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

MAGNETIC READER/SCANNER EXTENSION CABLES

These cable assemblies can be used to extend the Magnetic Hand Scanner **P/N 4123495** or Magnetic Slot Reader **P/N 4123500** distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. **Limitations:** Extension cables cannot be plugged into other extension cables.

Ordering Instructions: See IBM.

Cable 6 meters (19.7 feet): P/N 4832986, .

Cable 12 meters (39.4 feet): P/N 4832987

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
DEMSR/MSR Arm and Sensor Head Assembly	**4832963**
DEMSR/MSR Base and Feedback Assembly	**4832973**
DEMSR/MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**
DEMSR Cover	**4123486**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

Magnetic Hand Scanner

Number of MHSs # 4123495	Sensor Head Assemblies # 4832721	Handle and Feedback Assembly # 4832701	Amplifier Card and Cord Assembly # 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Magnetic Slot Reader

Number of MSRs # 4123500	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Dual Entry Magnetic Slot Reader

Number of DEMSRs # 4123520	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Cardand Cord Assem # 4832962	Cover # 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

3641 Reporting Terminal (cont'd)

Ordering Instructions: See IBM.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

WALL MOUNTING BRACKETS

A two piece mounting bracket is available to mount the 3641 Reporting Terminal to a wall, column, or other vertical surface.

One piece mounts on the 3641 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3641 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

Ordering Instructions: See IBM.

Warranty: Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

Wall Mounting Brackets: P/N 4151768 or feature code **#9450.**

SUPPLIES (None)

None required with machine order. Supplies may be ordered through-IBM.

3642 ENCODER PRINTER

PURPOSE

A workstation printer and magnetic stripe encoder which produces turn around documents. The magnetic stripe on the documents encoded by the 3642 can be read by the Magnetic Hand Scanner and the Magnetic Slot Reader.

MODELS

Model 1	001	Has ten print lines and allows hand feed operation.
Model 2	002	Has ten print lines and allows the automatic feeding of continuous forms as well as hand feed operation.

Prerequisites: A Loop Station Connector installed on an IBM Multiuse Communications Loop. See *Loop Accessories - 3630, 8100 Systems* in the M10000 pages.

Note: When ordering this machine for attachment to an 8100 system, the appropriate M8130, 8140 or 8101 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

Customer Setup: Machine only.

HIGHLIGHTS

The 3642 is designed to produce magnetic stripe documents at a workstation. Its capability includes:

- Prints and encodes magnetic striped cards and labels.
- Prints 10 lines of up to 70 alphameric characters each.
- Encodes alphameric data.
- Hand feed or automatic feed documents.
- Large printed-character option.

Automatic Feeding And Bursting: The mdl 2 Automatic Feed and Burst capability permits unattended operation. It provides a forms burster and a hopper which holds up to 400 continuous forms. A forms stacker which holds up to 400 cut forms is standard on both mdls. All continuous forms on the mdl 2 are automatically burst prior to encoding and printing.

The Automatic Feed and Burst capability is designed to burst 99 pound card stock and adhesive backed labels. It is not designed to burst 150-pound tag stock.

Document Speed: The document speed of the 3642 depends on the data printed and the forms size and will have to be evaluated for each application. The machine speed for a typical document is eight documents per minute.

Document Description: The 3642 contains a printer and magnetic stripe encoder that can print and encode on the following documents.

Document Sizes: Height: 8.26cm (3.25 in.) ... Length, Min: 12.7cm (5.00 in.) ... Length, Max: 18.733cm (7.375 in.).

Document Types: 99 pound Card Stock ... 150 pound White Tag Stock ... Pressure Sensitive Labels.

Document Thickness: Min.: 0.018cm (0.007 in.) ... Max.: 0.030cm (0.011 in.).

See *Forms Design Reference Guide,* GA24-3488, for more details on the 3642 Encoder Printer forms.

Character Sets: The 48 printed character set consists of 0-9, A-Z, and special characters period (.), single quote ('), plus (+), ampersand (&), dollar sign ($), asterisk (*), hyphen or minus (-), slash (/), comma (,), percent (%), at sign (@), and number sign (#).

A special (Large Character) 48-character set available at time of manufacture provides 0-9, A-Z, slash (/), minus (-), and decimal (.), and 9 special characters for creating large printed characters. See *3630 Plant Communications System Description* for details.

The large character set has two options:

- Large-character printing on the first 4 lines only - normal character printing on the last 6 lines.
- Large-character printing on all 10 lines.

The 63-character magnetically encoded character set consists of 0-9, A-Z, and 27 special characters.

Customer Setup: The 3642 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the General Information section.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3642 at time of delivery or when relocating the 3642.
- Removing and packing of the 3642 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3642 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network (see M10000).

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: The standard maintenance agreement as described in the General Information section applies to the 3642 terminals.

Maintenance of the 3642 terminals will normally be performed at the installed location. See "Use of IBM Equipment in Industrial Environments" in GI section.

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Physical Environments: The 3642 mdls 1 and 2 may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

Forms Design Reference Guide for Printers, GA24-3488
IBM 3630 Plant Communication System, System Description, GA24-3452
Introduction to IBM 8100 Information System, GA27-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3642 Encoder Printer Operating Guide, GA24-3680

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.83 meter (6 foot) cable - **#9986**
  4.3 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065.**
- Character Set Groups:

  #2956 - For standard size character set
  #9402 - Large-Char. lines 1-10
  #9401 - Large-Character lines 1-4

SPECIAL FEATURES (None)

3642 Encoder Printer (cont'd)

TERMS and CONDITIONS

Plan Offering: Plan B
Purchase Option: 55%
Non-field Installable Feat/Mdl Conversions: Yes
Machine Group:
Warranty: B
Per Call: 1
Termination Charge Percent: 20%
Termination Plan Months: 6
Upper Limit Percent: 5%
Base Term: 60 mos
Deferred Central Facilities Maintenance: Yes*

* Deferred Central Facility Maintenance (DCFM) Service. Minimum number of machnines - 4. Any combination of 3641s, 3642s,3643s, 3644s,3645s,3646s and 3647s may be intermixed to satisfy the minimum required for service. For each 3642 mdl 1 under DCFM amendment, MMC or MLC will be reduced $5.00 ... for each 3642 mdl 2, $6.00.

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

None required with machine order.

SUPPLIES

None required with machine order. Supplies may be ordered through your IBM SSD Sales Representative for initial and replacement quantities.

3643 KEYBOARD DISPLAY

PURPOSE

A combination keyboard and gas panel display terminal for input and output in interactive 3630 Plant Communication System applications and when attached to a 4331 processor or an 8100 system.

MODELS

Model 2	002	Displays 240 characters -- six rows of 40 characters. Keyboard consists of alphameric, control, and function keys.
Model 3	003	Displays 480 characters -- twelve rows of 40 characters. Keyboard consists of alphameric, control, and function keys.
Model 4	004	Displays 1024 characters -- sixteen rows of 64 characters. Keyboard consists of alphameric, control, and function keys.

Prerequisites:

1. Either the Alphameric Keyboard **(#4772)** or the Expanded Alphameric Keyboard **(#4774)** must be selected to complete the orde, see "Special Features".
2. A Loop Station Connector installed on an IBM Multiuse Communications Loop, see "Accessories".
3. Magnetic Reader Attachment **(#4910)** must be specified if either the Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader is to be attached.

   When ordering this machine for attachment to an 8100 system, section "Terminal Requirements" in the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

- Gas panel display with buffer.
- Keyboard options to meet input requirements.
- Operates with manufacturing application programs.
- Accesses control functions.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3643 at time of delivery or when relocating the 3643.
- Removing and packing of the 3643 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3643 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: Maintenance of the 3643 terminals will normally be performed at the installed location.

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Physical Environments: The 3643 mdls 2, 3 and 4 may be used in industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Concentrations of dust, grit and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with shipping, placement, operation and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

IBM 3630 Plant Communication System, System Description, GA24-3652.
Introduction to the IBM 8100 Information System, GA27-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3643 Keyboard Display Operating Guide, GA24-3681.

Customer Setup: The 3643 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.8 meter (6 foot) cable - **#9986**
  4.3 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065**.

SPECIAL FEATURES

Keyboards -- All keyboards will have a combination of preengraved and non-engraved keytops. For the non-engraved function keys; each 3643 will be provided with 3 sets of self-adhesive keytop labels. One set will be preprinted with commonly-used function nomenclature and will have a protective plastic coating applied. Also, a set of blank labels will be provided so that the user may create his own labels. A clear plastic overlay set will provide a protective cover for the blank label set.

Alphameric Keyboard (#4772): A 54 key-character alphameric section pre-engraved as a typewriter keyboard to the left of a function/transaction keypad. The function/transaction keypad consists of 12 engraved and 8 non-engraved keys. **Limitations:** Cannot be installed with Expanded Numeric Keyboard **(#4774). Maximum:** One on mdl 2, 3 or 4. **Field Installation:** No.

Expanded Alphameric Keyboard (#4774): Same as #4772; except that function/transaction keypad has 20 additional non-engraved keys. **Limitations:** Cannot be installed with keyboard **(#4772). Maximum:** One on mdl 2, 3 or 4. **Field Installation:** No.

Magnetic Attachment (#4910): Permits attachment of Magnetic Hand Scanner or Magnetic Slot Reader. The Magnetic Hand Scanner, Magnetic Slot Reader and Dual Entry Magnetic Slot Reader are plug compatible. **Limitations:** Cannot be installed with Magnetic Badge and Document Encoder **(#4920). Maximum:** One. **Field Installation:** Yes.

Magnetic Badge And Document Encoder (#4920): Provides a magnetic slot reader/encoder unit that records aiphameric data on magnetic striped badges and documents. Also has the capability to read data from magnetic striped media. **Limitations:** Cannot be installed with Magnetic Attachment **(#4910). Maximum:** One on Mdl 2, 3 or 4. **Field Installation:** Yes, on machines shipped after July 1981

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the

3643 Keyboard Display (cont'd)

media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair *Authorization Form,* GZ27-2981, pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 .

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form,* (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

MAGNETIC READER/SCANNER EXTENSION CABLES

These cable assemblies can be used to extend the Magnetic Hand Scanner **P/N 4123495** or Magnetic Slot Reader **P/N 4123500** distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitation: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: See IBM.

Cable 6 meters (19.7 feet): P/N 4832986 .

Cable 12 meters (39.4 feet): P/N 4832987 .

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
DEMSR/MSR Arm and Sensor Head Assembly	**4832963**
DEMSR/MSR Base and Feedback Assembly	**4832973**
DEMSR/MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**
DEMSR Cover	**4123486**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

Magnetic Hand Scanner

Number of MHSs # 4123495	Sensor Head Assemblies # 4832721	Handle and Feedback Assembly # 4832701	Amplifier Card and Cord Assembly # 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Magnetic Slot Reader

Number of MSRs # 4123500	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Dual Entry Magnetic Slot Reader

Number of DEMSRs # 4123520	Arm and Sensor Head Assembly #4832963	Base and Feedback Assembly #4832973	Amplifier Cardand Cord Assem # 4832962	Cover # 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: See IBM.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

SUPPLIES None

3644 AUTOMATIC DATA UNIT

PURPOSE

The 3644 Automatic Data Unit attaches to the 3631 or 3632 controller, an 4331 MDL Group 1 or 2 or an 8100 system via their loop features to provide system connection to a variety of distributed sensors, actuators, and production and laboratory equipment.

MODELS

Model 1 001

Limitations: The analog input function requires multiple Sensor I/O cards. If analog input or current loop is installed, some card-socket usage restrictions exist. The Analog Amplifier card should be installed only in 3644s containing the necessary prerequisite EC. Analog input and RS-232-C/CCITT V.24 Communications cannot both be installed in the same 3644. The Communications Adapter Card is not supported by the 3630 host services 3644 translation services program. See M10000 pages for details.

Prerequisites:

1. When the 3644 is installed on the 8100 system via the IBM Multiuse Communications Loop, the 8100 system will generate the parameter tables.

   Note: When ordering this machine for attachment to an 8100 system, the appropriate 8101, 8130 or 8140 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

2. A Loop Station Connector installed on an IBM Multiuse Communications Loop. See "Loop Accessories" in the 3630 or 8100 machine pages.
3. When the 3644 is installed on the 4331 Loop Adapter the 4331 processor will generate the parameter tables.

Customer Setup: Machine only.

HIGHLIGHTS

Provides:

- Power and housing for Sensor I/O cards
- Distributed attachment of user equipment
- Analog and digital attachments
- Bit serial asynchronous current loop and RS-232-C/CCITT V.24/V.28
- User-defined scan controls, data transmission and logic processing.

Customer Setup: The 3644 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3644 at time of delivery or when relocating the 3644; this includes the Sensor I/O cards.
- Removing and packing of the 3644 at time of discontinuance.
- Using and following the problem determination procedures of the 3644 and filling out the trouble report prior to calling for service.
- Executing the problem determination procedures for the Sensor I/O cards, determining the failing card, and mailing it to the honoring IBM location.
- Maintenance of the process sensors, actuators, and wiring.
- Determining requirements for and stocking spare Sensor I/O cards.
- Creating the parameter tables that direct the operation of the 3644.
- Installation and physical planning for the 3644. IBM assistance in determining the suitability of the industrial environment for the 3644 installation is available.
- Relocation of the 3644 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network.

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, or sensor I/O cards are at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: Maintenance of the 3644 terminals will normally be performed at the installed location. There is no regularly scheduled IBM preventive maintenance.

Warranty service of the Sensor I/O cards will be performed at the honoring IBM location.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Physical Environments:

The 3644 mdl 1 and its Sensor I/O cards may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the and *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

IBM 3630 Plant Communication System, System Description, GA24-3652.
Introduction to the IBM 8100 Information System, GA27-2875.
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3644 Automatic Data Unit, Component Description, GA24-3653
IBM 3644 Automatic Data Unit Programming Guide, GC24-5178
IBM 3644 Automatic Data Unit Operating Guide, GA24-3682

SPECIFY

Unless otherwise indicated, these specify features are only available at of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Plug: If **#2802**, **#2804**, or **#2730** voltage is specified, then **#2714** (non-locking plug) or **#2715** (locking plug) must be specified.
- Power Cable:
  1.8 meter (6 foot) cable - **#9986**
  4.3 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065**.
- Distribution of 3644 Microcode: The 3644 microcode is required at each S/370, 4331 or 8100 system location. The address for the initial shipment must be supplied as shown below.

The following four steps are to be taken when ordering 3644 microcode:

1) To identify what the 3644 is attached to specify:
   #9415 - when attached to 8100
   #9416 - when attached to 3631, 3632
   #9417 - when attached to 4331 Loop Adapter
2) To specify the desired media when attached to a 3631, 3632, or 4331 Loop Adapter specify:

   #9412 - 9/800 magnetic tape
   #9413 - 9/1600 magnetic tape
   #9414 - 9/6250 magnetic tape
3) To indicate the presence of the MIO feature (#4905) when attached to a 3631, 3632, or 4331 loop adapter, specify:

   #9491 - for initial 3644 on the system without MIO feature
   #9492 - for initial 3644 on the system with MIO feature (#4905).
   #9493 - for any additional 3644s on the system.
4) For 3644's attached to an 8100 specify:

   #9493 - for any additional 3644s.
   #9494 - for the first 3644

   Shipping address for 3644 microcode must be supplied exactly as follows:

3644 Automatic Data Unit (cont'd)

1. When the host is not an 8100 system, send to the host (for example, S/370) location:

   Line 1 - IBM Programming Support Representative
   Line 2 - c/o (Customer Name)
   Line 3 - Street Address (or P.O. Box)
   Line 4 - City, State, Zip
   Line 5 - Attention: Data Processing Manager

2. When the host is an 8100 system, send to the 8100 location:

   Line 1 - Customer Name
   Line 2 - Street Address (or P.O. Box)
   Line 3 - City, State, Zip
   Line 4 - Attention: Data Processing Manager

The above address is where the 3644 initial microcode will be sent automatically. All microcode ECs will be sent to the TPC# (Teleprocessing Control Number) address. The TPC# address is controlled and supplied by the FE Branch Office.

SPECIAL FEATURES

Manual I/O (#4905): Provides a 22-character display and a 35-key numeric/function keypad. Allows inquiry into customer data and status contained in 3644 storage when online to the 3630, 4331 or 8100 system. When offline, additionally allows modification of customer data locations to effect operator control of 3644 operation. **Maximum:** One. **Field Installation:** Not recommended.

MODEL CONVERSIONS (None)

ACCESSORIES

SENSOR I/O CARDS

16-Point Non-Isolated DI: Provides 16 non-isolated input points for connection to user voltage or contact sense signals. Each point provides a high level and a low level sense capability. Input parameters are:

Contact Sense	Low Level	High Level
Logical 1	≤ 2K Ohms	≤ 5K Ohms
Logical 0	≥ 50K Ohms	≥ 100K Ohms

Voltage Sense	Low Level	High Level
Logical 1	- 24.0 to + 1.0V DC	0 to + 9.0V DC
Logical 0	+ 2.5 to + 24.0V DC	+ 22.5 to + 52.8V DC

16-Point Isolated DI: Provides 16 points of optically isolated digital input for connection to user signals. 250V DC isolation is provided between user signals and the 3644. Each point provides a high level and a low level voltage - sense capability. Input parameters are:

	Low Level	High Level
Logical 1	+ 2.0 to +12.0V DC	+12.0 to +52.8V DC
Logical 0	- 12.0 to + 0.8V DC	- 52.8 to + 0.8V DC

16-Point Non-Isolated DO: Provides 16 NPN transistor switches in a grounded emitter configuration for switching user-provided DC power to user-provided devices. Each switch is capable of sinking .250 amps from a 52.8 volt source through a resistive load. A logical 1 written into the control register will cause the transistor to turn on. Maximum voltage drop in the on state is 0.4 volts at load currents up to 20 milliamperes and 0.6 volts at load currents up to .250 amps. If no user voltage source is attached, the card will supply an off state voltage of 5.5 volts maximum at 0 amps, and 2.4 volts minimum at .001 amps.

16-Point Isolated DO: Provides 16 NPN transistor switches in an open collector, open emitter configuration for switching user-provided DC power to user-provided devices. 250V DC or peak AC isolation is provided between each switch and the 3644. Each transistor switch is capable of switching up to .250 amp from a 52.8 volt source to a resistive load. A logical 1 written into the control register will cause the switch to turn on. Maximum voltage drop in the on state is 0.4 volts at load currents up to 20 milliamps and 0.6 volts at load currents up to 250 milliamps. Consult *3644 Component Description Manual* for limitations on the number of Isolated DO cards per 3644.

Analog/Digital Converter: Provides an 11-bit plus sign (12 bit total), 5 volt bi-polar successive approximation analog to digital converter with a zero correction logic section that reduces errors caused by component aging and temperature induced offset drift. Note that the ADC must be used in conjunction with at least one multiplexer card to provide for connection of signal wires. Additional multiplexer cards may be installed to provide a greater multiplexing capability. The ADC card must be installed in the 3644 card socket 1 if it is used. Analog Input Subsystems cannot be installed if Communication Adapter Card(s) are installed.

Analog 7 Range Amplifier: Provides a 7 range programmable gain instrumentation amplifier for low level analog input signals. Gains of 1, 10, 25, 50, 100, 250 or 500 may be selected for each analog input point. This extends the range of the ADC to ±10mv, ±20mv, ±50mv, ±100mv, ±200mv, ±500mv or ±5v full scale. The Analog Amplifier also converts the 16-point Solid State Multiplexer card from single ended to differential operation. The Analog Amplifier must be installed in Socket 2 if it is used.

The Analog Amplifer should be installed only in 3644's having the prerequisite noise reduction EC's. These EC's are factory installed in 3644's starting at Serial 0010077. Earlier 3644's may be upgraded with field installable EC 755840.

Note: A calibration tool to aid in ADC and Analog Amplifier calibration is available as RPQ S00399.

8-Point Reed Relay Multiplexer: Provides eight 3-wire connections for shielded differential analog input signals. Provides eight-way multiplexing for the ADC. Flying capacitor switching is used to provide + or - 200 volt common mode tolerance and reduce the influence of common mode voltage to unmeasurable levels at reference conditions. The reed relay multiplexer can switch signal voltages ranging from -0.5 to +5 volts. Multiplexer cards must be installed in contiguous socket locations, starting with socket 2 if no Analog Amplifier is installed, or with socket 3 if an Analog amplifier is installed. Reed Relay and Solid State Multiplexers may be intermixed.

16-Point Solid State Multiplexer: Provides sixteen 3-wire connections for shielded analog input signals. Provides 16-way multiplexing for the ADC. Solid state FET switches can handle signals ranging from -5 to +5 volts. If used without the Analog Amplifier, single ended operation is provided with the analog signals referenced to 3644 ground. If used with the Analog Amplifier, differential input operation is provided with a common mode tolerance of ±10 volts. Multiplexer cards must be installed in contiguous socket locations, starting with socket 2 if no Analog Amplifier is installed, or with socket 3 if an Analog Amplifier is used. Reed Relay and Solid State Multiplexers may be intermixed.

Current Loop Receiver/Transmitter: Provides two transmitters and two receivers for modulating and demodulating a 20 milliamp current flow. Switches are provided on the card to select speed (110, 150, 300, 600, 1200 baud), number of data bits (5, 6, 7, 8), parity (odd, even, none), and number of stop bits (1, 2). A variety of start/stop codes over a wide range of speeds is available to allow connection to bit-serial devices. Consult the *3644 Component Description Manual* for limitations on the number of Current loop cards per 3644.

Communications Adapter: Provides two bidirectional asnychronous RS-232-C/CCITT V.24/V.28 compatible attachment points for RS-232/CCITT V.24/V.28 compatible terminal equipment. Switches are provided on the card to select speed (110/134.5, 150, 300, 600, 1200 Baud), number of data bits (5, 6, 7, 8) parity (odd, even, none), and number of stop bits (1, 1.5, 2). 3644 support is provided for simplex, half duplex, and duplex channel configurations. The Communications Adapter Card cannot be installed in 3644's using the Analog Input Subsystem. The Communications Adapter Card is not supported by the 3630 Host Services 3644 Translation Services program.

FEATURE SUMMARY

Description	P/N
16-Point Non-Isolated DI Card	4152582
16-Point Isolated DI	4152581
16-Point Non-Isolated DO	4152583
16-Point Isolated DO	8333198
Analog/Digital Converter(ADC)	4152586
Analog 7 Range Amplifier	4152587
8-Point Reed Relay Multiplexer	4152584
16-Point Solid State Multiplexer	4152585
Current Loop Receiver/Transmitter	4152580
Communications Adapter	5680857

Ordering Instructions: For ordering for delivery with machine, see appropriate "Machines" pages.

Warranty: Each 3644 Sensor I/O card is warranted to be free from defects in materials and workmanship for a period of 90 days, starting either on date of shipment or on date of installation or 30 days after installation, whichever comes first. IBM at its option will repair or replace the defective accessory. Warranty service will be performed at the FE Repair Center. The customer is responsible for executing the problem determination procedures for the Sensor I/O cards, determining the defective card and mailing it to:

IBM Corporation
Repair Center
321 Route 17
Paramus, N.J. 07652

Cards that have been modified and cards that have been damaged through improper installation, handling, or failure to provide a suitable installation environment will not be accepted for warranty service. IBM shall be the sole judge of whether or not a card meets warranty requirements.

3644 Automatic Data Unit (cont'd)

Spare unit requirements are a function of the customer's application, the total number of 3644s installed, and the range of Sensor I/O card types installed. Spare unit stocking considerations are:

1. At least one spare for each type of Sensor I/O card installed at a customer site.
2. Where multiples of a single Sensor I/O card are installed, one spare for each eight active cards.

Each customer will have to determine his own unique spare requirements.

SENSOR I/O CARDS ATTACHMENT ACCESSORIES

Process Termination Block: Attaches to the end of the Sensor I/O card to provide a screw-down termination facility for process signals and to retain the card in the 3644 housing. Each installed card with the exception of the analog-digital converter must be equipped with a process termination block.

Accessory Socket Cover: Covers unused sensor card locations in the 3644 to minimize entry of airborne contaminants. One cover is required for each unused sensor card location. A cover is also used to retain the ADC.

Communications Adapter Cable: Provides translation at the 3644 process termination block to a standard EIA connector. The Adapter Cable is 20 inches (508 cm) long with ring connectors on one end and a female EIA DB-25 connector on the other end.

Description	P/N
Process Termination Block	**4152588**
Accessory Socket Cover	**4152589**
Communications Adapter Cable	**5680861**

Ordering Instructions: For ordering for delivery with machine, see appropriate "Machines" pages. A

Warranty: The 3644 Attachment Accessories are warranted free from defects in workmanship and materials for 90 days.

SUPPLIES (None)

3645 PRINTER

PURPOSE

A receive-only printer for printed output in interactive 3630 Plant Communication System, 4331 processor and 8100 Information System applications.

MODELS

Model 1 001 — 120 cps maximum bidirectional printer
Note: Actual printer throughput is dependent on system and application characteristics.

Customer Setup: Machine only.

Prerequisites: A Loop Station Connector installed on an IBM Multiuse Communications Loop. See "Loop Accessories" in the 3630 and 8100 machine pages.

Either Character Print - Standard **(#1501)** or Character Print - Large **(#1502)** must be specified.

Note: When ordering this machine for attachment to an 8100 system, the appropriate M8130, 8140 or 8101 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

HIGHLIGHTS

The 3645 Printer provides a hard-copy output on a variety of forms to meet plant floor printing requirements. The printer is a bidirectional matrix printer with electronic tabulation and indexing. Line spacing is 6 lines per inch. Up to 4 part cut forms can be used with standard friction feed. For continuous forms, the Forms Tractor **(#8700)** or the Forms Tractor with Separator Bar **(#8701)** is recommended. Card stock forms are not recommended.

Two printing feature options are provided:

Character Print - Standard **(#1501)** provides a basic character size printing (approximately 0.072 inch wide by 0.117 inch high). The printer character dot matrix is four of seven wide by eight high giving high legibility. The maximum print line is 132 positions. Character spacing is ten to the inch.

Character Print - Large **(#1502)** provides four character size printing options under program control:

Basic character size (approximately 0.072 inch wide by 0.117 inch high), and approximately two times basic size, four times basic size, and eight times basic size.

Intermix of printing sizes on a single line is not permitted.

The 3645 has been designed to operate in most industrial and commercial environments. The 3645 attaches to the 3631 or 3632 Plant Communication Controller via a local 9600 bps loop. The 3645 also attaches to the 3842 or 3843 Loop Control Unit via a 2400 bps loop, 4331 Loop Adapter or 8100 system loop.

Two variable width forms tractors are available. See "Special Features".

Forms Specification: Refer to *Form Design Reference Guide for Printers,* GA24-3488. (Use 3767 specifications.)

Customer Setup: The 3645 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup, and checkout of the 3645 at the time of delivery or when relocating the 3645.
- Removing and packing of the 3645 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3645 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network.

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: Maintenance of the 3645 Printer will normally be performed at the installed location. There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Maintenance courses are offered to the customer for a separate charge.

Physical Environments: The 3645 Printer may be used in industrialized work zones of a wide range of business, industrial, and commercial establishments.

It can resist:

- Concentration of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with shipping, placement, operation, and relocation of the terminal for most types of industries.

For environmental requirements refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

IBM 3630 Plant Communication System, System Description, GA24-3652
Introduction to the IBM 8100 Information System, GA27-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3645 Printer Operating Guide, GA24-3711

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.8 meters (6 foot cable) - **#9986**
  4.3 meters (14 foot cable) - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065.**

SPECIAL FEATURES

Character Print - Standard (#1501): Provides dot matrix character size approximately 0.072 inch wide by 0.117 inch high at 10 characters per inch. **Limitations:** Cannot be installed with Character Print - Large **(#1502). Maximum:** One. **Field Installation:** Yes.

Character Print - Large (#1502): Provides four character size printing options under program control: Standard-approximately 0.072 inch wide by 0.117 inch high at 10 characters per inch, and approximately two times standard size, four times standard size, and eight times standard size. Intermix of printing sizes on a single line is not permitted. **Limitations:** Cannot be installed with Character Print - Standard **(#1501). Maximum:** One. **Field Installation:** Yes. **Prerequisites: #8700** or **#8701.**

Variable Width Forms Tractor (#8700): A forms feeding device for continuous edge-punched fan-fold forms. Up to 6 parts (total thickness - 0.46mm (0.018 inch) may be used. Five and six part continuous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. Overall forms width from 76mm to 381mm (3 to 15 inches) can be fed. End of forms detection is provided. **Maximum:** One. **Field Installation:** Yes. **Note:** If this feature is ordered by MES, you must specify color **#9063** classic blue, **#9064** charcoal brown, **#9065** pebble gray.

Variable Width Forms Tractor With Separator (#8701): Forms feeding device for continuous edge punched fan-fold forms. A separator bar permits tearing off continuous forms at the perforation to within 40mm (1.5 inches) of the top printing line without misalignment of subsequent forms. Forms should have perforated carrier strips on both sides. Up to 4 part continuous forms total thickness 0.3mm (0.012 inch) may be used. Forms without perforated carrier strips and/or greater than 4 parts are not recommended. Form widths from 127mm to 378mm (5 to 14-7/8 inches) can be used. End of forms detection is provided. **Maximum:** One. **Field Installation:** Yes. **Note:** If this feature is ordered by MES, you must specify color **#9063** classic blue, **#9064** charcoal brown, **#9065** pebble gray.

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): Permits placement of continuous forms on the stand above floor level and provides for stacking after printing. This accessory is a two-shelf forms stand.

3645 Printer (cont'd)

SUPPLIES

None required with machine order. Supplies may be ordered through your IBM SSD Sales Representative for initial and replacement quantities.

3646 SCANNER CONTROL UNIT

PURPOSE

The 3646 Scanner Control Unit allows attachment of the Magnetic Hand Scanners or the Magnetic Slot Readers for rapid, accurate data collection.

MODELS

The standard 3646 can attach up to two magnetic readers, Magnetic Hand Scanners or Magnetic Slot Readers. Two additional magnetic readers can be attached via the optional Magnetic Reader Attachment **(#6351)**. Each magnetic reader can be addressed for independent operation.

Prerequisites: A Loop Station Connector installed on an IBM Multiuse Communications Loop, see "Accessories" Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader.

Note: When ordering this machine for attachment to an 8100 system, "Terminal Requirements" on the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 3646 is a compact terminal designed to bring magnetic scanning capability to the workstation. Its capability includes:

- Free standing on a table, counter, work bench, etc.
- Wall or column mounted via accessory brackets.
- Up to 4 magnetic readers.
- Readers can be Magnetic Hand Scanners or Magnetic Slot Readers in any combination.

Customer Setup: The 3646 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the General Information section.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3646 at time of delivery or when relocating the 3646. A Magnetic Hand Scanner or Magnetic Slot Reader is required for checkout.
- Removing and packing of the 3646 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3646 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

Problem Determination Procedures: Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: Maintenance of the 3646 terminals will normally be performed at the installed location. The standard maintenance agreement as described in the General Information section applies to the 3646 terminals.

See "Use of IBM Equipment in Industrial Environments" in the GI section.

For maintenance of 3646 accessories, see "Accessories".

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Physical Environments: The 3646 mdl 1 and accessories may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning,* GA24-3675.

Publications:

IBM 3630 Plant Communication System, System Description, GA24-3652
Introduction to the IBM 8100 Information System, GA27-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook
IBM 3646 Scanner Control Unit Operating Guide, GA24-3683

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.83 meter (6 foot) cable - **#9986**
  4.27 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065**.

SPECIAL FEATURES

Magnetic Reader Attachment (#6351): Allows two additional Magnetic Hand Scanners, Magnetic Slot Readers or Dual Entry magnetic Slot Readers to be attached to the 3646 mdl 1. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSION (None)

ACCESSORIES

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3646

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair *Authorization Form,* GZ27-2981, pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

3646 Scanner Control Unit (cont'd)

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 .

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

Ordering Instructions: To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3646

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will *be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form* (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

MAGNETIC READER/SCANNER EXTENSION CABLES

These cable assemblies can be used to extend the Magnetic Hand Scanner **P/N 4123495** or Magnetic Slot Reader **P/N 4123500** distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. **Limitation:** Extension cables cannot be plugged into other extension cables.

Ordering Instructions: To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3646.

Cable 6 meters (19.7 feet): P/N 4832986, .

Cable 12 meters (39.4 feet): P/N 4832987 .

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
DEMSR/MSR Arm and Sensor Head Assembly	**4832963**
DEMSR/MSR Base and Feedback Assembly	**4832973**
DEMSR/MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**
DEMSR Cover	**4123486**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

Magnetic Hand Scanner

Number of MHSs # 4123495	Sensor Head Assemblies # 4832721	Handle and Feedback Assembly # 4832701	Amplifier Card and Cord Assembly # 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Magnetic Slot Reader

Number of MSRs # 4123500	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Dual Entry Magnetic Slot Reader

Number of DEMSRs # 4123520	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Cardand Cord Assem # 4832962	Cover # 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

WALL MOUNTING BRACKETS

A two piece mounting bracket is available to mount the 3646 Scanner Control Unit to a wall, column, or other vertical surface.

One piece mounts on the 3646 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3646 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

Ordering Instructions: To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3646. When ordering, specify machine type.

Warranty: Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

Wall Mounting Brackets: P/N 4151768 or feature code **#9450.**

SUPPLIES (None)

3647 TIME AND ATTENDANCE TERMINAL

PURPOSE

A data entry terminal designed for attendance and other data entry labor reporting applications.

MODELS

Model 1 001

Prerequisites: A loop station connector installed on an IBM Multiuse Communications Loop. For magnetic stripe reading, a Magnetic Slot Reader, Dual Entry Magnetic Slot Reader, or a Magnetic Hand Scanner is required.

When ordering this machine for attachment to a 4331 processor the appropriate M4331 pages should be reviewed.

Customer Setup(CSU): Machine only.

HIGHLIGHTS

The 3647 Time and Attendance Terminal is designed for attendance, labor reporting, and other data entry applications. The base 3647 has a magnetic scanner adapter and a four-digit display that can be used for time of day. Two optional features are available:

- **Function Switch** - A six-position rotary switch that is customer definable.
- **Control Feature** - Provides control signals to allow door openings, audible alarms, etc.

An optional magnetic slot reader mounting bracket accessory (P/N 8632451) provides attachment for a slot reader. This mounting bracket is firmly attached to the 3647 via a keylock. The slot reader cable is coiled within the bracket.

The 3647 can be table- or wall-mounted. An optional wall mounting bracket accessory (P/N 4151768) is available.

The 3647 provides:

- **Time of Day Clock** - The initial time is set under program control and can be set for a 12- or 24-hour clock with time displayed in hours and minutes or hours and hundredths of hours.
- **Input Buffer** - An input buffer mode of operation can selected to store multiple input messages. This provides a high walk-by rate and allows input when the controller, loop, or data link is inoperative. A no-buffer mode of operation can also be selected to permit interactive processing on each input message.
- **Invalid Document Code** - An invalid document code option can be selected that allows input messages to be checked for the presence of a non-numeric character. Input without this character is rejected by the 3647.
- **Time Stamping** - A time stamping option can be selected that sends the displayed time of day with each input message transmitted to the controller.

Customer Setup: The 3647 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

Customer Responsibilities: The customer is responsible for:

- Unpacking, placement, setup, and checkout of the 3647 at the time of delivery or when relocating the 3647.
- Removing and packing of the 3647 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3647 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

Problem Determination Procedures: Terminal problem determination procedures (PDPs), prompt retry and recovery actions, and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

Maintenance: The standard maintenance agreement as described in the General Information section applies to the 3647 Time and Attendance Terminal; however, there is no regularly scheduled IBM preventive maintenance. Maintenance of the 3647 Time and Attendance Terminal will normally be performed at the installed location. If purchased, the terminals are eligible for Maintenance Agreement service immediately following expiration of the warranty period.

Physical Environments: The 3647 Time and Attendance Terminal may be used in industrialized work areas of a wide range of business, industrial, and commercial establishments.

It can resist:

- Concentration of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal,operational sites for most industries.
- Most industrial types of electromagnetic interference associated with the terminal operational sites.
- Vibration and shock associated with shipping, placement, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Installation Manual - Physical Planning,* GA24-3675.

On-Site Testing Allowance: The 3647 Time and Attendance Terminal will be eligible designated units when the 3630, 4331 Loop Adaptor or 8100 controller to which they are attached qualifies for an on-site testing allowance.

Systems Engineering Services: Systems Engineering Services are available upon customer request and at a charge to assist the customer in the use of the 3647.

Publications:

IBM 3060 Plant Communication System - System Description, GA24-3652
IBM 3647 Time and Attendance Terminal - Operating Guide, GA24-3732
Introduction to 8100 Information System, GA24-2875
Guide to the IBM 4331 Processor, GC20-1878
IBM 4331/3640 Information Handbook

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

  Note: 120V AC is compatible with existing 115V AC systems.

- Power Cable:
  1.8 meters (6 foot) cable - **#9986**
  4.3 meters (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- Color: Classic blue - **#9063** ... classic brown - **#9064** ... pebble gray - **#9065.**

SPECIAL FEATURES

Control Feature (#1501): Provides one point of TTL compatible input, one point of TTL compatible output, and two TTL compatible control signals. **Maximum:** One. **Field Installation:** No.

Function Switch (#3950): Provides a six-position rotary switch that can be be set by the operator. Five switch settings each transmit a unique function code when a magnetic stripe is scanned. One switch setting is set to "null." The meaning of the switch position is left to the customer and space is provided for a customer printed definition label near the switch. **Maximum:** One. **Field Installation:** No.

MODEL CONVERSION (None)

ACCESSORIES

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

3647 Time and Attendance Terminal (cont'd)

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair *Authorization Form,* GZ27-2981, pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 .

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will *be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form,* (GZ27-2981) pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

MAGNETIC READER/SCANNER EXTENSION CABLES

These cable assemblies can be used to extend the Magnetic Hand Scanner **P/N 4123495** or Magnetic Slot Reader **P/N 4123500** distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitation: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: See IBM.

Cable 6 meters (19.7 feet): P/N 4832986, .

Cable 12 meters (39.4 feet): P/N 4832987 .

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
DEMSR/MSR Arm and Sensor Head Assembly	**4832963**
DEMSR/MSR Base and Feedback Assembly	**4832973**
DEMSR/MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**
DEMSR Cover	**4123486**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

Magnetic Hand Scanner

Number of MHSs # 4123495	Sensor Head Assemblies # 4832721	Handle and Feedback Assembly # 4832701	Amplifier Card and Cord Assembly # 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Magnetic Slot Reader

Number of MSRs # 4123500	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Dual Entry Magnetic Slot Reader

Number of DEMSRs # 4123520	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: See IBM.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

WALL MOUNTING BRACKETS

A two piece mounting bracket is available to mount the 3647 Time and Attendance Terminal to a wall, column, or other vertical surface.

One piece mounts on the 3647 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3647 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

Ordering Instructions: See IBM.

Warranty: Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

Wall Mounting Brackets: P/N 4151768 or feature code **#9450 .**

MAGNETIC SLOT READER MOUNTING BRACKET

The Mounting Bracket is used to firmly attach the MSR or DEMSR to the 3647. It locks to the front cover of the 3647 by a key lock. The magnetic reader cable is coiled under the bracket.

Ordering Instructions: See IBM

Magnetic Slot Reader Mounting Bracket: P/N 8632451 .

3647 Time and Attendance Terminal (cont'd)

SUPPLIES

None required with machine order. Supplies may be ordered through IBM for initial and replacement quantities. For further information consult .

3651 STORE CONTROLLER MDLS 25, 75

PURPOSE

The control unit for a 3650 Programmable Store System. Using standard retail functions tailored by the customer to his own requirements, and/or customer-supplied supermarket application programming, the 3651 controls the operation of the 3650 Programmable Store System and its related terminals and provides for communications with an appropriate S/370, 30XX, or 4300 virtual storage processor.

MODELS

Model B25 — 9.2 megabyte integral disk storage. Limited features and processing capability. Supported by Programmable Store System Host Support only. Attaches 3275 model 3, 3653 model 1 and 1P, 3683 model 1, and 3663 all models terminals.

Model C25 — Same as model B25 except has 18.4 megabyte integral disk storage. The model C25 is physically larger than the B25.

Model A75 — 5 megabyte integral disk storage. Many features, full processing capability. Supported by Programmable Store System Host Support only. Attaches 3275 model 3, 3653 model 1 and 1P, 3683 all models, 3657 model 1, and 3663 model 1P, 2 and 3P terminals.

Model B75 — Same as model A75 except has 9.3 megabyte integral disk storage.

Model C75 — Same as model A75 except has 18.6 megabyte integral disk storage. The model C75 is physically larger than the model A75 and B75.

Model D75 — Same as model A75 except has 27.9 megabyte integral disk storage. The model D75 is the same physical size as the model C75.

Note: The 3651 model B25 and C25 Store Controller provide a lower entry system for those users who do not require the internal processing capability of the 3651 model A75, B75, C75 and D75. The effect of the different internal processing capability upon overall system performance is dependent upon the total system configuration and workload. To establish a supportable system configuration for any model Store Controller, systems design must be performed using the performance models and configuration aids available from IBM.

HIGHLIGHTS

The 3651 is a modular, programmable unit that provides the link between its attached terminals and the host data processing center. The 3651 is normally used to collect data from the various parts of the system, perform edit, logic, and arithmetic operations on that data and then log and/or forward it to its ultimate destination within the overall system - terminal or data processing center. The 3651 mdl 75 can also communicate with another mdl 75. Application functions for retail operations via 3653 mdl 1 terminals or 3653 mdl 1P terminals, when functioning as 3653 mdl 1 terminals are provided as standard. All other applications are performed by customer-supplied application programming. In mdls B25, C25, A75, B75, C75 and D75, customer-supplied supermarket and/or retail application programs may be used along with, or instead of, the standard retail operations. Standard features include the following:

Loop Adapter

Mdl 25 — Provides for attachment of one in-store local loop.

Mdl 75 — Provides for attachment of one in-store local loop and one additional loop which may be specified as local or remote (see Figure 1).

Controller Storage: The basic 3651 contains storage optionally expandable via special features (see "Special Features"). System configuration as well as user programs determine if additional storage increments are required.

	Basic Storage	Maximum Storage
All Models	61,440 bytes	126,976 bytes

Integral Disk Storage: The Integral Disk Storage is used for storage of selected controller functions, user-written application programs, system configuration data, data logging and data sets (files).

Models	A75	B25/B75	C25/C75	D75
Bytes per Track	15,360	15,360	15,360	15,360
Tracks per Cylinder	2	2	2	2
Bytes per Cylinder	30,720	30,720	30,720	30,720
Cylinders per IDS	167	301	602	903
Storage Capacity				
Movable Head	5,130,240	9,246,720	18,493,440	27,740,160
Fixed Head (M75)	122,880	122,880	245,760	368,640

Host Communications Adapter: [Mdl 75] and Mdl 25 with External Modem Interface (#9150)] Provides for transmission to and from a properly equipped S/370, 30XX, or 4300 processor. The basic transmission rate is 2400 bps over switched or nonswitched networks with 4800 bps as a specify option. Also provides for communications with 8100 processors over nonswitched lines using SDLC. This adapter interfaces to appropriate IBM modems or to the local Attachment Interface of the 4331 processor or to the Direct Connection interface of 8100 processors. With the appropriate features available on mdl 75, only the Host Communications Adapter can communicate with another 3650 Programmable Store System or locally attach a 3704, 3705 or 3725. (Mdl 25 with 1200 bps Integrated Modem #9512 provides for transmission to and from a properly equipped S/370, 30XX, or 4300 processor. The basic transmission rate is 1200 bps over switched network using an IBM integrated modem. See "Communications Facilities" below and M2700 pages.

To communicate with another 3650 system or local attachment to a 3704, 3705, or 3725 see "Special Features" below.

Audible Alarm: Activated when predetermined events require operator attention or intervention for system operation. A contact closure to which the customer can attach his remote alarm is available as an option with 3669/3689 Attachment. (See "3669/3689 Attachment" in "Special Features" below)

Controller Storage Save: [Mdl 75 only] Critical areas of controller storage are automatically written on the integral disk unit when power is turned off or a power failure is detected.

Terminal Devices: The terminals which are identified above under the different mdls of the 3651 are attached to the 3651 via Local/Remote Loop Adapter. Only the 3683 terminal, all mdls, will attach to 4800 bps Local Loop Adapter. Remote Loop Adapter available at 2400 bps only. A maximum of 191 terminals can be addressed by the 3651. However, the number of terminals which can be supported depends upon traffic volumes, desired response times, applications to be performed, and the mdl of the 3651.

One 3784 Line Printer mdl 1 may be attached to the 3651 Control Unit mdl 75.

Communications Facilities: The Host Communications Adapter (mdls 25 and 75), Auxiliary Communications Adapter (available on mdl 75 only) and 3669/3689 attachment (available on mdl 75 only) permit operation at the speeds indicated, over the facilities shown below, when using the appropriate DCE. For information concerning the facilities, see M2700 pages.

At 1200 bps - on facility CA2 (switched)
At 2400 or 4800 bps - on the public switched telephone network, a nonswitched voice grade line or a nonswitched data network. **Note:** The 3669 attachment cannot operate at 4800 bps.

Prerequisites: At the host location, a virtual storage S/370, 30XX, or 4300 processor with properly equipped 3704, 3705, 3725 or communications adapter. See M2700, 3704, 3705, and 3725 pages.

SPECIFY

- Power (AC, 1-phase, 60 Hz): Locking plug -- **#9884** for 208V or **#9886** for 230V. Non-locking plug -- **#9885** for 208V or **#9887** for 230V.
- Modem Attachment Host Communications Adapter: One IBM modem can be attached to this adapter on the 3651. The 3651 (except mdl 25) provides a cable and interface for connection of IBM modems at transmission rates of 2400 or 4800 bps for communications with the S/370, 30XX, 4300 processor or 8100 System. Can also be attached without modem to the local Attachment Interface (#4801) of a 4331 processor, mdl group 1 or 2. Can also be attached without modem at 4800 bps to the Direct Connection interface (SDLC FAC 16) of an 8101, 8130, or 8140 processor. The 3651 mdl 25 is featured to provide either a switched 1200 bps integrated modem (#9512) or an external modem interface (#9150) for connection of IBM modems at transmission rates of 2400 or 4800 bps for communications with the S/370, 30XX, 4300 processor or 8100 System. If switched network is selected, auto answer capability is standard. If leased operation is selected, dial backup is provided on a manual dial basis using the 3863, 3864, 3872 or 3874 Modem with appropriate special features. 4-wire Switched Network Backup is available with the 3863 mdl 1 and 3864 mdl 1.
- External Modem Interface (**#9150**): [Mdl 25] Provides a cable and interface on the Host Communications Adapter for connection of an IBM modem at transmission rates of 2400 or 4800 bps for communications over switched or leased networks. If switched network is selected, auto answer capability is standard. **Limitations:** Not available with 1200 bps Integrated Modem (**#9512**). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A 3863, 3864, 3872 or 3874 modem.
- 1200 bps Integrated Modem (**#9512**): [Mdl 25] Provides an integrated modem for operation over switched communication facilities at 1200 bps. Auto answer is provided. The cable provided is compatible with the IBM Protective Coupler (CBS type)

3651 Store Controller Models 25, 75 (cont'd)

available as P/N 1649100 (see RPQ 8Q0130 for description). For Canada, an additional cable is provided for attachment to the Canadian protective coupler. **Limitations:** Not available with External Modem Interface (**#9150**). **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** A FCC registered protective device (DAA) of the CBS type is to be provided by the user.

If a non-IBM modem is used, Specify Code **#9770** Wrap Cable is available to facilitate problem determination. The non-IBM modem must provide the clocking, an RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less on the Host Communications Adapter and the Auxiliary Communications Adapter.

Service (bps)	Specify Code
2400	**#9120**
4800	**#9126**

Notes:

(1) For communications capabilities product description and special features, see M2700, 3863, 3864, and 3872 pages.
(2) Specify codes **#9120** and **#9126** are not applicable with 1200 bps Integrated Modem (**#9512**).

- Controller Designation: Specify **#9491** on the first 3651 mdl 25 or 75 to be used with a host system location requiring 3650 Programmable Store System Host Support. Specify **#9492** on each additional 3651 mdl 25 or 75 in the network. Specification of **#9491** will provide IBM control code for the controller and all its attached devices (except the 3683 terminal) via a DTR sent to the designated host location.

  In addition, if **#9491** is specified, also specify **#9493** if any 3683 or 3685 terminals are attached to the 3651 controller and if a 3680 system is not attached to the same host system as the 3651. Specification of **#9493** will provide 3683 and 3685 control code. (If a 3680 system is attached to the same host system, the 3683 and 3685 control code is provided by a specify code on the 3684.) When **#9491** is specified, additional information must be specified as follows:

  1) Specify one of the following to indicate magnetic tape density (media) used at the host system location. The tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

     #9412 -- 9-track 800 bpi
     #9413 -- 9-track 1600 bpi
     #9414 -- 9-track 6250 bpi

     The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

  2) Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

     Line 1 - IBM Programming Systems Rep.
     Line 2 - c/o (Name of Customer)
     Line 3 - Street Address (or P.O. Box)
     Line 4 - (etc) - City, State, Zip Code

     This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code **#9491**). Whenever controller data is updated by an EC, the EC will be shipped to the most current Microcode Control (MC) address.

  In addition, if **#9493** is specified with **#9491**, specify **#9490** if there is a storage requirement that prevents 3683 operation with the current level of 3683 control code (i.e., EC 320560 or later). **#9490** provides 3683 control code level EC 320503 which operates in the same control code storage allocation as is required for 3683 control code level EC 320502. It is strongly recommended that new 3683 customers and 3687 customers do not take this specify option.

- Specify the following:

  #9504 - for 3650 BSC or SDLC Programmable Store Systems host support under DOS/VS VTAM or BTAM, OS/VS1 VTAM or BTAM, and OS/VS2 VTAM or BTAM.

  Note: The corresponding release of 3650 PSS Host Support must be ordered from IBM. See SCP pages.

- Store Loop Polarity Tester: One is furnished at each site at no charge.

  Notes: The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)

- Second Loop Adapter (mdl 75 only): Specify **#9442** to designate the second loop adapter as local or specify **#9552** to designate the second loop adapter as remote. Do not use these specify features if ordering 4800 bps local loop adapter for loop positions 1 and 2 (#4895). See Figure 1 below.

  Note: Specify **#9552** not allowed with 3669/3689 Attachment (#8069).

- RFI Standard: The RFI Standard (Specify **#2759**) is now provided on all machines as standard.

SPECIAL FEATURES

Control Storage Features: The amount to be ordered is dependent upon the number and type of terminals attached to the system as well as system configuration and user programs. For available storage configurations, see Table A below.

Storage Increment - Type II (#1564): Each #1564 provides the 3651 with an additional 16,384 positions of storage. **Maximum:** Three (see Table A). **Field Installation:** Yes. **Prerequisites:** The 3651 must be equipped with Storage Expansion Feature (#1570) and First Storage Increment (#1571).

Table A

Storage Configuration		Feature Distribution		
	Total Storage	Storage Expansion (#1570)	First Storage Increment (#1571)	Storage Increment Type II (#1564)
(A)	61440	0	0	0
(B)	77824	1	1	0
(C)	94208	1	1	1
(D)	110592	1	1	2
(E)	126976	1	1	3

Storage Expansion Feature (#1570): Provides the capability of expanding storage beyond 61,440 bytes. **Maximum:** One. **Field Installation:** Yes. **Note:** First Storage Increment (#1571) or First Storage Increment (#1571) and Storage Increment - Type II (#1564) are required to provide the appropriate additional positions of storage (see Table A).

First Storage Increment (#1571): Provides the 3651 with the first 16,384 additional positions of storage. See Table A. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1570.

Direct Attachment 3704/3705 (#2863): [Mdls A75, B75, C75, D75] Provides clocking from the Host Communications Adapter allowing the direct attachment to a local 3704 or 3705 at 2400 bps. **Limitations:** Not allowed with 3669/3689 attachment (#8069) with specify **#9200**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** The 3704 or 3705 must be equipped with Line Set, Type 1F (#4716). **Note:** A 6m (20 ft) external cable is provided which connects to the 3704/3705 cable.

IML-Write Adapter (#4633): Provides the 3651 with the ability to write an IML (Initial Machine Load) tape on a user provided tape cassette recorder to be read by a Point-of-Sale terminal equipped with the appropriate IML-Read Adapter (#4632 or #4634) feature. (Refer to *IBM 3650 Programmable Store System Introduction Manual*, GA27-3163, for cassette recorder interface requirement.) **Maximum:** One. **Field Installation:** Yes.

Local Loop Adapter, Add'l (#4882): [Mdls A75, B75, C75, D75] Provides an additional Local Loop Adapter as the Third Loop on the 3651. The actual number of terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the Loops as well as the communications link to the S/370. See "Terminal Devices" above. **Specify:** See Figure 1. **Limitations:** Not available on the 3651 if 9600 bps Loop Adapter (#4890), 4800 bps Loop Adapter (#4900) or Remote Loop Adapter (#6111) is installed. **Maximum:** One. **Field Installation:** Yes.

9600 bps Loop Adapter (#4890): [Mdls A75, B75, C75, D75] Provides a 9600 bps local Loop Adapter as the Third Loop. The feature provides for the attachment of 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) feature installed. The actual number of 3275 Display Station mdl 3s installed will depend upon program capacity and time requirements of the 3651 to service the Loops and the communications link to the S/370. See "Terminal Devices" above. **Limitations:** Not available if Local Loop Adapter, Add'l (#4882), 4800 bps Loop Adapter (#4900) or Remote Loop Adapter (#6111) is installed. Only 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) can be attached to this Loop adapter. **Specify:** See Figure 1. **Maximum:** One. **Field Installation:** Yes.

4800 bps Loop Adapters (#4895): [Mdls A75, B75, C75, D75] Provides 4800 bps Loop Adapters in Loop Adapter positions 1 and 2. The actual number of 3683 terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the loops as well as the communication link to the S/370. See "Terminal Devices" above. **Limitations:** Not allowed with add'l 2400 bps Local Loop Adapter (**#9442**) or 2400 bps Remote Loop Adapter (**#9552**). **Specify:** See Figure 1. **Maximum:** One. **Field Installation:** Yes.

4800 bps Loop Adapter (#4900): [Mdls A75, B75, C75, D75] Provides a 4800 bps local loop adapter as the third loop adapter on the

3651 Store Controller Models 25, 75 (cont'd)

3651. The actual number of 3683 terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the loops as well as the communications link to the S/370. See "Terminal Devices" above. **Specify:** See Figure 1. **Limitations:** Not available on the 3651 if 2400 bps Local Loop Adapter (#4882) or 9600 bps Local Loop Adapter (#4890) or 2400 bps Remote Loop Adapter (#6111) is installed. **Maximum:** One. **Field Installation:** Yes.

Remote Loop Adapter (#6111): [Mdls A75,B75, C75, D75] Provides a Remote Loop Adapter as the third loop on the 3651 for online service for up to twelve remote sites per Remote Loop Adapter. The feature provides an interface to a 3872 Modem on site which via leased line connects to a 3659 Remote Communications Unit at each remote site. This allows for the extension of the Loop to up to (1) three remote locations, with a 3659 mdl 1 at each site, (2) twelve remote locations, with a 3659 mdl 2 (multipoint) at each site, (see "Terminal Devices" above). The 3651 treats the remote Loop as if it were a local Loop. **Specify:** See Figure 1. **Limitations:** Not available if Local Loop Adapter, Add'l (#4882), 9600 bps Loop Adapter (#4890) or 4800 bps Loop Adapter (#4900) is installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One 3872 with #6101 or #6102 per Remote Loop Adapter at 3651 site and a 3659 Remote Communications Unit at each remote site. When more than one remote site is attached using 3659 mdl 1, a half-duplex 2-wire terminated, nonswitched voice grade line is required between the 3651 and the first remote site between successive remote sites, and from the last remote site back to the 4-wire terminated nonswitched voice grade line is required. When using the 3659 mdl 2 for more than one remote site, 4-wire duplex multipoint service is required. The 3659 mdl 2 requires that the 3872 be a basic control station (no special features) or equipped with #6302.

Auxiliary Communications Adapter (#6185): [Mdls A75, B75, C75, D75] Provides a separate 2400 bps or 4800 bps communications interface which can operate independently of the Host Communications Adapter. It can be used for either one of the following but not both: (1) 3651 mdl 75 to mdl 75 communications, or (2) Communications with another 3650 system via a 3669 Store Communications Unit at 2400 bps or a 3689 Store Communications Unit at 4800 bps. **Limitations:** Only one Auxiliary Communications Adapter (#6185 or #6188) allowed per 3651 mdl 75, not allowed with 3669/3689 Attachment (#8069) with specify **#9200** for Host Communications Adapter. The 4800 bps Auxiliary Communications Adapter cannot operate concurrently with 4800 bps Host Communications Adapter and the three 4800 bps Loop Adapters (#4895 and #4900). Only four of the five may operate concurrently at greater than 2400 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) For 3651 mdl 75 to mdl 75 communications: A 3863, 3864, 3872, or 3874 plus another 3651 mdl 75 similarly equipped. (2) For backup with another 3650 system: #8069 with **#9210**, or a 3669 Store Communications Unit at 2400 bps or a 3689 Store Communications Unit at 4800 bps.

Auxiliary Communications Adapter Synchronous Clock (#6188): [Mdls A75, B75, C75, D75] Provides a 2400 bps communications interface which operates independently from the Host Communications Adapter to allow direct communications with another 3651 mdl 75 with the same feature without the use of modems. **Limitations:** Only one Auxiliary Communications Adapter (#6185 or #6188) allowed per 3651 mdl 75, not allowed with 3669/3689 attachment (#8069). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Another 3651 mdl 75 with (#6188).

Synchronous Clock - Host (#7708): [Mdls A75, B75, C75, D75] Provides clocking from the Host Communications Adapter allowing the direct attachment to a local 3704 or 3705 at 2400 bps. **Limitations:** Not allowed with 3669/3689 attachment (#8069) with specify **#9200**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** The 3704 or 3705 must be equipped with Line Set, Type 1F (#4716). **Note:** A 6 meter (20 foot) external cable is provided which connects to the 3704/3705 cable.

3669/3689 Attachment (#8069): [Mdls A75, B75, C75, D75] Provides the capability to attach one 3669 Store Communications Unit, which allows communications over switched networks at 2400 bps; or one 3689 Store Communications Unit, which allows communications over switched networks at 4800 bps with another 3650 system, and alternately with a S/370 host processor. This feature can be provided for use with either the Host Communications Adapter or the Auxiliary Communications Adapter (#6185), but not with both. If the Auxiliary Communications Adapter is present, however, then this feature must be installed for use with the Auxiliary Communications Adapter. **Limitations:** When used with Auxiliary Communications Adapter, (#6185), it cannot communicate with a host processor. **#9210** not allowed with Auxiliary Communications Adapter Synchronous Clock (#6188). **#9200** not allowed with synchronous Clock - Host (#7708). **Specify:** (1) **#9200**, for use with Host Communications Adapter, **#9210** for use with Auxiliary Communications Adapter #6185. (2) **#9220** if local audible alarm is desired, **#9230** if contact closure is desired when operator attention is required. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) Local Loop Adapter, specify **#9442** for 2400 bps; or 4800 bps Local Loop Adapter, specify **#4895**. (2) a 3669 Store Communications Unit or a 3689 Store Communications Unit. (3) Auxiliary Communications Adapter (#6185) if **#9210** is specified.

3784 Adapter (#8154): [Mdls A75, B75, C75, D75] Provides the capability to directly attach one 3784 Line Printer mdl 1 to the 3651 controller. Fixed length cables are supplied as standard. Refer to *3650 PSS Installation Manual -- Physical Planning*, GA27-3167. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Specify **#9716** on the 3784 mdl 1 for attachment of the 3784 to the 3651 mdl A75 and B75 and **#9717** for attachment to the 3651 mdl C75 or D75.

Figure 1

Loop Adapter Position *	Loop Adapter	Special Feature	Specify Code
1	Local (2400 bps)	Standard	
1&2	Local (4800 bps)	#4895	
2	Add'l Local (2400 bps)		**#9442**
	Remote (2400 bps)		**#9552**
3	Add'l Local (2400 bps)	#4882	
	Add'l Local (4800 bps)	#4900	
	9600 bps	#4890	
	Remote (2400 bps)	#6111	

Unless the 4800 bps Local Loop Adapter feature (#4895) is ordered for positions 1 and 2, Loop Adapter Position 1 is occupied by the standard Local Loop Adapter (2400 bps) and Loop Adapter Position 2 is also standard and must be specified as 2400 bps local (**#9442**) or 2400 bps remote (**#9552**). If loop adapter position 2 is specified as remote, see Remote Loop Adapter (#6111) for prerequisites which will apply. For Loop Adapter Position 3, either a 2400 bps Add'l Local (#4882) or a 4800 bps Add'l Local (#4900) or 2400 bps Remote (#6111) or 9600 bps Local (#4890) Loop Adapter may be ordered. **Limitations:** Host communications, Auxiliary Communications, and Loop Adapters 1-3 cannot operate at 4800 bps or greater simultaneously. One adapter must be 2400 bps or less to allow all communications to operate simultaneously.

MODEL CONVERSIONS

The following model changes can be made in the field:

From	To A75	B75	C75	D75
A50	X	X*		
A60	X	X*		
A75		X*		
B25		X*		
B50		X		
B60		X		
C25			X*	X*
C75				X

* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

On purchased model 25 to model 75 changes, External Modem Interface (#9150) is a prerequisite on the model 25.

On purchased model 50 to model 75 changes, either Local Loop Adapter, Add'l (#4882 with **#9442** or **#9443**) or Remote Loop Adapter (#6111 with **#9552** or **#9553**) is a prerequisite on the mdl 50.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3650 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual*, GA27-3074, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to +105 C.
Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

SUPPLIES

Contact IBM.

3651 STORE CONTROLLER MDLS A50, B50

[NO LONGER AVAILABLE]

PURPOSE

Through its standard functions, tailored by the customer to his own requirements, the 3651 controls the operation of the 3650 Retail Store System and its related terminals and provides for communication with an appropriate S/370, 30XX, or 4300 virtual storage processor.

MODELS

Model A50 5 megabytes of integral disk storage

Model B50 9.3 megabytes of integral disk storage

HIGHLIGHTS

The 3651 is a modular, programmable unit that provides the link between point-of-sale (3653), receiving-marking (3275 mdl 3 and 3657), management (via 3275 mdl 3), and the host data processing center. The 3651 collects data from the various parts of the retail system, performs edit, logic, and arithmetic operations on that data and then logs and/or forwards it to its ultimate destination within the overall system-terminal or data processing center. The 3651 also communicates with its attached terminals on an interactive basis and processes inquiries against its files. Standard features include the following:

Local Loop Adapter: Provides for the attachment of one in-store loop.

Controller Storage: The basic 3651 contains storage optionally expandable via special features to 106,496 bytes (see "Special Features"). System configuration as well as user programs determine if additional storage increments are required. Operation with many user programs will require the additional storage increments.

Integral Disk Storage: The Integral Disk Storage is used for storage of selected controller functions, user written application programs, system configuration data, data logging and data sets (files).

	Mdl A50 (5MB)	Mdl B50 (9.3MB)
Bytes per Track	15,360	15,360
Tracks per Cylinder	2	2
Bytes per Cylinder	30,720	30,720
Cylinders per IDS	167	301
Storage Capacity		
Movable Head	5,130,240	9,246,720
Fixed Head	122,880	122,880

Host Communications Adapter: Provides for transmission to and from a properly equipped S/370, 30XX, or 4300 Processor. The basic transmission rate is 2400 bps over nonswitched or switched networks with 4800 bps as a specify option. This adapter interfaces to appropriate IBM modems (see "Communication Facilities" below and M2700 pages). For local attachment to 3704/3705 or communication adapter on a 4321/4331 processor, see "Special Features".

Audible Alarm: Is activated when predetermined events require operator attention or intervention for system operation.

Controller Storage Save: Critical areas of controller storage are automatically written on two areas of the integral disk unit when power is turned off or a power failure is detected.

Terminal Devices: The following terminals are attached to the 3651 Store Controller via Local/Remote Loop Adapter: 3653 Point of Sale Terminal, 3275 mdl 3 Display Station, and the 3657 Ticket Unit. Local Loop adapter number one can address 63 terminals and the other two Loop adapters (local or remote) can each address 64 terminals. However, the number of terminals which can be supported on each Loop depends upon traffic volumes, desired response times, and applications to be performed.

One 3784 Line Printer mdl 1 may be attached to the 3651 controller unit.

To establish a supportable systems configuration, systems design should be performed using the performance models and configuration aids available from IBM.

Communication Facilities: The communications adapter permits operation at the speeds indicated, over the facilities shown below, when using the appropriate modem. For information concerning the facilities, see M2700 pages. The alphameric communication facility references below correspond to those shown on the charts on those pages.

At 2400 bps: on facility C5, C5M, D4, D4M, D4SB or X1M
At 4800 bps: on facility C6, C6M, D5, D5M or X2M.

Prerequisites: A 3704 or 3705 in 2701, 2703 Emulation Mode for BSC systems and in NCP/VS mode for SDLC systems (with appropriate features; see M3704 and 3705 pages) attached to any virtual storage S/370 or 4300 processor . Also attaches via a Communications Adapter feature on the 4321 or 4331 processor. See M4321 or 4331 pages for details.

Bibliography: *IBM 3650 Retail Store System Introduction,* GA27-3075.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): locking plug, **#9884** for 208V and **#9886** for 230V; non-locking plug, **#9885** for 208V and **#9887** for 230V.

- Modem Attachment Host Communications Adapter: One IBM modem can be attached to this adapter on the 3651. The 3651 provides a cable and interface for connections of IBM modems at transmission rates of 2400 or 4800 bps for communications with the S/370, 30XX, or 4300 processor. Attachment can also be without modem to the local Attachment Interface (#4801) of a 4331 processor. If switched network is selected, auto answer capability is standard. If leased point-to-point operation is selected, dial backup is provided on a manual dial basis using the 3863, 3864, 3872, or 3874 Modem with appropriate special features.

  If a non-IBM modem is used, Specify Code **#9770** Wrap Cable is available to facilitate problem determination. The non-IBM modem must provide the clocking, an RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less.

Specify Code	Speed (bps)	IBM Modem
#9120	2400	3863 or 3872
#9121	2400 (2)	3863 or 3872
#9122	2400 (3)	3863 or 3872
#9124	4800 (2)	3864 or 3874
#9125	4800 (3)	3864 or 3874
#9126	4800	3864 or 3874

  Notes:
  1) For communications capabilities, product description and special features, see M2700, 3863, 3864, and 3872 pages.
  2) Point-to-point network.
  3) Multipoint network.

- Controller Designation: Specify **#9491** on first 3651 to be used with a host system location requiring RSS/Host support and **#9492** on each additional 3651 in the network.

  When **#9491** is specified, additional information must be specified as follows:

  1) Specify one of the following to indicate magnetic tape density (media) used at the host system location. The tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

     #9412 -- 9-track 800 bpi
     #9413 -- 9-track 1600 bpi
     #9414 -- 9-track 6250 bpi

     The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

  2) Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

     Line 1 -- IBM Programming Systems Rep
     Line 2 -- c/o (Name of Customer)
     Line 3 -- Street Address (or P.O. Box)
     Line 4 (etc.) -- City, State, Zip Code

     This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code **#9491**). Whenever controller data is updated by an EC, the EC will be shipped to the most current TPC address.

- Specify **#9503** for 3650 SNA Retail Store Systems requiring Release 3 RSS/Host Support under DOS/VS VTAM, OS/VS1 VTAM and OS/VS2 VTAM. All controllers shipped to new customers after March, 1976 require RSS/Host Release 3 and should be specified with **#9503.** **Notes:** (1) **##9503** is a prerequisite for #1559, #1560 and #1564. (2) The corresponding release of 3650 RSS Host Support must be ordered. See SCP pages.

- Store Loop Polarity Tester: One is furnished at each site at no charge.

  Notes: The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)

- RFI Standard: The RFI Standard **(#2759)** is now provided on all machines as standard.

SPECIAL FEATURES

Control Storage Features: The amount to be ordered is dependent upon the number and type of terminals attached to the system as well as system configuration and user programs. For available storage configurations, see Table A below.

Storage Increment - Type I (#1559): #1559 provides the 3651 with an additional 8,192 positions of storage. **Maximum:** One. **Field Installation:** Yes. (See Table A) **Prerequisites: #9503.**

3651 Store Controller Mdls A50, B50 (cont'd)

Storage Expansion (#1560): Contains 16,384 positions of storage to provide the capability of expanding storage beyond 57,344 positions to a maximum of 106,496 positions. **Maximum:** One. **Field Installation:** Yes. (See Table A) **Prerequisites: #9503.**

Storage Increment - Type II (#1564): Each #1564 provides the 3651 with an additional 16,384 positions of storage. **Maximum:** Three. **Field Installation:** Yes. **Prerequisites: #9503.** (See Table A)

Table A

Storage Configuration		Feature Distribution		
	Total Storage	Storage Increment - Type I (8,192 Pos.)	Storage Increment - Type II (16,384 Pos.)	Storage Expansion (16,384 Pos.)
(A)	40,960	0	0	0
(B)	49,152	1	0	0
(C)	57,344	0	1	0
(D)	65,536	1	0	1
(E)	73,728	0	1	1
(F)	81,920	1	1	1
(G)	90,112	0	2	1
(H)	98,304	1	2	1
(I)	106,496	0	3	1

Notes:

1. Field installation of Storage Increment - Type I is only recommended in changing from configurations A, E and G. Storage Increment - Type II is not used in configuration A, B and D.

   Customers who elect to purchase Storage Increment - Type I and later order additional storage should consider purchase of Storage Increment - Type II initially because some field upgrades of storage may require replacement of initial feature and installation of new feature.

Direct Attachment 3704/3705 (#2863): This feature, which operates at 2400 bps, provides the user (whose 3651 Store Controller, mdl A50 or B50 is located within 100 feet of a 3704 or 3705 Communications Controller with the ability to cable-connect these units without modems and a carrier communication line. **Prerequisites:** 3704 or 3705 must be equipped with Line Set, Type 1F (#4716). **Field Installation:** Yes. **Note:** With this feature, a 6m (20 ft) external modem cable is provided which is connected to the cable from the 3704 or 3705.

IML-Write Adapter (#4633): Provides the 3651 with the ability to write an IML (Initial Machine Load) tape on a user-provided tape cassette recorder (refer to *IBM 3650 Retail Store System Introduction Manual,* GA27-3075), to be read by a Point-of-Sale terminal equipped with the IML-Read Adapter (#4632) feature. **Maximum:** One. **Field Installation:** Yes.

Local Loop Adapter, Add'l (#4882): This feature provides a second or third Local Loop Adapter on the 3651. Up to a maximum of 64 terminals can be attached to each additional Loop. The actual number of terminals will depend upon the program capacity and time requirements of the 3651 to service the Loops as well as the communication link to the Host processor (see "Terminal Devices" above). **Limitations:** Cannot exceed a total of three Loop Adapters (local or remote) per 3651. **Maximum:** Two. **Field Installation:** Yes. **Specify:** See Figure 1.

9600 bps Loop Adapter (#4890): Provides a 9600 bps local Loop Adapter. Available in lieu of a second or third Local Loop Adapter. The feature provides for the attachment of 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) feature installed. The actual number of 3275 Display Station mdl 3s installed will depend upon program capacity and time requirements of the 3651 to service the Loops and the communication link to the Host processor (see "Terminal Devices" above). **Limitations:** Cannot exceed a total of three Loop adapters (local or remote) per 3651. Only 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) can be attached to this Loop adapter. **Maximum:** One. **Field Installation:** Yes. **Specify:** See Figure 1.

Remote Loop Adapter (#6111): Provides online service for up to twelve remote sites per Remote Loop Adapter. Available in lieu of a second or third Local Loop Adapter. The feature provides an interface to a 3872 Modem on site which via leased line connects to a 3659 Remote Communications Unit at each remote site. This allows for extension of the Loop to up to (1) three remote locations, with a 3659 at each site, (2) twelve remote locations, with a 3659 mdl 2 (multipoint) at each site, with a total of 64 terminals per Loop (see "Terminal Devices" above). The 3651 treats the remote Loop as if it were a local Loop. **Limitations:** Cannot exceed a total of three Loop adapters (local or remote) per 3651. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** One 3872 Modem with Point-to-Point (#6101 or #6102) feature per Remote Loop Adapter at 3651 site and a 3659 Remote Communications Unit at each remote site. When more than one remote site is attached using 3659 mdl 1, a half-duplex 2-wire terminated, nonswitched voice grade line is required between the 3651 and the first remote site, between successive remote sites, and from the last remote site back to the 3651. When only one remote site is to be attached, a duplex, 4-wire terminated nonswitched voice grade line is required. When using the 3659 mdl 2 for more than one remote site, 4-wire duplex multipoint service is required. The 3659 mdl 2 requires that the 3872 be a basic control station (no special features) or equipped with Second Modem (#6302). **Specify:** See Figure 1.

Synchronous Clock (#7708): Provides clocking for the Host Communications Adapter allowing for direct attachment to a local 3704, 3705 at 2400 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** The 3704 or 3705 must be equipped with #4716. **Note:** A 6m (20 ft) external cable is provided which connects to the 3704, 3705 or 4331 cable.

3784 Adapter (#8154): Provides the capability to directly attach one 3784 Line Printer mdl 1 to the 3651 controller. Fixed length cables are supplied as standard. Refer to *3650 PSS Installation Manual -- Physical Planning,* GA27-3167. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9716** on the 3784. Minimum storage required on the 3651 is 48K. **Note:** For attachment of the 3784 Line Printer, the controller must have EC 349850 applied and operating under RSS/Host Support Release 3. New 3651 controllers must have **#9503** specified.

Figure 1

Loop Adptr Position*	Loop Adapter	Special Feature	Specify Code
	Add'l Local	#4882	**#9442**
2	Remote	#6111	**#9552**
	9600 bps	#4890	**#9662**
	Add'l Local	#4882	**#9443**
3	Remote	#6111	**#9553**
	9600 bps	#4890	**#9663**

*Loop Adapter Position 1 is occupied by the standard Local Loop Adapter. For Loop Adapter Position 2 and 3, either an Add'l Local (#4882) or Remote (#6111) or 9600 bps (#4890) Loop Adapter may be ordered. For each one ordered, also specify the applicable **#9XXX** code from the chart above. The 9600 bps Loop Adapter (#4890) may be ordered only once.

MODEL CONVERSIONS

The following model changes can be made in the field:

From	To B50	To A75	To B75
A50	X*	X	X*
B50			X

* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

On purchased model 50 to model 75 changes, either Local Loop Adapter, Add'l (#4882 with **#9442** or **#9443**) or Remote Loop Adapter (#6111 with **#9552** or **#9553**) is a prerequisite on the model 50.

Customers who elect to purchase the 3651 model A50 or B50 and Storage Increment Type I (#1559) should consider the model A75 or B75 initially as field conversions to the model A75 or B75 require the replacement of this feature.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GA27-3074, or *3680 Site Planning and Site Preparation Guide,* GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to +105 C.
Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

SUPPLIES

Contact IBM.

3651 STORE CONTROLLER MDLS A60, B60

PURPOSE

The control unit for a 3660 Supermarket System. Controls all functions of the 3663 Supermarket terminals. A 3669 adapter is included, which allows communication at 2400 bps over appropriate communication facilities with a properly equipped S/370, 30XX, or 4300 processor. For backup purposes, the control unit, through the 3669 Store Communications Unit, can also communicate with and control 3663 Supermarket terminals in one other preassigned location. See "Communication Facilities" and "Prerequisites".

MODELS

Model A60 5 megabytes of integral disk storage

Model B60 9.3 megabytes of integral disk storage

HIGHLIGHTS

Up to 24 3663 Supermarket terminal stations can be attached to a 3651 mdl A60 or B60 in one store. Each 3663 mdl 1 or each 3663 mdl 2 counts as 1 out of the 24. In addition, for backup purposes, a 3651 mdl A60 or B60 can control all the 3663 Supermarket terminals that are normally controlled by the other preassigned 3651 mdl A60 or B60 (normally at another location).

The 3651 mdl A60 or B60 (using the 3663 Supermarket Terminal) supports the following functions, in most combinations.

Customer Checkout

- Automatic pricing through code lookup in a master price file
- Automatic handling of multiple priced items
- Automatic handling of mix and match group pricing
- Automatic distribution of net sales by department (up to 54)
- Automatic application of transaction discounts
- Automatic computation of sales taxes with automatic handling of taxable and non-taxable items
- Provision for tax exempt transactions
- Automatic control of maximum value of food stamps that should be accepted
- Check authorization facilities (positive or negative) through lookup against a check authorization record
- Computation of change due

All functions can be controlled to inhibit initiation by unauthorized personnel.

Store Support

- Preparation of the following accounting reports:
  - -- store summary
  - -- individual cashier performance and tender reconciliation
  - -- store office tender reconciliation
  - -- sales by department (up to 54)
  - -- distribution of miscellaneous income and disbursements by account
- Current inquiries for department sales, cashier performance and cash position, and store cash position
- Inquiries and changes to master price records and operator authorization control records
- Setting time and date for the internal clock
- Customer checkout training mode
- Printing miscellaneous messages received previously from the host S/370, 30XX, or 4300 processor
- Entry of miscellaneous messages for subsequent retrieval by the host S/370, 30XX, or 4300 processor
- Reporting of items returned by customers which are returned to stock
- Updating the system with data received from the host S/370, 30XX, or 4300 processor
- Shelf Label preparation

The above functions are compatible with variable length reconciliation periods, e.g., daily or weekly, and they are compatible with 24 hour store operation. All functions are individually controlled to inhibit initiation by unauthorized personnel.

Data Accumulation: The 3651 mdl A60 or B60 accumulates the following by-product data for subsequent retrieval by the host: Item movement totals, all accounting and performance totals used in store reports, totals of taxes and taxable sales, productivity totals for each terminal station in 15 minute increments, check authorization data requested, and individual logged entries covering coupons received, exception events, and security sensitive events.

Host S/370, 30XX, or 4300 Processor Transmission: The 3651 mdl A60 or B60 can transmit to the host, upon receiving a request, all of the data shown under "Data Accumulation," and other data, or records in the 3651. The 3651 will clear out data or records upon request by the host. The 3651 can receive records, record changes, commands or other pertinent data from the host.

Communication Facilities: For in-store operation, two store loops provide the communications linkage to the 3663 Supermarket terminals. See *Installation Manual - Physical Planning* (GA27-3079).

The communications adapter permits operation at 2400 bps over communications common carrier facility type C5 for out-of-store communications. For information concerning that facility, see M2700 pages.

Prerequisites:

- A 3669 Store Communications Unit mdl 1 must be attached.
- A 3663 Supermarket Terminal mdl 1 must be attached.
- Any virtual storage S/370, 30XX, or 4300 processor (3158 or 3168 VTAM only). For minimum configuration requirements, refer to Host S/370, 30XX, or 4300 Processor System Programming pages.

One of the following must be used: a 3704, 3705, or 3725 Communications Controller or Communications Adapter on 4331 Processor. For S/370 mdls 115, 125 or 135, 135-3, 138, this may be an ICA equipped with the proper BSC and switched network features. The modem that is used by the 3704, 3705, 3725 or Communications Adapter on the 4331 Processor must be either a 3872 or equivalent or an IBM 2400 bps Integrated Modem with switched network features. .@SS@

One of the following must be utilized:

- 3704, 3705, or 3725 Communications Controller, equipped with appropriate features.
- ICA feature on S/370 mdls 115, 125, 135, 135-3, 138.
- Communication Adapter Feature on 4331 Processor.

Limitations: The modem used by the 3704, 3705, 3725 or Communications Adapter on 4331 Processor must be either a 3872 or equivalent, an IBM 2400 bps Integrated modem or equivalent, 3976 mdl 3 or a PTT mandatory modem with switched network features.

The Dual Communications Adapter is required if 600/1200 bps switched host communications and 2400 bps nonswitched backup communication is to be used.

Bibliography: GA27-3076

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Locking plug -- **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9885** for 208V, **#9887** for 230V.
- RFI Standard: The RFI Standard **#2759)** is now provided on all machines as standard.
- Communications: **#9071** for Binary Synchronous Communication, or **#9072** for Synchronous Data Link Control Communication.
- Controller Designation: Specify **#9491** on the first 3651 to be used with a host system location and **#9492** on each additional 3651 in the network. When **#9491** is specified, additional information must be specified as follows:

  1) Specify one of the following to indicate magnetic tape density (media) used at the host system location. This tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

     #9412 -- 9-track 800 bpi
     #9413 -- 9-track 1600 bpi
     #9414 -- 9-track 6250 bpi

     The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

  2) Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

     Line 1--IBM Programming Systems Representative
     Line 2--c/o (Name of Customer)
     Line 3--Street Address (or P.O. Box)
     Line 4 (etc) -- City, State, Zip

     This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code **#9491**). Whenever controller data is updated by an EC, the EC will be shipped to the most current TPC address.

     Note: The 3660 Supermarket System Host Support must be ordered from PID.

- Cable: A 10 foot cable to the 3669 is provided as standard. If a longer cable is required, specify **#9021**, indicating length as a quantity of 20, 30 or 40.
- Store Loop Polarity Tester: One is furnished at each site at no charge.

  Notes: The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)
- Add'l DAA Cable: Specify **#9101** if second DAA Cable is required in configuration (forlusing switched 3872 modem to reload

3651 Store Controller Mdls A60, B60 (cont'd)

controller from host while system is being backed up from another store).

Codes: SIU = 3651 ID = H30

SPECIAL FEATURES

Storage Increment (#7680): Provides the 3651 with 8,192 bytes of additional control storage. **Maximum:** One . **Field Installation:** Yes.

MODEL CONVERSIONS

Model Changes between the model A50 or B50 and the model A60 or B60 are not recommended for field installation. 3651 features cannot be interchanged between model A60 and a model 50 or 75.

Model changes can be made in the field from model A60 to B60, A75 and B75, and from B60 to B75. Changes from A to B models require the replacement of integral disk storage. This change requires replacement of the integral disk storage. Adequate provision must be made for retaining the data contained on the replaced disk storage. All replaced parts become the property of IBM.

The following model changes can be made in the field:

From	To		
	B60	**A75**	**B75**
A60	X	X	X*
B60			X

* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GA27-3074, or *3680 Site Planning and Site Preparation Guide,* GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to +105 C.
Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

SUPPLIES

Contact IBM.

3653 POINT OF SALE TERMINAL

[NO LONGER AVAILABLE]

PURPOSE

An intelligent input/output terminal for the 3650 Programmable and Retail Store System to provide retail point-of-sale data collection, credit authorization, and inquiry functions. Self-contained intelligence allows the 3653 to continue most sales functions when disconnected from the 3650 system after a parameter initialization from either the Store Controller or Magnetic Wand Reader.

MODELS

Model 1 001 — Not customer-programmable. Attaches to 3651 models B25, C25, A50, B50, A75, B75, C75 and D75.

Model 1P P01 — Customer programmable. Optionally will function as a model 1 (non-customer programmable). Attaches to 3651 models B25, C25, A50, B50, A75, B75, C75 and D75. When attached to Model A50 or B50, it can function as a model 1 only. Basic storage is 36K bytes. This may be increased to 60K bytes through installation of Storage Increment features.

HIGHLIGHTS

A solid state, unitized, packaged unit. It features: data entry via the magnetic wand reader feature and a 10 numeric-key, 19 function-key keyboard; step-by-step display of operator instructions; printing of data in response to an inquiry; display of numeric data as it is being key entered; transmission of data to a 3651 for logging over a unique transmission line capable of handling large volumes of short messages from many terminals; and a cash drawer with removable till.

Keyboard: A 10-key numeric pad and nineteen function keys provide entry for variable source data. Types of transactions are indicated through the numeric pad, as well as data fields. Once a field has been entered, the depression of a function key causes one or more of the following functions to happen: editing for minimum and maximum field length; modulo check; price look-up; credit authorization, printing; transmission to the 3651; and, change in guidance or error feedback.

Printer: A 3-station printer which produces a cash receipt or sales-check as well as a journal for each transaction.

Display: An 8-digit numeric display plus"$, ." and "–" with five backlit captions shows numeric data as it is being keyed, extended prices, status codes for credit referrals, subtotals, totals, amount due, change, and refund amounts.

Operator Guidance: Step-by-step instructions are provided to the operator for each transaction by twenty backlit messages. Additional guidance is provided by the type of transactions shown on the numeric keys.

Status Indicators: Advise the operator that the terminal is: ready for use, waiting for a response to an inquiry or transmission to the 3651, offline from its 3651, or that the journal roll take-up spool is full.

Prerequisites: The 3650 system controller is a 3651 Store Controller mdl 25, 50 or 75. See M3651 pages for details.

Proposal/Acknowledgement Letter Statements: Each Proposal and Acknowledgement letter must include the following statement:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3653 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations.
>
> When a failure occurs in a cash drawer of any 3653 and it cannot be opened prior to maintenance by IBM, the customer will sign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

Maintenance: Installation of 3653s in the immediate sales area may preclude the acceptability of online repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the failing terminal to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the terminal online via a customer provided store loop termination.

Bibliography: *IBM 3650 Retail Store System Introduction,* GA27-3075.

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Journal Lock: **#9322** if lock is desired on access cover to journal take-up roll, journal tape supply, and cash receipt tape supply. For additional or replacement locks and keys, see "Accessories".
- Till Cover with Lock: **#9770** if top cover for cash drawer till is desired. For additional tills and covers and additional or replacement cash drawer locks and keys, see "Accessories".
- Till with movable bill dividers: **#9799** if movable bill dividers are desired. Otherwise, a till with fixed bill dividers will be supplied.
- Cash Drawer Lock: The 3653 is equipped with a cash drawer lock. A group of 25 unique lock numbers has been reserved to allow a customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following types on the 3653 order:

#9101	**#9106**	**#9111**	**#9116**	**#9121**
#9102	**#9107**	**#9112**	**#9117**	**#9122**
#9103	**#9108**	**#9113**	**#9118**	**#9123**
#9104	**#9109**	**#9114**	**#9119**	**#9124**
#9105	**#9110**	**#9115**	**#9120**	**#9125**

  If none is specified, a lock will be selected at random from a larger group of lock types; each 3653 will be shipped with two cash drawer keys. For additional or replacement keys, see "Accessories".
- Fractional Quantity Key: Specify **#9188** if the Fractional Quantity Selectable Function is chosen. Provides a key on the 3653 Keyboard with appropriate nomenclature.
- Adding Machine Layout on Modifiable Keyboard: Specify **#2996** provides an "adding machine" layout of the numeric keys instead of the "touch-tone" pad layout normally shipped on the Modifiable Keyboard feature (#4990). Adding machine layout provides a key arrangement of: Top row (7,8,9); middle row (4,5,6); bottom row (1,2,3). **Field Installation:** Not recommended.

SPECIAL FEATURES

Functional Expansion Increment - Type I (#4223): [Mdl 1] Provides the 3653 with the capability to support additional functions. The capability provided by this feature is equal to that provided by Functional Expansion (#4222) (see Note 1 below). **Limitations:** The third Type I Increment (#4223) cannot be Installed on a 3653 with Functional Expansion Increment - Type II (#4224). #4223 is mutually exclusive with #4222 (see Note 2 below for allowable configurations). **Maximum:** Three. **Field Installation:** Yes.

Functional Expansion Increment - Type II (#4224): [Mdl 1] Provides the 3653 with the capability to support additional functions. The capability provided by this feature is twice that provided by Functional Expansion Increment - Type I (#4223) (see Note 1 below). **Limitations:** Cannot be installed on 3653 with third Functional Expansion Increment - Type I (#4223). #4224 is mutually exclusive with #4222. See Note 2 below for allowable configurations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Must have two Functional Expansion Increment - Type I (#4223) installed.

Storage Increment (#4225): [Mdl 1P] Provides an additional 8,176 bytes of storage. **Maximum:** Three. **Field Installation:** Yes.

IML-Read Adapter (#4632): Provides a means to initialize 3653 terminals when a 3651 Store Controller mdl B25, C25, A75, B75, C75 or D75 is unavailable or unable to provide the IML (Initial Machine Load). An adapter is provided for attaching an external tape cassette recorder (refer to *IBM 3650 Retail Store System Introduction,* GA27-3075) and reading data previously recorded at a 3651 equipped with the IML-Write Adapter (#4633). **Maximum:** One. **Field Installation:** Yes.

Magnetic Wand Reader (#4944): A hand operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, and employee badges. The small lightweight wand attached via a four foot long, flexible cord, allows encoded merchandise tickets to be read without removing them from the merchandise. See Notes 3 and 4 below. **Maximum:** One. **Field Installation:** Yes.

Modifiable Keyboard (#4990): Provides an alternate keyboard designed to aid in faster keying and in customizing to a user's requirements. Provides up to 16 department motor keys. **Maximum:** One. **Field Installation:** Not recommended.

Notes

(1) Order Confirmation of allowable or maximum combination of additional functions to be used with Functional Expansion Increments must be obtained from IBM.

(2) The table below defines Plant Installable configurations and the maximum allowable field upgrades of #4223 and #4224.

(3) The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.

(4) See "Program Loading at Power-On Time" below for other use of wand.

3653 Point of Sale Terminal (cont'd)

	Number Of Functional Expansion Increments							
If Plant Installed Configuration is:								
Type I (#4223)	0	0	1	1	2	2	2	3
Type II (#4224)	0	0	0	0	0	0	1	0
Is Field Upgrade Possible?	Yes	Yes	Yes	Yes	Yes	Yes	No	*
Maximum Upgrade Above Plant Installed Configuration Allowable is:								
Type 1 (#4223)	2	3*	1	2*	1*	0	0	0
Type II (#4224)	1	0	1	0	0	1	0	1*

* Customers who elect to purchase the third #4223 and anticipate later ordering #4224 should consider purchase of #4224 initially because field upgrade requires the replacement of the third #4223.

Program Loading at Power-On Time

With 3650 Retail Store System Release I:

3651 Available: The IML and Parameter Initialization are loaded from the 3651 Store Controller.

3651 Unavailable: The IML must be obtained from a back-up 3651 Store Controller Parameter Initialization is accomplished by wanding magnetically encoded tickets with the Magnetic Wand Reader (#4944) at each 3653.

With Retail Store System Release II and Release III:

3651 Available: The IML, selectable functions and Parameter Initialization are loaded from the 3651 Store Controller.

3651 Unavailable: The IML, selectable functions and Parameter Initialization requires one 3653 with the IML-Read Adapter (#4632) feature on each local loop and at each remote location.

With 3650 Programmable Store System:

3651 Available: This IML is loaded from the 3651 Store Controller.

3651 Unavailable: The IML requires one 3653 with the IML Read Adapter (#4632) feature on each local loop and at each remote location.

MODEL CONVERSIONS

Model changes from Model 1 to Model 1P can be made in the field. All replaced parts of the base model become the property of IBM. The Functional Expansion features (#4222, #4223 and #4224) cannot be interchanged between the 3653 Model 1 and the 3653 Model 1P and would remain with the customer if a model change is made.

ACCESSORIES

Cash Till and Cover With Lock: Additional cash tills and till covers with locks may be ordered.

Cash Till Cover with Lock and Keys P/N 1851126
Cash Till with Fixed Bill Dividers (without cover) P/N 1860154
Cash Till with Adjustable Bill Dividers (without cover) P/N 2493151

Notes: Assembly of the Adjustable Till is a customer responsibility. The following item is also available but on a purchase-only basis:

Cash Till Cover with Lock and Keys **#9335**

Keyboard Accessories: The following terms are used in the KEYTOP descriptions:

VERSION	STEM NUMBER/KEY ALIGNMENT
OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal
-B	Small raised projection in keytop
-C	Circular, concave top on key button
-M	Minimal concavity of circular keytop
SIZE	**UNITS**
Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

Engraved Keytops: Keytops containing pre-defined messages are available for use on the 3653 terminal keyboards. Blank keytops are also available for customer engraving.

Retail Keytops: The following is a list of pre-defined keytops available in the 3650 Retail Store System nomenclature:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
1	White	Square	OH	Std	1650742
2	White	Square	OH	Std	1650743
3	White	Square	OH	Std	1650744
4	White	Square	OH	Std	1650745
5	White	Square	OH-B	Std	1650746
6	White	Square	OH	Std	1650747
7	White	Square	OH	Std	1650748
1 CASH	White	Square	OH	Std	1757346
2	White	Square	OH	Std	1757347
3 CASH S'CHK	White	Square	OH	Std	1757348
4 COD	White	Square	OH	Std	1757351
5 LAYBY	White	Square	OH-B	Std	1757352
6 CHRGE	White	Square	OH	Std	1757353
7 DEFER CHRGE	White	Square	OH	Std	1757354
8 INVCE WELFR	White	Square	OH	Std	1757355
9	White	Square	OH	Std	1757356
7G	White	Square	OH	Std	1762440
BH	White	Square	OH	Std	1762441
9J	White	Square	OH	Std	1762442
1 A CASH	White	Square	OH	Std	1762834
2 B CHECK	White	Square	OH	Std	1762835
3 C CHG	White	Square	OH	Std	1762836
4 D	White	Square	OH	Std	1762837
5 E	White	Square	OH-B	Std	1762838
6 F	White	Square	OH	Std	1762839
/	White	Square	OH	Std	1853929
1 CASH	White	Square	OH	Std	1853931
2 SPLC	White	Square	OH	Std	1853932
3 S'CHK	White	Square	OH	Std	1853933
4 COD	White	Square	OH	Std	1853934
5 L'Way	White	Square	OH-B	Std	1853935
6 CHG A	White	Square	OH	Std	1853936
7 CHG B	White	Square	OH	Std	1853937
8 CHG C	White	Square	OH	Std	1853938
9 CHG D	White	Square	OH	Std	1853939
6 CHG	White	Square	OH	Std	1855411
7 TMP	White	Square	OH	Std	1855412
8	White	Square	OH	Std	1855413
9	White	Square	OH	Std	1855414
8 CTA	White	Square	OH	Std	5192991
9 STORE	White	Square	OH	Std	5192992
6 REG	White	Square	OH	Std	1757364
7 PBA	White	Square	OH	Std	1757365
8 CCA	White	Square	OH	Std	1757366
9 CLUB	White	Square	OH	Std	1757367
NON-TAX	Yellow	Single	OH	Std	1650749
RETURN CREDIT	Yellow	Single	OH	Std	1650750
FRACT QTY	White	Single	OH	Std	1752442
NON MDSE CODE	Yellow	Single	OH	Std	1757342
EMPLOYEE DISCOUNT	Yellow	Single	OH	Std	1757343
RETURN	White	Single	OH	Std	1757344
MISC TAX CODE	Yellow	Single	OH	Std	1757349
ALLOW/MISC CREDIT	Yellow	Single	OH	Std	1757350
DEPOSIT	Yellow	Single	OH	Std	1757357
SKU	Blue	Single	OH	Std	1762444
DATA ENTRY	Blue	Single	OH	Std	1853915
NON MDSE CODE	Blue	Single	OH	Std	1853916
RETURN CREDIT	Blue	Single	OH	Std	1853917
PAYMENT	Blue	Single	OH	Std	1853918
ALLOW CODE	Blue	Single	OH	Std	1853919
DEPT	Blue	Single	OH	Std	1853920
CLASS	Blue	Single	OH	Std	1853921
NON TAX	Blue	Single	OH	Std	1853922
STOCK	Blue	Single	OH	Std	1853923
QTY	Blue	Single	OH	Std	1853924
SUB TOTAL	Blue	Single	OH	Std	1853935
DISCOUNT CODE	Blue	Single	OH	Std	1853926
TAX CODE	Blue	Single	OH	Std	1853927
SUB	White	Single	OH	Std	1855409
LOT	White	Single	OH	Std	1855410
ITEM	Blue	Single	OH	Std	5192903
COUPON DISPLAY	Blue	Single	OH	Std	5192987
NO COUPON	Blue	Single	OH	Std	5192988
VOID	White	Single	OH	Std	5587654
DISCOUNT CODE	Red	Single	OH	Std	5587655
Dept	Brown	Single	OH	R-1/8	5587658
CLASS	Brown	Single	OH	R-1/8	5587663
RETURN CREDIT	Red	Single	OH	Std	5587664
STOCK	Brown	Single	OH	4-1/8	5587667
ALLOW CODE	Red	Single	OH	Std	5587668
R/P/M	Blue	Single	OH	Std	1757074
C/U	Blue	Single	OH	Std	1757075
D	Blue	Single	OH	Std	1757076
0	White	Long	OV	Std	1762443
CLEAR	White	Long	OH	Std	1762910

3653 Point of Sale Terminal (cont'd)

0	White	Long	OV	Std	1762911
VOID	Red	Long	OV	Std	1762913
0 COUPON NO SALE	White	Long	OV	Std	5192990
0 NO SALE	White	Long	TH	Std	5587674
ENTER	White	Double	TV	R-1/8	1762530
TOTAL	White	Double	TV	R-1/8	1762531
CLEAR	White	Double	TV	R-1/8	1762532
TOTAL	Blue	Double	OV	Std	1853906
MODIFY TICKET	Blue	Double	OV	Std	1853907
ENTER	Blue	Double	OV	Std	1853908
ENTER COUPON	Blue	Double	OV	Std	5192989
QTY	Blue	Double	TV	Std	5588042
MODIFY TICKET	Blue	Double	TV	Std	5588043
MODIFY TICKET CASH	Blue	Double	TV	Std	5588047
SKIP FIELD	Blue	Double	OV	Std	1757077

Blank Keytops: The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
(all blank)	White	Square	OH-CM	R-1/8	1648413
	White	Square	OH-CB	Std	1752491
	White	Square	OH	Std	1853928
	White	Square	OH-B	Std	1853930
	White	Square	OH-CM	Std	1854184
	White	Square	OH-C	Std	1854185
	White	Single	OVH	Std	1762468
	Yellow	Single	OVH	Std	1762469
	Black	Single	OVH	Std	1762470
	Brown	Single	OVH	Std	1762471
	N-M Br	Single	OVH	Std	2688791
	White	Single	OH	R-1/8	1762506
	Red	Single	OH	R-1/8	1762507
	Blue	Single	OH	R-1/8	1762508
	Green	Single	OH	R-1/8	1762509
	Yellow	Single	OH	R-1/8	1762510
	Black	Single	OH	R-1/8	1762511
	Brown	Single	OH	R-1/8	1762512
	White	Single	OH	R-1/4	1762513
	Red	Single	OH	R-1/4	1762514
	Blue	Single	OH	R-1/4	1762515
	Green	Single	OH	R-1/4	1762516
	Yellow	Single	OH	R-1/4	1762517
	Black	Single	OH	R-1/4	1762518
	Brown	Single	OH	R-1/4	1762519
	Blue	Single	OVH	Std	1853914
	Green	Single	OVH	Std	1854182
	Red	Single	OVH	Std	1854183
	White	Long	TH	R-1/8	1648415
	White	Long	TH	Std	1648417
	White	Long	OV	Std	1853909
	White	Long	OH	Std	1855439
	Red	Double	TV	R-1/4	1648405
	Blue	Double	TV	R-1/4	1648406
	Green	Double	TV	R-1/4	1648407
	Yellow	Double	TV	R-1/4	1648408
	Black	Double	TV	R-1/4	1648409
	Brown	Double	TV	R-1/4	1648410
	White	Double	TV	Std	1762522
	Red	Double	TV	Std	1762523
	Blue	Double	TV	Std	1762524
	Green	Double	TV	Std	1762525
	Yellow	Double	TV	Std	1762526
	Black	Double	TV	Std	1762527
	Brown	Double	TV	Std	1762528
	White	Double	TV	R-1/8	1762533
	Red	Double	TV	R-1/8	1762534
	Blue	Double	TV	R-1/8	1762535
	Green	Double	TV	R-1/8	1762536
	Yellow	Double	TV	R-1/8	1762537
	Black	Double	TV	R-1/8	1762538
	Brown	Double	TV	R-1/8	1762539
	White	Double	TV	R-1/4	1762540
	N-M Br	Double	TV	Std	2688798
	Blue	Double	OV	Std	1853905
	White	Double	OV	Std	1854181

Universal Keytops: Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3653 Retail terminals. These accessories consist of legendable keytops and sheets of blank labels to use on these keytops.

The universal keytops come in the four standard sizes and in two heights. They consist of two parts; a white bottom button and a clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N
Keytop	White	Square	OH	Std	5188767
Keytop	White	Single	OVH	Std	5188768
Keytop	White	Single	OH	R-1/8	5188769
Keytop	White	Long	TH/TV	Std	1642499
Keytop	White	Long	OV	Std	5188771
Keytop	White	Long	OH	Std	5188772
Keytop	White	Double	OV	Std	5188773
Keytop	White	Double	TV	Std	5188774
Keytop	White	Double	TV	R-1/8	8627316
Cover	Clear	Square	--	--	5188751
Cover	Clear	Single	--	--	5188754
Cover	Clear	Long	--	--	5188757
Cover	Clear	Double	--	--	5188760

ITEM	COLOR	SIZE	DECALS/SHEET	P/N
Labels	White	Square	102 decals/sheet	5194900
Labels	White	Single	68 decals/sheet	1756848
Labels	Yellow	Single	68 decals/sheet	5194901
Labels	Red	Single	68 decals/sheet	5194902
Labels	Blue	Single	68 decals/sheet	5194903
Labels	Green	Single	68 decals/sheet	5194904
Labels	Brown	Single	68 decals/sheet	5194905
Labels	White	Long	42 decals/sheet	5194906
Labels	White	Double	28 decals/sheet	5194907
Labels	Red	Double	28 decals/sheet	5194908
Labels	Blue	Double	28 decals/sheet	5194909

Key Stops (P/N 1650058): The key stop is a small ring collar which is placed over the stem of a keybutton and under the keytop. The collar holds the keytop in the up position and prevents its use.

Keytop Extractor (P/N 1647720): The keytop extractor is a small plier-like device which fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard.

Two keytop extractors are supplied with each 3651 controller. The customer may desire additional extractors.

Locks and Keys: The 3653 is equipped with a cash drawer lock and can be equipped with an optional journal lock **(#9322)**. The terminal is shipped with two cash drawer keys. The cash drawer lock will be randomly selected unless specified otherwise. If the customer wishes to add or replace keys or locks with a specific identification number (stamped on lock and key) he should state the 3653's machine serial number and the key identification number. For replacement keys, the key part number listed below is also required. **Note:** Without a Key Identification Number, the order should state Machine Serial Number and the words "NEW LOCK REQUIRED." If the optional journal lock is specified, the terminal will be shipped with two journal keys also. Additional or replacement keys may be purchased from IBM or a local locksmith. Locks may be changed in the field.

3653 Cash Drawer Lock (including two keys), P/N 1851086
3653 Journal Lock, P/N 5998329
3653 Journal Lock Key, P/N 5182265 (order by machine type and P/N)
3653 Cash Drawer Lock Key, (order by machine type, lock serial number, and key P/N from the following chart):

Lock Serial Number	Lock Key P/N
H2601 - H2800	8549431
H2801 - H3000	8549482
H3001 - H3200	6021144
H3201 - H3400	6021145

SUPPLIES

Ribbons: A black ribbon cartridge, P/N 1136970 or equivalent, should be used for machines installed prior to June, 1975. Machines installed after this date and those machines previously installed that are changed to the new ribbon drive mechanism should use P/N 1136660 or equivalent.

Contact IBM.

3657 TICKET UNIT

PURPOSE

Magnetic Merchandise Ticket Input/Output Unit for the 3650 Programmable and Retail Store System.

MODELS

Model 1 001

Maximum: The maximum number of 3657s that can be attached to a 3651 depends upon the number of positions available and the traffic volumes and response times required.

Prerequisites: An available loop position.

HIGHLIGHTS

The 3657 is an online, high speed batch ticket encoder that can also perform batch ticket reading. Tickets are one inch high and contain a magnetic stripe 1/4-inch wide that runs the length of the ticket. The 3657 encodes this stripe with machine readable data which is read by the 3657 or by a wand reader available on the 3653 Point of Sale Terminal. Tickets also contain two lines of human readable data.

Two general types of tickets are used. For additional ticket types, contact IBM for details.

Two types of tickets used:

(1) **Label** -- 1-inch x 1-inch self-adhering paper stock with a protective backing. The 1-inch x 1-inch label dimension applies to label and backing. The label when detached is approximately 0.940-inch x 0.940-inch.

(2) **Tag** -- 1-inch x 2-inch and 1-inch x 3-inch heavy-duty paper stock attached to merchandise by hanging or stapling.

Input: 1-, 2- or 3-inch roll stock or 2 inch individual tags.

Batch Reading: Individual 2-inch tickets can be read from a cartridge. Tickets are fed from a removable cartridge and, if successfully read, directed to a ticket bin. Tickets that are unsuccessfully read are stacked into an identical cartridge. Additional or replacement cartridges can be ordered.

Output: 1-, 2- or 3-inch roll, strip or 2 inch individual tags.

Rated Speed: Speed is dependent on length of ticket, number of header tickets, output method selected and competing traffic on the Loop.

Header Tickets: Are print-only tickets which may be interspersed in the ticket output stream for batch or purchase order identification. Header tickets are not considered as merchandise identifiers.

Tickets per Minute

Ticket Size	Approximate Speed
1-inch roll	500
2-inch roll	250
3-inch roll	167
2-inch individual	130 (both make mode and read mode)

Printing: The two lines of human readable data are printed with two identical eight wire matrix print heads. Characters are 0.117 inch high spaced 12 characters per inch. A 64-character set oriented to the retail industry is provided. Uses a cassette ribbon replaceable by the customer ... contact IBM.

Ticket Data Content

	No. Characters	
Ticket Size	Encode	Print
1-inch	19	22
2-inch	40	42
3-inch	60	64

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9901** for 115V.

MODEL CONVERSIONS None

ACCESSORIES

Hopper/Stacker Cartridge (P/N 5560620): The 3657 is shipped with two hopper/stacker cartridges. Additional or replacement cartridges may be purchased.

SUPPLIES

Merchandise tickets may be purchased from the Systems Supplies Division. For information pertaining to prices and delivery schedules, contact an SSD sales representative.

3659 REMOTE COMMUNICATIONS UNIT

PURPOSE

The 3659 is a 2400 bps signal converter, used to provide store loop capability to establishments that are remotely located from the 3651 Store Controller model 50 or 75. The 3659 is used at each remote location to interface to common carrier-provided voiceband private line (nonswitched) channels for data transmission and to the store loop for Programmable and Retail Store System operations.

MODELS

Model 1	001	Point-to-point remote communications unit.
Model 2	002	[NO LONGER AVAILABLE] Multipoint remote communications unit.

HIGHLIGHTS

If a single remote site is served, the 3659 mdl 1 operation is duplex over a 4-wire duplex line connecting the store to the 3651. If two or three remote sites are served, the 3659 mdl 1 operation is duplex over 2-wire half-duplex lines connecting the stores to the 3651 in a serial manner. The use of the 3659 mdl 2 can provide service to up to twelve remote sites using a 4-wire duplex multipoint configuration.

Data Rate -- 2400 bps.

Equalization -- manually adjusted by an operator.

Problem Determination Aids: Included in each 3659 Remote Communications Unit are the following problem determination aids accessible to the operator:

- The unit may be wrap tested independently of the attached telecommunication line and store loop.
- The unit may be line tested (with telecommunication lines) and the modem at the 3651 or the adjacent 3659(s) independent of the store loop.

Communication Facilities

Common Carrier Nonswitched Facilities: Voiceband private line (nonswitched) channel type 3002 (or equivalent).

Privately Owned Communications Facility: Equivalent to above.

Attachment to Communication Line -- Via one cable provided by the 3659 and a second cable to interface to the store loop.

Related Equipment -- The 3659 mdl 1 communicates with 3659 mdl 1s at other remote sites and/or a 3872 Modem with #6101 or #6102 which is connected to the first or second Remote Loop Adapter special feature on the 3651 Store Controller mdl 50. The 3872 in this application may require an RPQ. See M3872 pages.

The 3659 mdl 2 communicates with a 3872 Modem without any special features or with #6302 only in a multipoint configuration. The 3872 is the control station modem in the multipoint network.

Customer Responsibilities:

1. The customer must provide (purchase, install, and maintain) all the necessary 3650 communication lines within the store. (Bulk Loop Cable is available from IBM.)
2. See the M2700 pages. The customer is responsible for the following: Obtaining assurance from the local common carrier that the telephone service provided will comply with the facilities described in the Bell System Technical Reference, *Transmission Specifications for Voice Grade Private Line Data Channels,* dated March, 1969, for Type 3002 lines with C-1 conditioning. *Data Communications Using Voiceband Private Line Channels,* PUB 41004, October 1973, for a 3002 channel. Inform the common carrier that the speed of the operation will be 2400 bps.

Bibliography: GA27-3075

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3661 STORE CONTROLLER

[NO LONGER AVAILABLE]

PURPOSE

The control unit for a 3660 Supermarket Key-Entry System controls all functions of the 3663 Supermarket terminals and provides for communication with the appropriate Host System. See "Communication Facilities" and "Prerequisites".

MODELS

Model 1	001	A controller that houses a direct access diskette drive with a 1-sided removable diskette.
Model 2	002	A controller with a diskette drive which accommodates a 1- or a 2-sided removable diskette.

Prerequisites: One 3663 Supermarket Terminal mdl 2 must be locally attached.

A properly equipped S/370 or 4300 processor must be available. The S/370 or 4300 processor must contain a virtual storage processor. For minimum configuration requirements, refer to S/370 or 4300 System Programming pages. In addition, either a 3704 or 3705 must be used or an ICA on a S/370 mdl 115, 125, 135, 135-3 or 138, or a Communications Adapter (#1601) feature on the 4331. 1200 bps external modems may be used with 3704, 3705, and ICA on S/370 mdl 115, 125, 135, 135-3 or 138, or a Communications Adapter (#1601) feature on the 4331. 1200 bps internal modems may be used with 3704, 3705, and ICA on S/370 mdl 115 or 125, or a Communications Adapter (#1601) feature on the 4331. For required features, see M2700 pages.

Communication Feature - one of the following arrangements must be used:

(1) Communications Feature With Clocking (#1482), Interface (#3701), and an external modem operating at 1200 bps, or

(2) Communications Feature With Clocking (#1482), 1200 bps Integrated Modem-Switched (#5501), and FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

IBM has not tested the 3660 Supermarket Key-Entry System on non-virtual IBM Systems. If a customer elects to establish communications with other than a virtual host system, he must understand that IBM does not assume responsibility for the resolution of any programming problems resulting from this system configuration.

HIGHLIGHTS

Up to 12 (optionally 18) 3663 Supermarket Terminals may be included in a 3660 Supermarket Key Entry System. One 3663 mdl 2 must be attached to the 3661 via local attachment, (standard) and a second, or third 3663 mdl 2 may be attached to the 3661 via the optional 3663 mdl 2 Local Attachment Feature. All other 3663 Terminal Stations in the system, up to 11, or optionally up to 17, depending locally upon the number of locally attached stations, are attached via a store loop.

The 3661 with the 3663 Supermarket Terminals provides the following functions:

Customer Checkout

- Automatic pricing through code look-up in a master price file for up to 250 items standard and up to 1,275 items with Add'l Storage (#1222).
- Automatic handling of multiple priced items in master file.
- Automatic handling of mix and match group pricing for items in the master price file.
- Automatic distribution of net sales by department.
- Automatic application of transaction discounts.
- Automatic computation of sales taxes, if applicable, with automatic handling of taxable and non-taxable items.
- Automatic control of maximum value of food stamps that should be accepted.
- Check verification facilities (negative with reason code) through look-up against a check verification record.
- Computation of change due.

All functions can be controlled to inhibit initiation by unauthorized personnel.

Store Support: Preparation of the following accounting reports:

- Store Summary
- Individual cashier performance and tender reconciliation
- Store office tender reconciliation
- Sales by department (up to 9)
- Distribution of miscellaneous income and disbursements by account.
- Current inquiries for department sales, cashier performance and cash position, and store cash positions.
- Maintenance of master price file, check verification file, and operator authorization file.
- Productivity totals for each terminal station and store totals in 60 minute increments.
- Setting time and date for the internal clock.
- Customer checkout training mode.
- Printing miscellaneous messages received previously from from the host.
- Entry of miscellaneous messages for subsequent retrieval by the host.
- Reporting of items returned by customers which are returned to stock.
- Updating the system with data received from the host.
- Shelf Label Preparation.

Most store support functions may be performed concurrently with customer checkout. All functions are individually controlled to inhibit initiation by unauthorized personnel.

Data Accumulation: The 3661 accumulates the following by-product data for subsequent retrieval by the host: Item movement totals, all accounting and performance totals used in store reports, totals of taxes and taxable sales, if applicable, productivity totals for each terminal station in increments of sixty minutes, exception events, and security sensitive events.

Host S/370 Or 4300 Processor Transmission: The 3661 can transmit to the host, upon receiving a request, all of the data shown under "Data Accumulation" and other data or records in the 3661. The 3661 will clear out data or records upon request of the host. The 3661 can receive records, record changes, commands or other pertinent data from the host. See "Programming Support" section for description of host, programming support, and requirements. Host communication cannot be performed concurrently with customer checkout or store support procedures.

Communication Facilities: For in-store operation, a store loop provides the communication link to the 3663 Supermarket Terminals. See *Installation Manual-Physical Planning,* GA27-3079, for further information.

The Communications Adapter permits operation at the speeds indicated over the facilities shown below when using the appropriate modem. For information concerning the facilities, see M2700 pages.

1200 bps ... on the public switched telephone network C2.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Communications:

  Binary Synchronous Communication **#9075**
  Synchronous Data Link Control **#9076**
- Modem Cable (external modem): A 10-foot cable to the modem is standard. If a longer cable is required, specify **#9442**, indicating length as a quantity of 20, 30, 40, or 50 feet.
- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559, from plant of manufacture. One is furnished at no charge to each 3660 site for testing Store Loop wiring.

SPECIAL FEATURES

Add'l Storage (#1222): Provides an additional 8,192 bytes of storage to increase the number of item records from a minimum of 250 to a maximum of 1,275. **Maximum:** One. **Field Installation:** Yes.

Communications With Clocking (#1482): Required for attachment to communication facilities through the 1200 bps Integrated Modem (#5501) or any external modem which does not have internal clocking. Also required for CCITT Interface (#3701). **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides the interface logic necessary to attach an external modem for communications to the host processor. Non-IBM modems may be attached subject to the Multiple Suppliers policy. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #5501. **Prerequisites:** (1) #9442 for cable length specify quantity of 10, 20, 30, 40 or 50 feet ... (2) #1482.

1200 bps Integrated Modem, Switched (#5501): Provides the point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. **Limitations:** Cannot be installed with Interface (#3701). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1482. The user must provide FCC registered protective circuitry of the CBS type (or equivalent).

3661 Store Controller (cont'd)

Scale Adapter (#6672): Allows attachment of an electronic scale that meets the interface requirements in *Scales Interface to the IBM 3663 Supermarket Terminal* document which is available from Corporate Industry Relations for use with locally attached 3663 mdl 2. **Maximum:** Two. **Field Installation:** Yes. **Specify: #9576** if scale will be used with first 3663 mdl 2, or **#9577** if it will be used with second 3663 mdl 2.

3663 Mdl 2 Local Attachment (#8110): Provides for the local attachment of a second 3663 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Note:** The first 3663 mdl 2 attachment is provided in the basic 3661.

Local Attachment Feature For Third 3663 Mdl 2 (#8111): Provides for the third local attachment of a 3663 mdl 2 terminal station. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8110.

MODEL CONVERSIONS

Model 1 may be changed to a model 2 by field installation. A mdl change requires the replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the start of any conversion.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3663 SUPERMARKET TERMINAL

PURPOSE

In conjunction with the 3651 mdl B25, C25, A60, B60, A75, B75, C75, D75 Store Controller or the 3661 Store Controller, the 3663 Supermarket Terminal provides the input and output facilities necessary to process transactions in a supermarket environment. It replaces and extends the function of mechanical supermarket registers.

MODELS

Model 1 001 [NO LONGER AVAILABLE] **Station and Control** -- One printer, display, keyboard, cash drawer and control segment for operating one checkstand.

Model 1P P01 [NO LONGER AVAILABLE] **Station and Control** -- One printer, display, keyboard, cash drawer and customer programmable control segment for operating one checkstand.

Model 2 002 [NO LONGER AVAILABLE] **Station Only** -- One printer, display, keyboard, and cash drawer that attaches to a 3663 model 1, 1P , 3 or 3P or the 3661 Store Controller , for operating additional checkstands. One 3663 model 2 must be attached to the 3661, a second and a third 3663 model 2 may be attached via #8110 and #8111 respectively (#8110 is a prerequisite for #8111.)

Model 3 003 [NO LONGER AVAILABLE] **Control Segment Only** -- A control segment for controlling one, or optionally up to three 3663 model 2s. **Note:** The first 3663 model 2 attachment is provided in the basic 3663 model 3.

Model 3P P03 [NO LONGER AVAILABLE] **Control Segment Only** -- A customer programmable control segment for controlling one or optionally up to three, 3663 model 2s. **Note:** The first 3663 model 2 attachment is provided in the basic 3663 model 3P.

Limitations: The mdl 1 is not available in conjunction with the 3651 Store Controller mdl B25, A75, B75, C75, or D75.

The mdl 1P is not available in conjunction with the 3651 Store Controller mdl A60 or B60 - Supermarket or with the 3661 Store Controller.

The mdl 3 is not available in conjunction with the 3651 Store Controller mdl B25, A60, B60, A75, B75, C75, or D75.

The mdl 3P is not available in conjunction with the 3651 Store Controller mdl A60 or B60 - Supermarket or with the 3661 Store Controller.

Prerequisites: One 3663 mdl 2 must be attached to the 3663 mdl 3.

With 3651 Store Controller mdl B25, C25, A75, B75, C75 or D75: (1) An available store loop position ... (2) For attachment of a 3663 mdl 2 to the store loop, a 3663 mdl 1P with a Mdl 2 Attachment Feature is a prerequisite unless the 3663 mdl 2 is attached to a 3663 mdl 3P. For attachment of a 3663 mdl 2 to a 3663 mdl 3P, a Mdl 2 Attachment Feature (#4900) is a prerequisite if it is the second 3663 mdl 2 attached to the 3663 mdl 3P. A 3rd Mdl 2 Attachment Feature (#4901) is a prerequisite if it is the third 3663 mdl 2 attached to the 3663 mdl 3P. **Note:** The first 3663 mdl 2 attachment is provided in the basic 3663 mdl 3P.

With 3651 Store Controller mdl A60 or B60: (1) A 3669 Store Communications Unit and an available store loop position ... (2) A 3663 mdl 1 with a Mdl 2 Attachment (#4900) feature is prerequisite for each 3663 mdl 2 to be added to a store loop.

With 3661 Store Controller: (1) An available local attachment on the 3661 or a store loop position. **Note:** One 3663 mdl 2 must be attached to the 3661 via the standard local attachment. One or two additional 3663 mdl 2s can be locally attached via optional Local Attachment Features) ... (2) For attachment of a 3663 mdl 2 to the store loop a 3663 mdl 1 with a Mdl 2 Attachment Feature is a prerequisite, unless the 3663 mdl 2 is attached to a 3663 mdl 3. For attachment of a 3663 mdl 2 to a 3663 mdl 3, a Mdl 2 Attachment Feature (#4900) is a prerequisite if it is the second 3663 mdl 2 attached to the 3663 mdl 3. A 3rd Mdl 2 Attachment Feature (#4901) is a prerequisite if it is the third 3663 mdl 2 attached to the 3663 mdl 3. **Note:** The first 3663 mdl 2 attachment is provided in the basic 3663 mdl 3.

HIGHLIGHTS

Has a storage area for each station into which keyed (or scanned if a 3667 Checkout Scanner is attached) data is entered prior to being transmitted to the 3651 Store Controller mdl B25, C25, A60, B60, A75, B75, C75 or D75 or the 3661 Store Controller. Checks for code accuracy, sequence control, field length, and correct number of fields. Another storage area at each station is used for receiving a previously entered message after being processed at the 3651 mdl B25, C25, A60, B60, A75, B75, C75 or D75 or the 3661. Upon receiving messages, data is edited and transferred to the printer and display.

With the appropriate special adapter features, the 3663 can attach non-IBM coin and trading stamp dispensers, non-IBM front end scales, and 3667 Checkout Scanners. In addition, a Document Insert feature can be added to the printer to allow "franking" (printing special data) on checks.

Keyboard: Has a ten-key numeric pad plus function keys. In part these include department keys, special item modification keys (for price, quantity and weight entries), tender payment keys, coupon entry keys, and other related supermarket required keys. (See the *IBM 3660 Supermarket System Introduction Manual*, GA27-3076, or the *IBM 3650 Programmable Store System Introduction Manual*, GA27-3163, for details).

Printer: Has two tape print locations as standard. Using a horizontal radial printing technique, the first tape printed is the customer receipt. The second tape is for summary journal data. An optional Document Insert feature position may be added. Alphameric printing is accomplished with a dot matrix print head. Printing in each position is up to 30 characters. Customer receipt tape printing is at 80 lines per minute. Summary journal tape printing is at 50 lines per minute. Document Insert printing is at 35 lines per minute. Shelf labels can be printed at 3-4 labels per minute, depending upon the size of the label.

Cash Drawer: Has a removable and lockable till with five spring-weighted bill compartments and five coin compartments.

A 3-position lock controls power to the station and manually opens the drawer regardless of power status. The key is removable in any position. No terminal function can be initiated with the drawer open.

Display: A variable character display panel allows displaying an alphameric message of up to 22 characters in length. Characters are 0.4 inches high and variable in width.

Communications: Provided over two 2-wire customer-provided loops called store loops. Messages from the 3651 mdl B25, C25, A60, B60, A75, B75, C75 or D75 or the 3661 are monitored by the 3663 Supermarket Terminalvfor terminal destination. A pluggable address scheme is provided for terminal numbering. See the *Installation Manual - Physical Planning*, (GA27-3079) for the 3660 Supermarket System and *Installation Manual - Physical Planning*, (GA27-3167) for the 3650 Programmable Store System.

Packaging: Stations can be specified fully integrated (all I/O segments under a single cover) or integrated with a remote display. An optional special feature with a specify code will provide a distributed station (I/O segments separately covered to allow location flexibility).

Proposal/Acknowledgement Letter Statements: Each Proposal and Acknowledgement Letter must include the following statement: "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3663 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations.

When a failure occurs in the cash drawer of any 3663 and it cannot be opened prior to maintenance by IBM, the Customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

Maintenance: Agreement for IBM to install and maintain the 3663 must be reviewed by FE area management prior to making any commitment to the customer.

SPECIFY

- Voltage (115 V AC, 1-phase, 60 cycle): **#9880** for locking plug, or **#9881** for non-locking plug.
- Power (AC, 1-phase): Specify one.
- Packaging: Specify **#9547** for fully integrated, **#9549** for integrated but with remote display. Specify **#9548** for distributed; special feature #3425 (Distributed Station) is a prerequisite. Specify one specify code for each 3663 mdl 1 or mdl 1P and one for each 3663 mdl 2; if **#9548**, feature code #3425 for each 3663 mdl 1, 1P and mdl 2 also. Specify codes need not be the same for all 3663s in a store. Changes in packaging of installed terminals are not permitted in the field.
- Cabling: See cable order form Z120-2516 and refer to *Installation Manual-Physical Planning* (GA27-3079) for the 3660 Supermarket System and *Installation Manual-Physical Planning* (GA27-3167) for the 3650 Programmable Store System.
- TARE key: Specify **#9737** for providing a keytop that has the word "TARE" on it to replace the lower blank key on the 3663. Do not specify if Optional Keyboard (specify code **#9488**) is ordered. Delete this specify on existing orders pending if Optional Keyboard (specify code **#9488**) is to be added. **Note:** The use of Tare capability is mandatory in the State of California.

3663 Supermarket Terminal (cont'd)

- Keytop Arrangement: Specify **#9353** for a reversed keypad (top row -- 7, 8, 9; middle row -- 4, 5, 6; bottom row -- 1, 2, 3). **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, if installed on one 3663 mdl 1 or 2, it must be installed on all 3663 mdl 1s and 2s in the store. Do not specify if Optional Keyboard (specify code **#9488**) is ordered. Delete this specify on existing orders pending, if Optional Keyboard (specify code **#9488**) is to be added. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended.
- Cash Drawer Locks: A separate group of 25 lock numbers has been set aside to allow a customer to use the same key in multiple terminals. If this is desired, specify one of the following locks on the 3663 order:

#9101	**#9106**	**#9111**	**#9116**	**#9121**
#9102	**#9107**	**#9112**	**#9117**	**#9122**
#9103	**#9108**	**#9113**	**#9118**	**#9123**
#9104	**#9109**	**#9114**	**#9119**	**#9124**
#9105	**#9110**	**#9115**	**#9120**	**#9125**

  If this option is not specified, a lock will be randomly selected from another, larger, group of unique lock numbers.
- Till Option: Specify **#9799** for shipment of a till with adjustable bill dividers. If this option is not selected, an assembled till with fixed bill dividers will be shipped.
- Keyboard Type: One keyboard type must be specified for each 3663 mdl 1, 1P and 2. Specify code **#9020** will provide the Regular Keyboard with the 10-key pad positioned on the left. This keyboard may have up to nine department keys. **Limitations:** In the 3660 Supermarket Scanning and Key Entry System, if installed on more than one 3663 in the local or back-up store, all key assignments must be the same. Not compatible with Optional Keyboard (**#9488**). In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments - paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended.

  Specify code **#9488** will provide the Optional Keyboard with the 10-key pad positioned in the center. The left to right dimension is 16-1/2 inches in the distributed version, special feature code #3425, (no change in the size of the integrated version). An expanded keytop shipping group is included to provide variety in colors, heights and sizes of blank keytops. Also, a means is provided to allow placing single or double sized keys in many locations. **Limitations:** In the 3660 Supermarket Scanning and Key Entry System, this keyboard must be installed on all 3663s in a store and is not compatible with specify code **#9020**, the Regular Keyboard. All key assignments must be the same. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments - paired mdl 1 and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended. **Prerequisites:** In the 3660 Scanning System, special feature #3880 is required on all 3663 mdl 1s in the store if any of the following features are installed in the same store: Coin Dispenser Adapters -- #1821, #1822.

SPECIAL FEATURES

Storage Expansion Feature (#1580): [Mdls 1P, 3P] Provides the capability of installing storage increments 4 through 9. **Limitations:** This feature now applies only to mdls 1P and 3P that were scheduled for shipment prior to August 1, 1980 and lower than EC level 320637. **Maximum:** One. **Field Installation:** Yes.

Checkout Scanner Adapter Type 2 (#1763): [Mdls 1, 1P] Allows attachment of a 3667 checkout Scanner for operation with the 3663 mdl 1 or 1P to which it is attached. **Limitations:** Cannot be installed when 3663 is attached to the 3661 Store Controller. Cannot be installed when #1761 is installed. **Maximum:** One. **Field Installation:** Yes.

2nd Checkout Scanner Adapter Type 2 (#1764): [Mdls 1, 1P] Allows attachment of a 3667 Checkout Scanner for operation with an attached 3663 mdl 2. **Limitations:** Cannot be installed when 3663 is attached to the 3661 Store Controller. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1763, #4900 and the 3663 mdl 2.

Coin Dispenser Adapter Type 2 (#1821): [Mdls 1, 1P, 3, 3P] Allows attachment of an 8-column Coin Dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment Interfaces to the IBM 3663 Supermarket Terminal" document which is available from Corporate Industry Relations) to any one station of a 3663 mdl 1, 1P , 3 or 3P. **Maximum:** One. **Limitation:** Not available if Coin Dispenser Type 1 (#1811)(no longer available) is installed. **Field Installation:** Yes.

2nd Coin Dispenser Adapter Type 2 (#1822): [Mdls 1, 1P, 3, 3P] Allows attachment of a second 8-column Coin Dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment Interfaces to the IBM 3663 Supermarket Terminal" document which is available from Corporate Industry Relations). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1821.

3rd Coin Dispenser Adapter Type 2 (#1823): [Mdls 3, 3P] Allows attachment of a third 8-column coin dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment Interfaces to the IBM 3663 Supermarket Terminal" document which is available from Corporate Industry Relations). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1821, #1822 and a third mdl 2 attachment (#4901).

Distributed Station (#3425): [Mdls 1, 1P, 2] Provides distributed packaging; all I/O segments separately covered to allow location flexibility. **Maximum:** One per 3663 mdl 1, 1P or 2. **Field Installation:** Not recommended. **Prerequisites:** Specify code **#9548** on 3663 mdl 1, 1P, or 2.

Document Insert (#3451): [Mdls 1, 1P, 2] Provides a third location on the printer for printing on an inserted form (refer to *3660 Supermarket Systems Introduction* GA27-3076 for details on forms). **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, if this feature is desired for a mdl 1 on the store loop, it must be installed on the attached mdl 2 (if any) or vice versa. In the 3660 Supermarket Scanning and Key Entry Systems, if this feature is desired for a mdl 2 attached to a mdl 3, it must also be installed on all other mdl 2s attached to that mdl 3. **Maximum:** One on each 3663 mdl 1, 1P or 2. **Field Installation:** Not recommended.

Storage Increment (#3880): [Mdls 1, 1P, 3, 3P] Provides 2,048 additional positions of storage. All replaced parts become the property of IBM. **Limitations:** If this feature is required on one 3663 mdl 1 or mdl 3, it must be installed on all 3663 mdl 1s and mdl 3s in the store. This feature is only allowed on mdl 1 and mdl 3 and on mdls 1P and 3P scheduled for shipment prior to August 1, 1980 and lower than EC level 320637. **Maximum:** One on 3663 mdl 1 and mdl 3, nine on mdl 1P and 3P. **Field Installation:** Yes. **Prerequisites:** Installation of more than 3 Storage Increments (mdl 1P and 3P only) requires one Storage Expansion Feature (#1580).

Storage Increment (#4225): [Mdls 1, 1P, 3, 3P] Provides 8,176 bytes of additional storage. **Limitations:** Not compatible with feature #3880 or #1580. This feature is to be used on all mdls 1P and 3P scheduled for shipment subsequent to August 1, 1980 and at EC level 320637 or higher. For mdls 1P and 3P shipped prior to August 1, 1980 an "as required" EC is necessary to allow installation of this feature. **Maximum:** Three. **Field Installation:** Yes.

IML-Read Adapter (#4634): [Mdls 1P, 3P] Provides a means to initialize 3663 terminals when a 3651 Store Controller mdl A25, B25, C25, A75, B75, C75 or D75 is unavailable or unable to provide the IML (Initial Machine Load). An adapter is provided for attaching an external tape cassette recorder (refer to *IBM 3650 Retail Store System Introduction Manual*, GA27-3075) and reading data previously recorded at a 3651 equipped with the IML-Write Adapter (#4633). **Maximum:** One. **Field Installation:** Yes.

Journal Lock (#4660): [Mdls 1, 1P, 2] Provides a locking internal security cover for the summary journal take-up spool. **Maximum:** One. **Field Installation:** Yes.

Mdl 2 Attachment (#4900): [Mdls 1, 1P, 3, 3P] Allows attachment of one 3663 mdl 2 to a 3663 mdl 1 or 1P, or allows attachment of a second 3663 mdl 2 to a 3663 mdl 3 or 3P. **Maximum:** One. **Field Installation:** Yes. **Note:** The basic 3663 mdl 3 or 3P provides for attachment of the first 3663 mdl 2 as a standard feature.

3rd Mdl 2 Attachment (#4901): [Mdls 3, 3P] Allows attachment of the third 3663 mdl 2 to a 3663 mdl 3 or 3P. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4900 on 3663 mdl 3 or 3P.

Numeric Key Pad Lock (#5330): [Mdls 1, 1P, 2] Provides a lock to prevent depression of the numeric keys or delimiter key when an error condition has been detected. **Maximum:** One. **Field Installation:** Not recommended.

Receipt Station Half Space (#6226): [Mdls 1, 1P, 2] Vertical spacing in the receipt station is modified to provide half normal vertical spacing, i.e., 10 vertical spaces per inch. The spacing may be manually switched to normal (5 lines per inch). This feature also detects end of label and start of label as well as "End of Forms". Depending on label size, approximately 3-4 labels per minute can be printed. **Limitations:** Only one printer per Control Segment can be used when printing shelf labels. 3663s attached locally to the 3661 cannot install this feature. **Maximum:** One. **Field Installation:** Yes.

Scale Adapter (#6671): [Mdls 1, 1P, 3, 3P] Allows attachment of an electronic scale (that meets the interface requirements in "Scales Interface to the IBM 3663 Supermarket Terminal" document which is available from Corporate Industry Relations). **Maximum:** Two on mdl 1 or 1P; three on mdl 3 or 3P. **Field Installation:** Yes. **Prerequisites:** For mdls 1P and 3P, the 3650 Programmable Store System Point of

3663 Supermarket Terminal (cont'd)

Sale Application/Supermarket Environment Program Product (5748-D21) is a mandatory requirement in all states conforming to the *National Bureau of Standards Handbook #44 for Weights and Measures.* **Specify: #9561** if Scale will be used for the station portion of a 3663 mdl 1 or 1P or for the first 3663 mdl 2 attached to a 3663 mdl3 or 3P, or **#9562** if it will be used for a 3663 mdl 2 attached to a 3663 mdl 1 or 1P, or for the second 3663 mdl 2 attached to a 3663 mdl3 or 3P, or **#9563** if it will be used for the third 3663 mdl 2 attached to a 3663 mdl 3 or 3P.

Stand-alone Initial Machine Load (#7555): [Mdl 1, 3] Allows a user-provided tape cassette to be attached to a 3663 Supermarket Terminal mdl 1 or mdl 3 to provide IML capability if required when the 3663 is operating in standalone mode. **Maximum:** One. **Limitations:** The IML feature on a 3663 mdl 1 cannot be used to IML a 3663 mdl 3; therefore, when there is a mixture of mdl 1s and mdl 3s, the feature should be installed on a mdl 3 instead of mdl 1. **Field Installation:** Yes. **Prerequisites:** A 3661 Store Controller. **Note:** One IML feature will support all terminals on the store loop. User-provided tape cassette must meet requirements defined in the *IBM 3660 Supermarket Systems: Key Entry System Introduction,* GA27-3111.

MODEL CONVERSIONS

Not recommended for field installation except from model 1 to 1P and from model 3 to 3P. All replaced parts become the property of IBM.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GA27-3074, or *3680 Site Planning and Site Preparation Guide,* GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to +105 C.

Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

Keyboard Accessories: The following terms are used in the KEYTOP descriptions:

Version	Stem Number/Key Alignment
OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal
-B	Small raised projection in keytop
-C	Circular, concave top on key button
-M	Minimal concavity of circular keytop

Size	Units
Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

Engraved Keytops: Keytops containing pre-defined messages are available for use on the 3663 terminal keyboards. Blank keytops are also available for customer engraving. Keytops can be ordered by P/N . Specify P/N and quantity.

The following is a list of pre-defined keytops available in the 3660 Supermarket System nomenclature:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
FOR	White	Square	OH-CM	Std	1650263
5	White	Square	OH-BC	Std	1752490
4	White	Square	OH-C	Std	1854186
5	White	Square	OH-C	Std	1854187
6	White	Square	OH-C	Std	1854188
*	White	Square	OH-CM	Std	1854189
1	White	Square	OH-CM	Std	1854190
2	White	Square	OH-CM	Std	1854191
3	White	Square	OH-CM	Std	1854192
7	White	Square	OH-CM	Std	1854193
8	White	Square	OH-CM	Std	1854194
9	White	Square	OH-CM	Std	1854195
NO SALE	White	Single	OH	Std	1762460
VOID	Red	Single	OH	Std	1762462
DISC	Red	Single	OH	Std	1762463
REFUND	Red	Single	OH	Std	1762464
MFR COUPON N	Red	Single	OH	Std	1762465
STORE COUPON M	Red	Single	OH	Std	1762466
FOOD STAMP E	Blue	Single	OH	R-1/8	1762472
CHECK FEE	Blue	Single	OH	R-1/8	1762473
BOTTLE DEPOSIT	Blue	Single	OH	R-1/8	1762474
PRICE B (PSWD)	Blue	Single	OH	R-1/8	1762475
TAX/NO TAX	Blue	Single	OH	R-1/8	1762476
WEIGHT A (OP#)	Blue	Single	OH	R-1/8	1762478
QTY C	Blue	Single	OH	R-1/8	1762479
MEAT	Red	Single	OH	R-1/8	1762480
BOTTLE REFUND	Red	Single	OH	R-1/8	1762481
WINE	Red	Single	OH	R-1/8	1762482
PROD	Green	Single	OH	R-1/8	1762484
FLWR	Green	Single	OH	R-1/8	1762485
GEN MDSE	Green	Single	OH	R-1/8	1762487
FROZ FOOD	Green	Single	OH	R-1/8	1762488
DELI	Yellow	Single	OH	R-1/8	1762489
CH'ESE	Yellow	Single	OH	R-1/8	1762490
BEER	Yellow	Single	OH	R-1/8	1762492
LIQUOR	Brown	Single	OH	R-1/8	1762493
TOBAC	Brown	Single	OH	R-1/8	1762494
NON FOOD	Brown	Single	OH	R-1/8	1762495
SNDRY	Brown	Single	OH	R-1/8	1762496
GROC	White	Single	OH	R-1/8	1762497
GROC TAX	White	Single	OH	R-1/8	1762498
GROC NON TAX	White	Single	OH	R-1/8	1762499
FISH	White	Single	OH	R-1/8	1762502
BAKE	White	Single	OH	R-1/8	1762503
HABA	White	Single	OH	R-1/8	1762504
DAIRY	White	Single	OH	R-1/8	1762505
MFG COUPON N	Blue	Single	OH	Std	1854196
MISC N	Blue	Single	OH	Std	1854197
STORE COUPON M	Blue	Single	OH	Std	1854198
PRICE B (PSWD)	Blue	Single	OH	Std	1854199
WEIGHT A (OP#)	Blue	Single	OH	Std	1854200
QTY C	Blue	Single	OH	Std	1854201
REFUND D	Blue	Single	OH	Std	1854202
VOID J	Blue	Single	OH	Std	1854203
SIGN ON/OFF	Blue	Single	OH	Std	1854204
FOOD STAMP E	Blue	Single	OH	Std	1854205
DISC K	Blue	Single	OH	Std	1854206
CHECK F	Blue	Single	OH	Std	1854207
CHECK VERIFY I	Blue	Single	OH	Std	1854208
CASH G	Blue	Single	OH	Std	1854209
NO SALE	Blue	Single	OH	Std	1854210
STAMP-	Blue	Single	OH	Std	1854211
TAX/NO TAX	Blue	Single	OV	Std	1854212
GROC	Blue	Single	OV	Std	1854213
PROD	Green	Single	OV	Std	1854215
DEPT 1	Blue	Single	OV	Std	1855373
DEPT 2	Blue	Single	OV	Std	1855374
DEPT 3	Blue	Single	OV	Std	1855375
DEPT 4	Blue	Single	OV	Std	1855376
BAKE	Blue	Single	OH	Std	1855377
DELI	Blue	Single	OH	Std	1855378
DAIRY	Blue	Single	OH	Std	1855379
FROZ FOOD	Blue	Single	OH	Std	1855380
LIQUOR	Blue	Single	OH	Std	1855381
WINE	Blue	Single	OV	Std	1855382
HABA	Blue	Single	OV	Std	1855383
TOBAC	Blue	Single	OV	Std	1855384
GEN MDSE	Blue	Single	OV	Std	1855385
CHECK FEE	Blue	Single	OV	Std	1855386
FISH	Blue	Single	OV	Std	1855387
FLWR	Blue	Single	OV	Std	1855386
SNDRY	Blue	Single	OV	Std	1855389
CH'ESE	Blue	Single	OV	Std	1855390
NON FOOD	Blue	Single	OV	Std	1855391
BEER	Blue	Single	OV	Std	1855392
ALTER ENTRY	Blue	Single	OH	Std	5183540
FS/NO FS	Yellow	Single	OH	Std	5194241
SERV-DELI	Blue	Single	OV	Std	8542914
DRUG TAX	Blue	Single	OV	Std	8542915
SEAFOOD	Blue	Single	OV	Std	8542916
TARE OVERRIDE	Blue	Single	OH	Std	8542917
MEAT	Red	Single	OV	Std	1854219
0	White	Long	TH	Std	1648416
0	White	Long	OV	Std	1854214
ENTER	White	Double	TV	Std	1762520
TOTAL	White	Double	TV	Std	1762521
GROC	White	Double	TV	R-1/8	1762529
ENTER	White	Double	TV	R-1/8	1762530
TOTAL	White	Double	TV	R-1/8	1762531
CLEAR	White	Double	TV	R-1/8	1762532
CLEAR	White	Double	OV	Std	1854216
TOTAL	White	Double	OV	Std	1854217
ENTER	White	Double	OV	Std	1854218

Blank Keytops: The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
(all blank)	White	Square	OH-CM	R-1/8	1648413
	White	Square	OH-CB	Std	1752491
	White	Square	OH	Std	1853928

3663 Supermarket Terminal (cont'd)

White	Square	OH-B	Std	1853930
White	Square	OH-CM	Std	1854184
White	Square	OH-C	Std	1854185
White	Single	OVH	Std	1762468
Yellow	Single	OVH	Std	1762469
Black	Single	OVH	Std	1762470
Brown	Single	OVH	Std	1762471
N-M Br	Single	OVH	Std	2688791
White	Single	OH	R-1/8	1762506
Red	Single	OH	R-1/8	1762507
Blue	Single	OH	R-1/8	1762508
Green	Single	OH	R-1/8	1762509
Yellow	Single	OH	R-1/8	1762510
Black	Single	OH	R-1/8	1762511
Brown	Single	OH	R-1/8	1762512
White	Single	OH	R-1/4	1762513
Red	Single	OH	R-1/4	1762514
Blue	Single	OH	R-1/4	1762515
Green	Single	OH	R-1/4	1762516
Yellow	Single	OH	R-1/4	1762517
Black	Single	OH	R-1/4	1762518
Brown	Single	OH	R-1/4	1762519
Blue	Single	OVH	Std	1853914
Green	Single	OVH	Std	1854182
Red	Single	OVH	Std	1854183
White	Long	TH	R-1/8	1648415
White	Long	TH	Std	1648417
White	Long	OV	Std	1853909
White	Long	OH	Std	1855439
Red	Double	TV	R-1/4	1648405
Blue	Double	TV	R-1/4	1648406
Green	Double	TV	R-1/4	1648407
Yellow	Double	TV	R-1/4	1648408
Black	Double	TV	R-1/4	1648409
Brown	Double	TV	R-1/4	1648410
White	Double	TV	Std	1762522
Red	Double	TV	Std	1762523
Blue	Double	TV	Std	1762524
Green	Double	TV	Std	1762525
Yellow	Double	TV	Std	1762526
Black	Double	TV	Std	1762527
Brown	Double	TV	Std	1762528
White	Double	TV	R-1/8	1762533
Red	Double	TV	R-1/8	1762534
Blue	Double	TV	R-1/8	1762535
Green	Double	TV	R-1/8	1762536
Yellow	Double	TV	R-1/8	1762537
Black	Double	TV	R-1/8	1762538
Brown	Double	TV	R-1/8	1762539
White	Double	TV	R-1/4	1762540
N-M Br	Double	TV	Std	2688798
Blue	Double	OV	Std	1853905
White	Double	OV	Std	1854181

UNIVERSAL KEYTOPS: Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3663 Supermarket terminals. These accessories consist of legendable keytops and sheets of blank labels to use on these keytops.

The universal keytops come in the four standard sizes and in two heights. They consist of two parts; a white bottom button and a clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

Accessories can be ordered by P/N . Specify P/N and quantity.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N
Keytop	White	Square	OH	Std	5188767
Keytop	White	Single	OVH	Std	5188768
Keytop	White	Single	OH	R-1/8	5188769
Keytop	White	Long	TH/TV	Std	1642499
Keytop	White	Long	OV	Std	5188771
Keytop	White	Long	OH	Std	5188772
Keytop	White	Double	OV	Std	5188773
Keytop	White	Double	TV	Std	5188774
Keytop	White	Double	TV	R-1/8	8627316
Cover	Clear	Square	--	--	5188751
Cover	Clear	Single	--	--	5188754
Cover	Clear	Long	--	--	5188757
Cover	Clear	Double	--	--	5188760

ITEM	COLOR	SIZE (DECALS/SHEET)	P/N
Labels	White	Square (102 decals/sheet)	5194900
Labels	White	Single (68 decals/sheet)	1756848
Labels	Yellow	Single (68 decals/sheet)	5194901
Labels	Red	Single (68 decals/sheet)	5194902
Labels	Blue	Single (68 decals/sheet)	5194903
Labels	Green	Single (68 decals/sheet)	5194904
Labels	Brown	Single (68 decals/sheet)	5194905
Labels	White	Long (42 decals/sheet)	5194906
Labels	White	Double (28 decals/sheet)	5194907
Labels	Red	Double (28 decals/sheet)	5194908
Labels	Blue	Double (28 decals/sheet)	5194909

Key Stops (P/N 1650058): The key stop is a small ring collar which is placed over the stem of a keybutton and under the keytop. The collar holds the keytop in the up position and prevents its use. These stops may be ordered by P/N Specify P/N and quantity.

Keytop Extractor (P/N 1647720): The keytop extractor is a small plier-like device that fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard. Two keytop extractors are supplied with each 3651 controller and one extractor with each 3684 Point of Sale - Control Unit. If the customer desires additional extractors, they may be ordered by P/N .

Locks and Keys: The 3663 Stations are equipped with three locks and a complement of keys as follows:

- Cash Drawer Lock -- different for each station unless specified otherwise. The Cash Drawer Keylock (P/N 1851086) is shipped with two keys as standard.
- Till Lock -- One standard key (P/N 1851268) fits all tills. One key shipped as standard per till.
- Summary Journal Lock (optional feature #4660) -- One standard key (P/N 1851372) fits all summary journals. One key shipped as standard per summary journal.

Additional or replacement keys may be purchased from IBM or a local locksmith. Locks may be changed in the field. A customer authorization letter with key identification number (stamped on key and lock) must accompany the order. If the customer does not specify a specific key number, a new lock with keys will be selected randomly. Allow 6 to 7 weeks for shipment. **Note:** To order extra keys, specify machine serial number and the key identification number being replaced. Without a key identification number, a new lock must be ordered with the words "NEW LOCK REQUIRED".

3663 Cash Drawer Key - **Specify:** Machine serial number, key identification number, machine type, lock serial number, and key P/N from the following chart:

Lock Serial Number	Lock Key P/N
H2601 - H2800	8549431
H2801 - H3000	8549482
H3001 - H3200	6021144
H3201 - H3400	6021145

3663 Till Key - **P/N 1851268 ***
3663 Summary Journal Key - **P/N 1851372 ***
3663 Cash Drawer Keylock (with 2 keys) - **P/N 1851086 ***

*** Specify:** Machine serial number and the key identification number being replaced.

Tills: The 3663 Supermarket terminal stations are equipped with a removable till and locking cover. Additional tills with locking covers may be ordered . Specify P/N and quantity. See 3663 Till Key under "Locks and Keys".

Note: The Adjustable Till is pre-assembled for the customer.

3663 Till with Fixed Bill Slots, **P/N 1851117**
3663 Till with Adjustable Bill Slots, **P/N 1990616**

SUPPLIES

Ribbons: A black ribbon, P/N 1136970, or equivalent, is recommended; should be used for machines installed prior to June, 1975. Machines installed after this date and those machines previously installed that are changed to the new ribbon drive mechanism should use P/N 1136660 or equivalent. Contact IBM. See *3660 Supermarket System Introduction,* GA27-3076, for roll paper and Document Insert forms specifications.

3667 CHECKOUT SCANNER

PURPOSE

Fixed head optical reader for the 3650 Programmable Store System and the 3660 Supermarket System. The 3667 is 71.1cm (28 inches) high and it is particularly adaptable to:

- Checker unload mode of checkout
- Seated checker operation

MODELS

Model 1 001 [NO LONGER AVAILABLE] Checkout Scanner

HIGHLIGHTS

Reads the regular (Version "A") and the zero suppression (Version "E") industry standard Universal Product Code (UPC) symbols on manually-fed supermarket items placed symbol down on the scanner window. When used with the 3650 Programmable Store System, can also read industry standard European Article Numbering (EAN-13) symbols. (When used with the 3650 Programmable Store System, interpretation of all symbols is done by the user application program.) Item velocity meets the industry's Symbol Standardization Subcommittee requirement for up to 100 inches per second. Packaged as the front end of a total checkstand design, one 3667 can operate with one 3663 Supermarket Terminal mdl 1, 1P or 2. The 3667 contains a laser system which complies with the safety standards of the United States Department of Health, Education, and Welfare (Performance Standard for Laser Products, August 2, 1976 -- Class I, 21 CFR Subchapter J) only when properly attached to a 3663 mdl 1 or 1P with feature #1763, #1764 or equivalent.

The scanner reads the new Universal Product Code symbol (Version A & E), announced by the USA Uniform Grocery Product Code Council or the European EAN Universal Product Code via RPQ 7S0250 on the 3663.

Alternate product codes, which may result from national and/or international harmonization efforts, will be addressed by IBM following adoption and publication of the corresponding agreed specifications.

Prerequisites: If the 3667 is to operate with a 3663 mdl 1 or 1P, the 3663 mdl 1 or 1P requires Checkout Scanner Adapter Type 2 (#1763).

If the 3667 is to operate with a 3663 mdl 2, the 3663 mdl 1 to which that 3663 mdl 2 is attached requires Checkout Scanner Adapter Type 2 (#1763) and 2nd Checkout Scanner Adapter Type 2 (#1764).

Customer Responsibilities : Refer to *Installation Manual - Physical Planning,* GA27-3079, for the 3660 Supermarket System for correct ambient light intensity requirement. A number of states presently have, and others are considering the adoption of, regulations governing the use of laser products. Users should determine the extent of regulation in their state. New York state currently requires an attachment to the checkstand. This user-supplied feature must be in place prior to installation of the 3667. Details are available from the N.Y. State Department of Labor, Division of Safety and Health, Two World Trade Center, New York, N.Y. 10047. Window replacement is a customer responsibility.

The 3667 Scanner must be mechanically restrained in its final mounted position. During maintenance, the 3667 can be tipped forward by a downward force in the extended components drawer. The customer must provide this restraint. Unless the 3667 is restrained from tipping by the geometry of the checkstand, an IBM-provided Safety Clip or Safety Bracket must be ordered for each 3667. It is the responsibility of the customer to locate and install the restraining hardware (see "Specify").

Copies of the UPC Symbol Specifications and the UPC Guidelines are available at a charge from the UPC Council. Write to:

Uniform Product Code Council, Inc.
7061 Corporate Way, Suite 106
Dayton, Ohio 45459
513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN) write to:

Secretary General E.A.N.
Rue Des Colonies 54, Bte 8
1000 Bruxelles - Belgique

SPECIFY

- **Cable Requirements:** See M3663 pages.
- **Packaging/Labels:** Certain states require special packaging and/or labels to be legally in compliance with the current regulations. Machines installed in these states must have the appropriate specify code:

  State of New York **#9550**

- **Scan Direction:** Specify **#9604** for Normal Scan Direction. This is typically used for Over the Counter (OTC) operation, sometimes referred to as checker unload.

  Optional Scan Direction: Specify **#9605** for optional scan direction. This is typically used for Over the End (OTE) operation, sometimes referred to as customer unload.

  See *IBM 3650 Programmable Store System Installation Manual - Physical Planning,* GA27-3167, or *IBM 3600 Supermarket Systems; Installation Manual - Physical Planning,* GA27-3079, for illustration of scan direction options.

- **Item Sensor Position:** Prior to the availability of of specify **#9301** and **#9302**, the item sensors were shipped in the low position.

  Specify: #9301 for Item Sensor-High Position. This position may be desired with Specify **#9604** (Normal Scan Direction). (Caution: Small flat items may not be sensed in this position causing re-scans or possibly missed items. Contact your Market Support Center for more information.)

  Specify: #9302 for Item Sensor-Low Position. This position may be desired with Specify **#9605** (Optional Scan Direction).

- **Restraining Hardware:** See *3660 System Installation Manual - PhysicalPlanning,* GA27-3079, to determine type of restraining hardware desired. Order one of the following for each 3667 to be installed:

  1) Safety Clip - for each 3667, order (1) B/M 5194716 to secure one rear 3667 leg to the customers' stationary horizontal mounting surface, or
  2) Safety Bracket - for each 3667, order (1) B/M 5194758 to secure the 3667 lower rear cabinet extension to the customers' stationary vertical checkstand surface.

  Order the Safety Clip or Safety Bracket on MES. This is a no-charge item to the customer and a quantity sufficient for three months' installation may be submitted on a single MES order for a given customer.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Window (P/N 556123): The 3667 Checkout Scanner is equipped with a replaceable window. With use, it will tend to get scratched and need to be replaced periodically. Window replacement is a customer responsibility. Specify P/N and quantity.

SUPPLIES

Contact IBM.

3669 STORE COMMUNICATIONS UNIT

PURPOSE

To provide communications for the 3650 Programmable Store System and the 3660 Supermarket System over common carrier network facilities between a 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 and:

- The host S/370, 30XX or 4300 Processor via a 3872 Modem or 2400 bps Integrated Modem of a 3704, 3705 or 3725 Communications Controller with switched line features or a Communications Adapter (#1601) feature on a 4321 or 4331.
- The store loops at another predesignated store location via another 3669 at that location, to provide backup operation for that store in case its 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 is inoperative.
- The 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 in the predesignated store via the 3669 in that store for the purpose of data reconciliation when the backup operation is terminated. If both Store Controllers are 3650 mdl 75, communication can also be performed for purposes other than backup data reconciliation.

The 3669 is designed to operate at 2400 bps over a switched telephone network. This unit is equipped with Automatic Answering facility but requires manual dialing. The connection to the telephone network is made through FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. See "Accessories" for information on IBM's offering pertaining to an FCC Registered CBS type protective coupler.

MODELS

Model 1 001 Switched Network

Prerequisites: A 3650 Programmable Store System or a 3660 Supermarket System (equipped with a 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75)... A switched line communications facility with FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. See"Accessories" for information on IBM's offering pertaining to an FCC Registered CBS type protective coupler. ... A store loop equipped with at least one 3663 Supermarket Terminal mdl 1 or 1P ... Communications with any virtual storage S/370 or 4300 processor (4321, 4331, 4341, 4361, 4381, 3033, 3033MP, 3158MP, 3168, 3168MP VTAM only), (165II BTAM only) or 3081 via the 3704, 3705 or 3725, or an ICA (BTAM only) on a S/370 mdl 115, 125, 135, 135-3 or 138 or a Communications Adapter (#1601) feature on a 4321 or 4331 or 4361.

HIGHLIGHTS

The 3669 is a synchronous signal converter designed to connect, under switched control, either a 3651 Store Controller mdl A60, B60, A75, C75 or D75 or two store loops to the common carrier network. Diagnostic test functions are normally under control of the 3651 mdl A60, B60, A75, B75, C75 or D75 during initial power on. An additional switch setting allows the performance of manual diagnostic test. Auto answer is included as a standard feature.

Attachment: One cable is provided to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. See "RPQ" section below for additional ordering information. One cable is provided to interface to the store loop.

Customer Responsibilities: (1) See M2700 pages ... (2) Customer is responsible for obtaining, installing, and testing the store loops. See *Installation Manual - Physical Planning* (GA27-3079) for the 3660 Supermarket System.

SPECIFY

- Voltage (AC, 1-phase, 60 cycle): Locking plug -- **#9880** for 115V, **#9884** for 208V, or **#9886** for 230V. For non-locking plug -- **#9881** for 115V, **#9885** for 208V, or **#9887** for 230V.
- Cable: RPQ 8Q0129 Cable - Modem to Protective Coupler (DAA). This N/C RPQ provides a cable which is compatible with the IBM Protective Coupler (CBS Type) available as P/N 1649100 (see RPQ 8Q0130 for description).

SPECIAL FEATURES

Direct Line Attachment (#2939): Available in some countries to meet PTT specifications to have the 3669 homologated. Consult your Teleprocessing Coordinator to determine if whether it is required. **Maximum:** One. **Field Installation:** Yes.

RPQs

PTT (RPQ 7B0211): Mandatory Interface on 3669 Store Communication Unit.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3683 POINT OF SALE TERMINAL

PURPOSE

A user-programmable input/output terminal for the 3650 Programmable Store System or the 3680 Programmable Store System which provides the point of sale transaction, data collection, credit authorization, price look-up and other inquiry and data entry functions. The self contained programmable segment allows the 3683 to continue most sales functions when disconnected from the 3651 Store Controller or the 3684 Point of Sale Control Unit, and after receiving a program load from the 3651 or the 3684.

MODELS

A description of each available model of the 3683 is as follows. 3683 models 1, 2, and 3 are supported under the 3650 Programmable Store System and the 3680 Programmable Store System. The 3683 models 1A, 2A, and 3A are supported under the 3650 Programmable Store System but are not supported on the 3680 Programmable Store System.

Model 1 001 — Comprised of a base unit with 32K bytes of base storage and an integrated printer. The cash receipt station is standard. Additional print stations, journal, validation or label printer may be added as features for a maximum of three print stations.

Model 1A A01 — Same as the 3683 model 1 except that the 3683 model 1A has 56K bytes of base storage and provides for the attachment of a 3687 Checkout Scanner. **Limitations:** Cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), Storage Increment-8K (#7710), Storage Increment-24K (#7730) or Expansion Feature I (#3880).

Model 2 002 — Comprised of a base unit with 56K bytes of base storage and a 1- or 2-station distributed printer. The printer is contained in a separate set of covers cable connected to the base unit. The cable length is 3.6m (12 ft). The cash receipt station is standard. Only the journal print station may be added to allow for a maximum configuration of two print stations. All other I/O (cash drawer, displays or keyboards) must be distributed or remote when used with this unit. **Limitations:** Cannot install Label Printer (#8726), Validation Printer (#8725), Integrated Cash Drawers (#1571 and #1573), Storage Increment-8K (#7710), and Storage Increment-24K (#7730).

Model 2A A02 — Same as the 3683 model 2 except that the 3683 model 2A enables attachment of a 3687 scanner. **Limitations:** In addition to those listed under 3683 model 2, cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), or Expansion Feature I (#3880).

Model 3 003 — Comprised of a base unit with 56K bytes of base storage and a 1-, 2-, or 3-station distributed printer. The printer is contained in a separate set of covers cable connected to the base unit. The cable length is 3.6m (12 ft). The cash receipt station is standard. Additional print stations, journal, validation or label printer may be added as features for a maximum configuration of three print stations. All other I/O (cash drawers, displays or keyboards) must be distributed or remote when used with this unit. **Limitations:** Cannot install Integrated Cash Drawers (#1571 or 1573), Storage Increment- 8K (#7710) or Storage Increment-24K (#7730).

Model 3A A03 — Same as the 3683 model 3 except that the 3683 model 3A provides for the attachment of a 3687 Scanner. **Limitations:** In addition to those listed under 3683 model 3 cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), or Expansion Feature-1 (#3880).

Limitations: On 3683 mdls 1, 2 or 3, when six of the following features are installed, Storage Retention (#7785) is required.

IML Read Adapter	#4633
Magnetic Wand Reader	#4945 *
Non-IBM EAN/UPC Wand Attachment	#4946 *
Non-IBM OCR Hand-Held Reader Adapter	#5422 *
Non-IBM Coin Dispenser Adapter	#5431
Non-IBM Scale Adapter	#5433
Storage Expansion-POS	#6991
Totals Retention	#8010

* mutually exclusive

3683 mdls 1A, 2A or 3A will allow up to a maximum of three of the following featues to be installed in the base unit before Expansion Feature-II (#3881) is required. When the features are installed, the sum of the unit values should not exceed 3. When the unit value exceeds 3 or if Storage Expansion-POS (#6991) is required, then Expansion Feature-II (#3881) must be installed.

Feature	Unit/Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
IML Read Adapter (#4633)	1

Prerequisites: 1) A 3651 Store Controller mdl 25 or 75 or 3684 Point of Sale Control Unit model 2 provides the control segment for the 3683. See M3651 or 3684 pages for details. 2) A keyboard, #4921, #4922, or #4923 , and a display, #3331, #3332, #3336 or #3337, must be ordered for each 3683. If a 3683 mdl 2, 2A, 3 or 3A is ordered, a distributed display (#3335 or #3338) or a remote display (#3333 or #3337) are the only type of display that can be attached. A distributed keyboard attached by Distributed Keyboard Attachment (#3240) is the only keyboard that can be attached, and if a cash drawer is attached, it can only be attached by Cash Drawer -- Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577).

Proposal/Acknowledgement Letter Statements: Each Proposal and Acknowledgement Letter must include the following statement:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3683 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations.
>
> When a failure occurs in the cash drawer of any 3683, and it cannot be opened prior to maintenance by IBM, the customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

Customer Setup: The 3683 will be shipped with customer setup instructions. The customer is responsible for:

- Unpacking, placement, set up and checkout of the 3683 at time of delivery, or when relocating the 3683.
- Relocation of the 3683 (if required) to allow IBM service access.
- Using and following the 3683 Problem Determination Procedures.

Maintenance: 3683s located in the immediate sales area may preclude the customer acceptability of online repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the failing terminal to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the terminal online via a customer-provided store loop termination.

HIGHLIGHTS

A modular input/output unit with features and mdls that provide for an integrated or distributed terminal. It features data entry by keyboard or from a Magnetic, EAN/UPC or a non-IBM OCR Hand-Held Reader or from a 3687 Checkout Scanner and data output via an 8-digit numeric display, with up to 32 indicators for operator guidance and machine status conditions, or an alphameric display with 36 character positions and printing of data under program control. The minimum configuration must include a base unit plus a Keyboard and a Display (see "Prerequisites"). The 3684 mdl 2, as well as the 3651 mdl 25 or 75, is capable of transmitting or receiving data with several 3683s over a 2400 bps loop. The 3683 mdls 1A, 2A or 3A are not program-supported for attachment to the 3684 mdl 2 loop. The 3651 mdl 75 is capable of transmitting or receiving data with several 3683s, all mdls, over a 4800 bps loop. Separate printer-based mdls (2, 2A, 3, and 3A) of the 3683 are available to provide the ability to distribute the printer from the bases unit. All I/O devices (cash drawers, displays, keyboards) must be distributed when these mdls are designated.

Base Unit: Provides (1) the base electronic storage and intelligence and an audible alarm; and, (2) a matrix printer with cash receipt station. Basic storage for the 3683 mdl 1 is 32K bytes. This can be increased to 56K bytes by Storage Increment features and to 120K bytes via the Storage Expansion feature. The base storage for the 3683 mdls 1A, 2, 2A, 3, and 3A is 56K bytes. They also can be increased to 120K bytes via the Storage Expansion feature. An audible alarm, activated when predetermined events require operator attention or intervention for system operation, is also part of the base unit.

3683 Point of Sale Terminal (cont'd)

Printer: A matrix, bidirectional printer which prints a 38-character print line at 15 characters per 25.4mm (inch) spacing. Vertical spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. It uses an easily replaceable cartridge ribbon. In addition to the standard character sets, an all-points addressable capability allows (by customer programming) printing of customer logo and special graphics. Additional print stations can be ordered as features. The cash receipt station will accept 88.9mm (3.5 in.) diameter roll paper, 69.85mm (2.75 in.) wide.

Storage Increments: When storage on a 3683 mdl 1 is upgraded from 40K to 48K or to 56K by field installation, the new Storage Increment feature displaces the old. Removed parts belong to the customer. Prior to using a removed module in another 3683 the compatibility of the part should be verified and an RPQ must be submitted to allow reinstallation on another machine.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug or **#9891** for non-locking plug. If the standard 2.8m (9 ft) power cable is not desired, specify **#9511** for 1.8m (6 ft) cable.

  Note: 120V AC, 60 Hz is compatible with existing 115V systems.

- Loop Speed: Specify **#9420** for 2400 bps loop speed or **#9430** for 4800 bps loop speed.

- Controller Designation: Specify **#9493** on the 3651 controller for 3683 control code if 3683 terminals are attached to the 3651 controller and if a 3680 system is not attached to the same host system. See "Specify" in M3651 pages.

SPECIAL FEATURES

Cash Drawer-Integrated-First (#1571): [Mdls 1, 1A] Provides a cash drawer with housing with removable till that is integrated with the 3683 base unit. The cash drawer has a media slot that will accommodate approximately a 25.0mm (inch) stack of documents. Opening the cash drawer is under program control. A cash drawer lock is provided. See note below for special ordering instructions for lock and removable bill dividers. **Maximum:** One. **Limitations:** Only one additional cash drawer may be ordered - either Cash Drawer Integrated-Second (#1573), Cash Drawer Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577). **Field Installation:** Yes.

Cash Drawer-Integrated-Second (#1573): [Mdls 1, 1A] Provides a second Integrated Cash Drawer with housing and removable till that is installed directly below Cash Drawer-Integrated-First (#1571). Functionally equivalent to Cash Drawer-Integrated-First (#1571). **Maximum:** One. **Prerequisites:** #1571. **Field Installation:** Yes.

Cash Drawer-Distributed (#1575): Provides a distributed cash drawer with housing and removable till that can be located up to 3.6m (12 ft) from the 3683 base. Functionally equivalent to Cash Drawer-Integrated-First (#1571). **Maximum:** Two, if no other drawer is ordered. One, if Cash Drawer Integrated-First (#1571) or non-IBM Cash Drawer Attachment (#1577) is ordered. **Field Installation:** Yes.

Non-IBM Cash Drawer Attachment (#1577): Provides an IBM-defined interface with cable and plug for attaching a non-IBM Cash Drawer. **Maximum:** Two, if no IBM Cash Drawer is ordered. One, if a Cash Drawer Integrated-First (#1571) or Cash Drawer Distributed (#1575) is ordered. **Limitations:** An attached non-IBM Cash Drawer must meet the IBM-defined interface. **Field Installation:** Yes.

Notes:

- For cash drawer tills and covers, see "Accessories".
- Specify **#9799** for each IBM cash drawer ordered (#1571, #1573 or #1575) if a till with movable bill dividers is desired.
- Cash Drawer Lock: Each IBM cash drawer (#1571, #1573 or #1575) is equipped with a lock. A group of 25 unique lock numbers has been reserved to allow a customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following features on the cash drawer order:

#9101	**#9106**	**#9111**	**#9116**	**#9121**
#9102	**#9107**	**#9112**	**#9117**	**#9122**
#9103	**#9108**	**#9113**	**#9118**	**#9123**
#9104	**#9109**	**#9114**	**#9119**	**#9124**
#9105	**#9110**	**#9115**	**#9120**	**#9125**

  If none is specified, a lock will be selected at random from a larger group of lock types. Each cash drawer will be shipped with two cash drawer keys.

Distributed Keyboard Attachment (#3240): Provides for locating the keyboard up to 3.6m (12 ft) from the 3683 base. **Prerequisites:** #4921 or #4922 or #4923. **Maximum:** One. **Field Installation:** Yes.

Display, One-Sided (#3331): An operator display and guidance unit consisting of an 8-digit numeric display and 32 indicators for operator guidance and machine status. The display is used to display numeric input or output data such as item number, totals, amount due, etc. The 32 indicator lights point to labels that describe machine status or guidance. The unit will be shipped with the indicators labeled . However, the customer may relabel all but five indicators and, under customer program control, define their use. A legend sheet, with a variety of legends, will be shipped with each machine. **Maximum:** One. **Limitations:** Cannot be ordered with Display-Two Sided (#3332), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display, Two-Sided (#3332): An operator and customer display guidance unit which contains all the functions of Display, One-Sided (#3331) plus an 8-digit numeric display with 6 indicators on the back of the unit for customer viewing. **Maximum:** One. **Limitations:** Cannot be installed with Display-One Sided (#3331), Display-Customer Remote (#3333), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display-Customer Remote (#3333): A customer display and status indicator unit that is connected to the 3683 by a 3.6m (12 ft) cable. The unit consists of an 8-digit numeric display and 12 indicators (6 are shipped with labels and 6 without). All are relegendable. The display and indicators are under customer program control. **Maximum:** One. **Prerequisites:** #3331. **Limitations:** Cannot be installed with the Display-Two Sided (#3332), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Distributed Display Attachment (#3335): Provides for distributing Display-One Sided (#3331) or Display-Two Sided (#3332) up to 3.6m (12 ft) from the 3683 base. **Maximum:** One. **Prerequisites:** #3331 or #3332. **Limitations:** Cannot be installed with Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Alphameric Display (#3336): An operator/customer display consisting of two rows of 18 characters, each for a total of 36 characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3683. **Maximum:** One. **Limitations:** Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

Remote Second Alphameric Display (#3337): A customer display that is connected to the 3683 by a 3.6m (12 ft) cable. The display consists of two rows of 18 characters each, for a total of 36 characters and is used to display numeric as well as alphabetic data such as item number, description, etc. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with a numeric display (#3331, #3332, #3333 or 3335). **Field Installation:** Yes.

Distributed Alphameric Display Attachment (#3338): Provides for distributing the Alphameric Display (#3336) up to 3.6m (12 ft) from the 3683 base. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with numeric display (#3331, #3332, #33333 or #3335). **Field Installation:** Yes.

Expansion Feature-I (#3880): [Mdls 1, 2, 3] Provides facilities to accommodate additional features that cannot be installed on the base unit. **Prerequisites:** On 3683 mdls 1, 2 or 3, this feature is a prerequisite to install any of the following: IML Read Adapter (#4633), Magnetic Wand Reader (#4945), Non-IBM EAN/UPC Wand Attachment (#4946), Non-IBM OCR Hand-Held Reader Adapter (#5422), Non-IBM Coin Dispenser Adapter (#5431), Non-IBM Scale Adapter (#5433). **Maximum:** One. **Limitations:** Cannot be installed with Expansion Feature-II (#3381) or with Storage Expansion-POS (#6991). This feature will allow installation of up to a maximum of four of the following features. When the features are installed the sum of the unit values should not exceed 4. **Field Installation:** Yes.

Feature	Unit Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
*Non-IBM OCR Hand-Held Reader Adapter (#5422)	1
*Magnetic Wand Reader (#4945)	1
IML Read Adapter (#4633)	1
*Non-IBM EAN/UPC Wand Attachment (#4946)	2

* mutually exclusive

Expansion Feature-II (#3881): Provides expanded facilities on the 3683 to permit installation of features not accommodated by the base unit (all mdls) or by the addition of Expansion Feature I (#3880) on 3683 mdls 1, 2 or 3. **Prerequisites:** This feature is a prerequisite to install Storage Expansion-POS (#6991) and displaces Expansion Feature-I (#3880), if installed on 3683 mdls 1, 2 or 3. This feature is a prerequisite if both the non-IBM EAN/UPC Wand Attachment (#4946) and the IML Read Adapter (#4633) are to be installed. **Limitations:** Cannot be installed with Expansion Feature-I (#3880). **Maximum:** One. **Field Installation:** Yes.

IML Read Adapter (#4633): Provides a means to initialize 3683 terminals when a 3684 mdl 2 is unavailable or unable to provide the IML (Initial Machine Load), or provides a means to initialize 3683, 3653 mdls 1 (EC 349653 or higher is prerequisite) and IP, or 3663 mdls IP and 3P

3683 Point of Sale Terminal (cont'd)

terminals when a 3651 Store Controller mdl 25 or 75 with a 3683 attached to its loop is unavailable or unable to provide the IML. An adapter is provided for attaching an external user-provided tape cassette recorder and reading data previously recorded at a 3684 mdl 2 with the IML Write Adapter (#4634), or at a 3651 mdl 25 or 75 with the IML Write Adapter (#4633). (Refer to *IBM 3680 Planning and Site Preparation Guide,* GA27-3213, for cassette recorder interface requirement.) **Prerequisites:** On 3680 mdls 1, 2 or 3, #3880 or #3881. Expansion Feature II (#3881) is a prerequisite to this feature if the non-IBM EAN/UPC Wand Attachment (#4946) is installed. **Maximum:** One. **Field Installation:** Yes. **Note:** The 3651 mdl 25s and 75s do not have the capability to create an IML tape that can be used with this feature.

Journal Lock (#4690): Provides a special lock and security cover over the printed journal. See note below for special lock selections. **Maximum:** One. **Prerequisites:** #4695. **Field Installation:** Yes.

Journal Printer (#4695): Provides a journal print station with a journal roll take-up mechanism. Print line length is 38 characters at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer permit the customer to highlight exceptions through special graphics designed and controlled by user programming. A 12.7mm (0.5 in.) signature window is provided. The journal station will accept 88.9mm (3.5 in.) diameter roll paper, 69.85mm (2.75 in.) wide. **Maximum:** One. **Field Installation:** Yes.

Manager Keylock (#4905): Provides a keylock mounted on the keyboard that allows customer programming to interrogate the position of the keylock when the key is operated. Possible uses include the enforcement of a manager override to a restricted security function. See note below for special lock selection. **Maximum:** One. **Prerequisites:** #4921 or #4922 or #4923 . **Field Installation:** Yes.

Note: Two groups of ten unique specify numbers have been reserved to allow a customer to order a specific journal lock or manager keylock for each terminal. (The 3683 and 3684 use the same journal lock and manager keylock numbers, therefore all terminals within a store could have the same lock if desired.) If the same lock is desired on the journal and manager keylock, specify the respective locks with the same value in the last digit. That is, if **#9203** and **#9303** are specified, the same lock (**#9203**) will be installed at both locations.

Journal Lock	Manager Keylock
#9201	#9301
#9202	#9302
#9203	#9303
#9204	#9304
#9205	#9305
#9206	#9306
#9207	#9307
#9208	#9308
#9209	#9309
#9210	#9310

If none is specified, a lock will be selected at random from a larger group of lock types. Each lock feature will be shipped with two keys. For additional or replacement keys, see "Accessories".

Keyboards, General: All keyboards have customer legendable keybuttons except for 11 keybuttons which have molded legends. All single and double function keys are under customer program control. Double keys may be moved, added or deleted by the user. Several colors and sizes of decal sheets with common legends will be shipped with the 3683. See "Accessories" for released keybuttons that may be ordered for any unique customer requirement. **Maximum:** One keyboard (#4921 or #4922 or #4923). **Field Installation:** Yes.

35-Key Modifiable Keyboard (#4921): A 35-key keyboard that includes:

- 5-Legended system control keys.
- 19-Unlegended function keys.
- 11-Keys with dual legends on each keybutton, "numeric" and "transaction types", in the data entry arrangement.

48-Key Modifiable Keyboard (#4922): [Data Entry] A 48-key keyboard that includes:

- 5-Legended system control keys.
- 32-Unlegended function keys.
- 11-Keys with dual legends on each keybutton, "numeric" and "transaction type", in the data entry arrangement.

48-Key Modifiable Keyboard (#4923): [Adding Machine] A 48-key keyboard that includes:

- 5-Legended system control keys.
- 32-Unlegended function keys.
- 11-Keys with round numeric legended keybuttons in the adding machine arrangement.

Magnetic Wand Reader (#4945): [Mdls 1, 2, 3] A hand operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, employee badges, etc. The small lightweight wand attached via a 1.2 meter (4 foot) long, flexible cord allows encoded merchandise tickets to be read without removing them from the merchandise. See note. **Prerequisites:** On 3683 mdls 1, 2 or 3, #3880 or #3881. **Limitations:** Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a non-IBM OCR Hand-Held Reader Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Note:** The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.

Non-IBM EAN/UPC Wand Attachment (#4946): [Mdls 1, 2, 3] Provides an adapter to support the attachment of a non-IBM EAN/UPC Bar Code hand-held wand reader. This feature provides an external connector to attach the non-IBM wand reader. The types of wand readers that can attach to this feature are either analog output wand readers (Intermec 1233R or equivalent) or digital output wand readers (Hewlett-Packard HEDS 3000 or equivalent) that meet the requirements stated in the non-IBM EAN/UPC Wand Attachment, Product Attachment Information for the 3650/3680. This document can be ordered by the salesman after FCS from Industry Relations/Product Information Corporate Headquarters Armonk. **Prerequisites:** On the 3683 Mdls 1, 2 or 3 Expansion Feature #3880 or #3881. Also on the 3683 Mdls 1, 2 or 3 Expansion Feature II (#3881) is a prerequisite to this feature if the IML Read Adapter (#4633) is installed. The IBM Multiple Supplier Systems Bulletin (GI20-6648) applies to the non-IBM wand reader. **Limitations:** When this attachment is used with an analog output wand reader, it is possible that this feature may experience failures if operated within five miles of a high power AM transmitter of the type used for television broadcasting. Cannot be installed with the Magnetic Wand Reader (#4945) or non-IBM OCR Hand Held Reader Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Specify: #9660** for analog wand interface or **#9661** for digital wand interface.

Non-IBM OCR Hand-Held Reader Adapter (#5422): [Mdls 1, 2, 3] Provides an adapter to support the attachment of a non-IBM OCR hand-held wand reader that meets the requirements stated in the "Non-IBM OCR Wand Reader to IBM 3653 Product Attachment Information" document. This feature provides a 1.83 meter (6 foot) cable with an ITT--Cannon DBC-25S type connector to attach the non-IBM OCR Hand-Held Reader unit. **Prerequisites:** On 3683 mdls 1, 2 or 3, #3880 or #3881. **Limitations:** Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a Magnetic Wand Reader (#4945). **Maximum:** One. **Field Installation:** Yes.

Non-IBM Coin Dispenser Adapter (#5431): Provides an IBM-defined serial interface for attaching a non-IBM-manufactured coin dispenser that meets the requirements stated in the "IBM 3680 PSS System non-IBM Coin Dispenser Adapter Product Attachment Information" document which is available from Corporate Industry Relations. For further information on the attachment, refer to the Market Support Center. **Prerequisites:** On 3683 mdls 1, 2 or 3, #3880 or #3881. There is no prerequisite feature on a 3683 mdl 1A, 2A or 3A. **Maximum:** One. **Field Installation:** Yes.

Non-IBM Scale Adapter (#5433): Provides an IBM defined serial or parallel interface for attaching a non-IBM manufactured scale that meets the requirements stated in the "IBM 3680 PSS System non-IBM Scale Adapter Product Attachment Information" document which is available from Corporate Industry Relations. For further information on the attachment, refer to the Market Support Center. **Specify: #9385** if Serial Interface is to be installed; **#9386** if Parallel Interface is to be installed. On Parallel Interface also specify **#9387** if scale is a 10kg Metric scale. On Serial Interface specify **#9388** is scale is a 5-digit scale. Otherwise, scale is assumed to be a 4-digit scale. **Prerequisites:** On 3683 mdls 1, 2 or 3, #3880 or #3881. There is no prerequisite feature on a 3683 mdl 1A, 2A or 3A. The IBM 3650 Programmable Store System Point of Sale Application/ Supermarket Environment Program Product (5748-D21) is a mandatory requirement in all states conforming to the National Bureau of Standards Handbook #44 for Weights and Measures. **Maximum:** One. **Field Installation:** Yes.

Storage Expansion-POS (#6991): Provides the capability for expanding the storage capacity of a 3683 from a maximum of 56K to a maximum of 120K bytes. This feature permits installation of up to four 16K Storage Increments (#7720) on 3683s. **Prerequisites:** Expansion Feature II (#3881) must be installed. In addition, the 3683 mdl 1 must have Storage Increment--24K (#7730) installed. **Maximum:** One. **Field Installation:** Yes.

3683 Point of Sale Terminal (cont'd)

3683 MDL 1 STORAGE CONFIGURATOR

32K	**Base Storage**
40K	8K - #7710, or
48K	16K - #7720, or
56K	24K - #7730
	Expansion Feature II - #3881
	Storage Expansion-POS-#6991 (#7730 and #3881 are prerequisites)
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)

3683 MDL 1A, 2, 2A, 3, OR 3A STORAGE CONFIGURATOR

56K	**Base Storage**
	Expansion Feature II - #3881
	Storage Expansion-POS-#6991
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)

Storage Increment--8K (#7710): [Mdl 1] Provides an additional 8,192 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with Storage Increments--16K (#7720) or Storage Increment--24K (#7730) or on a 3683 mdl 1A, 2, 2A, 3 or 3A. **Field Installation:** Yes.

Storage Increment--16K (#7720): Provides an additional 16,384 bytes of storage. **Maximum:** One, if Storage Expansion-POS (#6991) is not installed; four, if Storage Expansion-POS (#6991) is installed. **Limitations:** Cannot be installed with Storage Increment--8K (#7710) or 24K (#7730) or on the 3683 mdls 1A, 2, 2A, 3 or 3A unless Storage Expansion-POS (#6991) is installed. **Field Installation:** Yes. **Note:** If Storage Increment--8K (#7710) is installed, it must be removed to install this feature.

Storage Increment--24K (#7730): [Mdl 1] Provides an additional 24,576 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with #7710 or #7720. **Field Installation:** Yes. **Note:** If Storage Increment--8K (#7710) or Storage Increment--16K (#7720) is already installed, it must be removed to install this feature.

Storage Retention (#7785): Provides an internal battery and charger to power storage during a power interruption. All data and programs are protected so that a transaction in process when power was interrupted will continue when primary power is restored. The duration of storage retention depends on the charged state of the battery. When fully charged, storage will be retained for approximately 12 minutes. The number of times the battery is discharged greatly affects battery life; therefore, facilities are provided to allow the customer through programming, to deactivate the battery for scheduled power off conditions such as store closing. Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. Replacement batteries may be ordered through IBM (see "Accessories") or through other sources that meet the supply battery specifications as defined by IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Storage Retention (#7785) had to be specified on 3683 mdls 1, 2 or 3 when six of the following features are installed:

#4633	#5431
#4945*	#5433
#4946*	#6991
#5422*	#8010

* mutually exclusive

Totals Retention (#8010): Provides an additional 240 bytes of customer programmable storage that are powered by its own battery to protect loss of information such as totals, transaction number, terminal address, etc. when power is turned off or power interruptions occur. An early warning status condition will be given to the program when the battery needs replacing. Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. (See "Accessories" for battery life characteristics and types of batteries required for replacement.) **Maximum:** One. **Field Installation:** Yes.

Validation Printer (#8725): [Mdls 1,1A, 3, 3A] Provides a flatbed document validation station for printing on inserted forms. Prints 38 characters per line at 15 characters per 25.4mm (inch). Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer allow logos, special graphics and highlighting to be designed and printed by user programming. **Maximum:** One. **Limitations:** Cannot be installed with Label Printer (#8726). **Field Installation:** Yes.

Label Printer (#8726): [Mdls 1,1A, 3, 3A] Provides a flatbed station capable of printing on inserted forms or labels. Includes the capabilities of the Validation Printer Feature (#8725) and in addition includes the capability of printing labels. Prints 38 characters per line at 15 characters per 25.4mm (inch). Vertical line spacing is 6.3 lines per 25.4mm (inch) at the rate of 20 lines per second. The all points addressable characteristics of the printer allow logos, special graphics, and highlighting to be designed and printed by user programming. Label printing capabilities include "card stock"; shelf labels and gummed labels on a carrier. **Maximum:** One. **Limitations:** Cannot be installed with Validation Printer (#8725). **Field Installation:** Yes. **Note:** If the Label Printer feature is to be field installed in place of the Validation Printer (#8725), removed parts belong to the customer.

MODEL CONVERSIONS

Only upgrades to the "A" model designation from the same base model are available in the field (e.g., 1 to 1A). Customer Price Quotations and Customer Order Acknowledgement letters for purchase MESs must state: "Installation of this base mdl change involves the removal of parts which become the property of IBM." **Prerequisites:** When upgrading a 3683 model 1 to a 3683 model 1A, Storage Increment-24K (#7730) is required.

ACCESSORIES

Battery, Storage Retention (P/N 8543856): A nickle cadmium battery that will provide power to retain data and programs in main storage and registers during a primary power interruption. A 12.5 volt battery is shipped with the intial order for Storage Retention Feature **#7785.**

Battery, Totals Retention: Provides power for 240 bytes of storage to secure totals, transaction sequence number, terminal address, and other user-defined data against power off or power interruptions. This power source (Eveready #E134, Mallory TR134R or equivalent) is customer replaceable. The capacity rating of this type of battery when new is approximately 1,000 milliamp hours. The life of the battery is determined by the shelf life which is approximately 9,000 hours. This means if a battery is installed in a 3683 six months after manufacture, its useful machine life will be six months on the average. It is recommended that the user's program test the battery state at least once per day. When the battery condition reaches the low threshold state, there are approximately 72 hours of battery life left. Procurement and replacement of the battery is the customer's responsibility. The customer must ensure that the power is "On" on the terminal when the battery is replaced or all information will be lost.

Cash Till and Cover With Lock: Additional cash tills and till covers with locks may be ordered.

Cash Till with Fixed Bill Dividers (without cover) **P/N 1860154**
Cash Till with Adjustable Bill Dividers (without cover) **P/N 2493151**
Cash Till Cover with Lock and Keys **P/N 1851126**

Notes: Assembly of the Adjustable Till is a customer responsibility. The following item is also available but on a purchase-only basis:

Cash Till Cover with Lock and Keys **#9335**

Console Table (#1560): An operator workstation for the 308X processor complex, which provides a durable melamine working surface for up to two operators and their display consoles. The table has a color accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1780 mm x 815 mm and the end accessory panel is 265 mm higher than the 720 mm table height.

Specify end attachment of accessory panel:
#9441 for right end attachment.
#9442 for left end attachment.

Specify color code:
#9161 for Willow Green.
#9162 for Garnet Rose.
#9163 for Sunrise Yellow.
#9164 for Classic Blue.
#9165 for Charcoal Brown.
#9166 for Pebble Gray.
#9167 for Pearl White.

Keyboard Accessories: The following terms are used in the KEYTOP descriptions:

VERSION	STEM NUMBER/KEY ALIGNMENT
OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal
-B	Small raised projection in keytop
-C	Circular, concave top on key button
-M	Minimal concavity of circular keytop
SIZE	UNITS

3683 Point of Sale Terminal (cont'd)

Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

Engraved Keytops: Keytops containing pre-defined messages are available for use on the 3683 terminal keyboards. Blank keytops are also available for customer engraving.

Retail Keytops: The following is a list of pre-defined keytops available in the 3650 Retail Store System nomenclature:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
1	White	Square	OH	Std	1650742
2	White	Square	OH	Std	1650743
3	White	Square	OH	Std	1650744
4	White	Square	OH	Std	1650745
5	White	Square	OH-B	Std	1650746
6	White	Square	OH	Std	1650747
7	White	Square	OH	Std	1650748
1 CASH	White	Square	OH	Std	1757346
2	White	Square	OH	Std	1757347
3 CASH S'CHK	White	Square	OH	Std	1757348
4 COD	White	Square	OH	Std	1757351
5 LAYBY	White	Square	OH-B	Std	1757352
6 CHRGE	White	Square	OH	Std	1757353
7 DEFER CHRGE	White	Square	OH	Std	1757354
8 INVCE WELFR	White	Square	OH	Std	1757355
9	White	Square	OH	Std	1757356
7G	White	Square	OH	Std	1762440
BH	White	Square	OH	Std	1762441
9J	White	Square	OH	Std	1762442
1 A CASH	White	Square	OH	Std	1762834
2 B CHECK	White	Square	OH	Std	1762835
3 C CHG	White	Square	OH	Std	1762836
4 D	White	Square	OH	Std	1762837
5 E	White	Square	OH-B	Std	1762838
6 F	White	Square	OH	Std	1762839
/	White	Square	OH	Std	1853929
1 CASH	White	Square	OH	Std	1853931
2 SPLC	White	Square	OH	Std	1853932
3 S'CHK	White	Square	OH	Std	1853933
4 COD	White	Square	OH	Std	1853934
5 L'Way	White	Square	OH-B	Std	1853935
6 CHG A	White	Square	OH	Std	1853936
7 CHG B	White	Square	OH	Std	1853937
8 CHG C	White	Square	OH	Std	1853938
9 CHG D	White	Square	OH	Std	1853939
6 CHG	White	Square	OH	Std	1855411
7 TMP	White	Square	OH	Std	1855412
8	White	Square	OH	Std	1855413
9	White	Square	OH	Std	1855414
8 CTA	White	Square	OH	Std	5192991
9 STORE	White	Square	OH	Std	5192992
6 REG	White	Square	OH	Std	1757364
7 PBA	White	Square	OH	Std	1757365
8 CCA	White	Square	OH	Std	1757366
9 CLUB	White	Square	OH	Std	1757367
NON-TAX	Yellow	Single	OH	Std	1650749
RETURN CREDIT	Yellow	Single	OH	Std	1650750
FRACT QTY	White	Single	OH	Std	1752442
NON MDSE CODE	Yellow	Single	OH	Std	1757342
EMPLOYEE DISCOUNT	Yellow	Single	OH	Std	1757343
RETURN	White	Single	OH	Std	1757344
MISC TAX CODE	Yellow	Single	OH	Std	1757349
ALLOW/MISC CREDIT	Yellow	Single	OH	Std	1757350
DEPOSIT	Yellow	Single	OH	Std	1757357
SKU	Blue	Single	OH	Std	1762444
DATA ENTRY	Blue	Single	OH	Std	1853915
NON MDSE CODE	Blue	Single	OH	Std	1853916
RETURN CREDIT	Blue	Single	OH	Std	1853917
PAYMENT	Blue	Single	OH	Std	1853918
ALLOW CODE	Blue	Single	OH	Std	1853919
DEPT	Blue	Single	OH	Std	1853920
CLASS	Blue	Single	OH	Std	1853921
NON TAX	Blue	Single	OH	Std	1853922
STOCK	Blue	Single	OH	Std	1853923
QTY	Blue	Single	OH	Std	1853924
SUB TOTAL	Blue	Single	OH	Std	1853935
DISCOUNT CODE	Blue	Single	OH	Std	1853926
TAX CODE	Blue	Single	OH	Std	1853927
SUB	White	Single	OH	Std	1855409
LOT	White	Single	OH	Std	1855410
ITEM	Blue	Single	OH	Std	5192903
COUPON DISPLAY	Blue	Single	OH	Std	5192987
NO COUPON	Blue	Single	OH	Std	5192988
VOID	White	Single	OH	Std	5587654
DISCOUNT CODE	Red	Single	OH	Std	5587655
Dept	Brown	Single	OH	R-1/8	5587658
CLASS	Brown	Single	OH	R-1/8	5587663
RETURN CREDIT	Red	Single	OH	Std	5587664
STOCK	Brown	Single	OH	4-1/8	5587667
ALLOW CODE	Red	Single	OH	Std	5587668
R/P/M	Blue	Single	OH	Std	1757074
C/U	Blue	Single	OH	Std	1757075
D	Blue	Single	OH	Std	1757076
0	White	Long	OV	Std	1762911
0 NO SALE	White	Long	TH	Std	5587674
ENTER	White	Double	TV	R-1/8	1762530
TOTAL	White	Double	TV	R-1/8	1762531
CLEAR	White	Double	TV	R-1/8	1762532
QTY	Blue	Double	TV	Std	5588042
MODIFY TICKET	Blue	Double	TV	Std	5588043
MODIFY TICKET CASH	Blue	Double	TV	Std	5588047

Blank Keytops: The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
(all blank)	White	Square	OH-CM	R-1/8	1648413
	White	Square	OH-CB	Std	1752491
	White	Square	OH	Std	1853928
	White	Square	OH-B	Std	1853930
	White	Square	OH-CM	Std	1854184
	White	Square	OH-C	Std	1854185
	White	Single	OVH	Std	1762468
	Yellow	Single	OVH	Std	1762469
	Black	Single	OVH	Std	1762470
	Brown	Single	OVH	Std	1762471
	N-M Br	Single	OVH	Std	2688791
	White	Single	OH	R-1/8	1762506
	Red	Single	OH	R-1/8	1762507
	Blue	Single	OH	R-1/8	1762508
	Green	Single	OH	R-1/8	1762509
	Yellow	Single	OH	R-1/8	1762510
	Black	Single	OH	R-1/8	1762511
	Brown	Single	OH	R-1/8	1762512
	White	Single	OH	R-1/4	1762513
	Red	Single	OH	R-1/4	1762514
	Blue	Single	OH	R-1/4	1762515
	Green	Single	OH	R-1/4	1762516
	Yellow	Single	OH	R-1/4	1762517
	Black	Single	OH	R-1/4	1762518
	Brown	Single	OH	R-1/4	1762519
	Blue	Single	OVH	Std	1853914
	Green	Single	OVH	Std	1854182
	Red	Single	OVH	Std	1854183
	White	Long	TH	R-1/8	1648415
	White	Long	TH	Std	1648417
	Red	Double	TV	R-1/4	1648405
	Blue	Double	TV	R-1/4	1648406
	Green	Double	TV	R-1/4	1648407
	Yellow	Double	TV	R-1/4	1648408
	Black	Double	TV	R-1/4	1648409
	Brown	Double	TV	R-1/4	1648410
	White	Double	TV	Std	1762522
	Red	Double	TV	Std	1762523
	Blue	Double	TV	Std	1762524
	Green	Double	TV	Std	1762525
	Yellow	Double	TV	Std	1762526
	Black	Double	TV	Std	1762527
	Brown	Double	TV	Std	1762528
	White	Double	TV	R-1/8	1762533
	Red	Double	TV	R-1/8	1762534
	Blue	Double	TV	R-1/8	1762535
	Green	Double	TV	R-1/8	1762536
	Yellow	Double	TV	R-1/8	1762537
	Black	Double	TV	R-1/8	1762538
	Brown	Double	TV	R-1/8	1762539
	White	Double	TV	R-1/4	1762540
	N-M Br	Double	TV	Std	2688798

Universal Keytops: Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3683 Point of Sale terminal (and the 3684 Point of Sale control unit). These accessories consist of legendable keytops and sheets of blank labels to use on these keytops.

The universal keytops come in the four standard sizes and in two heights. They consist of two parts; a white bottom button and a clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N

3683 Point of Sale Terminal (cont'd)

Keytop	White	Square	OH	Std	5188767
Keytop	White	Single	OVH	Std	5188768
Keytop	White	Single	OH	R-1/8	5188769
Keytop	White	Long	TH/TV	Std	1642499
Keytop	White	Long	OV	Std	5188771
Keytop	White	Long	OH	Std	5188772
Keytop	White	Double	OV	Std	5188773
Keytop	White	Double	TV	Std	5188774
Keytop	White	Double	TV	R-1/8	8627316
Cover	Clear	Square	--	--	5188751
Cover	Clear	Single	--	--	5188754
Cover	Clear	Long	--	--	5188757
Cover	Clear	Double	--	--	5188760

ITEM	COLOR	SIZE	DECALS/SHEET	P/N
Labels	White	Square	102 decals/sheet	5194900
Labels	White	Single	68 decals/sheet	1756848
Labels	Yellow	Single	68 decals/sheet	5194901
Labels	Red	Single	68 decals/sheet	5194902
Labels	Blue	Single	68 decals/sheet	5194903
Labels	Green	Single	68 decals/sheet	5194904
Labels	Brown	Single	68 decals/sheet	5194905
Labels	White	Long	42 decals/sheet	5194906
Labels	White	Double	28 decals/sheet	5194907
Labels	Red	Double	28 decals/sheet	5194908
Labels	Blue	Double	28 decals/sheet	5194909

Key Stops (P/N 1650058): The key stop is a small ring collar which is placed over the stem of a keybutton and under the keytop. The collar holds the keytop in the up position and prevents its use.

Keytop Extractor (P/N 1647720): The keytop extractor is a small plier-like device which fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard.

Two keytop extractors are supplied with each 3651 controller and one extractor with each 3684 Point of Sale - Control Unit. The customer may desire additional extractors.

Locks and Keys: The 3683 is equipped with a cash drawer lock and can be equipped with an optional journal lock **#4690** and optional Manager Keylock **#4905**. The cash drawer lock and all other locks ordered will be shipped with two keys. The cash drawer lock, journal lock, manager lock, and diskette cover will be randomly selected unless specified otherwise (see "Special Features"). If the customer wishes to replace a unique lock, the order should state the 3683 machine serial number, lock name and the lock identification number (stamped on lock). **Note:** Without an identification number, the order should state machine serial number, lock name and the words "NEW LOCK REQUIRED". Additional or replacement keys may be purchased from a local locksmith or from IBM. Locks may be purchased from IBM and may be changed in the field. The following randomly selected locks (with two keys) may be ordered by P/N:

3683/3684 Cash Drawer Lock	**P/N 8543281**
3683/3684 Journal Lock	**P/N 8543620**
3683/3684 Manager Lock	**P/N 8547992**

Magnetic Slot Reader (P/N 4123500 or Feature code #9441): The Magnetic Slot Reader (MSR) attaches by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. This slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature on the appropriate machine is required to use the MSR.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, the customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regurlarly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Readers	Spares
50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

Optionally, the customer can obtain post-warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Note: A Magnetic Reader attachment feature on the appropiate machine is required to use the Magnetic Slot Reader.

SUPPLIES

Ribbons: A black ribbon cartridge, P/N 7034640 or equivalent, is required.

Paper: Roll paper 88.9mm (3.5 in.) diameter, 69.85mm (2.75 in.) wide is required at the cash receipt and journal print stations.

Contact IBM.

3684 POINT-OF-SALE CONTROL UNIT

PURPOSE

A user-programmable input/output, data collection and processing terminal with a 985,088 byte integrated diskette for the 3680 Programmable Store System. Model 1 of the 3684 is designed for single terminal stores. The 3684 model 1 contains a single programmable segment with appropriate features to allow the user to perform the point-of-sale, data collection, credit authorization, price look-up, inquiry, data entry and host communication functions. The point-of-sale features and functions are similar to the 3683 Point-of-Sale Terminals.

Model 2 of the 3684 is designed to perform the Point of Sale function and to act as a master control in multiple terminal stores. There are two self-contained programmable segments, one to perform the point-of-sale function similar to the 3683, and the second to perform the control function for communication with its own point-of-sale segment and with additional loop-attached 3683 (models 1, 2 or 3) terminals. In addition, the control segment controls the diskette and host communication input/output functions. The 3683 models 1A, 2A or 3A are not program-supported for attachment to the 3684 model 2 loop.

MODELS

Model 1	001	Single unit
Model 2	002	Master unit

Prerequisites:

1. A 3704, 3705 or 3725 in 2701, 2703 Emulation Mode (or Integrated Communications Adapter) for BSC system and in NCP/VS mode for SDLC systems (with appropriate features ... see M3704, 3705 and 3725 pages) attached to any virtual storage S/370 or 4300 processor.
2. A Keyboard (#4921 or #4922 or #4923)
   and a display (#3331, #3332, #3336 or #3337) must be ordered for each 3684.

HIGHLIGHTS

A modular input/output unit with features that provide for an integrated or a limited distributed (cash drawer and display) package. It features data entry by keyboard or from a magnetic, non-IBM EAN/UPC, or non-IBM OCR hand-held reader and data output by an 8-digit numeric display, with up to 32 indicators for operator guidance and machine status conditions, or an alphameric display with 36 character positions and printing of input or output data under program control. It features a cash drawer with removable till and adjustable divider option. An integrated diskette is used for customer program storage, data and table storage, diagnostic programs and error logging. The minimum configuration must include a base unit plus a keyboard and a display. (See "Prerequisites".)

Base Unit: Consists of [1] programmable segments and storage (56K for mdl 1; mdl 2 has 32K for the point-of-sale segment and 56K for the control segment.); [2] a matrix printer with a cash receipt station; and [3] a 985,088 byte diskette drive. An audible alarm, activated when predetermined events require operator attention or intervention for system operation, is also part of the base unit.

Printer: A matrix, bidirectional printer which prints a 38-character print line at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. It uses an easily replaceable cartridge ribbon. In addition to the standard character sets, an all-points addressable capability allows (by customer programming) printing of logos and special graphics . Additional print stations can be ordered by special feature. The cash receipt station will accept 88.9mm (3.5") diameter roll paper, 69.85mm (2.75") wide.

Diskette: A 985,088 byte Diskette 2D is used on both mdls. The diskettes are formatted to 256 byte blocks. The diskette is removable and interchangeable.

Communications: All 3684 mdls may have BSC or SDLC communication capability. Depending on customer selection at system generation, either or both protocols may reside in the terminal and either may become active when loaded from the diskette.

System Attachment: The 3684 mdls 1 and 2 attach to any virtual storage S/370 or 4300 processor via a 3704, 3705 or 3725 Communications Controller in 2701, 2703 Emulator Mode (or Integrated Communications Adapter) for BSC systems and in NCP/VS mode for SDLC systems. Attachment is over communication lines at speeds of 1200, 2400 or 4800 bps. The 3684 has the capability of concurrent host communication and point-of-sale function, which allows store operations to continue when transmitting or receiving data from the host processor.

The 3684 mdl 1 and 2 can communicate with the 8100 System over nonswitched communication facilities using SDLC, and with the Series/1 over switched, nonswitched point-to-point or multipoint facilities using BSC. The Host Command Processor (HCP) Facility in the 3684 can communicate with a user program in the 8100 executing at the Data Stream Interface, or with a user program in the Series/1 using Read/Write support of the Realtime Programming System. A user-written program in the 3684 can communicate with a user program in the 8100 at the DSI level or in the DPPX/DTMS environment, or with a user program in the Series/1 using RPS Read/Write communications support.

Communications Facilities: The 3684 operates in data half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of 1200/600, 2400/1200, 4800/2400 bps on nonswitched facilities. In addition, the 3684 also operates in half-duplex point-to-point mode at transmission speeds of 1200/600, 2400/1200 and 4800/2400 bps on switched facilities. See M2700 pages.

Modems: A 1200 bps Integrated Modem feature (#5530) or an external modem may be attached to a 3684. External modems require the External Modem Interface feature (#3701).

IBM Modem	Speed (bps)
3863 mdl 1, mdl 2	2400/1200
3864 mdl 1, mdl 2	4800/2400
3872 mdl 1	2400/1200

Switched network backup mode of operation is possible using an appropriately featured external modem. For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872 pages.

In-Store Communications: The 3684 mdl 2 performs a master control function for 3683s that are attached to the 3684 by a 2400 bps loop. Interactive communication capability exists between the 3684 and 3683s for data collection, price look-up, credit, and diagnostic facilities.

All mdls of the 3684 receive their initial machine load (IML) from a S/370 or 4300 host processor either by physical diskette transport or by teleprocessing. The 3684 IML and the IMLs for 3683s associated with a 3684 mdl 2 are maintained on the diskette. The 3684 mdl 2 transmits the 3683 IML when requested by the 3683.

Limitations: The 3684 mdl 2 has a limited number of optional feature positions available to the customer. If Storage Expansion-POS (#6991) is required by your customer, then a maximum of two feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 2 and specify code **#9444** should be indicated. If Storage Expansion-POS (#6991) is not required, then a maximum of four feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 4 and specify code **#9445** should be indicated.

If your customer does not initially install Storage Expansion-POS (#6991) and specifies **#9445** to provide additional feature capability and decides after installation that he required Storage Expansion-POS (#6991), then the feature capability provided by **#9445** will have to be replaced at customer expense. When this occurs you must recalculate the unit value to ensure you have not exceeded a sum total of 2.

Feature	Unit Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
*Non-IBM OCR Hand-Held Reader Adapter (#5422)	1
*Magnet Wand Reader (#4945)	1
IML Write Adapter (#4634)	1
*Non-IBM EAN/UPC Wand Attachment (#4946)	2

* = Mutually Exclusive

See RPQ 8Q0322 for additional feature position configurations applicable to the External Storage Attachment Feature #4500.

Customer Responsibilities:

Proposal/Acknowledgement Letter Statements: Each proposal and acknowledgement letter must include the following statement:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3684 which contains cash or other valuables. It will be the customers' responsibility to remove, control and replace cash so that IBM can fulfill its warranty and maintenance obligations.
>
> When a failure occurs in the cash drawer of any 3684 and it cannot be opened prior to maintenance by IBM, the Customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

Customer Setup: The 3684 will be shipped with customer setup instructions. The customer is responsible for:

- Unpacking, placement, set up and checkout of the 3684 at time of delivery, or when relocating the 3684.
- Relocation of the 3684 (if required) to allow IBM service access.
- Using and following the problem determination procedures.
- Physical set up and connection of cables to TP lines/modems and loop.

Maintenance: 3684s located in the immediate sales area may preclude the acceptability of repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer

3684 Point-of-Sale Control Unit (cont'd)

should remove the unit to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the unit.

Storage Increments

Note: 1. Storage Increments--8K (#7710) and 24K (#7730) apply to the Point-of-Sale segment of the 3684 mdl 2 only. Storage Increment--16K (#7720) applies to the 3684 mdl 1 and 2 when Storage Expansion (#6990) is installed. If #6990 is not installed, then #7720 applies only to the Point-of-Sale segment of the 3684 mdl 2.

2. When storage is upgraded by field installation, the new Storage Increment feature displaces the old. Removed parts belong to the customer. Prior to using a removed module in another 3684, the compatibility of the part should be verified and an RPQ must be submitted to allow reinstallation on another machine.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug or **#9891** for nonlocking plug. If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) cable.

  Note: 120V AC, 60 Hz is compatible with existing 115V Systems.

- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559, on MES (group 91) from Raleigh Order Department.

  One is furnished at no charge to each 3684 mdl 2 site for testing store loop wiring.

  Note: The customer must provide (purchase, install and maintain) all necessary 3680 store loop communication lines within the store. Bulk loop cable is available from IBM.

- Controller Designation: Specify **#9491** on the first 3684 to be used with a host system location and specify **#9492** on each additional 3684 in the network. Specification of **#9491** will result in 3684 controller and 3683 terminal code (DTR) being sent to specified host location.

  When **#9491** is specified, additional information must be specified as follows:

  1) Specify one of the following to indicate magnetic tape density (media) used at the host system location. This tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

     #9412 -- 9 track, 800 bpi
     #9413 -- 9 track, 1600 bpi

     #9414 -- 9 track, 6250 bpi

     The 3684 controller and 3683 terminal data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

  2) Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

     Line 1 -- IBM Programming Systems Representative
     Line 2 -- c/o (Name of Customer)
     Line 3 -- Street Address (or P.O. Box)
     Line 4 -- City, State, Zip Code

     This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code **#9491**). Whenever controller data is updated by an EC, the EC will be shipped to the most current microcode control (MC) address.

- Storage Expansion: If Storage Expansion-POS (#6991) is required specify **#9444** ... if Storage Expansion-POS (#6991) is not required, specify **#9445**. See "Limitations" above.

- If **#9491** is specified and there is a storage requirement that prevents 3683 operation with the current level of control code, specify **#9490** with **#9491**. **#9490** provides 3683 Control Code level EC 320503 which operates in the same control storage allocation as is required for 3683 Control Code level EC 320502. It is strongly recommended that new customers and 3687 customers do not take this specify option.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Cash Drawer Integrated - 1st (#1572): Provides a cash drawer with removable till that is contained within the 3684 base unit. The cash drawer has a media slot that will accommodate approximately a 25mm (1 inch) stack of documents. Opening the cash drawer is under program control. A cash drawer lock is provided. See note below for special ordering instructions for lock and till with adjustable dividers. **Maximum:** One. **Limitations:** Only one additional cash drawer may be ordered - either Cash Drawer Integrated-2nd (#1573), Cash Drawer-Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577). **Field Installation:** Yes.

Cash Drawer Integrated - 2nd (#1573): Provides a second Integrated Cash Drawer with housing and removable till and is installed directly below Cash Drawer Integrated-1st (#1572). Functionally equivalent to Cash Drawer Integrated-1st (#1572). **Maximum:** One. **Prerequisites:** #1572. **Field Installation:** Yes.

Cash Drawer-Distributed (#1575): Provides a distributed cash drawer with housing and removable till that can be located up to 3.6 meters (12 feet) from the 3684 base. Functionally equivalent to Cash Drawer Integrated-1st (#1572). **Maximum:** Two if no other cash drawer is ordered. One if Cash Drawer Integrated-1st (#1572) or one non-IBM Cash Drawer Attachment (#1577) is ordered. **Field Installation:** Yes.

Non-IBM Cash Drawer Attachment (#1577): Provides an IBM-defined interface with cable and plug for attaching an non-IBM Cash Drawer. **Maximum:** Two if no IBM Cash Drawer is installed. One if a Cash Drawer Integrated-1st (#1572) or Cash Drawer-Distributed (#1575) is ordered. **Limitations:** An attached non-IBM Cash Drawer must meet the IBM-defined interface. **Field Installation:** Yes.

Notes:

(1) For cash drawer tills and covers, see "Accessories" in the M3683 and 3684 pages.

(2) Cash Drawer Lock: Each IBM Cash Drawer (#1572, #1573 or #1575) is equipped with a lock. A group of 25 unique lock numbers has been reserved to allow the customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following features on the cash drawer order:

(3) Specify **#9799** for each IBM Cash Drawer ordered (#1572, #1573 or #1575) if a till with movable bill dividers is desired.

#9101	**#9106**	**#9111**	**#9116**	**#9121**
#9102	**#9107**	**#9112**	**#9117**	**#9122**
#9103	**#9108**	**#9113**	**#9118**	**#9123**
#9104	**#9109**	**#9114**	**#9119**	**#9124**
#9105	**#9110**	**#9115**	**#9120**	**#9125**

If none is specified, a lock will be selected at random from a larger group of lock types. Each cash drawer will be shipped with two cash drawer keys.

Distributed Keyboard Attachment (#3240): Provides for locating the keyboard up to 3.6 meters (12 feet) from the 3684 base. **Prerequisites:** #4921 or #4922 or #4923 . **Maximum:** One. **Field Installation:** Yes.

Diskette Cover Lock (#3310): Provides a lock for the diskette cover. (See Note below for special lock selection.) **Maximum:** One. **Field Installation:** Yes.

Note: Three groups of 10 unique specify numbers have been reserved to allow a customer to order a specific journal lock, manager keylock or diskette cover lock for each terminal. (The 3683 and 3684 uses the same journal lock and manager lock numbers, therefore all terminals within a store could have the same lock if desired.) If the same lock is desired on the journal, manager keylock and diskette cover, specify the respective locks with the same value in the last digit. That is, if **#9203**, **#9303** and **#9213** are specified, the same lock **#9203** will be installed at all locations.

Journal Lock	Manager Keylock	Diskette Cover Lock
#9201	**#9301**	**#9211**
#9202	**#9302**	**#9212**
#9203	**#9303**	**#9213**
#9204	**#9304**	**#9214**
#9205	**#9305**	**#9215**
#9206	**#9306**	**#9216**
#9207	**#9307**	**#9217**
#9208	**#9308**	**#9218**
#9209	**#9309**	**#9219**
#9210	**#9310**	**#9220**

If none is specified, a lock will be selected at random from a larger group of lock types. Each lock feature will be shipped with two keys. For additional or replacement keys, see "Accessories".

Display, 1-Sided (#3331): An operator display and guidance unit consisting of an 8-digit numeric display and 32 indicators for operator guidance and machine status. The display is used to display numeric

3684 Point-of-Sale Control Unit (cont'd)

input or output data such as item number, credit number, totals, amount due, etc. The 32 indicator lights point to labels that describe: (1) machine status such as: Ready, Wait, Offline, etc. (2) step-by-step guidance to lead the operator through a transaction or procedure. The unit will be shipped with the indicators labeled. However, the customer may relabel all but five indicators and, under customer program control, define their use. A legend sheet with a variety of legends will be shipped with each machine. **Maximum:** One. **Limitations:** Cannot be installed with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display, 2-Sided (#3332): An operator and customer display guidance unit which contains all the functions of Display, One-Sided (#3331) plus an 8-digit numeric display with six indicators on the back of the unit for customer viewing. **Maximum:** One. **Limitations:** Cannot be installed with Display, 1-Sided (#3331), Display-Customer Remote (#3333), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display-Customer Remote (#3333): A customer display and status indicator unit that is connected to the 3684 by a 3.6 meter (12 foot) cable. The unit consists of an 8-digit numeric display and 12 indicators (six are shipped with labels and six without). All are relegendable. The display and indicators are under customer program control. **Maximum:** One. **Prerequisites:** #3331. **Limitations:** Cannot be ordered with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Distributed Display Attachment (#3335): Provides for distributing Display, 1-Sided (#3331) or Display, 2-Sided (#3332) up to 3.6 meters (12 feet) from the 3684 base. **Maximum:** One. **Prerequisites:** #3331 or #3332. **Limitations:** Cannot be installed with Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Alphameric Display (#3336): An operator/customer display consisting of two rows of eighteen characters each for a total of thirty-six characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3684. **Maximum:** One. **Limitations:** Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

Remote 2nd Alphameric Display (#3337): A customer display that is connected to the 3684 by a 3.6 meter (12 foot) cable. The display consists of two rows of eighteen characters, each for a total of thirty-six characters and is used to display numeric as well as alphabetic data such as item number description, etc. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

Distributed Alphameric Display Attachment (#3338): Provides a cable for distributing the Alphameric Display (#3336) up to 3.6 meters (12 feet) from the 3684 base. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

External Modem Interface (#3701): Provides an EIA interface for attachment of an IBM or other external modem. **Limitations:** Cannot be ordered with 1200 bps Integrated Modem (#5530). **Maximum:** One. **Field Installation:** Yes. Specify the following as applicable:

1. Specify **#9695** if the 3684 is required to provide clocking (1200 bps maximum).
2. Specify **#9126** if the 3683, 3684, 3872 Modem is to be attached.

Expansion Feature (#3890): Provides additional facilities on the 3684 mdl 1 to accommodate features that cannot be installed on the base unit. **Maximum:** One. **Limitations:** Applies to 3684 mdl 1 only. **Prerequisites:** This feature is a prerequisite to install #4945, #4946, #5422, #5431 or #5433. **Field Installation:** Yes. **Note:** No expansion feature is required on the 3684 mdl 2 to install its applicable features.

External Storage Attachment (#4500) : Provides the ability to attach the External Disk Drive Feature (#4501). **Maximum:** One. **Limitations:** Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. **Field Installation:** Yes.

External Disk Drive (#4501) : Provides a 10MB file for attachment to the 3684 mdl 2 for storage of user data files. Cable attached to the 3684. **Limitations:** Applies to 3684 mdl 2 only. **Prerequisites:** #4500. **Field Installation:** Yes. When this feature is field installed the customer is responsible for performing the customer set up procedure.

IML-Write Adapter (#4634): Provides the 3684 mdl 2 with the ability to write an IML (Initial Machine Load) tape on a user-provided tape cassette recorder (refer to *IBM 3680 Planning and Site Preparation Guide,* GA27-3213, for Cassette Recorder interface requirement) which can be read by a 3683 Point-of-Sale terminal equipped with an IML-Read Adapter (#4633) feature. **Maximum:** One. **Limitations:** Applies to 3684 mdl 2 only. Mutually exclusive with 4800 bps Loop (#4710) and with External Storage Attachment (#4500). **Field Installation:** Yes.

Journal Lock (#4690): Provides a special lock and security cover over the printed journal. (See Note below for special lock selection.) **Maximum:** One. **Prerequisites:** #4695. **Field Installation:** Yes.

Journal Printer (#4695): Provides a journal print station with a journal roll take-up mechanism. Print line length is 38 characters at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer permit the customer to highlight exceptions through special graphics designed and controlled by user programming. A 12.7mm (.5") signature window is provided. **Maximum:** One. **Field Installation:** Yes. The journal station will accept 88.9mm (3.5") diameter roll paper, 69.85mm (2.75") wide.

4800 bps Loop (#4710): Provides a 3684 mdl 2 loop speed of 4800 bps in place of the standard loop speed of 2400 bps. Loop speed for 3683s to be attached must be specified as same speed. **Maximum:** One. **Limitations:** The sum of the communication speeds of all operational communications attachments to a 3684 mdl 2 must not exceed 7200 bps. These attachments include the store loop, host communications, and Serial I/O RPQ MN2257. Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. **Field Installation:** Not recommended.

Manager Keylock (#4905): Provides a keylock mounted on the keyboard that allows customer programming to interrogate the position of the keylock when the key is operated. Possible uses include the enforcement of a manager override to a restricted security function. (See note below for special lock selection.) **Maximum:** One. **Prerequisites:** #4921 or #4922 or #4923. **Field Installation:** Yes.

Keyboards, General: All keyboards except Feature #4922 and #4923 with Specify **#9250** have customer-legendable keybuttons except for the 11 keybuttons which have molded legends. All single- and double-function keys are under customer program control. Double keys may be moved, added or deleted by the user. Several colors and sizes of decal sheets with common legends will be shipped with the 3684. See "Accessories" section for released keybuttons that may be ordered for any unique customer requirement. **Maximum:** One #4921 or #4922 or #4923. **Field Installation:** Yes.

Specify Option: An option is available for #4922 and #4923 that provides pre-defined keytops with the 3663/3683/3684 Supermarket nomenclature. The keytops provided with this option are the engraved type and are not customer-legendable. For a description of the nomenclature of the keytops provided, refer to *IBM 3680 Programmable Store System Introduction Manual,* GA27-3199. Specify: **#9250.**

35-Key Modifiable Keyboard (#4921): A 35-key keyboard that includes:

5-Legended system control keys.
19-Unlegended function keys.
11-Keys with dual legends on each keybutton, "numeric" and "transaction type" in the data entry arrangement.

48-Key Modifiable Keyboard (#4922): [Data Entry] A 48-key keyboard that includes:

5-Legended system control keys.
32-Unlegended function keys.
11-Keys with dual legends on each keybutton, "numeric" and "transaction type" in the data entry arrangement.

48-Key Modifiable Keyboard (#4923): [Adding Machine] A-48 key keyboard that includes:

5-Legended system control keys.
32-Unlegended function keys.
11-Keys with round numeric legended keybuttons in the adding machine arrangement.

Note: No Expansion Feature is required on the 3684 mdl 2 to install any applicable features.

Magnetic Wand Reader (#4945): A hand-operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, employee badges, etc. The small lightweight wand attached via a 1.2 meter (4 foot) long flexible cord allows encoded merchandise tickets to be read without removing them from the merchandise. See Note. **Prerequisites:** #3890 must be installed on 3684 mdl 1. **Limitations:** Cannot be installed with an non-IBM EAN/UPC Wand Attachment (#4946) or an non-IBM OCR Wand Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Note:** The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.

3684 Point-of-Sale Control Unit (cont'd)

Non-IBM EAN/UPC Wand Attachment (#4946): Provides an adapter to support the attachment of a non-IBM EAN/UPC Bar Code hand-held wand reader. This feature provides an external connector to attach the non-IBM wand reader. The types of wand readers that can attach to this feature are either analog output wand readers (Intermac 1233R or equivalent) or digital output wand readers (Hewlett-Packard HEDS 3000 or equivalent) that meet the requirements stated in the non-IBM EAN/UPC Wand Attachment Product Attachment Information for the 3650/3680. This document can be ordered by the marketing representative after FCS from IBM. **Prerequisites:** On the 3684 mdl 1, Expansion Feature #3890. The IBM Multiple Supplier Systems Bulletin (G120-6648) applies to the non-IBM wand reader. **Limitations:** When this attachment is used with an analog output wand reader, it is possible that this feature may experience failures if operated within five miles of a high power AM transmitter of the type used for television broadcasting. Cannot be installed with the Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Specify: #9660** for analog wand interface or **#9661** for digital wand interface.

Non-IBM OCR Hand-Held Reader Adapter (#5422): Provides an adapter to support the attachment of a non-IBM OCR hand-held wand reader that meets the requirements stated in the *Non-IBM OCR Wand Reader to IBM 3653 Product Attachment Information* document. This feature provides a 1.83 meter (6 foot) cable with an ITT--Cannon DBC-25S type connector to attach the non-IBM OCR Hand-Held Reader unit. **Prerequisites:** #3890 must be installed on 3684 mdl 1. **Limitations:** Cannot be installed with an non-IBM EAN/UPC Wand Attachment (#4946) or a Magnetic Wand Reader (#4945). **Maximum:** One. **Field Installation:** Yes.

Non-IBM Coin Dispenser Adapter (#5431): Provides an IBM-defined serial interface for attaching a non-IBM Manufactured Coin Dispenser that meets the requirements stated in the "3680 PSS System non-IBM Coin Dispenser Adapter Product Attachment Information" document which is available from IBM. For further information on the attachment, contact IBM. **Prerequisites:** #3890 for 3684 mdl 1 only. **Maximum:** One. **Field Installation:** Yes.

Non-IBM Scale Adapter (#5433): Provides an IBM-defined serial or parallel interface for attaching a non-IBM Manufactured Scale that meets requirements stated in the "IBM 3680 PSS non-IBM Scale Adapter Product Attachment Information" document which is available from Corporate Industry Relations. For further information on the attachment, contact IBM. Specify: **#9385** if Serial Interface is to be installed; **#9386** if Parallel Interface is to be installed. On Parallel Interface, specify **#9387** if scale is a 10K metric scale. On Serial Interface, specify **#9388** if scale is a 5-digit scale. Otherwise, scale is assumed to be a 4-digit scale. **Prerequisites:** #3890 for 3684 mdl 1 only. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

A 3684 may be equipped with either the External Modem Interface (#3701) or the 1200 bps Integrated Modem (#5530) features.

Note: A 6.1 meter (20 foot) communication cable is provided for attachment to a standalone modem or to a communications facility when an integrated modem is used. If a standard 6.1 meter communication cable is not desired, specify **#9061** for 3.0 meter (10 foot) cable, **#9062** for 9.1 meter (30 foot) cable or **#9063** for 12.2 meter (40 foot) cable.

1200 bps Integrated Modem (#5530): Provides an integrated modem for operation over switched or nonswitched communication facilities at 1200 bps. Auto answer is provided when operating over switched network. No external modem is required. **Limitations:** Cannot be installed with External Modem Interface (#3701). **Maximum:** One. **Field Installation:** Yes. Specify the following when ordering this modem:

Specify one:

#9481 for Switched Network
#9482 for Nonswitched Network

If **#9481** Switched Network is specified, also specify (one):

#9777 for 2025 Hz answer tone frequency required for operation at 1200 bps with non-IBM modems with Automatic Calling features.

#9778 for 2100 Hz answer tone frequency required for operation with host IBM 1200 bps integrated modems with Automatic Call Originate function.

If **#9482** Nonswitched Network is specified, also specify (one):

#9651 for 4-wire facility
#9652 for 2-wire facility

Note: If Switched Network (**#9481**) is specified, FCC registered protective circuitry of the CBS type (or equivalent) provided by the user is required. See "Accessories" section for additional information.

Storage Expansion (#6990): Provides the capability of expanding the storage capacity of the 3684 mdl 1 and the control segment of the 3684 mdl 2 from a maximum of 56K to a maximum of 120K bytes. See configurator chart for maximum storage. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Applies only to the 3684 mdl 1 and to the control segment of the 3684 mdl 2.

Storage Expansion-POS (#6991): [Mdl 2] Provides the capability of expanding the storage capacity of the point-of-sale segment of the 3684 mdl 2. The storage capacity of the point-of-sale segment is expanded from a maximum of 56K bytes to a maximum of 120K bytes. This feature permits the installation of up to four Storage Increment-16K (#7720) per #6991. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Storage Retention (#7785) cannot be installed on a 3684 mdl 2 that has Storage Expansion (#6990) and Storage Expansion-POS (#6991) installed at the same time. **Note:** This limitation is removed for machines shipped after August 1981. **Prerequisites:** #7730.

Storage Increment--8K (#7710): Provides an additional 8,192 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with Storage Increments--16K (#7720) or Storage Increment--24K (#7730). **Field Installation:** Yes.

Storage Increment--16K (#7720): Provides an additional 16,384 bytes of storage. **Maximum:** One per 3684 mdl 2 point-of-sale segment; without Storage Expansion-POS (#6991) installed; four with Storage Expansion-POS (#6991) installed; four per 3684 mdl 1 or 2 control segment with Storage Expansion (#6990). **Limitations:** Cannot be installed with Storage Increment--8K (#7710) or Storage Increment--24K (#7730) in point-of-sale segment of 3684 mdl 2. Cannot be installed in the 3684 mdl 1 or the control segment of the 3684 mdl 2 without #6990. **Specify: #9588** if increment is to be installed in point-of-sale segment of 3684 mdl 2; **#9589** if increment is to be installed in control segment of 3684 mdl 2. **Field Installation:** Yes.

Storage Increment--24K (#7730): Provides an additional 24,576 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with Storage Increment--8K (#7710) or Storage Increment--16K (#7720). **Field Installation:** Yes.

3684 Mdl 1 Storage Configurator

56K	Base Storage
	Storage Expansion #6990
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)

3684 Mdl 2 Storage Configurator

Total Stge Size	Storage Increment Feature	POS Segment					Control Segment	
		w/o #6990 or #6991		with #6990 Only		with #6991	w/o #6990	with #6990
		Stge Incre Only	Stge Incre and #9588	Stge Incre Only	Stge Incre and #9588	Stge Incre and #9588	Stge Incre	Stge Incre and #9589
32K	–	Base	Base	Base	Base	Base		
40K	8K-#7710	x	–	x	–	–		
48K	16K-#7720	–	x	–	x	–		
56K	24K-#7730	x	–	x	–	Req'd x	Base	Base
72K	16K-#7720					x		x
88K	16K-#7720 (2)					x		x
104K	16K-#7720 (3)					x		x
120K	16K-#7720 (4)					x		x

Note: The number of #7720s must equal the sum of specify code **#9588s** and **#9589s** when #6990 and/or #6991 is ordered.

Storage Retention (#7785): Provides an internal battery and charger to power storage during a power interruption. All data and programs are protected so that a transaction in process when power was interrupted will continue when primary power is restored. The duration of storage retention depends on the charged state of the battery. When fully charged, storage will be retained for approximately 12 minutes for mdl 1 and approximately six minutes for mdl 2. If Storage Expansion (#6990) and Storage Expansion-POS (#6991) are installed on the same 3684 mdl 2, a fully charged battery will retain storage for approximately three minutes. The number of times the battery is discharged greatly affects battery life; therefore, facilities are provided to allow the customer through programming, to deactivate the battery for scheduled power off conditions such as store closing.

Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. Replacement batteries may be ordered

3684 Point-of-Sale Control Unit (cont'd)

through IBM or through other sources that meet the battery specifications as defined by IBM. **Maximum:** One. **Limitations:** Cannot be installed on a 3684 mdl 2 that has Storage Expansion on both the point-of-sale segment and control segment. This limitation is removed for machines shipped after August 1981. If Storage Retention (#7785) is required on machines installed prior to August 1981, an RPQ will have to be submitted. Any parts removed due to this RPQ will be retained by IBM as property of IBM. **Field Installation:** Yes.

Totals Retention (#8010): Provides an additional 240 bytes of customer programmable storage that are powered by its own battery to protect loss of information such as totals, transaction number, terminal address, etc., when power is turned off or power interruptions occur. An early warning status condition will be given to the program when the battery needs replacing. Replacement batteries to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time-and-material basis. See "Accessories" for battery life characteristics and the types of batteries required for replacement. **Maximum:** One. **Limitations:** Applies to 3684 mdl 1 and to the Point-of-Sale segment of the 3684 mdl 2. **Field Installation:** Yes.

Validation Printer (#8725): Provides a flat-bed document validation station for printing on inserted forms. Prints 38 characters per line at 15 characters per 25.4mm (1 inch). Vertical line spacing is 6.3 lines per 25.4mm (1 inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer allow logos, special graphics and highlighting to be designed and printed by user programming. **Maximum:** One. **Limitations:** Cannot be installed with Label Printer (#8726). **Field Installation:** Yes.

Label Printer (#8726): Provides a flat-bed station capable of printing on inserted forms or labels. Includes the capabilities of the Validation Printer Feature (#8725) and in addition includes the capability of printing labels. Prints 38 characters per line at 15 characters per 25.4mm (1-inch). Vertical line spacing is 6.3 lines per 25.4mm (1-inch) at the rate of 20 lines per second. The all points addressable characteristics of the printer allow logos, special graphics, and highlighting to be designed and printed by user programming. Label printing capabilities include "card stock" shelf labels and gummed labels on a carrier. **Maximum:** One. **Limitations:** Cannot be installed with Validation Printer feature (#8725). **Field Installation:** Yes. **Note:** If the Label Printer is to be field installed in place of the Validation Printer (#8725), removed parts belong to the customer.

MODEL CONVERSIONS

Field installable. The parts removed for a model change become the property of IBM.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3680 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GA27-3074, or *3680 Site Planning and Site Preparation Guide,* GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to 105 C.
Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

The following items are available on a purchase-only basis. For shipment concurrent with the machine, order the Feature Number as shown below.

Item	Feature Number	Maximum Quantity
Protective Coupler (DAA)	**#9344**	No maximum
Cash Till Cover (with lock and key)	**#9355**	No maximum

Note: The Protective Coupler (DAA) will not be shipped from the same location, but concurrent ship dates can now be scheduled.

Protective Coupler (DAA) (#9344 P/N 1649100): The Protective Coupler (DAA) #9344 is an FCC registered device that can be used to connect the 3684 to the public switched network facilities. The coupler is powered by a provided transformer (calculator type) which plugs into a 110 volt, 60 Hz, wall outlet and is attached to the unit with a 6 foot cord. The coupler connects to the switched network facilities via an USOC RJ41S data jack provided by the telecommunication common carrier service supplier. The modem, to which the coupler is attached, is required to transmit at -2.0dBM. The FCC registration number is AA9987-62186-PC-E and the ringer equivalence is 0.8B. **Prerequisites:** Switched Network **(#9481). Field Installation:** Yes. **Note:** See above for Customer Responsibilities, Site Preparation and Repair Center information.

For other available accessories, see "Accessories" in the M3683 pages.

SUPPLIES

Ribbons: A black ribbon cartridge, P/N 7034640 or equivalent, is required.

Diskette: Diskette 2D, P/N 1766872, or equivalent, formatted with 256 byte blocks, is required for 3684 mdls 1 and 2.

Paper: Roll paper, 88.9mm (3.5 inch) diameter, 69.85mm (2.75 inch) wide, is required at the Cash Receipt and Journal print stations.

3687 CHECKOUT SCANNER

PURPOSE

A fixed head optical reader which attaches to the 3683 (mdls 1A, 2A and 3A) in the 3650 Programmable Store System. It is particularly adaptable to all modes of checkout and it accommodates both standing and seated operators.

MODELS

Model 1 001

HIGHLIGHTS

The 3687 is 216.0mm (8.50 in) high, not including the rails; 508.0mm (20.00 in) wide; and 278.0mm (10.94 in) deep, and reads the UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13, and EAN-8 bar code symbols on supermarket items that are manually fed past the window of the 3687. Packaged as part of the total checkstand design, one 3687 can operate with one 3683 Supermarket Terminal mdl 1A, 2A or 3A.

The 3687 is a Class 1 laser product which complies with the safety standards of the United States Department of Health, Education, and Welfare (Performance Standard for Laser Products, August 2, 1976 - Class 1, CFR Subchapter J).

The product reads the Universal Product Code (UPC) which has been adopted in the United States as an industry specification for supermarket items identification. It also reads the European Article Numbering (EAN) symbol which has been adopted in World Trade countries as an industry specification for merchandise identification.

Prerequisites: Each 3687 requires a 3683 mdl 1A, 2A or 3A, and operates only under the 3650 Programmable Store System.

Customer Responsibilities: Window replacement is a customer responsibility. See S3650 pages for general description of customer responsibilities.

Copies of the UPC Symbol Specifications and the UPC Guidelines are avilable at a charge from the UPC Council. Write to:

Uniform Product Code Council, Inc.
7061 Corporate Way, Suite 106
Dayton, Ohio45459
513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN), write to:

Secretaire General, E.A.N.
Rue Des Colonies 54, BTE 8
1000 Bruxelles, Belgigue

For each 3687, the customer must provide a switchable on and off power outlet for locking plug. A 1.8m (6 ft) power cord and locking plug will be shipped with each machine.

Refer to *IBM 3650 PSS Installation Manual - Physical Planning,* GA27-3167, for requirements for mounting the 3687 in a checkstand.

A number of states presently have, and others are considering the adoption of, regulations governing the use of laser products. Users should determine the extent of regulation in the states where the 3687 is to be installed.

SPECIFY

- Voltage 120V AC, 1-phase, 3-wire, 60 Hz.
- Packing: If machine is to be installed in N. Y. State, specify **#9550** for additional labeling to meet current regulations. If machine is to be installed in Texas, specify **#9551** for additional labeling to meet current regulations.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Scratch-Resistant Window Kit (P/N 7032261): A scratch-resistant window in an installation kit. Intended to be permanently installed by the user. User installable only. Replaces the expendable window with which the 3687 is equipped. It fits the 3687 only.

Window (P/N 1749143): The 3687 Checkout Scanner is equipped with a replaceable window. With use, it will get scratched and need to be replaced. Window replacement is a customer responsibility.

SUPPLIES

Contact IBM.

3689 STORE COMMUNICATIONS UNIT

PURPOSE

To provide communications for the 3650 Programmable Store System over common carriersupplied communications network facilities.

MODELS

Model 1 001

Prerequisites:

A 3650 Programmable Store System with (minimum requirements):

- A 3651 Store Controller mdl A75, B75, C75 or D75 with the 4800 bps Loop Adapter (#4895) and the 3669/3689 Attachment (#8069).
- Access to an appropriate switched network communications facility.
- A store loop equipped with at least one 3683 Point of Sale terminal with 4800 bps specify feature **#9430**.
- Communications with any virtual storage S/370 or 4331 or 4341 processor via a properly equipped 3704 or 3705 or a Communications Adapter on a 4321 or 4331.

Customer Setup: The 3689 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance.

HIGHLIGHTS

The 3689 mdl 1 provides communications between a 3651 Store Controller mdl A75, B75, C75 or D75 and:

- The host S/370 or 4331 or 4341 processor via a 3864 Modem mdl 2 attached to a 3704, 3705 or 3725 Communications Controller with switched line features or a Communications Adapter feature on a 4321 or 4331.
- The store loops at another predesignated store location via another 3689 mdl 1 at that location, to provide backup operation for the store in case its 3651 Store Controller mdl A75, B75, C75 or D75 is inoperative.
- The 3651 Store Controller mdl A75, B75, C75 or D75 via another 3689 mdl 1 in another predesignated store in a controller-to-controller operation via Auxiliary Communications Adapters (#6185) for the purpose of data transfer or data reconciliation when the backup operation is terminated.

Addtional characteristics of the 3689 mdl 1 are:

- Operates in half-duplex mode over 2-wire switched telecommunication networks. Operating mode is point-to-point.
- A microprocessor for signal processing.
- Auto Answer: Automatic Answering of Switched Network calls.
- Automatic Speed Selection: The transmission speed of the 3689 mdl 1 follows the transmission speed (4800/2400 bps) of the Host 3684 mdl 2. **Note:** There is no Automatic Speed Selection when loop communication is involved.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- When operating with a Host S/370 or 4331 or 4341 processor via a 3864 mdl 2, the modem diagnostic functions, referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Release 1 or 2 (5735-XX6).
  2. Network Problem Determination Application (NPDA) Release 2 (5735-XX8).
  3. ACF/NCP Release 2.1 (5735-XX1).
- The protective circuits required for FCC Registration are built into the 3689 mdl 1 to allow direct attachment to the Public Switched Network.

Diagnostics: Built-in diagnostics - The 3689 mdl 1 will respond to diagnostic commands from the Host system and provide its status and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 for data transmission. This diagnostic status/test requests can be interspersed with data requests without interrupting 3651 sessions.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem or modem interface.

NPDA will utilize the modem facilities to provide alert messages on error threshold and display formatted modem test results.

In addition, tests can also be executed from the 3689 operator panel. These manual tests include:

- Self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Lamp test -- tests all indicator lights on the operator panel.

Communication Facilities

Public Switched Networks: The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to M2700 pages for further details.

Privately-owned Communication Facilities: Equivalent to above.

International Facilities: Transmission of data between the United States and Canada on switched facilities is supported.

Attachment to Facilities: Attachment of the 3689 mdl 1 to the public switched network is by a cable, supplied with the 3689 mdl 1 which is terminated with a miniature 8-position keyed plug for connection to a programmed data jack (USOC RJ45 or RJ41 or equivalent) which is provided by the telecommunications service supplier. (A data jack is installed only on a dedicated data line; not on customer-owned switching equipment.) The protective circuitry required by the FCC for direct attachment to the public switched network is contained in the modem. The FCC registration number is:

3689 mdl 1 AN09SA-67992-DP-N

The ringer equivalence is 0.8B.

Note: Telephone sets (handsets) are required with switched facilities at all 3689 mdl 1 locations.

Customer Responsibilities: The customer must be informed of his responsibilities as detailed in the M2700 pages, and in the site preparation section of the *3650 Programmable Store System Installation Manual - Physical Planning* (GA27-3167).

The customer is also responsible for:

1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2) Switched Telecommunication Network -- arranging for the telecommunication service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. The customer must also inform the telecommunication service supplier that the rate of data transmission will be faster than 1200 bps.
3) If the 3689 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.
4) Unpacking and placing of the 3689, physical setup, and connection of cables at setup time.
5) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
6) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
7) All three of the following program products at the current release must be installed for LPDA to function between the Host and the 3689 mdl 1 if the customer requires the LPDA function.

   NCCF (5735-XX6)
   NPDA (5735-XX8)
   ACF/NCP (5735-XX1)

8) Obtaining, installing and testing the store loops.

3689 Store Communications Unit (cont'd)

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug, **#9891** for non-locking plug. If standard 3.0 meter (10 foot) power cable is not required, specify **#9986** for 1.8 meter (6 foot) cable.
- Telecommunication Cable (modem to telecommunication line): Specify **#9710** for 3m (10 foot) cable .

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3694 DOCUMENT PROCESSOR

PURPOSE

A programmable MICR Reader-Inscriber-Sorter for remote processing of documents used primarily in the Finance Industry. As a member of the 3600 Finance Communication System, the 3694 combines the programming and host communication facilities of the 3601 Finance Communication Controller with MICR document handling capabilities.

Can attach to S/370 or 4300 processors via a 3705 or 3725 Communications Controller (to 4331 also via the Communications Adapter) using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities.
Can attach to System/34 or System/36 Processors via communications adapter using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities.
Application support for System/34 is provided by the following Check Processing Executive/General Support FDPs, or user supplied programming. Document Control Section Edit (5698-RFL), Table Preparation Facility (5798-RFK), Allitems File Translation Facility (5798-RFJ), and Communication Support Facility (5798-RKH).
Note: See "Programming" and "SCP" pages for attachment capability.

The 3262 models 3 and 13 line printers may be attached to a 3694 for high-speed report printing. The 3287 models 1 and 2 and 3268 model 2 printers may also be attached for lower volume printing.

The 3694 is available in eight models: Models 1A, 1B, 1C and 1D and models 2A, 2B, 2C and 2D. They perform identical functions except that the model 2s have an automatic document feed and high-speed sorter path for program controlled sorting and/or data capture at up to 400 6-inch documents per minute.

Multiple 3694s can be attached to a given 3694 or to a 3602 Finance Communication Controller for data concentration and control.

MODELS

Model 1A	A01	One Distribution Stacker Module - 6 pockets
Model 1B	B01	Two Distribution Stacker Modules - 12 pockets
Model 1C	C01	Three Distribution Stacker Modules - 18 pockets
Model 1D	D01	Four Distribution Stacker Modules - 24 pockets (Pockets are also known as Stackers)

All models include a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, and approximately 81,000 bytes of user-programmable storage. User storage can be expanded, optionally, up to a maximum of approximately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

Model 2A	A02	One Distribution Stacker Module - 6 pockets
Model 2B	B02	Two Distribution Stacker Modules - 12 pockets
Model 2C	C02	Three Distribution Stacker Modules - 18 pockets
Model 2D	D02	Four Distribution Stacker Modules - 24 pockets

All models also have a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, approximately 81,000 bytes of user-programmable storage, plus an automatic feeding device and high-speed document path for operations at rates up to 400 documents per minute for 6-inch documents. User storage can be expanded, optionally, up to a total of approximately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

HIGHLIGHTS

Combines document inscribing (E13B), reading, sorting, identifying and endorsing functions with data capture and storage accumulation, and communication capabilities under program control. Can communicate with a host system using any one of two SDLC communication features and an EIA Interface feature with an external modem, or by direct attachment to a 3705 or 3725 or 4331 or System/34 Communications Adapter.

Houses a diskette drive which can accommodate 2-sided diskettes offering storage of user data and programs, i.e., sort table, all items file and cluster summary data.

Accommodates up to four Distribution Stacker Modules with each containing six distribution pockets. Each distribution pocket has a capacity of approximately 400 documents. Depending upon the mdl, a 3694 can have one, two, three or four such modules. Optional distribution list printers may be dynamically assigned under program control to individual pockets to list the contents of each pocket as the document enters, or on a deferred basis.

An optional microfilm feature is available to record images of documents processed on the full function path (mdls 1 and mdls 2) and documents processed on the sorter path (mdls 2). Film image format is duplex mode (front and rear of documents recorded adjacent to each other). Film record includes header data, item sequence numbers and frame marks (blips). An optional PAID stamp feature is available on 3694 mdls 2 for face cancelling items as PAID for items processed on the sorter path.

A 3694 mdl 2A, 2B, 2C or 2D is equipped with an automatic feed/high-speed path. It can capture data and fine-sort documents at a rate of up to 400 documents per minute (for 6-inch documents).

The 3262 (mdls 3 and 13), 3287 (mdls 1 and 2) printers and 3268 (mdl 2) may be attached to offer, with appropriate programming support, an ability to print host, diskette or program-supplied print line images.

Clusters of up to four 3694s may be attached to another 3694 for communications concentration and control. Depending upon the applications and operational considerations, up to 18 3694s may be attached to a 3602 Finance Communication Controller for large cluster concentration and control. (For attachment of more than eight 3694s to a controlling 3602, Systems Assurance approval is required.)

Transmission: The 3694 can operate over common carrier-provided or equivalent customer-owned facilities. For information concerning these facilities, see the M2700 pages.

Modems: External modems operating at up to 9600 bps may be attached when used with SDLC feature #4502. For information concerning modem attachment support, see the M2700 pages.
Prerequisites: If Host Connected - a communications controller with appropriate features -- see M3705, 3725 or 4331 (for Communications Adapter #1601 on the 4331) 5340, or 5360 pages.

Typical Configuration Guideline: As a reference, the most typical 3694 featured machine configuration is as follows:

3694 mdl 2B	Base machine with 12 pockets and Autofeed/Sorter path
#1015	Additional diskette storage
2X #3201	Two distribution list printers
#3701	EIA Interface
#4502	SDLC communication without clocking

Other features commonly ordered are:

#5121	Microfilm
#5450	PAID Stamp

Required Specify's must also be ordered.

The following is a more detailed guide to configuring specific 3694 machines. It is based upon the operational diskette levels provided by the IBM 3694 application program product, CHX/3694 (PP 5748-F53):

Basic 3694 Configuration: This configuration is for 3694s which communicate directly with S/370, System/34, System/36 or 4300 processors.
This configuration also applies to a 3694 which is attached to another controlling 3694 or 3602 controller (clustered configurations).

Cluster Controller 3694 Configuration: This configuration is for 3694s which communicate directly with S/370 or 4300 processors, and have other 3694s attached for concentration and control.

3694 Document Processor (cont'd)

Required Feature/Mdls		
Application/Use	Basic 3694	3694 Cluster Controller
Communication to host through modem which does not have internal clocking, or for direct attachment to 3705 or 3725 at speeds of 1200 or 2400 bps.	#3701 and #4501	#3701 and #4501
Communication to host through modem which has internal clocking speeds up to 9600 bps, to 4331 Communication Adapter without modems, System/34 Communication Adapter or to controlling 3694 or 3602 without modems.	#3701 and #4502	#3701 and #4502
Cluster control	–	#1015,#4401, #1007,**#9601** and #1007,**#9602**
Attachment of printers (See note, 3262, 3287s, 3268s)	#3101	#3101
Additional disk storage for increased MICR item data storage.	#1015	–
In-line Microfilming.	#5121	#5121
Paid Stamping (mdl 2 only).	#5450	#5450
Printing of pocket distribution list: – Typical application uses one printer per six stacker/pockets.	#3201 (multiple)	#3201 (multiple)
High-speed sorter path: – Typical application uses twelve or more pockets (mdls 2B, 2C or 2D).	Mdl 2s	Mdl 2s
Pocket-full lights: – Typical application uses one such feature per six stacker/pockets.	#5540 (multiple)	#5540 (multiple)

Note: Printer mdl description
(Not for use with System/34 and System/36 host systems).

3262-13	325 lpm
3262-3	650 lpm
3287-1	80 cps
3287-2	120 cps
3268-2	340 cps

Bibliography: GC20-0370, *IBM S/370 Bibliography,* and GC27-0001, *IBM 3600 Finance Communication System, System Summary.*

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (1-phase, 60 Hz): **#9884** for 208V, **#9914** for 240V. Specifications on the voltage level available at the location where the 3694 is to be installed should be obtained prior to selecting one of the previous voltages. This is necessary in order to avoid having to re-wire the 3694 after delivery, thereby introducing delays in the installation of the unit.
- Power Cord: Select appropriate length power cord, and specific type of cord.
  - 1.83m (6 foot) cord, specify **#9986** with one of the following:

    #9080, water-tight plug (Russell and Stoll 3720-U2) for below-floor power installation.

    #9081, locking plug (L6-15P Nema).
  - 4.27m (14 foot) cord, specify **#9987** with one of the following:

    #9080, water-tight plug (Russell and Stoll 3720-U2) for below-floor power installation.

    #9081, locking plug (L6-15P Nema).
- Controller Designation: Media distribution of controller data. Specify **#9491** to identify the initial controller (3601, 3602 or 3694) ordered for use with a host system location, or specify **#9492** to identify additional controllers (3601, 3602 or 3694s) per host system. **#9491** should only be ordered when host media DTR tape containing microcode is required. If a pre-configured diskette is specified when ordering the CHX/3694 Application Program Product (PP 5748-F53), then specify **#9492** for the controller designation.

The following specify numbers (**#9493**, **#9494** and **#9495**) are provided to enable the user to attach a 3614 or a 3624 to additional 3601 or 3602 controllers, when the initial controller is a 3694.

If the initial controller (with specify **#9491**) is a 3694, and if there is a 3614 with a first position designator and a specify **#9002** attached to any 3601 or 3602 on the same host system, then specify **#9493** is required.

If the initial controller (with specify **#9491**) is a 3694, and if there is no 3614 or 3624 with a first position designator attached to any 3601 or 3602 on the same host system, then specify **#9494** is required.

If the initial controller (with specify **#9491**) is a 3694, and if there is a 3614 with a first position designator and a specify **#9001**, or a 3624 with a first position designator attached to any 3601/3602 on the same host system, or if encryption capability via the data encryption standard (DES) is desired on a 3601 or 3602 on the same host system, then specify **#9495** is required.

Both specify **#9493** and **#9495** may be ordered with the initial 3694 (with specify **#9491**).

If **#9491** is specified, select the specify number of the desired media:

#9412 9/800 Magnetic Tape
#9413 9/1600 Magnetic Tape
#9414 9/6250 Magnetic Tape

If magnetic tape is not available on designated CPU, then select one of the following media (DOS/VS or VSE users only):

#9431 80-column cards
#9432 96-column cards

If card or tape inputs are not available at the host location, contact Finance Industry Marketing for guidance.

When feature **#9491** is specified, additional shipping information is required.

Supplement Spec (via AAS entry) is to be entered exactly as follows to indicate shipping address of the Host System location:

Line 1 -- IBM Programming Support Representative (PSR)
Line 2 -- c/o (Name of customer)
Line 3 -- Street address (or P.O. Box)
Line 4 -- (etc.) -- City, State, Zip

This is the address to which the first controller (3601, 3602 or 3694) data tape will be automatically shipped for the first controller ordered (with specify **#9491**). Whenever controller data is updated by an EC, it will be shipped to the most current MC address.

- Cables: See "Accessories" for ordering instructions for 3262 or 3237 printer cables. Communication cables for the 3694 are provided without charge when feature #3701 (EIA Interface) is ordered through the normal AAS procedure. Also see *Installation Manual - Physical Planning,* GC31-2010.
- **#9571** to request shipping of a 3694 in three frames (four if a 3- or 4-stacker module configuration was ordered), **#9570** to request shipping of a 3694 in two frames. Specify **#9570** requires considerably less time to install than specify **#9571**, however, specify **#9570** should only be used when the customer's physical facilities will accommodate access for the larger shipping cartons. See the *IBM 3694 Document Processor Installation Manual Physical Planning*, GC31-2010, for details.
- **#9580** to request shipping by air (required for areas outside Canada and the Continental U.S.). All air shipments are in three frames (four, if a 3- or 4-stacker module configuration is ordered, mdls C and D).

  If air shipment is required within the Continental U.S. or Canada, the branch office must send a request for premium transportation to the IBM Charlotte plant of manufacture (form #625-3433-01).
- **#9481** for system operation without host CPU, host 3694, or host 3602 attachment. **Note:** MANDATORY for all orders without hosts.
- Tool Kits: Required for CE Maintenance. For Rental Customer -- specify on first 3694 order for each customer site. If required for multiple machine sites, an additional Tool Kit(s) is available on a no-charge MES. For Purchase Customers -- specify on each 3694 order. When installed rental 3694s are purchased, a Tool Kit is to be ordered on a no-charge MES for each machine. Specify **#9766** for Base Machine Service tools.

  Specify **#9441** for microfilm feature service tools. The microfilm tool kit consists of a 3694 microfilm cassette, a set of test documents, and a roll of film. Individual microfilm tool kit parts are available from Mechanicsburg.

3694 Document Processor (cont'd)

SPECIAL FEATURES

NON-COMMUNICATION FEATURES

Add'l Storage (#1007): Provides an additional 32,768 bytes of control storage or additional 32,768 bytes of user-programmable storage. Specify **#9601** for control storage, or **#9602** for user storage. A maximum of one additional storage feature for control storage (**#9601**), and a maximum of one additional storage feature for user programming (**#9602**) may be ordered for a 3694 mdl 1 or 2.

Auxiliary Compact Diskette Drive (#1015): The Auxiliary Compact Diskette Drive supporting Diskette 1 and Diskette 2 provides an additional storage capacity of approximately 270,000 or 568,000 bytes. No area on the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes. **Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction), and EDAM Temporary File Support. Refer to "Device Attachment Factors Table" and "Attachment Factor Functions" section.

Device Cluster Adapter (DCA) (#3101): Permits attachment of any combination of one or two 3262 (mdls 3, 13), 3268 (mdl 2) or 3287 (mdls 1, 2) printers to a 3694.
Limitations: Maximum distance from 3694 to terminal is 1,500m (4,920 feet). Not for use with System/34 and System/36 host systems.
Note: Attachment of two printers requires Systems Assurance Review. **Maximum:** One. **Field Installation:** Yes.

Distribution List Printer Module (#3201): The Distribution List Printer (DLP) prints two distribution lists, each containing up to 18 characters per line. Independent paper movement allows either list, or both, to be printed at up to 180 lines per minute. Each list is dynamically assignable to distribution pockets to print, under program control, data from, or relative to, documents selected to corresponding distribution pockets. **Maximum:** Six distribution list printers (for up to 12 distribution lists) may be ordered per 3694. The maximum is dependent upon the number of Stacker Modules. **Field Installation:** Yes.

One "Drawer Position" is available in the base of each of the first three stacker modules for installation of distribution list printer drawers. Drawers can contain one or two distribution list printers (providing 2 or 4 distribution lists).

The positioning options of the distribution list printers modules is as follows, and is predetermined by the quantity ordered:

	Stacker Module 1	Stacker Module 2	Stacker Module 3	Stacker Module 4
Position	1A 1B	2A 2B	3A 3B	N/A

N/A = Not available

Quantity of Printers Installed	Required Positioning of Installed Printers
1	1A
2	1A,1B
3	1A,1B,2A
4	1A,1B,2A,2B
5	1A,1B,2A,2B,3A
6	1A,1B,2A,2B,3A,3B

Controller Attachment (#4401): Required to attach up to four 3694s to a controlling 3694 at a link speed of 9600 bps. This feature is required in the controlling 3694 only. **Limitations:** Attached 3694s must each be placed within 100 cable-feet of the controlling 3694. **Note:** Support for feature #4401 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Factors Table" for the 3694. **Maximum:** One. **Field Installation:** Yes.

Microfilm (#5121): Provides for filming front and rear of documents processed on 3694 mdls 1 and mdls 2 in duplex format (front and rear of item recorded adjacent to each other on film). Item sequence number is recorded (exposed) on film for every other item filmed. Frame marks (blips) are recorded on film for each item filmed. Indicative data can be recorded on film as header film records. Minimum image resolution is 110 lines per millimeter. Camera reduction is 50:1. Users specify that microfilming is active on a 'per-run' basis. Rated filming speed is the same as processing speed for the mdl 2 sorter path (400 documents per minute for 6-inch documents). A film cassette to house the film supply and film take-up reel is provided with the feature. Additional film cassettes can be ordered from "Accessories" below. The microfilm feature uses 16mm, medium- to high-speed, unperforated film, and can accept either 100-foot (thick-base) or 215-foot (thin-base) film supply reels. Capacity of film is approximately 13,300 items (front and rear) per 100 feet of film. **Maximum:** One **Field Installation:** Yes. **Note:** A CE microfilm tool kit is required to install this feature. Refer to "Tool Kit" description under "Specify" for ordering information.

Paid Stamp (#5450): Provides for face cancelling items as PAID on 3694 mdl 2 only. Stamping mechanism is located on sorter path of mdl 2s and is activated on a user-specified 'per-run' basis. At least one full stamping of the word PAID will appear on each document, and additional partials may also appear. **Limitations:** 3694 mdl 2s only. **Maximum:** One #5450 per 3694 mdl 2s. **Field Installation:** Yes. **Prerequisites:** #5121.

Stacker Lights (#5540): This feature provides six individual pocket lights per Stacker Module which may be installed on any Module as required. An individual light on a pocket illuminates when a pocket is approximately three quarters full. The light is switched off when the pocket is cleared. If the transport has stopped due to a full pocket, the operator must restart via the green start button. **Limitations:** Can only be installed on machine serial number 10023 and above. **Maximum:** One per Stacker Module. **Field Installation:** Yes. **Prerequisites:** Specify **#9501** on Stacker Module 1 ... **#9502** on Stacker Module 2 ... **#9503** on Stacker Module 3 ... **#9504** on Stacker Module 4.

Control Storage (#9601): Used for attachment of certain device types, functions, and features which have associated attachment factors. See "Device Attachment Table" below. Some combinations of device types, functions, and features can be accommodated with no additional control storage. Other combinations require additional control storage as provided by the Add'l Storage feature #1007 with the Control Storage specify **#9601**. Refer to Attachment Factor Functions and Device Attachment Table sections for a further explanation of attachment factors and required control storage.

User-Programmable Storage (#9602): Used for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in this additional user-programmable storage. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATION FEATURES

For operation without attachment to either a host processor or a controlling 3602 or 3694, specify **#9481** must be used.

For communications with a controlling 3602 or 3694, each attached 3694 must be equipped with the EIA Interface (#3701) and the SDLC Communications Feature without Business Machine Clocking (#4502).

For communications with a S/370, System/34, System/36 or 4300 series host processor, each 3694 must be equipped with one of the following SDLC features and the EIA Interface (#3701).

EIA Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705 or 3725 the Communications Adapter (#1601) feature on the 4331 Processor ... or the Communication Adapter onthe System/34 or System/36 ... or for direct local attachment to the 3705, 3725 4331 Communications Adapter or a controlling 3602 or 3694 without requiring modems ... see M3602, 3705, 3725 (#4716), 4331 or System/34 pages.
Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Maximum:** One. **Field Installation:** Yes. Cable length from this feature to the controlling 3602/3694 cannot exceed 30.4m (100 feet). Cable length for attachment to an external modem cannot exceed 8.1m (20 feet). See the *3694 Installation Manual - Physical Planning,* GC31-2010, for details. **Prerequisites:** #4501 or #4502.

SDLC Communications With Business Machine Clocking (#4501): Required for attachment to communication lines through the EIA Interface (#3701) at 1200 bps or 2400 bps with any external modem which does not have internal clocking, or for local attachment to a 3705 or 3725 Communications Controller at 1200 or 2400 bps (feature #4716). **Limitations:** Cannot be installed with #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331 or System/34 Communications Adapter without Modems. It is also required in 3694s which attach to a controlling 3694 or 3602. **Limitations:** Cannot be installed with #4501. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701.

> **Note:** SDLC as used in the 3694 Document Processing system conforms to a subset of both the ISO HDLC and NASI ADCCP Standards. For details of the conformance, see *IBM Synchronous Data Link Control General Information Manual,* GA27-3093-2.

MODEL CONVERSIONS

3694 model 1s shipped beginning November 13, 1982 can be field upgraded to model 2s. Model 1s shipped prior to November 13, 1982 cannot be upgraded to model 2s but model 2s cannot be field-changed to model 1s. Model 2s can be changed to model 1s at time of manufacture only. Model suffix upgrades and downgrades (e.g., 1A to 1B, 2A to 2B, 1B to 1A, 2B to 2A, etc.), can be field-changed.

3694 Document Processor (cont'd)

ATTACHMENT FACTOR INFORMATION

A 'base' attachment factor capability of 26 and an 'expanded' attachment factor capability of 24 is standard on all mdls of the 3694. An 'expanded' attachment factor capability of 49 can be obtained by adding feature #1007 with specify **#9601**.

To determine if feature #1007 with specify **#9601** is required, the attachment factor for each device type, function, or feature required must be allocated, one time only, against either the 'base' or the 'expanded' attachment factor sum, but not both. (The 'base' and 'expanded' attachment factor sums must be calculated separately.)

The 'base' attachment factor sum may not exceed 26. If the 'expanded' attachment factor sum is 24 or less, feature #1007 with specify **#9601** is not required. If the 'expanded' attachment factor sum is greater than 24, but does not exceed 49, feature #1007 with specify **#9601** is required. An 'expanded' attachment factor sum of greater than 49 is not allowed. **Maximum**: One. **Field Installation**: Yes.

Device Attachment Table: In the following table, attachment factors in the column labeled BASE are applicable to the 'base' attachment factor calculation only. Attachment factors in the column labeled BASE OR EXPANDED are applicable to either the 'base' or 'expanded' attachment factor calculation.

The 3694 loads support for devices/features into control storage *in the sequence* indicated by the following table. The 3694 will *always* attempt to load each device or feature into 'base' control storage. If a device or feature is encountered that will not fit into 'base' control storage and it is applicable to 'expanded' control storage, the controller will load it into 'expanded' control storage if space is available.

Refer to the *IBM 3694 Document Processor Description and Configuration,* GC31-2009, for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section. See "Attachment Factor Functions".

Device Attachment Factors Table

DEVICE TYPE/FEATURE/FUNCTION	ATTACHMENT FACTOR BASE	ATTACHMENT FACTOR BASE OR EXPANDED
3694 Operator Console	2.8	
SDLC (#4501 or #4502)	0.7	
Multiple Block I/O - Diskette	3.0	
Optional Instruction Locator	0.3	
Instruction Enhancements	1.7	
3694 Document Processor Base [Note 1, 4]		21.5
Alternative Line Attachment Base [Note 3]		5.4
Dynamic Control [Note 5]		1.5
SDLC Link Diagnostics [Note 3]		0.8
SDLC/SNA Attachment Part 1 [Note 3]		8.0
SDLC/SNA Attachment Part 2 [Note 3]		5.8
Device Cluster Adapter [Note 2]		5.0
LSEEKP Instruction [Note 1]		1.8
Translate Instruction (LTRT) [Note 1]		1.2
Data Decompression/Decompaction [Note 1]		1.2
Data Compression/Compaction [Note 1]		1.6
SCRPAD Instruction [Note 1]		1.7
Priority Dispatching (LCHAP) [Note 1]		0.3
Data Sequencing		1.6
Extended Statistical Counter Recording [Note 1]		1.3
Extended Diskette Access Method (EDAM) Base		5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 6]		1.7
EDAM Temporary File Support [Note 7]		1.5
3262/3287 Part 1 [Note 2]		3.0
3262/3287 Part 2 [Note 2]		1.5
Set Diskette		0.9

Notes:

(1) The Optional Instruction Locator must be included if this function is used. If more than one function requiring the Optional Instruction Locator is used, the attachment factor for the Locator need be included only once.

(2) The device cluster adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used.

(3) The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2 together comprise the SNA Primary interface support required in the controlling 3694 for controller-to-controller (3694-to-3694) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., base or expanded). This SNA primary function is used in conjunction with the controller attachment feature (#4401).

(4) The 3694 Operator Console function must be included if the 3694 Document Processor Base function is included.

(5) The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., base or expanded) if Dynamic Control is used.

(6) The EDAM Base must be included if the Allocate/Deallocate function is used.

(7) The EDAM Base must be included if EDAM Temporary File Support is used.

ATTACHMENT FACTOR FUNCTIONS

Data Sequencing: Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Extended Statistical Counter Recording: Allows user applications, via the STATS instruction, to access the basic statistical counters of the 3694 and attached devices.

Set Diskette: Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements: Provides the user application with the following instructions:

Bit Manipulating - Test and Branch (LIFON, LIFOFF) -- provide a test, set and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.

Logical Compare Data Immediate (CCDI) -- compares immediate data to data in a specified field.

Move Data Immediate (MVDI) -- moves immediate data to a specified field.

Load Data Immediate (LDDI) -- loads immediate data into specified register.

Scale -- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. Scale should significantly reduce the number of instructions required to process monetary input.

Segment Indexing (SETX, TESTX, SETXREG) -- provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference: (1) Variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.

Branch on Index (BRANX) -- provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.

Execute (LEXEC) -- provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching: Provides the ability to dynamically specify the order in which controller workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP configuration macro.

Translate: The LTRT instruction processes an input data stream against user-specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Multiple Block I/O - Diskette: Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE Instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than three blocks are read or four blocks are written.

Data Compression/Compaction: This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently-occurring characters according to a user-defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction: This function allows a controller application program to decompress and/or decompact a data

3694 Document Processor (cont'd)

stream which had previously been compressed and/or compacted by a host or a controller application program.

Extended Diskette Access Method (EDAM) Base: Provides the capability to open, access and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instruction): Provides, via the LDKT instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support: Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

Dynamic Control: Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3694 through the SNA Primary interface.

LSEEKP Instruction: Locates a table entry which is 'equal to', 'greater than or equal to', or 'less than or equal to' a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program.

SCRPAD Instruction: Provides access to optional global work areas distinct from segment storage.

ACCESSORIES

Belts - Ink Roll - Ribbons: These Accessories may be purchased from IBM or a customer-selected source. Allow a lead time of 120 days.

7032508	MLP/PLP Ribbon-Purple
7032562	MLP/PLP Ribbon-Blue/Black
7032505	MLP/PLP Ribbon-Black
423653	Endorser Ink Roll-Red
423654	Endorser Ink Roll-Black
423656	Endorser Ink Roll-Purple
7034365	ID Printer Ribbon Assembly
7032878	MICR Ribbon
7032759	Restraint Belt
7032760	Picker Belt
7032761	Feed Drum Belt
7032763	Read-Head Belt

Cables: Cables are provided without charge when EIA Interface (#3701) is ordered. Detailed information about these cables is provided in *IBM 3694 Document Processor Installation Manual - Physical Planning*, GC31-2010. The cables are ordered through the normal ordering procedure. See the 3287 or 3262 Printers Accessories section for cable attachment to the 3694.

Microfilm Cassette - MES Orders (P/N 5682436): This cassette provides space for both microfilm supply reel and take-up spool. Cassette utilizes standard 16mm supply reels (100-foot or 215-foot film length). Cassette includes one take-up spool. **Note:** A single cassette is provided with the ordering of the microfilm feature (#5121).

Documents: E13B magnetic characters, print quality and codeline arrangement on the documents must meet the specifications recommended by the American Bankers Association. Intermixed paper and card documents within the following specifications can be processed:

Length: 146.05 to 225.4mm (5.75 to 8.875")
Width: 66.68 to 107.95mm (2.625 to 4.25")
Document Thickness: 0.09 to 0.14mm (0.0035 to 0.0055")

Carrier Envelope: Carrier envelopes containing mutilated documents should not exceed total thickness of 0.356mm (0.014"). **Note:** The use of carrier documents may cause a higher than normal jam stop frequency.

Base Weights: 75 to 120 grams per square meter (basic weight is the weight of 500 sheets of 17" x 22" paper), 20 to 32 pounds. Standard column card stock may also be processed (must meet ABA RS-147-R3 specification). **Note:** Insertion of an occasional 16 pound document is allowed. Insertion of concentrations of 16 pound documents is not recommended.

Grain: Preferably long grain.

SUPPLIES

To ensure that consumables are on-hand when the 3694 is shipped and received at the installation, care should be taken to have the customer submit an order to IBM for 3694 supplies well ahead of installation time. **Customer Responsibilities:** The customer is responsible for changing all consumable supplies listed above. If the customer desires to have an IBM CE replace or install any of the consumable supplies, the CE time involved will be billed to the customer. Special note should be taken of Section 5, Belts ... the customer must be informed of the need to keep spares on hand and have his operators trained in their replacement.

Consult IBM for information regarding the following consumable supplies required for the 3694:

1. Diskette 1 (128 Bytes) P/N 2305830
   Diskette 2 (128 Bytes) P/N 1766870
   Diskette 2 (256 Bytes) P/N 2736700

2. Ribbons: **Note:** Ribbon inks for the Master List Printer and Distribution List Printer ribbons are formulated to minimize printer wire damage.

   Master List Printer Ribbons:
   Ribbon - Purple P/N 7032508
   Ribbon - Blue/Black P/N 7032552
   Ribbon - Black P/N 7032505

   Distribution List Printer Ribbons:
   Ribbon - Purple P/N 7032508
   Ribbon - Blue/Black P/N 7032552
   Ribbon - Black P/N 7032505

   Sequence Number Printer Ribbon Assembly:
   Ribbon Assembly P/N 7034635

   MICR Ribbon:
   MICR Ribbon P/N 7032878

3. Endorser and PAID Stamp Ink Rolls:
   Red P/N 423653
   Black P/N 423654
   Purple P/N 423656

4. Endorser Plates: Endorser plates are made to the customer's specifications. See IBM for ordering procedures and prices.

5. Belts:
   Restraint Belt P/N 7032759
   Picker Belt P/N 7032760
   Feed Drum Belt P/N 7032761
   Read-Head Belt P/N 7032763

6. Vacuum Cleaner Supplies:
   Vacuum Bags P/N 1245561
   Filter P/N 1245562

7. Microfilm Lamps:
   Package of 4 Lamps P/N 7032252

8. 3694 Customer
   Convenience Kit: P/N 7032998

   Starter Supply Kit, approximately 6 months supply of all consumables. See IBM for details.

9. Paper Specifications:
   Master List Printer:
   Single-part Fan Fold P/N 7034710
   *Width: 89mm +/- 1mm (3.5")
   Weight: 16 lb Bond
   Length of Fold: 140mm (5.5")
   Number of Folds/Pack: 500

   Master List Printer:
   Single-part Roll P/N 7034714
   Double-part Roll P/N 7034713
   *Width: 89mm +/- 1mm (3.5")
   Weight: 16 lb Bond
   Max. Dia.: 83mm (3.27")
   Thickness: 0.07-0.20mm (max.) (0.0028-0.0079")

   Distribution List Printer:
   Single-part roll (only) P/N 7034712
   *Width: 44.5mm +/- 0.5mm (1.75")
   Weight: 16 lb Bond
   Max. Dia.: 83mm (3.27")
   Thickness: 0.07-0.20mm (max.) (0.0028-0.0079")

* Use of paper less than 88.9mm (3.5") wide on the MLP and 44.45mm (1.75") wide on the DLP may damage the print mechanism.

Paper Roll Core: Paper sensing mechanisms require that the core of the paper roll have an inside diameter of 11.10mm +/- 1.01mm (0.437" +/- 0.04") and an outside diameter of 22.25mm +/- 1.01mm (0.875" +/- 0.04").

3704 COMMUNICATIONS CONTROLLER

The 3704 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Controller	Maximum Lines *	Maximum Storage	Host Program	Comm Control Program
3704	32	64K	BTAM	EP
3705 II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-1	256	1024K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

* Maximum lines that can physically attach, CF3705 is required to determine actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

PURPOSE

The 3704 attaches to any S/370, 4300 Processor, or in 2701/2702/2703 Emulation Mode only, to S/360 models 30 (submodels E or F), 40, 50, 65, 67 (in 65 mode), 75 and 195 for communication with local or remote I/O devices over various common-carrier provided or customer-owned communication facilities.

Note: See "Programming" and "SCP" pages for attachment capabilities.

MODELS

The 3704 is available in four models:

Model		Storage (bytes)	Maximum Communication Lines
A1	A01	16K	32
A2	A02	32K	32
A3	A03	48K	32
A4	A04	64K	32

Prerequisites: The 3704 requires a control unit position on a processor's Byte Multiplexer Channel. See the machine pages of the processor to which the 3704 will attach.

HIGHLIGHTS

The 3704 is a modular, programmable unit which greatly expands the communications capabilities of S/360, S/370, 30XX, 4300 Processors. By virtue of its modularity and programmability, the 3704 boasts a high degree of flexibility in tailoring to a teleprocessing system's requirements.

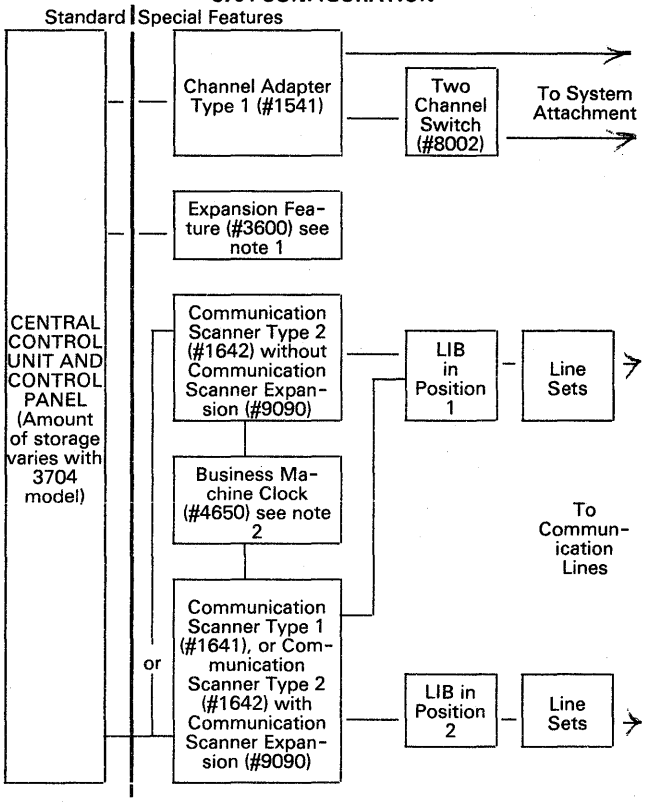
The 3704 is housed in a 36x24x57-inch cabinet which contains the Central Control Unit (CCU), the Control Panel (CP), storage (as indicated above), a Channel Adapter (CA), a Communication Scanner (CS), Line Interface Bases (LIB), and Line Sets (LS) to allow attachment of up to 32 communications lines.

The maximum number of communication lines attachable is a function of the speed of the lines, the CS installed and the mode of operation.

The HONE Configurator is available to assist in configuring the 3704 to the requirements of a specific TP network.

Customer Responsibilities: See the M2700 pages. Also see the 3704/3705 Programming pages for attachment capability, and the host systems programming pages for possible restrictions to the above.

3704 CONFIGURATION



Notes:

1) Required for mdls A2, A3 and A4, or CS Type 2 (#1642) on mdl A1.

2) A minimum of one Business Machine Clock (#4650) is required. See "Special Features".

Communication Facilities : The 3704 operates over common-carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

3704 Local Attachment (Start/Stop): In addition to terminals being attached to the 3704 through common carrier-provided facilities, they may also be connected directly to the 3704 using LS Type 1C (#4713). The cable groups selected from the *Physical Planning Manuals* or the device must have the 25-pin data set interface. LS Type 1C (#4713) allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding Business Machine Clocks (BMC) in both the terminal and the 3704.

3704 Local Attachment (Synchronous): In addition to the synchronous terminals being attached to the 3704 throughcommon-carrier-provided facilities, they may also be connected directly to the 3704 using LS Type 1F #4716. The cable groups selected from the *Physical Planning Manuals* for the device must have the 25-pin data set interface. LS Type 1F #4716 allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding BMCs in both the terminal and the 3704.

3704 Line Interface Bases: Communication lines are attached to the 3704 through 'LIBs', of which there are several different types, to accommodate the various types of line terminations. Depending on type, these LIBs will house from one to eight "Line Sets" each, which will allow the attachment of from one to 16 communication lines. The 3704 will accommodate a maximum of two of these LIBs, allowing up to 32 lines to be attached. **Note:** The LIB position in the 3704 must be specified. See 'LIB Position Designator' following special feature #1642.

Bibliography: S/360 -- GC20-0360 ... S/370 -- GC20-0001

SPECIFY

- Voltage (AC, Single phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V. If a 4.3 meter (14 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) power cable. **Field Installation:** Not recommended.
- For mdls A2, A3 or A4, Expansion Feature **#3600** is required. See "Special Features".

3704 Communications Controller (cont'd)

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white. **Field Installation:** Not recommended.
- Prior to submitting an MES order, the FE Branch Manager should be consulted for any software/hardware compatibility requirements resulting from order.
- Cabling: Specify **#9080** for below floor, or **#9081** for on the floor.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Two-Channel Switch (#8002): Provides for the attachment of a 3704 CA Type 1 (#1541) to two S/360, S/370, 303X, 4331 or 4334 Processor channels (which may be on the same processor, or on two different processors). The CA so equipped will, however, be capable of operation on only one channel at a time. A manual switch on the CP selects the channel which is to be made operable. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1541.

Unit Protection (#8510): Provides a lock on the 3704 which deactivates all switches (except power-off and power-on) when key is removed. Two keys are included. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Channel Adapter Type 1 (#1541): Provides for communication with a S/360, S/370, 303X, 4300 Processor Byte Multiplexer Channel. All such communications are accomplished via 1, 2, 3 or 4-byte transfers, with de-selection and re-selection between each transfer. Data transfer rates are primarily dependent on the 3704's internal processing requirements. **Maximum:** One. **Field Installation:** Yes.

Communication Scanner Type 1 (#1641): Provides the interface between the communication line attachment features and the Central Controller. The CS Type 1 (#1641) uses the 3704 interrupt facilities to allow the program to perform character assembly and disassembly, and allows for program control of line control, control character recognition, code translation and error recovery functions. **Limitations:** This Scanner may not be installed if a CS Type 2 is to be installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** At least one #4650.

Communication Scanner Type 2 (#1642): Provides the interface between the communication line attachment features and the Central Controller. The CS Type 2 (#1642) assembles and disassembles characters automatically, provides character buffering for each line and allows for program control of line control, control character recognition, code translation and error recovery functions. The basic scanner is operational with one LIB Type A1 only. **Limitations:** This scanner may not be installed if a CS Type 1 is to be installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** At least one #4650 and #3600. **Specify:** CS Expansion (**#9090**) to permit installation of two LIBs of any types except two LIB Type 1s (#4701). **Note:** See "Specify" section for CSB II additional attachment capability.

LIB Position Designator: The position of the LIBs within the 3704 must be specified in accordance with the table below:

	Communication Scanner Type 1 (#1641)		Communication Scanner Type 2 (#1642)	
LIB TYPE	Position 1	Position 2	Position 1	Position 2
1	----	----	#9501	#9502
1	#9311	#9312	#9511	#9512
8	#9381	#9382	#9581	#9582
9	#9391	#9392	#5991	#5992
10	#9401	#9402	#9701	#9702

The LIBs *should* be assigned to position in numerical order: that is, LIB Type A1s *should* be assigned to the lowest numbered positions, LIB Type 1s next lowest, etc., so that the highest type numbered LIB is in the highest numbered position. Each order submitted must indicate the Feature number for each LIB desired plus a location specify code (position number, from above table) based on the LIB Type.

The positions of the line sets within the LIB will be automatically assigned.

Cables: The cables that are included in each line set (except **#4719**) are listed in the *IBM Input/Output Equipment Installation Manual - Physical Planning*, GC22-7064. These cables must be ordered separately from the 3704 order on a cable order.

To obtain cables longer than 15 meters (50 feet), select the required cable below and order the cable assembly P/N and the required cable length in meters. These longer cables are ordered by P/N on an MES. The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file for prices.

To order a cable for a RS-232-C/CCITT V.24 Modem Interface Attachment:

Duplex (Line Set Type 1H **#4714**)
Order cable assembly P/N **1785928**
(See Note 1)

Half Duplex (Line Set Type 1D **#4714**)
Order cable assembly P/N **1785929**
(See Note 1)

To order a cable for a Autocall Originate (RS-366-A/CCITT V.25) Attachment:

(Line Set Type 1E **#4715**)
Order cable assembly P/N **1753439**
(See Note 2)

Note 1: Maximum Length: 30 meters (100 feet).

Note 2: Maximum Length: 45 meters (150 feet).

Expansion Feature (#3600): Required for mdls A2, A3, and A4 or CS Type 2 (#1642) on mdl A1. **Maximum:** One. **Field Installation:** Yes.

Business Machine Clock (#4650): Provides clocking when the attached external modem or internal IBM line adapter does not provide this clocking. The speed of this clocking must be specified for each Business Machine Clock (#4650) ordered from the following table:

Speed (bps)	Specify
100	**#2716**
110	**#9605**
134.5	**#9606**
200	**#2717**
300	**#9612**
600	**#9607**
1200	**#9608**
2400	**#9610**

Limitations: Required only when modem does not provide clocking except that each CS requires at least one BMC, which must be at a speed less than one-half that of the lowest speed modem clocked line. **Maximum:** Four per CS Type 1 (#1641) or Type 2 (#1642). **Field Installation:** Yes. **Prerequisites:** #1641 or #1642. **Note:** Individual BMCs may be assigned by the program to one or more communication lines.

Line Interface Base Type A1 (#4700): For attachment of up to four LSs 1A, 1C, 1F, 1E, or 1D in any combination. **Limitations:** See CS Type 2 (#1642). When installed in combination with other type LIBs, the maximum of two applies to the total number of LIBs. **Maximum:** Two if CS Expansion (**#9090**) is specified with CS Type 2 (#1642). Without (**#9090**), maximum is one. **Field Installation:** Yes. **Prerequisites:** #1642.

Line Interface Base Type 1 (#4701): Provides for the attachment of up to eight LS 1A, 1C, 1D, 1F. **Limitations:** When installed in combination with other type LIBs, the maximum of two applies. **Maximum:** Two with CS Type (#1641); one with CS Type 2 (#1642). **Prerequisites:** #1641 or #1642 with **#9090. Field Installation:** Yes.

Line Interface Base Type 8 (#4708): Provides for the attachment of up to two Modem Attachment Bases - 1200 bps (**#5103**). **Limitations:** When installed in combination with other type LIBs, the maximum of two applies to the TOTAL number of LIB. **Maximum:** Two per 3704. **Field Installation:** Yes. **Prerequisites:** #1641 or #1642 with CS Expansion (**#9090**).

Line Set Type 1A (Low-Speed External Line Interface) (#4711): Provides for the attachment of two start/stop communication lines at speeds up to 1200 bps, each of which has an EIA RS-232-C interface for attachment to an external modem. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650), assigned by the program to this LS.

Line Set Type 1C (Low-Speed Local Attachment) (#4713): Provides for the local attachment of two half-duplex IBM Start/Stop terminals at speeds up to 1200 bps via IBM-provided cables. Modems are not required. **Note:** The attached terminal must provide a BMC and external modem cable to which the 3704 LS 1C cable will connect. Total cable length must not exceed 200 feet. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's clock.

Line Set Type 1D (Medium-Speed External Line Interface) (#4714): Provides for the attachment of two start/stop or synchronous communication lines at speeds up to 9600 bps, each of which has an EIA RS-232-C interface for attachment to an external modem. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4700) or four per LIB Type A1 (#4701). **Field**

3704 Communications Controller (cont'd)

Installation: Yes. **Prerequisites:** #4701 or #4700. **Note:** For speeds in excess of 4800 bps, see Address Substitution and Scan Limits under "Specify" .

Line Set Type 1E (Auto Call Unit) (#4715): Provides two RS-366 interfaces for attachment of external automatic calling units. **Limitations:** When installed in combination with other type LSs, the below maximums apply to the total number of LSs per LIB. **Maximum:** Eight per LIB Type 1 (#4701) or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700.

Line Set Type 1F (Medium-Speed Local Attachment) (#4716): Provides for the local attachment of two half-duplex, synchronous IBM terminals at speeds up to 2400 bps via IBM-provided cables. Modems are not required. This LS requires different cable groups depending upon terminal type. For cabling information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004; for Remote, see *Multiplexers,* GA27-3006. **Note:** The attached terminal must be equipped with a BMC, and must provide a standard external modem cable to which the 3704 LS 1F external cable will connect. Total cable length must not exceed 100 feet. **Limitations:** When installed in combination with other LSs, the maximum below applies to the total number of LSs per LIB. **Maximum:** Eight per LIB Type 1 or four per LIB Type A1. **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's BMC.

Line Set Type 1J (#4719): [External Mil Std 188C Modem] For attachment of one start/stop or synchronous communication line at a speed of up to 50.0K bps via an external modem having an interface that conforms to the requirements in Section 7.2.1 of Mil Std 188C. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #4700 and #1642. CS Type 2 (#1642). If CS Expansion **#9090** is ordered with #1642, see "Address Substitution" under "Specify".

Line Set Type 8A (1200 bps Leased Integrated Modem) (#4781): Provides for the attachment of one start/stop line up to 600 bps or one synchronous line at 1200 bps. This line set includes one 1200 bps Integrated Modem. No external modems are required. This integrated modem must communicate with another 1200 bps Integrated Modem. **Limitations:** When installed in combination with LS Type 8B, the maximum below applies to the total number of lines per Modem Attachment Base (#5103). **Maximum:** Two per Modem Attachment Base - 1200 bps (#5103). **Field Installation:** Yes. **Prerequisites:** #5103 and a Business Machine Clock (#4650) assigned by the program to this LS.

Line Set Type 8B (1200 bps Switched Integrated Modem) (#4782): For attachment of one start/stop switched line at speeds up to 600 bps or one synchronous switched line at speeds of 600 bps or 1200 bps. This feature is to be used in conjunction with the Public Switched Network via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. This LS includes one 1200 bps Switched Line Modem with Automatic Answer capability ... no external modem is required. *This integrated modem must communicate with another 1200 bps Integrated Modem.* **Limitations:** When installed in combination with LS Type 8A, the maximum of two applies to the total number of lines per Modem Attachment Base (#5103). **Maximum:** Two per Modem Attachment Base - 1200 bps (#5103). **Field Installation:** Yes. **Prerequisites:** #5103 and a Business Machine Clock (#4650) assigned by the program to this LS.

Modem Attachment Base 1200 bps (#5103): Provides for the attachment of up to two of LSs 8A, 8B, or 8D (in any combination). **Maximum:** Two per LIB Type 8 (#4708). **Field Installation:** Yes. **Prerequisites:** #4708.

MODEL CONVERSIONS

May be made in the field.

ACCESSORIES

Keys: A 3704 with Unit Protection (#8510) is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

SUPPLIES (None)

3705 COMMUNICATIONS CONTROLLER

[*3705-I Models A, B, C, D are no longer available*]

The 3705 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Controller	Maximum Lines *	Maximum Storage	Host Program	Comm Control Program
3705-II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3704	32	64K	BTAM	EP
3725-1	256	1024K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

* Maximum lines that can physically attach, CF3705 is required to predict actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

PURPOSE

The 3705-II attaches to all S/370, 30XX, 4331 or 4341 Processors or, in 2701/2702/2703 Emulation Mode only, to S/360 models 40, 50, 65, 67 (in 65 mode), 75 and 195 for communication with local or remote I/O devices over various common carrier-provided or customer-owned communication facilities.

MODELS

The 3705 consists of the following models based on either the number of frames and/or the storage capacity:

Model E1 - H8	Storage
E1, F1, G1, H1	32K
E2, F2, G2, H2	64K
E3, F3, G3, H3	96K
E4, F4, G4, H4	128K
E5, F5, G5, H5	160K
E6, F6, G6, H6	192K
E7, F7, G7, H7	224K
E8, F8, G8, H8	256K
J1, K1, L1	320K
J2, K2, L2	384K
J3, K3, L3	448K
J4, K4, L4	512K

3705-II models E01 through H08 consists of monolithic storage with a cycle time of 1.0 microseconds. 3705-II models J01 through L04 consists of monolithic storage with a cycle time of 900 nanoseconds.

The model numbering of the 3705 is 'x' 'y'. The 'x' is an alpha code designating the number of frames in a 3705; E represents one frame, F or J two, G or K three, and H or L is four frames for 3705-II; 'y' is numeric code designating the storage size.

In the 3705-II (models E, F, G and H), the storage is housed only in the first frame, which has up to eight increments of monolithic storage. The 3705-II, models J, K and L have 256K of storage in the first frame and 64K in the second frame. Additional storage in 64K increments may be installed in the second frame for a maximum of 512K bytes.

Prerequisites:

Note: The HONE Configurator (AID CF3705) must be used to prepare the DP Order Guide before entering an order.

Host Processor Attachments:

The 3705-II requires a control unit position on a system channel, unless only the Remote Program Loader (RPL) feature is installed.

S/360 mdls 40, 50: Multiplexer Channel (standard). Attachment to S/360 is in 2701, 2702, 2703 emulation mode only.

S/360 mdls 65, 67 (65 mode), 75, 195: Multiplexer Channel of 2870. See M2870 pages. Attachment to S/360 is in 2701, 2702, 2703 emulation mode only.

S/370 mdls 115, 125: Multiplexer Channel (special feature). See M3115, M3125 pages.

S/370 mdl 135: Byte Multiplexer Channel (standard), Selector or Block Multiplexer Channel (special features). See M3135 pages.

S/370 mdl 135-3: Byte Multiplexer Channel (standard), or Block Multiplexer Channels (special feature). See M3135-3 pages.

S/370 mdl 138: Byte Multiplexer Channel (standard), or Block Multiplexer Channels (standard). See M3138 pages.

S/370 mdl 145: Byte Multiplexer or Selector Channel (standard), or Block Multiplexer Channel (special feature). See M3145 pages.

S/370 mdl 145-3: Byte Multiplexer Channel (standard), or Block Multiplexer Channels. See M3145-3 pages.

S/370 mdl 148: Byte Multiplexer Channel (standard), or Block Multiplexer Channels (standard). See M3148 pages.

S/370 mdls 155, 155-II, 158 and 158-MP: Byte Multiplexer or Block Multiplexer Channels (standard). See M3155, 3158 pages.

S/370 mdls 165, 165-II, 168, 168-MP, and 195: Selector Channel of 2860, Multiplexer Channel of 2870. Selector Subchannels (special features) of 2870, or Block Multiplexer Channel of 2880. See M2860, 2870, 2880 pages.

3031 Processor: Byte Multiplexer Channel (one is standard), Block Multiplexer Channels (five are standard). See M3031 pages.

3032 Processor: Byte Multiplexer Channel (one is standard), Block Multiplexer Channels (five are standard). See M3032 pages.

3033 Processor: Byte Multiplexer Channels (two are standard), Block Multiplexer Channels (ten are standard). See M3033 pages.

3081, 3083, 3084 Processor: Byte Multiplexer Channels, Block Multiplexer Channels. See M3081, 3083, 3084 pages.

4331 Processor: Byte Multiplexer Channel (special feature). See M4331 pages.

4341 Processor: Byte Multiplexer Channel (standard). See M4341 pages.

Note: The 3705-II attaches to a S/360 with a minimum of 128K bytes of storage.

Note: See "Programming" and "SCP" pages for attachment capability.

HIGHLIGHTS

A modular, programmable unit which expands the communications capabilities of S/360, S/370, 30XX, 4331 or 4341 Processors. By virtue of its modularity and programmability, the 3705 boasts a high degree of flexibility in tailoring to a teleprocessing system's requirements. Also, it can relieve the Processor of many TP functions, including, but not limited to, line control, polling, addressing, code translation and error recovery. The maximum number of communication lines which can be physically attached to a 3705 is 352 lines; but, the maximum number of communication lines capable of concurrent operation is a function of the speed of the lines, the type of Channel Adapter (CA), memory size, the Communication Scanner (CS) installed and the programming mode of operation. The maximum number of lines which can be physically installed can exceed the operational capability, see "Specify" for "special scheduled" systems. The 3705-II mdls E01 through H08 have a 1.0 microsecond storage cycle time, the 3705-II mdl J01 through L04 have a 900 nanosecond storage cycle time.

The 3705-II mdls J, K, and L require ACF/NCP/VS Release 2 and all following releases unless otherwise specified.

Communication Facilities: The 3705 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

3705 Local Attachment (Synchronous): In addition to the synchronous terminals being attached to the 3705 through common carrier -provided facilities, they may also be connected directly to the 3705 using LS Type 1D (LS1D) (#4714). addition to the synchronous terminals being attached to There must be corresponding Business Machine Clocks (BMC) in both the terminal and the 3705.

3705 Local Attachment (V.35): Terminals may be attached locally to the 3705 using LS1W (#4727) (half-duplex) or LS1Z (#4728) (duplex) V.35 interfaces. No BMC is required in the attached device since clocking signals are provided by BMC(#4651) in combination with (#4727) or (#4728).

Customer Responsibilities:

See M2700 pages. See also the 3704/3705 Programming pages for attachment capability and refer to Host Systems Programming pages for possible restrictions to the above attachments.

Machine Organization: The basic machine consists of the Central Control Unit (CCU) with storage (32K in the 3705-II) and an operator's control panel.

A minimum machine configuration must have, in addition to the base unit, the following features:

(1) Either a Channel Adapter (CA) feature or the Remote Program Loader (RPL) feature. The CA requires different levels of processing overhead and thus yield different performance capabilities.

(2) A Communication Scanner (CS) feature to provide for the connection between the Attachment Base (AB) feature and the Line Interface Base(s) (LIBs) features. Like the CAs, the various

3705 Communications Controller (cont'd)

CSs have varying degrees of performance due to the different levels of processing overhead.

(3) An AB which provides a common connection between the CSs and the CCU.

(4) A LIB which provides the connection between the CS and the various LSs. The LIB provides the hardware for the mounting of the individual LSs. Each LIB is designed for a certain set of functions in conjunction with the various LS.

(5) A LS which provides the electronics and external cables to interface to a communication facility.

Note: Both the external cables and the LSs are individually ordered. The number of LSs that can be contained in a LIB is contingent upon the electronic hardware of the LS required to perform the functions supporting the communications facilities. See Figure 3.

(6) A BMC which provides clocking of data in and out of CS.

Attachment Bases: The Attachment Base (AB) provides the physical and logical connection between the CA1 and the CCU, and between the CCU and the various CSs. There are two ABs. A 3705 must have at least one AB, and in some instances have two ABs.

Channel Adapter: The CA provides the logical interface between a 3705 and with defined host processor. Every 3705 must have at least one CA in the first frame (except those units having the RPL (#6260). CA1 can only be placed in the first frame of a 3705. When the second CA is a Type 2 or Type 3, then "ROS Substitution" must be specified on the first frame (3705), specify **#9754.** When there are two or more CA4s and the ACF/NCP/VS Program Product or EP/VS with PRPQ #P85032 is installed, then "N ROS Substitution" must be specified in every frame in which a CA4 is present, specify **#9566.**

When ordering or removing a CA, use the specify to indicate total number of CAs in the 3705 and 3706 combined and place this specify on the first 2 frames (3705 and first 3706).

if 1 CA, specify **#9201** if 3 CAs, specify **#9203**
if 2 CAs, specify **#9202** if 4 CAs, specify **#9204**

These "specifies" are required on the first two (2) frames whenever a CA is *added to* or *removed from* either frame.

External Cables: All CAs need external cables which must be ordered separately from the CA features. **Limitations and Prerequisites:** The 3705-I (first frame) can contain one CA Type 1, 2, 3, or 4. The 3706 (second frame) can contain one CA Type 2, 3, or 4.

3705-II (first frame) can contain two CSs. The 3706 (second frame) can contain two CSs.

When operating with ACF/NCP/VS the 3705-II (first frame), can contain two CAs. The 3706 (second frame) can contain two CAs. If two CSs are in one frame (3705-II), at least one of the adapters must be CA4. When operating with greater than one CA4 and EP/VS with PRPQ #P85032, two CA4s can be in the same frame. Note: EP 3.0 standalone only supports one CA4 in each frame.

No CSs are allowed in the third or fourth frame.

The CSs can be mixed with the following exceptions:

- When CA4 is in the same machine with either a CA2 or a CA3, then the CA4 would be in the first frame.
- The CA1 cannot be in a machine with either a CS3, CS3HS, or CA4. The CA1 is not available on a 3705 mdl J, K, or L.
- Emulation Mode requires either a CA1 or a CA4 connected to a byte multiplexer channel.
- CA2 and CA3 are used only with Network Control mode of the Network Control Program.
- For the 3705-II, if greater than two CAs are installed, the CAs must all be CA4s. Up to four CA4s are allowed.
- For the 3705-II, up to four I/O Channel Attachments are allowed (two per frame).
- For the 3705-II, Remote Program Load-II Feature (#6261) can coexist with a CA.
- For the 3705-II, if two CAs in the same frame, then no Two-Channel Switch (#8002) is allowed.
- Dual ROS need not be removed when total CAs are reduced to a single CA in the entire machine.

CA1 requires the AB1 as a prerequisite. CA2, CS3, and CS4 contain the AB function within their respective features.

The placement of various RPL/CA and CA configurations is as follows:

3705		3706	
LIB Pos. 3 RPL CA-4 (B1)	LIB Pos. 2 (A1)	LIB Pos. 3 (B1)	LIB Pos. 2 (A1)
LIB Pos. 4 CS-3 CS-3HS (B2)	LIB Pos. 1 (A2)	LIB Pos. 4 CS-3 CS-3HS (B2)	LIB Pos. 1 (A2)
CCU (B3)	CS-2 CS-3 CS-3HS (A3)	LIB Pos. 5 (B3)	CS-2 CS-3 CS-3HS (A3)
CCU (B4)	CA-1 CA-2 CA-3 CA-4 (A4)	CA-4 LIB Pos. 6 (B4)	CA-2 CA-3 CA-4 (A4)

Note: CS-3 takes two positions.

Allowable Hardware Channel Adapter Configurations:

1st CA Type	2nd CA Typ	3rd CA Type	4th CA Type	ROS Type	Frame Location 1st CA	2nd CA	3rd CA	4th CA	ROS Specify Code
1**	-	-	-	1	3705	-	-	-	-
1**	2	-	-	Dual	3705	3706	-	-	**#9754**
1**	3	-	-	Dual	3705	3706	-	-	**#9754**
2	-	-	-	2	3705	-	-	-	-
2	2	-	-	Dual	3705	3706	-	-	**#9754**
2	3	-	-	Dual	3705	3706	-	-	**#9754**
3	-	-	-	2	3705	-	-	-	-
3	2	-	-	Dual	3705	3706	-	-	**#9754**
3	3	-	-	Dual	3705	3706	-	-	**#9754**

Allowable Hardware Channel Adapter Configurations (cont'd)

1st CA Type	2nd CA Typ	3rd CA Type	4th CA Type	ROS Type	Frame Location 1st CA	2nd CA	3rd CA	4th CA	ROS Specify Code
4	-	-	-	1	* 3705	-	-	-	-
4	2	-	-	Dual	* 3705	3705	-	-	**#9754**
4	2	-	-	Dual	* 3705	3706	-	-	**#9754**
4	3	-	-	Dual	* 3705	3706	-	-	**#9754**
4	4	-	-	1	* 3705	3705	-	-	-
4	4	-	-	1	* 3705	3706	-	-	-
4	4	-	-	N	* 3705	3705	-	-	**#9566**
4	4	-	-	N	* 3705	3706	-	-	**#9566**
4	4	4	-	N	* 3705	3705	3706	-	**#9566**
4	4	4	-	N	* 3705	3706	3706	-	**#9566**
4	4	4	4	N	* 3705	3705	3706	3706	**#9566**

* Available only on 3705-II.
** Not available on a 3705-II J, K, L mdls.

Definition of the different ROS types:

(1) "1" ROS type 1 is used to IPL over one channel either a CA1 or CA4. In addition, when 2 CA4s are installed, the IPL Source Switch must be used to select which channel is to do the IPL with a ROS type 1. No specify code is required for ROS type 1. See N ROS to allow for IPL over any CA4.

(2) "2" - used to IPL over only one channel, either a CA2 or CA3. No specify code is required for the Type 2 ROS.

(3) DUAL ("ROS Substitution") - used to IPL over one of two channels, using any appropriate combination shown above. Specify code **#9754** is required for DUAL ROS.

(4) N ("N ROS SUBSTITUTION") to be used only with CA4s. ACF/NCP/VS, or EP/VS allows for IPL over any CA4. (PRPQ #85032 is needed to go beyond 2 CA4s in EP). Specify code **#9566** is required for "N" ROS.

(5) RPL - used to IPL remotely. There is a separate ROS for the 3705-II remote. (Although remote is not mentioned on this page, it is listed here for convenience). No specify code is required for RPL ROS.

3705 Communications Controller (cont'd)

Allowable Hardware Channel Adapter Combinations with RPL/CA installed:

3705-II only

RPL	1st CA Type	2nd CA	3rd CA Type	ROS Type	Type	Frame Location 1st CA RPL	2nd CA	3rd CA
1	1	-	-	RPL/1	3705	3705	-	-
1	1	2	-	RPL/Dual	3705	3705	3706	-
1	1	3	-	RPL/Dual	3705	3705	3706	-
1	2	-	-	RPL/2	3705	3705	-	-
1	2	2	-	RPL/Dual	3705	3705	3706	-
1	2	3	-	RPL/Dual	3705	3705	3706	-
1	3	-	-	RPL/2	3705	3705	-	-
1	3	2	-	RPL/Dual	3705	3705	3706	-
1	3	3	-	RPL/Dual	3705	3705	3706	-
1	4	-	-	RPL/1	3705	3705	-	-
1	4	2	-	RPL/Dual	3705	3705	3706	-
1	4	3	-	RPL/Dual	3705	3705	3706	-
1	4	4	-	RPL/N	3705	3705	3706	-
1	4	4	4	RPL/N	3705	3705	3706	3706

Communication Scanner Features: The CS features provide the common logical connection between the various LIBs with their respective LSs and the CCU. Each frame of a 3705 must have a CS if LSs are placed within the frame. There are three CSs, each with a different performance capability.

Limitations:

1. One CS per frame. CS2 and CS3 can be placed within a 3705 in any combination.
2. A CS1 (#1641) can only be placed in the first frame of a 3705-I (cannot be placed in a 3705-II).
3. CS1 cannot be in a 3705 with a CS3 or CS3.
4. Each CS1 or CS2 must have at least one BMC, but not more than four BMCs. CS3 must have at least one BMC (specify **#9615**), and may have one additional clock (specify **#9609** or **#9610**).
5. CS3 only supports attachment of LIBs 1, 8,, 9 and 10.
6. CS3 cannot be in the first frame of a 3705-I.
7. A CS is required in a frame containing LIBs.
8. CS1 (#1641), cannot be installed with the NCP/VS Program Product.
9. CS3HS must have BMC, specify (**#9615**); no other clock is allowed.
10. CS3HS allows for the attachment of only LS1GA (#4722) or LS1TA(#4723).
11. Address Substitution is not allowed in a 3705 with a CS3HS (#1644). HSS is not allowed in conjunction with LS1GA and/or LS1TA.
12. The CS3 does not support Tributary support in EP 3.0.
13. The CS3HS can only be installed on a 3705-II.

Prerequisites: CS1 must have an AB1 in the 3705. CS2 and CS3, and CS3HS must have an AB2 in the 3705. A CS located in a particular frame requires a CS in each preceding frame. **Field Installation:** All scanners can be field installed.

Line Interface Base (LIB): LIBs are used to provide for the physical attachment of LSs in the 3705. LIB Type 1 must be placed in LIB position 1 if Address Substitution or HSS is to be required in the 3705. The LIBs with the highest speed lines should be placed in the lowest LIB positions (Position 1 is the lowest).

Maximum LIB Attachment Capability per Module ... figure 1

3705-I

	1st Module	2nd	3rd	4th	
CS 1	4	N/A	N/A	N/A	(Note 1)
CS 2	4	6	6	6	(Note 1)
CS 3	N/A	4	4	4	(Note 2)

3705-II

	1st Module	2nd	3rd	4th	
CS 2	4	6	6	6	(Note 3)
CS 3	3	4	4	4	(Note 2)
CS 3 H.S.	1	1	1	1	(Note 6)

Note 1: LIBs 1 through 12 can be attached to CSs Types 1 and 2 on the 3705-I.

Note 2: LIBs 1, 8, 9, and 10 will attach to the CS3 on the 3705-I or 3705-II (excluding LSs 1A, 1B and 1C).

Note 3: LIBs 1 through 12 will attach to the CS2 on the 3705-II.

Note 4: LIB capacity is limited by the number of CAs and/or the RPL feature. See RPL/CA Placement chart for available LIBs.

Note 5: LSs operating over 10K bps must be in LIB position 1.

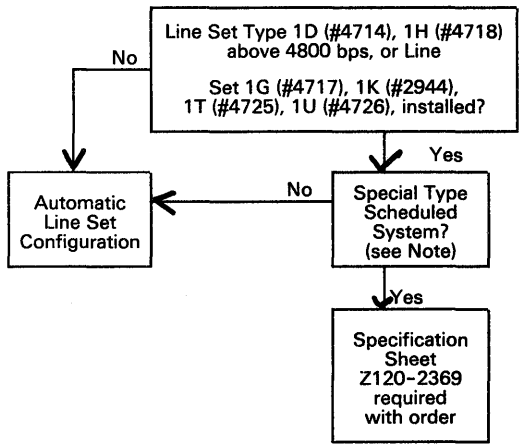
Note 6: The LS addresses for CS3 HS are 0 and 2. *ONLY* one LIB Type 1 can operate with a CS3 HS.

Limitations: When installed with other LIBs of the same or different type, the maximum cannot be exceeded. There are no restrictions on intermixing LIBs. **Prerequisites:** A CS is required in each frame containing LIB(s). **Field Installation:** All LIBs are field installable.

The LIBs must be assigned to a position in numerical order: that is, LIB Type 1s must be assigned to the lowest numbered positions, LIB Type 2s next lowest, etc., so that the highest type-numbered LIB is in the highest numbered position. The order as submitted then must specify a feature code *and* location specify code for each LIB to be installed.

The positions of the LSs within the LIB will, in most cases, be automatically assigned. To determine whether this automatic assignment is applicable, use the following flowchart:

(Normally the Specification Sheet, Z120-2369, should be used only if required by the flowchart below. If, however, specific positions for LSs are desired, even when the Automatic LS Configuration is suggested, fill out the Specification Sheet and submit it).



Note: A "Special Type Scheduled System" is one in which the 3705 is effectively servicing two different TP networks on a scheduled basis. That is, one set of communication lines is serviced in one time period and a second set of lines is serviced in a second time period *and there is no overlap of the two systems in time.*

Line Sets: LSs provide the electronic logic to meet the individual requirements of the communication facility. (See Figures 2 and 3 for attachment capability of LSs with respect to LIBs).

Note: All LSs require cables (except #4719). See "Cables" for further details. The numeric portion of the LS type number indicates the LIB type. Each LS type shown is for only one LS.

FIGURE 3: LIB-LINE SET CONFIGURATION CHART

Partition within LIB		1	2	3	4	5	6	7	8
Line Interface Address		0,1	2,3	4,5	6,7	8,9	A,B	C,D	E,F
LINE Type	SETS Description								
1D	HALF DUPLEX Low & Med. Speed External Modem	x x	- -	- -	- -	- -	- -	- -	- -
1D	DUPLEX Low and Med. Speed External Modem	T R	- -	- -	- -	- -	- -	- -	- -
1D	DIRECT ATTACH Synchronous	x x	- -	- -	- -	- -	- -	- -	- -
1E	Autocall Originate	A A	- -	- -	- -	- -	- -	- -	- -
1G	High-Speed External Modem	x .	- -	- -	- -	- -	- -	- -	- -
1GA	High-Speed External Modem	x .	- -	. .	. .	. .	. .	. .	. .
1J	External Mil Std 188 External Modem	x .	- -	- -	- -	- -	- -	- -	- -
1K	CCITT V.35								

3705 Communications Controller (cont'd)

	Interface	x . - - - - - - - - - - - - - -
1N	CCITT X.21 Non-Switched - half duplex - Medium Speed, SC 9842	x x - - - - - - - - - - - - - -
1N	CCITT X.21 Non-Switched - half duplex - High Speed, SC 9843	x . x x - - - - - - - - - - - -
1N	CCITT X.21 Non-Switched - duplex Medium Speed, SC 9842	T R - - - - - - - - - - - - - -
1N	CCITT X.21 Non-Switched - duplex High Speed, SC 9843	T . R . - - - - - - - - - - - -
1R	CCITT X.21 Switched duplex Medium Speed - SC 9840	T R - - - - - - - - - - - - - -
1R	CCITT X.21 Switched duplex High speed - SC 9841	T . R . - - - - - - - - - - - -
1S	CCITT V.35 Interface	x . - - - - - - - - - - - - - -
1T /1U	High-Speed Duplex External Modem	T . R . - - - - - - - - - - - -
1TA	High-Speed Duplex External Modem	T . R . . . .
1W	High-Speed Local Attachment w/o Modem HDX data	x . - - - - - - - - - - - - - -
1Z	High-Speed Local Attachment w/o Modem DPX data	T . R . - - - - - - - - - - - -
2A	Telegraph Single Current	x x - - - - - - - - - - - - - -
3A	Limited Distance Type 1 Line Adapter 2-wire	x x - - - - - - - - - - - - - -
3B	Limited Distance Type 1 Line Adapter 4-wire	x x - - - - - - - - - - . . . .
8A	1200 bps Leased Integrated Modem	x x - - - - . . . .
8B	1200 bps Switched Integrated Modem	x x x x x x . . . .
9A	1200 bps Switched Integrated Modem with Autocall Originate	x A x A . . . .
10A	1200 bps Leased Duplex Data Integrated Modem	T R - - - - - - - - - - . . . .

Note: If the line speed is over 10K bps, the LS must reside in line address positions 0, 2, 4 or 6 when attached to CS2 or reside in line address positions 0, 2, 4, 6, 8, A, C, or E when attached to CS3. Over 10K bps, the LSs must reside in the first LIB, when attached to CS2 or CS3.

Note: See Scan Limits, Address Substitution, and HSS under "Specify".

LEGEND:

A	Denotes an Autocall interface.
X	Denotes a transmit/receive address for a half-duplex line if installed.
.	Denotes an unused and unavailable address.
-	Denotes an unused and available address.
TR	Denotes a Transmit Receive line pair; uses two adjacent addresses.
T.R.	Denotes a Transmit Receive line pair; uses two adjacent even addresses.

Partition within LIB	1	2	3	4	5	6	7	8
Line Interface Address	0,1	2,3	4,5	6,7	8,9	A,B	C,D	E,F
LINE SETS Type Description								

Bibliography: GC20-0001

SPECIFY

- All 3705-IIs are to be ordered as follows:

  "E" mdls - order one 3705 mdl E1 through E8.

  "F or J" mdls - order one 3705 (any F or J mdl) *and* one 3706 (mdl code same as 3705) with **#9755** to designate first 3706.

  "G or K" mdls - order one 3705 (any G or K mdl) *and* two 3706s (mdl code same as 3705). Each 3706 must be ordered separately. On one 3706 order, specify **#9755** to designate the first 3706 and on the other one, specify **#9756** to designate second 3706.

  "H or L" mdls - order one 3705 (any H or L mdl) *and* three 3706s (mdl code same as 3705). Each 3706 must be ordered separately. On one 3706 order, specify **#9755** to designate first 3706, on another 3706, specify **#9756** to designate second 3706 and on third 3706, specify **#9757** to designate the third 3706.

  Note: The 3706 type number is to be specified at no charge, and is to be used only for internal IBM ordering and control purposes. Order the 3705 and each 3706 separately with all its associated features. Specify items for voltage, color, and cabling must be ordered on the 3705 and each 3706. The 3706 type number should never appear on any agreement.

  Note: When doing a model conversion, the Mdl I Frame Specify Code must translate to a Mdl II Frame Specify Code. The position must not be changed.

Position	Mdl I	Mdl II
2	**#9751**	**#9755**
3	**#9752**	**#9756**
4	**#9753**	**#9757**

  For Power Compatibility: RPQ S30251 (no charge) must be ordered with a 3706, if the 3705 to which it will attach is installed and has a serial number higher than 40000; otherwise, specify **#9820**.

  When transferring a 3706 in the field from a 3705 with a serial number lower than 40000 to a 3705 with a serial number higher than 40000, RPQ S30251 and removal of specify code **#9820** must be ordered for the 3706.

  When transferring a 3706 in the field from a 3705 with a serial number higher than 40000 to a 3705 with a serial number lower than 40000, specify code **#9820** and removal of RPQ S30251 must be ordered for the 3706.

  Note: The above will result in appropriate installation and removal of BM 1644026, which is required on 3706s with serial numbers lower than 50000 only when attached to a 3705 with a serial number higher than 40000.

  3705 Feature Change: To relocate LSs and/or LIBs from one frame to another on a leased machine, concurrently submit a MES order for each frame, and specify **#9544** on any order which contains reinstallations. Because specify code **#9544** cause all LSs and LIBs on an order to be shipped as documents only, any outright adds should be ordered on a separate order than one containing specify code **#9544**. The LIB positions must be kept contiguous on each frame.

  To relocate a LIB (and its associated LSs) within the same frame on a leased machine, indicate removal of that LIB position code, and indicate add of the desired LIB position code. Specify code **#9544** is not required for reinstallations within the same frame.

  If non-standard LS positioning is desired, specify **#9545**, submit a specification sheet (Form Z120-2369) and indicate same to the system when entering the order.

  Note: An MES may be a mix of LSs and/or LIB moves, moves within the same frame, moves to and/or from other frames in the same machine. If a specification sheet is submitted, enter the installed LIBs and LSs in the "F/C" column, enter the Add F/Cs in the "Required" column, and enter the Remove F/Cs in the "Not Required" column.

- Voltage (AC, 3 phase, 4 wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V. Field Conversion: Yes.

  If a 4.3 meter (14 feet) cable is not required, specify **#9986** for 1.8 meter (6 feet) cable.

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white. Not recommended for field installation.

- Address Substitution/Upper Limit Scan: For 3705s with a CS2, there are two methods of address modification: Upper Scan Limits

3705 Communications Controller (cont'd)

and Address Substitution, which allow the CS2 to operate a line set at speeds greater than 4800 bps. For information on USL, see the *IBM 3704 and 3705 Principles of Operation,* GC30-3004.

Address Substitution (#9001, #9002, #9003, #9004) : May be required when lines at speeds greater than 4800 bps are to be installed. Associated with the invocation by software, the Address Substitution capability allows multiple scanning of an LS's address at the expense of *not* scanning other LS addresses. The specify feature blocks the installation of a LS in those address positions that are *not* scanned by address substitution. The choice of which of the four following specify features is to be ordered should be based on the number of high-speed lines to be installed and their relative LS positions within the first LIB position. The lowest position (**#9001**) is always specified first, followed by each succeeding number. For those positions within a LIB where Address Substitution is invoked, only the even addresses are scanned. To allow installation of LSs in the "blocked positions", so that LSs can be used on a part time basis, do not specify the Address Substitution option.

Address Substitutions should not be specified when standard LS placement is desired on special scheduled systems which invoke address substitution SYGEN options only on a part-time basis.

#9001 - Blocks installation of a LS in partition 8 (both 3705 and 3706s) on all Type 1 and Type 2 LIBs. Specify **#9001**

when the *first* LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.

#9002 - Blocks installation of a LS in partition 7 (3705 and 3706s) on all Type 1 and Type 2 LIBs. Specify **#9002** when the *second* LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.

#9003 - Blocks installation of a LS in partition 6 (3705 and 3706s) on all Type 1, Type 2, Type 3 and Type 10 LIBs. Specify **#9003** when the *third* LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.

#9004 - Blocks installation of a LS in partition 5 (3705 and 3706s) on all Type 1, Type 2, Type 3 and Type 10 LIBs. Specify **#9004** when the *fourth* LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.

Maximum: One each of the above per 3705 and 3706. **Limitations:** The same specify feature should be ordered on all associated 3706(s) when a 3705 requires Address Substitution. **Prerequisites:** #1642. **Field Installation:** Yes.

Note: When Address Substitution is specified, it will block LS installation in all LIBs in the 3705 and associated 3706(s), and therefore, will reduce the physical line handling capability of the 3705. See *IBM 3704/3705 Communications Controller, Principles of Operation,* GC30-3004, for further details.

Address Substitution should not be used on a 3705 containing a CS1 or CS3.

Note: When CS3 High-Speed (#1644) is in a 3705, the Address Substitution cannot be used by any scanner in the 3705. High-Speed Select cannot be employed with LS 1TA or 1GA.

High-Speed Select:

For the 3705 with a CS3 there are two methods of address modification: Upper Scan Limits (USL) and High-Speed Select (HSS), which allow the CS3 to operate with LS speeds greater than 4800 bps. For information on USL, see the *IBM 3704 and 3705 Principles of Operation, GC30-3004.*

HSS (**#9011, #9012, #9013, #9014, #9015, #9016, #9017, #9018**) may be required when lines at speeds greater than 4800 bps are to be installed. The specify feature blocks the installation of a LS in a position whose address is not scanned. The choice of which of the eight following specify features is to be ordered should be based on the number of high-speed lines used and their relative positions within a LIB position. For those positions within a LIB where High-Speed Select is invoked, only the even addresses are scanned.

#9011 - Blocks installation of a LS in partition 1 of the additional LIBs within a 3705 or 3706 module. Only the 3705 or 3706 module containing the high-speed line is affected.
#9012 - Blocks installation of a LS in partition 2
#9013 - Blocks installation of a LS in partition 3
#9014 - Blocks installation of a LS in partition 4
#9015 - Blocks installation of a LS in partition 5
#9016 - Blocks installation of a LS in partition 6
#9017 - Blocks installation of a LS in partition 7
#9018 - Blocks installation of a LS in partition 8

Note: When HSS is specified, it will restrict LS installation in all LIBs (except LIB position 1) of the 3705 or 3706 which has the scanner modification implemented. See *IBM 3704/3705 Principles of Operation,* GC30-3004, for further details. **Prerequisites:** CS3 (#1643). **Maximum:** One each of the above per CS3 (#1643). **Limitation:** None. **Field Installation:** Yes.

- Cabling: **#9080** for below floor, or **#9081** for on floor.
- A Communication Cable Order must be submitted for: Each new 3705 or 3706 machine order; each MES order where the added feature requires external cable.
- Prior to submitting an MES order, the FE Branch Manager should be consulted for any software/hardware compatibility requirements resulting from the order.
- 3705 Specification Sheet: A completed sheet (Z120-2369) *may* be required. See "Line Attachment Configurator" in the Special Features section.
- Cables: The cables that are included in each line set (except **#4719**) are listed in the *IBM Input/Output Equipment Installation Manual - Physical Planning,* GC22-7064. These cables must be ordered separately from the 3705 order on a cable order.

To obtain cables longer than 15 meters (50 feet), select the required cable below and order the cable assembly P/N and the required cable length in meters. Theselonger cables are ordered by P/N on an MES.

The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file

for prices.

To order a cable for a CCITT V.35 Interface Modem Attachment:

Duplex (Line Set Type 1U **#4726**)
Order cable assembly P/N **1648394**
(See Note 1)

Half-Duplex (Line Set
1S **#4720**)
Order cable assembly P/N **5997479**
(See Note 1)

To order a cable for a Autocall Originate (RS-366-A/CCITT V.25) Interface Attachment:

(Line Set Type 1E **#4715**)
Order cable assembly P/N **1753439**
(See Note 2)

Note 1: Maximum Length: 30 meters (100 feet)

Note 2: Maximum Length: 45 meters (150 feet)

To order a cable for a EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The 3705 can now support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 15 meters (50 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications.

To connect a cable longer than 15 meters (50 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier:

   A 3863 or 3864 or 3865 modem which does *not* have Data Multiplexer #3260 installed must have EC **344120** installed.

   A 3865 modem with Data Multiplexer #3260 installed must have EC **323406** installed.
3. Order a Duplex or Half-Duplex Cable:

   Duplex (Line Set 1D or 1H **#4714** or **#4718**, order cable assembly P/N 1785928. (See Note 1.)

   Half-Duplex (Line Set 1D **#4714**, order cable assembly P/N 1785929. (See Note 1.)

   Note 1: Maximum length 100 meters (328 feet).

3705 Communications Controller (cont'd)

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Remote Power - Off (#6250): Provides the capability of turning the 3705-II power off with a command over a communication line. This feature is applicable to the 3705-II when the 3705-II is utilized only as a remote stand-alone. **Maximum:** One per 3705-II. **Field Installation:** Yes. **Prerequisites:** #6261.

Remote Program Loader-II (#6261): Provides the means of remotely loading the NCP with or without a CA on the machine. **Maximum:** One per 3705-II. **Limitations:** For the 3705-II, cannot be installed with four CA4s (#1544), but any other proper CA combination (see CA section) is acceptable; also, the RPL-II feature on the 3705-II cannot be installed with #4705 or #5001 unless there is a CA also installed. **Field Installation:** Yes.

Two-Channel Switch (#8002): To attach either #1541, #1542 or #1544 to two defined host Processor channels, which may be on the same CPU or on two different CPUs. The CA so equipped will, however, be enabled for operation on one channel at a time. Selection of which channel is to be operable is by a manual switch on the control panel. **Maximum:** One per CA. **Limitations:** If two CAs are in the same frame, then no #8002 is allowed; otherwise, one #8002 per CA. **Field Installation:** Yes. **Prerequisites:** #1541 or #1542 or #1544.

Unit Protection (#8510): Provides a lock on the 3705 that deactivates all push buttons, mode select switches, and diagnostic rotary switches on the control panel when the key is removed from the lock, channel enable/disable, function select rotary switches and power on/off are unaffected. This is included on all models. For additional or replacement keys, see "Accessories". **Maximum:** One per 3705. **Limitations:** None. **Field Installation:** Yes. **Prerequisites:** None.

COMMUNICATIONS FEATURES

Attachment Base Type 1 (#1301): Provides interface logic for CA1 and/or the CS1. **Limitations:** #1301 is needed on the 3705-II only when used in conjunction with #1541. No more than one #1301 or #1302 per 3705. **Field Installation:** Yes.

Attachment Base Type 2 (#1302): Provides interface logic for CS2, CS3, and CS3HS. **Limitations:** #1302 is required for CS2, CS3 or CS3HS. No more than one #1301 or #1302 per 3705. **Field Installation:** Yes. **Note:** CA2, CA3, and CA4 contain the AB logic within the logic of their respective features.

Channel Adapter Type 1 (#1541): For communication with the defined host processor Byte Multiplexer Channel. All such communications are accomplished via 1, 2, 3 or 4-byte transfers, with deselection and reselection between each transfer. Data transfer rates are primarily dependent upon the 3705's internal processing requirements. **Maximum, Limitations, Prerequisites:** See above general description. **Field Installation:** Yes.

Channel Adapter Type 2 (#1542): A high-performance adapter for NCP mode only, which supports communication with a defined host processor's Byte Multiplexer, Block Multiplexer, or Selector Channel, at data transfer rates of up to 276 KB bytes/second (limited by system channel capability). Transfer is always accomplished in "burst" mode, with a 2-byte "burst" standard on the Byte Multiplexer Channel, full "burst" standard on the Block Multiplexer and Selector Channels. **Maximum, Limitations, Prerequisites:** See general description under "Highlights". **Field Installation:** Yes.

Channel Adapter Type 3 (#1543): An adapter of the same performance characteristics as the Type 2 (#1542) with the additional capability of an automatic two-processor switch. It communicates with a defined host processor's Byte Multiplexer, Block Multiplexer, or Selector Channel (mdls 115 and 125 excepted). The switch, part of the basic adapter, is primarily designed to furnish symmetric support for two tightly-coupled processors; i.e., each side of the switch is connected to one of the two MP CPUs. Additionally, this Adapter can be attached to two channels from one CPU to provide alternate path capability. For either tightly-coupled multiprocessor or single CPU attachments, data transfer occurs on only one path at a time. Included as standard is a remote switch attachment capability to remotely control the switch from the configuration control panel of a S/370 Mdl 158 MP or 168 MP, as well as from the 2925 mdl 10 Remote Switching Console. **Maximum, Limitations, Prerequisites:** See general description under "Highlights". **Field Installation:** Yes.

Channel Adapter Type 4 (#1544): Provides attachment to defined host processor's Byte Multiplexer, Block Multiplexer or Selector Channel. It supports either a high-performance Emulation Program running with a CS3HS, a CS2 or CS3 or a high-performance Network Control Program running the same scanners. When attached to a byte multiplexer channel, the CA4 transfers bytes in "bursts" of up to 32 bytes prior to interrupting the control program when running in EP mode. In ACF/NCP/VS mode, the CA4 transfers in "bursts" up to 16 bytes and can transfer up to 248 bytes prior to interrupting the control program. In ACF/NCP/VS mode, when attached to a defined host processor's Block Multiplexer or Selector Channel, the CA4 "bursts" up to 248 bytes and can transfer up to 248 bytes prior to interrupting the control program. When the CA4 is supported using the ACF/NCP/VS Program Product, the CA operates in a cycle steal mode (data is directly moved to or from storage, and after this is accomplished, the control program resumes its operation at the completion of this stolen cycle unless another "cycle steal" request is pending). The cycle steal operation improves the 3705 throughput when compared with NCP/VS support of CA4 by reducing the number and complexity of control program interrupts. When attached to a byte multiplexer channel and supported by NCP/VS, the CA4 transfers in bursts of 4 bytes per control program interrupt. This CA is necessary when using the CS3 in Emulation Mode. **Maximum, Limitations, Prerequisites:** See general description under "Highlights". **Field Installation:** Yes.

Communication Scanner Type 2 (#1642): Provides a medium performance operation. The Scanner provides for the transfer of data between storage and the LSs on a byte-by-byte basis. The Scanner assembles and disassembles characters. The Scanner interrupts the control program on a byte-by-byte basis. The control program provides for the line control, control character recognition, code translation and error recovery functions. **Maximum:** One Scanner per frame. **Limitations, Prerequisites:** See "Highlights". **Field Installation:** Yes.

Communication Scanner Type 3 (#1643): Provides a high performance operation. This Scanner provides for data transfer between storage and the LSs on a multi-byte (buffer) basis. Data transfer between storage and the CS3 is accomplished on a storage cycle steal basis (the CS3 interrupts execution of the control program for a machine cycle, moves data to or from storage. At the conclusion of the data movement, the control program resumes its operation at the point of the interrupt, unless another "cycle steal" request is pending.) This feature supports only synchronous lines and provides control character recognition for BSC and SDLC line controls. This feature provides ASCII to EBCDIC and EBCDIC to ASCII code translation when operating with BSC line control, in NCP mode only. The CS3 interrupts the control program either on (up to 254 character) buffer boundaries, or by unique control characters, or at certain error conditions. It also provides for an auto-dial operation. **Maximum:** One Scanner per Frame. **Limitations:** If a CS3 on a 3705 mdl L is in the last frame, order RPQ **S30274** (no-charge) for all the frames. **Prerequisites:** See "Highlights". **Field Installation:** Yes.

Communication Scanner Type 3 High-Speed (#1644): Is a modified #1643 which allows line speeds up to 230.4K bps. Only two half-duplex data or one full-duplex data line can be attached to this scanner. **Maximum:** One Scanner per frame. **Limitations and Prerequisites:** See general description under "Highlights". **Field Installation:** Yes.

Line Interface Base Type 1 (#4701): Provides for attaching LSs which interface to external modems, autocall units, or locally (directly) attached terminals. **Maximum, Limitations, Prerequisites:** See Figure 1. **Field Installation:** Yes.

Line Interface Base Type 2 (#4702): Provides for attaching LSs which interface to telegraph circuits. **Maximum, Limitations, Prerequisites:** See Figure 1. **Field Installation:** Yes.

Line Interface Base Type 3 (#4703): Provides for attaching IBM Limited Distance Line Adapters. **Maximum, Limitations, Prerequisites:** See Figure 1. **Field Installation:** Yes.

Line Interface Base Type 8 (#4708): Provides for attaching 1200 bps Integrated Modems. **Maximum, Limitations, Prerequisites:** See Figure 1. **Field Installation:** Yes.

Line Interface Base Type 9 (#4709): Provides for attaching 1200 bps Integrated Modems and Autocall Units. **Limitations, Prerequisites and Maximum:** See Figure 1. **Field Installation:** Yes.

Line Set 1D (#4714): [up to 9600 bps Attachment] Provides for the attachment of external modems or Direct Attachment of terminals. One of the following cable groups must also be ordered.

a. **Modem Attach Half-Duplex, cable group #485:** Two communication lines (up to 9600 bps over nonswitched or switched facilities) transmitting half-duplex data using external modems with EIA RS-232-C/CCITT V.24 Interfaces. This is for Synchronous (BSC/SDLC) or Asynchronous (Start/Stop) Terminals. This function is to be used in place of #4711.

b. **Modem Attach Duplex, cable group #473 for Synchronous Attachment, or cable group #492 for Asynchronous Attachment:** One communication line up to 9600 bps over nonswitched, 4-wire, facilities, transmitting duplex data, using external modems with EIA RS-232-C/CCITT V.24 interfaces. This mode of operation provides for the transmission of data simultaneously in a transmit and receive mode. This function is to be used in place of #4718 or #4712.

c. **Direct Attach Synchronous, cable group #1358, up to 100 feet:** For direct attachment of two half-duplex IBM Terminals up to 2400 bps with IBM-provided cables. Modems are not required. This LS requires different cable groups depending upon terminal type. For cabling information see *IBM System/370 Installation Manual - Physical Planning,* GC22-7064. The attached terminals must be equipped with a BMC and

3705 Communications Controller (cont'd)

must provide a standard external cable to which this cable will attach. This function is to be used in place of #4716.

Note 1: When operating this LS over 4800 bps, refer to Address Substitution and HSS under "Specify".

Note 2: For Asynchronous Direct Attach Operation, order RPQ **8Q0261**.

Line Set Type 1G (#4717): [High-Speed External Modem] For attachment of one synchronous communication line for operation at 19.2K bps, or 50K bps . Has a digital interface for attachment to a switched or leased wideband external modem. See Scan Limits, Address Substitution and High-Speed Select under "Specify". **Maximum, Limitations, Prerequisites:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 1J (#4719): [External Mil Std 188 Interface] Provides for the attachment of one start/stop or synchronous communication line at a speed up to 50K bps via an external modem having an interface that conforms to the requirements in Section 7.2.1 of Mil Std 188C. **Note**: No external cable is provided with this LS. For speeds greater than 7200 bps, #1642 or #1643 is required. **Maximum, Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 1S (#4720): [Common Carrier 56K bps attachment] Provides for the attachment of a single synchronous CCITT V.35 type interface to be used on a communication facility up to 56K bps. The 1S LS may be operated at 14.4K bps or 57.6K bps in conjunction with a 1W LS (#4727) in another 3705. See Scan Limits, Address Substitution and High-Speed Select under "Specify". **Maximum, Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 2A (#4721): [Telegraph Single Current] For attachment of two single current telegraph lines, each of which may be wired for 20 mA, 40 mA, or 62.5 mA single current termination. **Maximum, Limitations, Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 1GA (#4722): [High-Speed External Modem] For attachment of one synchronous, half-duplex data communication line for operation up to 230.4K bps; has a digital interface for attachment to a leased wideband external modem. **Maximum**: Two per #4701. **Limitations**: Up to two LSs of this type allowed in the same 3705/3706 frame. **Field Installation**: Yes. **Prerequisites**: #1644.

Line Set Type 1TA (#4723): [High-Speed External Modem] For attachment of one synchronous, full duplex data communication line for operation up to 230.4K bps. Has a digital interface for attachment to a leased wideband external modem. **Maximum**: One per #4701. **Limitations**: Only one LS per 3705 or 3706 frame. **Field Installation**: Yes. **Prerequisites**: #1644.

Line Set Type 1T (#4725): [High-Speed Duplex External Modem] 50K bps . This LS will only run with the NCP program product. Provides for the attachment of one duplex synchronous line which has a digital interface for attachment to an external data set for 50K bps , leased or switched wideband facilities (not program supported for switched facilities). The control program must condition this line interface for external clock control. See Scan Limits, Address Substitution and HSS under "Specify". **Maximum, Prerequisites, and Limitations:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 1U (#4726): [High-Speed Duplex External Modem] 56K bps. This LS will only run with the NCP program product. Provides for the attachment of one duplex synchronous line which has a CCITT V.35 interface for attachment to a common carrier communication facility with line speeds up to 56K bps. The control program must condition this line interface for external clock control. The 1U LS may be operated at 14.4K bps or 57.6K bps in conjunction with a #4728 in another 3705. See Scan Limits, Address Substitution and HSS under "Specify". **Maximum, Prerequisites and Limitations:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 1W (#4727): [High-Speed Local Attach] 14.4K bps or 57.6K bps, half-duplex data. Provides for local attachment of a single half-duplex synchronous device which has a CCITT V.35 type interface (similar to the LS Type 1S). Clocking is provided for this LS by #4651; the attached device must be set for external clock control. The total cable length must not exceed 60 meters (200 feet) at 14.4K bps operation, and 30 meters (100 feet) at 57.6K bps operation. The total length includes the attached device cable length. See Scan Limits, Address Substitution, and HSS under "Specify". **Maximum**: Eight per LIB Type 1. **Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 1Z (#4728): [High-Speed Local Attach Duplex] 14.4K bps or 57.6K bps duplex data. Provides for the local attachment of a single duplex synchronous device which has a CCITT V.35 interface (similar to LS1U). Clocking is provided for this LS by #4651, such that the attached device must be set for external clock control. The total cable length must not exceed 30 meters (100 feet) at 57.6K bps operation. The total length includes the attached device cable length. See Scan Limits, Address Substitution, and HSS under "Specify". **Maximum**: Four per LIB Type 1. **Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 3A (#4731): [Limited Distance Type 1 Line Adapter, 2-wire] For attachment of two half-duplex, start/stop lines at speeds up to 134.5 bps. Includes two IBM Limited Distance Type 1 (2-wire) Line Adapters and no external modems are required. **Note**: Total wire length may not exceed 4.75 wire-miles. See GA24-3435 for further details. **Maximum, Limitations, Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 3B (#4732): [Limited Distance Type 1 Line Adapter, 4-wire] For attachment of two start/stop lines at speeds up to 134.5 bps. Includes two IBM Limited Distance Type 1 (4-wire) Line Adapters; no external modems are required. **Note**: Total wire length may not exceed 4.75 wire-miles. See GA24-3435 for further details. **Maximum, Limitations, Prerequisites:** See Figures 1 and 3. **Field Installation**: Yes.

Line Set Type 8A (#4781): [1200 bps Leased Line Adapter] Provides for the attachment of two start/stop or synchronous lines at speeds up to 600 bps or at 1200 bps. This LS includes two 1200 bps LAs suitable for communication over a leased voice grade channel with similar LAs. No external Modems are required. This integrated modem must communicate with another 1200 bps IBM integrated modem. **Maximum, Limitations, Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 8B (#4782): [1200 bps Switched Network Line Adapter] Provides for the attachment of two start/stop lines at speeds up to 600 bps or two synchronous lines at speeds of 600 bps or 1200 bps. This LS includes two 1200 bps LAs equipped with Auto Answer suitable for communication over the Public Switched Network via *FCC registered protective circuitry of the CBS type (or equivalent) provided by the user* with similar LAs. No external modems are required. This integrated modem must commmunicate with another 1200 bps IBM integrated modem. **Maximum, Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Set Type 10A (#4784): [1200 bps Leased Duplex Data Integrated Modem] Provides for the attachment of one synchronous line capable of duplex data transmission at speeds up to 1200 bps. This LS includes one 1200 bps integrated modem. No external modem is required. This integrated modem must communicate with another 1200 bps IBM integrated modem. **Maximum, Limitations, Prerequisites:** See Figures 1 and 3 **Field Installation**: Yes.

Line Set Type 9A (#4791): [1200 bps Switched Network Line Adapter with Automatic Call Originate] Provides for the attachment of one synchronous line at a speed of 1200 bps or 600 bps. This LS includes one 1200 bps LA equipped with the Automatic Answering and Automatic Call Originate functions suitable for the automatic dialing of a remote terminal, the automatic answering of an incoming call and for communication over the Public Switched Network via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user with a similar LA (which need not be equipped with the Auto Answer and Autocall Originate features). No external modems or automatic call units are required. This integrated modem must communicate with another 1200 bps IBM integrated modem. **Maximum, Limitations and Prerequisites:** See Figures 1 and 3. **Field Installation:** Yes.

Line Interface Base Type 10 (#5000): Provides for attaching 1200 bps Integrated Modems with duplex data transmission capability. **Maximum, Limitations, Prerequisites:** See Figure 1. **Field Installation:** Yes.

Line Set Type 1N (#5655): [Nonswitched CCITT X.21 Interface] Provides for the attachment of two half-duplex data nonswitched synchronous lines, or one duplex data nonswitched synchronous line at speeds of 2400 or 4800 or 9600 or 48K bps, via a DCE complying with CCITT Recommendation X.21. Operation is allowed with either a #1642 or a #1643. Specify **#9842** for medium speed applications (2400 or 4800 or 9600 bps). Specify **#9843** for high-speed applications (48K bps). Order cable group **#1391** for duplex, or order cable group **#1392** for half-duplex (one for each LS) and order cable group **#1396** (required only one per 3705 or 3706) (Maintenance "Y" Cable). **Limitations and Maximum:** See Figures 1 and 3. **Field Installation:** Yes. **Prerequisites:** #4701 ... #4650 at 2400 bps (specify **#9610**). (This is in addition to the BMC required for all externally clocked LSs.)

Line Set Type 1R (#5656): [Switched CCITT X.21 Interface] Provides for the attachment of one duplex data switched synchronous line at speeds of 2400, or 4800, or 9600 bps, via a DCE complying with CCITT Recommendation X.21. Operation is allowed only on a CS2 (#1642). Specify **#9840** for medium-speed application (2400, 4800, or 9600 bps). Specify **#9841** for high-speed application (48K bps). Order cable group **#1391** for each LS. **Limitations:** May be installed only on a 3705-II and CS2. See Figures 1 and 3. **Maximum:** See Figures 1 and 3. **Field Installation:** Yes. **Prerequisites:** #4701 ... BMC at 2400 bps; (**#4650**, specify **#9610**) ... BMC (**#4650**) at 1/24 or less of the operating speed of the attached Data Communication Equipment; for 2400 bps specify **#2716**, or **#9604**, or **#2715**; for 4800 bps, specify **#2717**, or **#9606**, or **#2716**, or **#9604**, or **#2715**; for 9600 bps, specify **#9612**, or **#2717**, or **#9606**, or **#2716**, or **#9604**, or **#2715**; for 48K bps, specify **#9609**, or **#9608**, or **#9607**, or **#9612**, or **#2717**, or **#9606**, or **#2716**, or **#9604**, or **#2715**.

3705 Communications Controller (cont'd)

Business Machine Clock (#4650): Within each communication channel there must be a clocking mechanism to time the data rate. When this clocking mechanism is not provided by either the communication facility or the modem, then the 3705 must provide the clocking through the use of a BMC. The clock speed should match the data rate in bits per second (bps). The BMCs are contained within the CS. A clock in a CS cannot be used by communication lines attached to a different CS. Each CS1 or CS2 must have at least one BMC, with each scanner limited to a maximum of four clocks. If a CS has at least one communication line attached where either the modem or the communication facility provides the clocking, then one of the possible four clocks in the scanner must be less than one-half the speed of the lowest speed of the externally clocked line attachment. The 1N and 1R LSs each have unique internal clock requirements. See detail descriptions of these LSs for further information. All local attached terminals must have a BMC in the 3705 which matches the transmission rate (bps) of the terminal. **Note:** The BMC is assigned to a given communication line interface under the control of the program operating in the 3705. **Note:** For purposes of determining BMC requirements, LS5A, LS5B, LS6A, and LS11A, and LIB Type 7 provide "modem clocking". **Note:** CS3 must have BMC ... Specify **#9615** and may have one other clock (either specify **#9609** or **#9610**).

The following LSs must have a BMC:

Line Set 1A	**#4711**	
Line Set 1B	**#4712**	
Line Set 1C	**#4713**	
Line Set 1D	**#4714**	when used for direct attach, or start/stop.
Line Set 1F	**#4716**	
Line Set 1N	**#5655**	
Line Set 1R	**#5656**	
Line Set 2A	**#4721**	
Line Set 3A	**#4731**	
Line Set 3B	**#4732**	
Line Set 4A	**#4741**	
Line Set 4B	**#4742**	
Line Set 4C	**#4743**	
Line Set 8A	**#4781**	
Line Set 10A	**#4784**	
Line Set 8B	**#4782**	
Line Set 9A	**#4791**	
Line Set 12A	**#4785**	
Line Set 12B	**#4786**	

The following LSs may require a BMC, if the clocking is not supplied by the modem:

Line Set 1D	**#4714**
Line Set 1H	**#4718**
Line Set 1J	**#4719**

A BMC is required for each speed; specify one of the following speeds for each BMC:

Speed (bps)	Specify	Speed (bps)	Specify
45.5	**#9601**	150.0	**#9611**
50.0	**#9613**	300.0	**#9612**
56.9	**#9602**	600.0	**#9607**
74.2	**#9603**	950.0	**#9614**
75.0	**#9604**	1200.0	**#9608**
110.0	**#9605**	2000.0	**#9609**
134.5	**#9606**	2400.0	**#9610**
150,600,1200	**#9615** *		

* **Note:** #9615 is only available with #1643 and #1644, and is mandatory.

Maximum: Four with CS Type 2. Two with CS3. **Field Installation:** Yes. The above requirements for a BMC can only be satisfied by #4650. These requirements are not satisfied by #4651.

Business Machine Clock (#4651): When either #4727 or #4728 is located in a #4701, then a BMC #4651 must be added to the LIB. **Maximum:** One per 3705/ or 3706 module. **Limitations:** Must be applied to LIB 1 in position one of a 3705 or 3706 module. **Prerequisites:** #4727 or #4728 in LIB position one. **Specify: #9621** for 14.4K bps ... **#9622** for 57.6K bps.

MODEL CONVERSIONS

For an installed or on-order 3705, any required 3706(s) must be ordered on AAS. Any model change on an installed 3705, whether or not an additional 3706 is needed, must have an MES(s) entered for the model conversion on both the 3705 and any installed 3706(s). "Specify" items for voltage, color, and cabling must be included on new 3706 order(s). Also see Specify items for Address Substitution and for Communication Cable Order.

- The change from Models A, B, C, or D to models J, K, or L must be done in two stages. Order the first MES to go from A, B, C, or D to E, F, G, or H and the second MES to go from models E, F, G, or H to Models J, K, or L.
- The model designations for the 3705 and all associated frames (3706s) must be changed whenever memory is added or deleted, and whenever a frame (3706) is added or deleted.

3705 models J, K, or L are not recommended for field downgrade to 3705 models A, B, C, D, E, F, G, H and 3705 models E, F, G, or H are not recommended for field downgrade to 3705 models A, B, C or D.

ACCESSORIES

Locks and Keys: A 3705-II with Unit Protection (#8510) is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

SUPPLIES (None)

3705-80 COMMUNICATIONS CONTROLLER

The 3705-80 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Controller	Maximum Lines *	Maximum Storage	Host Program	Comm Control Program
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3704	32	64K	BTAM	EP
3705-II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3725-1	256	1024K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

* Maximum lines that can physically attach, CF3705 is required to predict actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

PURPOSE

The 3705-80 will attach to S/370, 303X or 4300 Processors for communication with local or remote I/O devices over various communication facilities. The 3705-80 will also attach to S/360 models 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only.

MODELS

The 3705-80 is available in sub-models to allow easy selection of a communications controller by line attachment capability.

These models are:

M81 – 4 Line Attachments of EIA RS-232-C/CCITT V.24

M82 – 10 Line Attachments of EIA RS-232-C/CCITT V.24

M83 – 16 Line Attachments of EIA RS-232-C/CCITT V.24

HIGHLIGHTS

The 3705 Communications Controller mdl 80 is designed for a user starting in communications. The 3705-80:

- Contains all the required features and functions to run duplex or half-duplex data transmission communication lines to an EIA or CCITT interface in the multiplexer; a channel adapter or RPL must be selected. Cables must be ordered separately.
- 256K bytes of storage are standard on all mdls.
- Uses ACF/NCP/VS R2.1, ACF/NCP/VS R3, NCP/VS for OS/VS with one channel adapter, or EP 3.0.
- Has a common line set for SDLC, BSC and Start/Stop protocols at line speeds up to 9600 bps for Start/Stop and 19.2K bps for SDLC and BSC.
- Provides a basic Business Machine Clock (BMC) of 134.5 bps in all mdls.
- The operator's Panel Key Lock is standard on all mdls.
- Publications: See related publications in the *Introduction to the IBM 3705-80 Communications Controller,* GA27-3004, available from Mechanicsburg.
- Provides for attachment of a duplex or half-duplex line (CCITT V.35) up to 56K bps, or
- Provides a digital interface for attachment of a duplex or half-duplex line up to 50K bps, or
- Allows for attachment of up to two switched or nonswitched CCITT X.21 lines up to 9600 bps, or
- Allows for attachment of a CCITT X.21 high-speed line up to 48K bps Auto Call Units, or
- Allows for high-speed local attachment of devices at 14.4K bps, or 57.6K bps.
- Allows for the attachment of Channel Adapter 1 (byte mode of operation).
- Allows for the attachment of one or two Channel Adapters Type 4 (cycle steal mode or byte mode of operation).
- Allows for the connection of any one of two host channels with the two-channel switch (manual operation).
- Allows for remote operation with the Remote Program Loader with or without a channel adapter.

Machine Organization: The 3705-80 provides all functions necessary to run duplex or half-duplex EIA or CCITT lines up to 9600 bps with EP, NCP or PEP; a channel adapter or RPL must be selected. Cables must be ordered separately. Major components of the 3705-80 are:

- Communications Scanner Type 2 (CS2) modified is standard in all mdls and provides for connection between the line and the Central Control Unit (CCU). The modified CS2 scans the line addresses and places the information into the CCU storage.
- 256K bytes of storage are standard in all mdls.
- Channel Adapter 1 (CA1) provides the interface between the 3705-80 and a S/370, 303X or 4300 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA1 communicates with the processor byte multiplexer channel. The CA1 is an optional feature. Only one can be installed per machine.
- Channel Adapter 4 (CA4) provides the interface between the 3705-80 and a S/370, 303X or 4300 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA4 can connect to the byte multiplexer channel (like the CA1), the block, or selector channels.
- Line sets and line attachments provide the electronics to interface to a communications facility.
- BMC provides the clocking of data in and out of the communications scanner. A BMC of 134.5 bps is included in all mdls. A total of four clocks can be included.
- Remote Program Loader (RPL) feature provides the means of loading the NCP into the 3705-80 without using the channel adapter. This is an optional feature.
- The Operator Panel Lock (Unit Protection) provides a keylock that deactivates all push buttons, mode select switches and diagnostic rotary switches on the control panel when the key is removed from the lock. Channel enable/disable, function select rotary switches and power on/off are unaffected. This is included on all mdls. For additional or replacement keys, see "Accessories".
- High-speed line attachment (19.2K bps to 57.6K bps using the CCITT V.35 or digital interface). One high-speed duplex line, or two half-duplex high-speed lines can be attached to the 3705-80. Address Substitution is used in the 3705 program for the Communications Scanner Type 2 (modified) to scan the high-speed even line addresses at a greater frequency.

  Upper Scan Limit of 16 must be used when the EIA RS-232-C/CCITT V.24 is operated at 19.2K bps to scan even and odd line addresses.

Communications Facilities: The 3705-80 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

Modems: The following modems are used with the 3705-80. These modems take advantage of the diagnostic capabilities which are contained in the Network Problem Determination Application (NPDA) Release 2 (PP 5735-XX8). The modems are:

3863-1	2400 bps	Nonswitched
3863-2	2400 bps	Switched (except in V.26bis mode)
3864-1	4800 bps	Nonswitched
3864-2	4800 bps	Switched
3865-1	9600 bps	Point-to-point, nonswitched
3865-2	9600 bps	Multipoint, nonswitched
3868-1	2400 bps	Nonswitched
3868-2	4800 bps	Nonswitched
3868-3	9600 bps	Point-to-Point, nonswitched
3868-4	9600 bps	Multipoint, nonswitched

The above modems are supported in ACF/NCP R2.1 (PP 5735-XX1).

3867 – The Link Diagnostic Unit: Allows other modems to use the diagnostic capabilities of a level of ACF/NCP R2.1 in conjunction with NPDA R2.

Other modems are:

3872	2400 bps	Switched
3872	2400 bps	Nonswitched

Non-IBM Modems may be attached subject to the Multiple Supplier Systems Bulletin.

EIA RS-232-C/CCITT V.24 Line Attachments:

Mdl M81 supports 4 Line Attachments

Mdl M82 supports 10 Line Attachments

Mdl M83 supports 16 Line Attachments

The RS-232-C/CCITT V.24 line attachments support lines up to and including 9600 bps using S/S, BSC, or SDLC line protocols. These lines can be duplex or half-duplex using the RS-232-C/CCITT V.24

3705-80 Communications Controller (cont'd)

interface. Half-duplex data transmission requires one address in EP, or NCP; synchronous duplex data transmission requires two addresses in the NCP. For duplex operation (4-wire) specify **#9711**; for half-duplex operation (2- or 4-wire) specify **#9712**.

Synchronous lines can operate at 19.2K bps using upper scan limit of 16. An upper scan limit of 16 will only scan Line Interface Addresses 20 through 2F. Other Line Interface Addresses will not be scanned.

Each specify code **#9711** will cause two line attachments to be installed as duplex and each specify code **#9712** will cause two Line Attachments to be installed as half-duplex on the initial installation of the 3705-80 to the limit of the mdl ordered. If fewer lines are specified than the mdl allows, the remaining lines will be installed as half-duplex.

To change between Duplex and Half-Duplex mode of operation, order a Record Purpose-Only MES:

- Specify **#9720** to change one or more line attachments from duplex to half-duplex.
- Specify **#9721** to change one or more line attachments from half-duplex to duplex.

The CE must be provided the MES number from the Record Purpose-Only MES, the Specify Code(s), the Line Interface Address(es) to be changed with each associated Specify Code and reference the VA000A installation instructions.

Specify Codes **#9712** and **#9711** are not recommended for field installation.

Any line attachment can connect to an external modem or directly to a device with one of the following cables. Each line attachment requires one cable.

– Attachment to one external modem requires Cable Group **#1404** for each modem.

– Direct attachment (HDX) of a device requires Cable Group:
#1399 for S/S, or
#1400 for Synchronous (SDLC & BSC)
for each device. Check clocking requirements and device requirements for each direct attachment.

For 2740 with Station Control and all other Start/Stop Directly Attached devices FE must install jumpers on the machine as defined in the installation instructions.

To change the line attachment to or from Directly Attached Start/Stop operation, order a Record Purpose-Only MES using the appropriate Specify Code for one or more line attachments as follows:

#9722	modem attach or sync direct attach	to	any S/S direct attach
#9722	2740 w/o station control direct attach	to	any other S/S direct attach
#9722	any other S/S direct attach	to	2740 w/o station control direct attach
#9723	any S/S direct attach	to	modem attach or synch direct attach

The CE must be provided the MES number from the Record Purpose-Only MES, the Specify Code(s), the Line Interface Address(es) to be changed with each associated Specify Code and reference the VA000A Installation Instructions.

Line Attachments and Line Sets: The line sets (LS) and line attachments provide the electronics to meet the requirements of specific communications facilities. The following chart indicates by model, the Line placement and mode of operation by Line Interface Address.

MODEL / LINE TYPE	MODE	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
		---------- LINE INTERFACE ADDRESS ----------															
M81,M82 LINE ATTACH EIA: RS-232-C/ CCITT V.24	DX	-	-	-	-	T	R	T	R	T	R	T	R	b	b	b	b
	HDX	-	-	-	-	X	.	X	.	X	.	X	.	b	b	b	b
M81,M82 LINE SET 2 CCITT V.35	DX	T	.	R	.	-	-	-	-	-	-	-	-	B	B	B	B
	HDX	X	.	X	.	-	-	-	-	-	-	-	-	B	B	B	B
M81,M82 LINE SET 3 HIGH SPEED DIGITAL	DX	T	.	R	.	-	-	-	-	-	-	-	-	B	B	B	B
	HDX	X	.	X	.	-	-	-	-	-	-	-	-	B	B	B	B
M81,M82 LINE SET 4 AUTOCALL		A	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-
M81,M82 LINE SET 5 DIRECT ATTACH	HDX	X	.	X	.	-	-	-	-	-	-	-	-	B	B	B	B
M81,M82 LINE SET 8 CCITT X.21 MED SPEED	DX	T	R	T	R	-	-	-	-	-	-	-	-	b	b	b	b
	HDX	X	.	X	.	-	-	-	-	-	-	-	-	b	b	b	b
M81,82 LINE SET 9 CCITT X.21 48K	DX	T	.	R	.	-	-	-	-	-	-	-	-	B	B	B	B
	HDX	X	.	.	.	-	-	-	-	-	-	-	-	B	B	B	B
M83 LINE ATTACH EIA: RS-232-C/ CCITT V.24	DX	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R
	HDX	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.

MODEL / LINE TYPE	MODE	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
M82 LINE ATTACH EIA: RS-232-C/ CCITT V.24	DX	T	R	T	R	T	R	T	R	T	R	T	R	b	b	b	b
	HDX	X	.	X	.	X	.	X	.	X	.	X	.	b	b	b	b
M83 LINE ATTACH EIA: RS-232-C/ CCITT V.24	DX	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R
	HDX	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.

LEGEND:

A	Denotes address used for an autocall interface.
X	Denotes a Transmit/Receive address for a half-duplex line.
.	Denotes an address not used and unavailable.
-	Denotes an address not used and available.
B	Denotes an address blocked by address substitution.
b	Denotes an address not used and available that will be blocked if address substitution used.
TR	is a Transmit Receive address used on a duplex line and uses two adjacent addresses.
T.R.	is a Transmit Receive address used on a duplex line and uses two adjacent even addresses.

To change the mode of operation of an RS-232-C/CCITT V.24 Line Attachment, a CCITT X.21 Line Attachment, or the speed of the High-Speed Direct Attachment, use a Record Purpose-Only MES for leased machines using the Specify Codes as defined in the write-ups for each of these functions. Purchased machines submit RPQs.

These mode change Specify Codes **#9720, #9721, #9722, #9723, #9724** and **#9725** can be ordered only on a Record Purpose-Only MES.

Note: Any change for an optional CCITT V.35 (Line Set 2) or digital (Line Set 3) line attachment must be ordered by MES from the factory. A Record Purpose-Only MES cannot be used.

Direct Attachment: Devices to be connected directly to the 3705-80, without modems, can do so using the EIA RS-232-C/CCITT V.24 line attachment. This line attachment will attach Start/Stop, BSC or SDLC protocols up to 2400 bps. All directly attached devices (at speeds of

3705-80 Communications Controller (cont'd)

2400 bps or less) must have a BMC and the 3705-80 must have a BMC of equal speed.

To attach a device directly to the 3705-80 requires the direct attachment cable group defined under "Line Attachments" and a BMC. The BMC in the 3705-80 must match the speed of the clock in the attached device.

Most devices that attach directly require a feature to be installed in the device. Consult the machines pages of the device for details of the features required.

High-speed Direct Attachment, Line Set 5 (#6715), allows connection of devices to the 3705-80 without modems at speeds of 14.4K bps or 57.6K bps. This LS includes a clock, which is looped out to the device and back to the 3705-80. Therefore, the device does not need a clock.

Submit an RPQ for direct attachment of terminals at 3600/7200 bps or 4800/9600 bps.

Remote Communications Controller: The 3705-80 can be used as a remote communications controller (no channel connection to a host processor). This enables the 3705-80 to become a remote concentrator with a communications link to a local 3705 or 3725 communications controller. The remote communications controller acts as an extension of the local communications controller, passing data over the communications link to the local communications controller and on to the host. For more information on the functions of a Remote Communications Controller, refer to the manual for ACF/NCP/VS.

The Remote Program Loader feature also allows for the 3705-80 to be locally attached with a channel adapter to one host, and attached remotely to another host through a local 3705 or 3725 communications controller. This allows the user to load the NCP from either source, but not at the same time.

Business Machine Clock: A BMC provides the clocking of data in and out of the Communications Scanner. A BMC of 134.5 bps is included in all mdls. Three additional BMCs can be put in the scanner. A BMC is assigned to a specific line attachment under control of the NCP, or EP. The selection of the speed of the BMC is determined with the following rules:

No Clocking in the Modems (usually 1200 bps or less), or a Directly Attached Device:

- All devices that attach to the modems without clocking must have a BMC and the 3705 must have a BMC of equal speed for speeds up to 2400 bps.
- All Directly Attached Devices must have a BMC and the 3705 must have a BMC at equal speed, when the clocking is in the scanner.

Clocking in the Modems (usually greater than 1200 bps):

- When the modem provides the clocking, then the 3705 must have a clock of less than one-half the lowest line speed attached. The BMC of 134.5 bps meets this requirement.

CCITT X.21 Additional Requirements for BMCs:

- **CCITT X.21 Switched:** A switched line must have a BMC speed of less than 1/24th of the operating line speed. At operating speeds of 4800 bps and over, the 134.5 bps basic clock will suffice. At 2400 bps a BMC of 50 bps (**#1409**) is required. A BMC with a speed of 2400 bps (**#1416**) is also required.
- **CCITT X.21 Nonswitched:** A BMC with a speed of 2400 bps (**#1416**) is required for testing. This BMC is in addition to the required BMC which is less than one-half the line speed. The Basic BMC of 134.5 bps meets the requirement of less than one-half the lowest line speed.

BMC Feature Codes:

Feature	Speed (bps)
#1409	50
#1410	110
#1413	300
#1414	600
#1415	1200
#1416	2400

An RPQ may be submitted for other speeds. **Field Installation:** Yes. **Maximum:** Four clocks per machine.

Performance: The 3705-80 is a 4-, 10- or 16-line communications controller. The following is a definition of line parameters and NCP parameters that allow 16 lines to run in the 3705-80 with a CA1. If the communications system matches these parameters, it will run. It is always advisable to run the HONE Configurator (CF3705) to get a performance analysis.

SDLC Operation:

NCP Parameters:
- Dynamic Reconfiguration
- RAS Options:
  - Address trace
  - Auto network shutdown
  - System abend
  - Channel attention delay
- 3863, 3864, 3865 Modems for LPDA
- ACF/NCP/VS R3

Line Parameters:
- Message size: 25 characters in, 256 characters out
- Half-duplex SDLC data transmission
  - (if duplex data transmission then: 16-4800 bps lines, or 8-9600 bps lines)
- Message rate: 0.782 msg/sec
- 9600 bps line speed
- 2-3270 control units per line
- 8-logical units per line
- Parameters as used in CF3705:
  - Propagation delay: 40 milliseconds
  - Number of entries in service order table: 2
  - Min. time between poll cycles: 0.5 sec.
  - Line turnaround time: 8.5 milliseconds
  - Input data per SDLC response: 1
  - Output data per SDLC response: 1
  - NCP buffer size: 240 bytes

BSC Operation:

NCP Parameters:
- Dynamic Reconfiguration
- All available RAS options
- 3863, 3864 or 3865 Modems used for LPDA
- ACF/NCP/VS R3

Line Parameters:
- Message size: 25 characters in, 256 characters out
- Half-duplex BSC operation
- Message rate: 0.782 msg/sec.
- 9600 bps line speed
- 2-3270 control units per line
- 8-logical units per line
- Parameters used in CF3705:
  - Propagation delay: 40 milliseconds
  - Number of entries in service order table: 2
  - Min. time between poll cycles: 0.0 sec.
  - Line turnaround time: 8.5 milliseconds
  - NCP buffer size: default 64 bytes

High-Speed Operation: A generalized predefinition of performance with a high-speed line (over 9600 bps) is difficult because a parameter change can cause a significant change in performance. Therefore, it is recommended that the HONE Configurator (CF3705) be used when using a high-speed attachment to predict performance of the 3705-80.

The following specific configuration will run:

SDLC with Address Substitution used. One 56K bps duplex line will run with ten 4800 bps half-duplex lines as defined above for SDLC. Other lines may run but CF3705 should be used to check this possibility.

- Message size: 2,000 characters in, 2,000 characters out.
- Messages per second: 0.875 in and out.
- Data throughput at 3,500 characters per second.
- 3705 to 3705 with virtual route pacing 1 for 6 PIUs (FID4).
- Parameters used in CF3705 as defined above except propagation delay of 20 milliseconds.

The Hone Configurator (CF3705) must be run for PEP configuration.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): 4.3 meter (14 feet) cable, or specify **#9986** for 1.8 meter (6 feet) cable. Specify **#9903** for 208V, **#9905** for 230V. **Field Installation:** Yes.
- Color: Specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunset yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9066** for pearl white. **Field Installation:** Not recommended.
- Prior to submitting an MES order, the FE Branch Manager should be consulted for any software or hardware compatibility requirements resulting from the order.
- Cables: The cables that are included in each line set are listed in the *IBM Input/Output Equipment Installation Manual - Physical Planning*, GC22-7064. These cables must be ordered separately from the 3705 machine order on a cable order.

  To obtain cables longer than 15 meters (50 feet) select the required cable below and order the cable assembly P/N and the required cable length in meters. These longer cables are ordered by P/N on an MES. The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file for prices.

3705-80 Communications Controller (cont'd)

To order a cable for a CCITT V.35 Interface Modem Attachment:

Duplex (Line Set 2 **#6712**)
Order cable assembly P/N **1648394**
(See Note 1)

Half-Duplex (Line Set 2 **#6712**)
Order cable assembly P/N **5997479**
(See Note 1)
To order a cable for a Autocall Originate (RS-366/CCITT V.25) Interface Attachment:

(Line Set 1E **#4715**)
Order cable assembly P/N **1753439**
(See Note 2)

Note 1: Maximum Length: 30 meters (100 feet).
Note 2: Maximum Length: 45 meters (150 feet).

To order a cable for a EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The 3705 Communications Controller can now support a cable length of up to 100 meters when connecting to a 3863, 3864, or 3865 modem or equivalent. Cable lengths up to 15 meters (50 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications.

To connect a cable longer than 15 meters (50 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is"FG" or later, no further action is required.

2. If the suffix is"DG" or earlier:

   A 3863 or 3864 modem or a 3865 modem which does *not* have Data Multiplexer #3260 installed must have EC **344120** installed.

   A 3865 modem with Data Multiplexer #3260 installed must have EC **323406** installed.

3. Order a cable:

   Duplex or Half-Duplex Line Attachment, order cable assembly P/N 1736733.

   Maximum length is 100 meters (328 feet).

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Remote Program Loader (#6261): This optional feature provides the means of remotely loading the NCP. **Limitations**: One per 3705-80. Cannot exist with second #1544. **Field Installation**: Yes.

Two-Channel Switch (#8002): This optional feature will connect to two S/360, S/370, 303X or 4300 Processor channels, which may be on the same host, or on a different host. Selection of which channel is used is by a manual switch on the control panel which will enable one channel at a time. Additional channel cables must be ordered with this feature. **Limitations**: One. Cannot be installed if two CAs are installed. **Field Installation**: Yes.

COMMUNICATIONS FEATURES

Channel Adapter Type 1 (CA1) (#1551): Provides the interface between the 3705-80 and a S/370, 303X or 4300 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA1 communicates with the processor byte multiplexer channel with 1, 2, 3, or 4-byte transfers. **Maximum**: One. **Field Installation**: Yes.

Channel Adapter Type 4 (CA4) (#1544): Provides the interface between the 3705-80 and S/370, 303X or 4300 Processors. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 in Emulation mode only. There are two modes of operation of a CA4:

1. The CA4 operates like a CA1 and transfers one, two, three, or four bytes of data on the byte multiplexer channel.

2. Cycle Steal Mode increases the throughput of the ACF/NCP/VS program product. Up to 248 bytes of data can be transferred across the block or selector channels.

Only one mode of operation can be used at any time. Maximum performance is obtained with the cycle steal mode of operation. The CA4 can connect to the byte multiplexer channel (like the CA1), the block multiplexer channel, or the selector channel. To run the emulator program, the CA4 must be attached to the byte multiplexer channel. Dual CA4s can connect to different channel types and each CA4 can operate in a different mode. **Limitations**: The first CA4 cannot exist with a #1551 and the second CA4 cannot exist with a #1551 or a #6262. **Field Installation**: Yes.

Line Set 8 (LS8) (#5657): [9600 bps CCITT X.21 Attachment] This LS provides for attachment of two duplex switched or nonswitched, or two half-duplex nonswitched synchronous lines at speeds of 2400 bps, 4800 bps or 9600 bps. For switched operation specify **#9775**; for nonswitched operation specify **#9777**. Each specify applies to the entire LS. A switched line must have a BMC at less than 1/24th of the operating line speed. Another BMC of 2400 bps (#1416) is required for testing. Cable Group **#1391** is required to attach each line. **Limitations**: One LS per machine. **Field Installation**: Yes. Use a Record Purpose-Only MES to change between switched and nonswitched operation after initial installation. **#9775** and **#9777** are not recommended for field installation; use only on initial machine order. See the beginning of this section for more detail. Switched operation requires ACF/NCP R3. LS8 cannot be installed with #6712, #6713, #6714, #6715 or #5658. Not available on mdl M83.

Line Set 9 (LS9) (#5658): [48K bps CCITT X.21 Attachment] This LS provides for attachment of one duplex switched or nonswitched, or one half-duplex nonswitched synchronous line at 48K bps. For switched operation specify **#9776**; for nonswitched operation specify **#9778**. Each specify applies to the entire LS. A switched line must have a BMC at less than 1/24th of the operating line speed. Another BMC of 2400 bps (#1416) is required for testing. Cable Group **#1391** is required to attach to each line. **Limitations**: One LS per machine. Must use Address Substitution. For a mode change, order a Record Purpose-Only MES with specify code **#9776** for a nonswitched to switched mode change or **#9778** for a switched to nonswitched mode change. The CE must be provided the MES number from the Record Purpose-Only MES, the specify code indicating the mode change being performed and to reference the VA000A installation instructions. Switched operation requires ACF/NCP R3. LS9 cannot be installed with #6712, #6713, #6714, #6715 or #5657. Not available on mdl M83. **Field Installation**: Yes.

Line Set 2 (LS2) (#6712): [56K bps CCITT V.35 Attachment] This LS provides for the attachment of one duplex, or two half-duplex synchronous lines, which have a CCITT V.35 type interface with lines speeds up to 56K bps (this includes line speeds of 19.2K bps and 48K bps). Half-duplex data transmission requires one even address in EP or NCP (adjacent odd addresses will be assigned); duplex data transmission requires two even addresses in NCP (adjacent odd addresses will be assigned). For duplex operation specify **#9713**; for half-duplex operation, specify **#9714**. Each specify applies to the entire line set. This LS in duplex mode is used with a LS 1Z in a 3705-II for direct attachment at 14.4K bps, or 57.6K bps; in half-duplex mode it connects to LS 1W. This LS also connects to #6715 in another 3705-80 in half-duplex mode. To attach this LS to an external modem requires one of the following cables: Attachment to a duplex line requires Cable Group Group **#1497** ... attachment to a half-duplex line requires Cable Group **#496** for each modem . **Limitations**: One line set per machine. Uses address Substitution. A Record Purpose-Only MES does not apply. LS2 cannot be installed with #6713, #6714, #6715, #5657, or #5658. Not available on mdl M83. **Field Installation**: Yes.

Line Set 3 (LS3) (#6713): [50K bps Digital Attachment] This LS provides for attachment of one duplex synchronous line, or two half-duplex synchronous lines which have a high-speed digital interface. This LS attaches to an external modem for speeds up to 50K bps on nonswitched, or switched wideband facilities (not program supported for switched facilities). For duplex operation, specify **#9715**; for half-duplex operation, specify **#9716**. Each specify applies to the entire LS. Half-duplex data transmission requires one even address in EP, or NCP (adjacent odd address will be assigned); duplex data transmission requires two even addresses in NCP (adjacent odd addresses will be assigned). To attach to the high-speed digital interface requires Cable Group **#489** for each modem attachment. **Limitations**: One LS per machine. Uses Address Substitution. A Record Purpose-Only MES does not apply. LS3 cannot be installed with #6712, #6714, #6715, #5657 or #5658. Not available on M83. **Field Installation**: Yes.

Line Set 4 (LS4) (#6714): [Auto Call Attachment] This LS supports four RS-366-A/CCITT V.25 interfaces for attachment of external automatic calling units. Each auto call unit works with an EIA RS-232-C/CCITT V.24 line attachment. Two Cable Groups #486 to connect to four External Auto Call Units are required. **Limitations**: One LS per machine. LS4 cannot be installed with #6712, #6713, #6715, #5657, or #5658. Not available on mdl M83. **Field Installation**: Yes.

Line Set 5 (LS5) (#6715): [57.6K bps Direct Attachment CCITT V.35] This LS provides for local attachment of two half-duplex synchronous devices which have a CCITT V.35 interface. Clocking is provided. Specify **#9832** for 57.6K bps or **#9830** for 14.4K bps. The attached device must be set for external clock control. The total cable length must not exceed 60 meters (200 feet) at 14.4K bps operation, and 30 meters (100 feet) at 57.6K bps operation. The total length includes the attached device cable length. Each specify applies to the entire LS. This LS can connect to a LS 2 in another 3705-80 in half-duplex mode. Cable Group **#1394** is required to attach each device. **Limitations**: One LS per machine. Uses Address Substitution. For a speed change, order a Record Purpose-Only MES with specify code **#9832** for a 14.4K bps to 57.6K bps, or **#9830** for a 57.6K bps to 14.4K bps. The CE must be provided the MES number from the Record Purpose-Only MES, the

3705-80 Communications Controller (cont'd)

specify code indicating the speed change and to reference the VA000A installation instructions. LS5 cannot be installed with #6712, #6713, #6714, #5657, or #5658. Not available with mdl M83. **Field Installation:** Yes.

CCITT X.21 Line Attachments: **#9775** and **#9777** are not recommended for field installation. To change the mode of operation between switched or nonswitched operation on CCITT X.21 lines, order a Record Purpose-Only MES: Specify **#9724** to change one or more line attachments from nonswitched to switched. Specify **#9725** to change one or more line attachments from switched to nonswitched. The CE must be provided the MES number from the Record Purpose-Only MES, the specify code(s), and the Line Interface Address(es) to be changed with each associated Specify Code, and reference the VA000A installation instructions.

MODEL CONVERSIONS

The following 3705-80 model conversions are field installable. Other model conversions are not recommended.

Models	Conversion Time
M81 to M82	5.9 hours
M82 to M83	3.4 hours
M81 to M83	7.9 hours

- **EIA RS-232-C/CCITT V.24:** All Line Attachments will be shipped in half-duplex mode on model conversions. Do not use specify codes **#9711** or **#9712**.
- **CCITT X.21:** Line Attachments will be shipped in switched mode on model conversions. Do not use specify codes **#9775** or **#9777**.

ACCESSORIES

Keys: The 3705-80 with Operator Panel Lock is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

SUPPLIES (None)

3715 PRINTER

PURPOSE

The 3715 is a printer for all models of the 3741.

MODELS

Model 1 001 40 cps printing rate in both directions

Model 2 002 80 cps printing rate in both directions

Prerequisites: #8111 and #8120 or #8121 on the 3741.

HIGHLIGHTS

The 3715 prints serially in both left-to-right and right-to-left directions using the EBCDIC character set. The maximum print line is 132 print positions at 10 characters per inch spacing. Line spacing is six lines per inch.

Reformatting, editing, disk read, line feed, and printed line length are factors which affect printer throughput. For detail calculation of performance, refer to *3741 Reference Manual* (GA21-9183). In most cases, throughput can be summarized as follows: the 3715 mdl 1 is equal to or faster than the 3713 Printer, and the 3715 mdl 2 is approximately 50 percent faster than the 3715 mdl 1.

When using the 3741 mdls 3 or 4 ACL Translator (#1350), the 3715 mdl 2 is recommended in order to obtain equal or greater throughput than the 3713.

The unit has a pressure-feed platen that permits feeding of forms in a range of 3 to 14-7/8 inches overall width. Continuous forms fold-to-fold length may range from 3 to 14 inches. Edge-punched continuous forms are fed using the adjustable forms tractor, which is standard.

Matrix characters are formed by seven vertical wires printing dots in up to four of seven possible horizontal positions. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for design considerations and limitations. Up to 6-part forms can be printed with a maximum thickness of .018 inches. 5- and 6-part forms should be tried for satisfactory feeding, print registration, and print quality. Card stock continuous forms are not recommended. For optimum handling of continuous forms, the Forms Stand (**#4450**) is recommended.

Publications: *IBM Data Station Operator Guide* (GA21-9131) and *IBM 3741 Data Station Reference Manual* (GA21-9183).

SPECIFY

- Power: Power is supplied to the 3715 by the attaching 3741, no specify required.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for gray.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model conversions are field installable.

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from the carton and provides for forms stacking after printing. This accessory is a one-shelf forms stand.

SUPPLIES

Ribbons: A black ribbon, P/N 1136653 or equivalent, is required.

3717 PRINTER

PURPOSE

The 3717 is a printer for all models of the 3741.

MODELS

Model 1 001

Field Installation: Not recommended.

Prerequisites: #8122 on 3741 mdls 1 and 3, #8123 on 3741 mdls 2 and 4.

HIGHLIGHTS

The 3717 is a line printer with speeds of up to 155 lines per minute with a 48-character set or up to 120 lines per minute with an optional 64-character set. The maximum print line is 132 print positions at 10 characters per inch spacing. Line spacing is six lines per inch.

The unit has left- and right-adjustable forms tractors which hold overall forms widths from 3-1/2 to 14-7/8 inches. Continuous forms fold-to-fold length may range from 3 to 14 inches.

Up to 6-part forms can be printed with a maximum thickness of .02 inches. Card stock continuous forms are not recommended. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations.

Publications: *IBM 3741 Data Station Operator Guide* (GA21-9131), and *IBM 3741 Data Station Reference Manual* (GA21-9183).

SPECIFY

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V. Voltage must be consistent with system voltage.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for gray.
- Print Belt: Specify one: **#9496** for 64-character EBCDIC or **#9497** for 48-character EBCDIC. **Note:** **#9496** should be specified if printing of application control language source listings is required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from the carton and provides for forms stacking after printing. This accessory is a one-shelf forms stand, and is recommended for optimum handling of continuous forms.

Print Belt, Add'l: Permits the customer to obtain more than one character set print belt for various applications. Order **#5910** for 64-character EBCDIC and **#5911** for 48-character EBCDIC. **Field Installation:** Yes.

SUPPLIES

Ribbons: A black ribbon, P/N 1136634 or equivalent, is required.

3725 COMMUNICATION CONTROLLER MDL 1

PURPOSE

The 3725 Model 1 controls data communications between modem-attached or directly-attached (without a modem) terminal devices and one or more directly- or remotely-connected S/370 (except mdls 115 and 125), 303X, 308X, 43XX host processors, or between two host processors. Remote connection may be via common carrier-provided or customer-owned communication facilities. The 3725 mdl 1 is the base machine. An optional 3726 provides additional line and channel attachment capability. A 3727 console is required for installation, operation, and maintenance.

The following is a brief summary of the 3725 Communication Controllers:

Communic. Controller	Max Lines*	Max Storage	Host Program	Comm Control Program
3725 Model 1	256	2M	VTAM/TCAM	ACF/NCP-PEP
	256	1M	BTAM	EP
3725 Model 2	24	512K	VTAM/TCAM	ACF/NCP-PEP
	24	512K	BTAM	EP

* Maximum lines that can physically attach, CF3725 is required to predict actual line attachment capabilities

See individual pages for each Communication Controller for information on additional features.

MODELS

Model 1 001

Prerequisites: If channel-attached, the 3725 requires a control unit position on a system channel. See processor pages for details. When attaching to a a 4321 or 4331 in EP mode, restrictions are imposed on the number of available subchannels which may be used by the 3725.

HIGHLIGHTS

The 3725 is a modular, programmable communication controller, which runs under the control of:

- Either ACF/NCP Version 2 for the 3725 or EP/3725 R1 or both in PEP mode.
- Or ACF/NCP Version 3 or EP/3725 R2 or both in PEP mode. (See Program Products and SCP sections for details.)

Its programmability allows a high degree of flexibility in tailoring a data communications system to the customer's requirements. In addition, it plays an active role in Communications Network Management (CNM) by providing data to the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA).

The machine structure is simplified by having a small number of features: Five types of line interfaces, one storage feature, one type of communication scanner and one type of channel adapter. This allows easy additions and changes to the machine configuration.

Characteristics of the 3725 include:

- LSI technology for better RAS characteristics, lower power consumption, and less floor space than previous communication controllers.
- Increased internal performance (compared to the 3705-II) for high-speed lines and large networks.
- Attachment of high-speed lines which use the modulo 128 function of ACF/NCP for INN links.
- 512K bytes up to 2M bytes of main storage, by 256K byte increments, to accommodate larger networks and higher speed lines.
- Maintenance and Operator Subsystem (MOSS) a functionally separate processor facilitates maintenance and problem determination by providing:
  - box error logging
  - alert mechanisms
  - display of machine status
  - diagnostics for the Central Control Unit (CCU), channel adapters, scanners and line interfaces
  - utilities to:
    - collect microcode dumps and send them to the host for printing
    - provide actual configuration data, help the customer to plan for MES, and store this information on the MOSS diskette via the Graphic Configuration File for further console display or update. This information can be transferred to the host where the machine diagram can be printed by ACF/SSP
    - allow the operator to keep a current Line Description File, providing the physical address, symbolic name, speed, and protocol of each connected line. This file, stored on the MOSS diskette, may be transferred to the host and printed by ACF/SSP.
- Improved RAS Characteristics:
  - Reliability and availability of the 3725 are enhanced by the following elements:
    - Extensive error detection, including storage protection against inadvertent overlays.
    - Functional building block design (most adapter errors are contained within a single building block and thus will not take the system down)
    - Error correcting code for the main storage and scanner storage
    - Error by-pass facilities: Microcode re-IPLs, system re-IPLs and dynamic reconfiguration of SNA resources
    - Automatic first-level problem determination with alert messages, which report hardware errors to the network operator and recommend actions
    - Enhanced problem determination aids
    - Automatic power-on when power returns after loss
    - Port Swapping which allows the operator to logically swap a line from a failing port to a spare port without involvement of of the host processor.
  - Serviceability of the 3725 is improved by:
    - Many host-independent functions for installation and maintenance
    - Error information logging/retrieval
    - Diagnostics and trouble shooting facilities
    - Concurrent maintenance for MOSS diskette drive and console.
- Network Management and Problem Determination: Considerable function has been designed into this communication controller to provide maximum availability to the customer. The 3725 MOSS provides problem determination and recovery procedures that are designed to be easily understood and used by the operator e.g.:
  - Stand Alone Link Test facility to test an SDLC Communication link attaching another 3725 or 3705, without involvement of a host or a control program.
  - Line Interface Display to monitor at the console the status of most of the control leads on a line interface.

  The 3725 supports IBM's CNM (Communications Network Management) direction by sending error related information to the Network Problem Determination Application (NPDA) running in a host processor under the support of the Network Communications Control Facility (NCCF). This enhanced CNM support provides better problem determination in SNA networks. The basic NCP problem determination functions (alerts) are also offered in the non-NPDA environment, but they are not available in EP mode.
- Attachment of up to 96 lines to the 3725: Addition of the 3726 to the 3725 expands this capability to 256 lines, either duplex or half-duplex. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.
- One or two channel adapters in the 3725 to connect to the byte multiplexer, block multiplexer or selector channels of host processors. Four more channel adapters can be installed in the 3726.
- Configuration Aids: The HONE Configurator CF3725 and the *Configuration Guide*, SA33-0012, are available to IBM representatives to assist in configuring a 3725 to specific network requirements. The CF3725 configurator provides configurations with feature and specify codes, cable lists as well as storage and performance estimates. In CF3725 a number of sample configurations are also available for guidance.

Machine Organization: The 3725 mdl 1 contains:

Central Control Unit: Executes instructions to control communication scanners and channel adapters. The CCU runs under the control of ACF/NCP for the 3725, EP/3725 or both in PEP mode.

Main Storage: Houses a 3725 network control program (NCP, EP, PEP) and other program products loaded from the host processor and provides buffers for the data exchanged with the channel adapters and the lines. The base machine includes 512K bytes of storage as standard.

Maintenance and Operator Subsystem (MOSS): Provides IPL and utility procedures for the 3725 mdl 1 operator. It includes an independent processor with its microcode, a diskette drive and an attachment for the operator console.

Two Line Attachment Bases: They are called CLABs. Each CLAB has one communication scanner and can attach up to 32 duplex or half-duplex communication lines via optional Line Interface Couplers (LICs).

Transmission Subsystem (TSS): Provides the physical connection to communication facilities. It consists of Line Attachment Bases (LABs) with microprocessor based scanners, Line Interface Couplers (LICs) and optional Internal Clock Controls (ICCs). Integrated DCEs (modems) are not available for the 3725 and 3726.

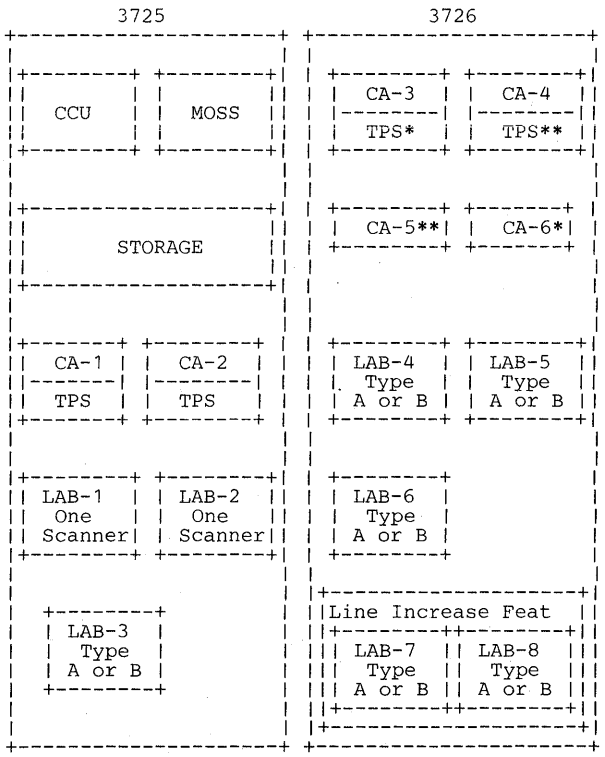
3725 Communication Controller Mdl 1 (cont'd)

The 3725 mdl 1 may also contain:

Channel Adapters (CAs): Provide physical connection to host channels. An optional two processor switch allows a channel adapter to be attached to two processor channels, with non-simultaneous communication. The base machine provides a physical base for two Channel Adapters and two Two-Processor Switches.

Expansion: One 3726 Communication Controller Expansion may be connected to the 3725 mdl 1. The 3726 allows attachment of up to 160 additional lines and/or up to four additional single channel adapters or two additional channel adapters equipped with Two-Processor Switches. See M3726 pages for additional information.

Console: The 3725 mdl 1 requires a primary 3727 Operator Console for installation, operation and maintenance; see M3727 pages for details. A second 3727 Operator Console may be used as an alternate operator console. The operator consoles are directly attached, i.e., no DCEs (modems) are required. Only one operator console is active at a given time. The active console is selected by a switch on the 3725 mdl 1 control panel. See "Service Requirements" for additional information.



Note: The numeric suffixes indicate positions, e.g. LAB-3 means LAB in position 3. LAB-1 and LAB-2 are standard in the base 3725.

* exclusive
** exclusive

Position Numbering: Channel Adapter and LAB positions are numbered sequentially through both the 3725 and the 3726. Thus Channel Adapter positions 1 and 2 are in the 3725 and Channel Adapter positions 3 through 6 are in the 3726. Similarly LAB positions 1,2 and 3 are in the 3725 and LAB positions 4 through 8 are in the 3726. See figure above.

Customer Responsibilities: See M2700 pages. Also see EP and NCP Programming pages for attachment capability.

Communications Facilities: The 3725 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

Remote Communication Controller: The 3725 can be used without channel connection to a host processor. Such a 3725 is termed "link-attached" and is connected via one or more communication links to channel-attached 3705s and/or 3725s. A link-attached controller has the same networking capabilities as a channel-attached one. Link attachment is a standard capability of the 3725; no special feature is needed.

For more information on the functions of a link-attached Communication Controller, see the Advanced Communications Functions for NCP (ACF/NCP) in the Program Products section.

Service Requirements: The 3725 requires a local (primary) 3727 Operator Console as the console for operation, as well as for installation and maintenance. Maximum distance is 7.5 meters (25 feet).

The 7427 Console Switching Unit (Special Product provided by RPQ 8J5008) offers the capability to allow up to four 3725 machines to share a single primary operator console.

Service limitations are: A primary console is required for maintenance and must be available whenever service is to be performed. There must be no obstructing wall or door between the primary console and any attached 3725. The primary console must be available for maintenance personnel when called for servicing a 3725 or 3726.

Data Communication Equipment:

Modems: The following modems or units may be used with the 3725:

3863 mdl 1/2	2400 bps	
3864 mdl 1/2	4800 bps	
3865 mdl 1/2	9600 bps	
3867	2400 to 9600 bps	Link Diag Unit
3868 mdl 1	2400 bps	
3868 mdl 2	4800 bps	
3868 mdl 3/4	9600 bps	
3872	2400 bps	
3874	4800 bps	

Public Data Networks: Public Data Networks are attached as listed in the charts of the M2700 pages.

Non-IBM DCEs: Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35 or X.21 may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.

Automatic Calling Equipment: Automatic calling equipment which comply with EIA RS-366 or CCITT Recommendation V.25 may be attached under the provisions of the IBM Multiple Supplier Systems Policy.

Data Encryption Equipment: The following devices may be attached to the 3725: 3845 Data Encryption Device ... 3846 Data Encryption Device

Configuring and Ordering Procedures:

- For a new machine:

  A new machine must be configured with the aid of the HONE Configurator CF3725, or the *Manual Configuration Guide,* SA33-0012. Either procedure yields a list of feature codes and specify codes, which is used to order the machine, and a pictorial diagram showing the positions of the LABs, LICs and ICCs. A copy of this diagram should be given to the customer, as it will be needed when the NCP or EP is generated. At order confirmation time, the machine configuration must be verified by the configurator CF3725. A copy of the CF3725 output must be given to CE, as it will be needed to order and install the DCE and other communication cables.

  Approximately 30 days before the machine is to be shipped, the plant will send a similar pictorial diagram to the branch office. It will include two more copies of this diagram with the machine documentation. One of these should be given to the customer, the other to CE.

  A similar pictorial diagram, called the Graphic Configuration File, is stored on the MOSS diskette. Most of this file is generated by the 3725, but the customer is responsible for adding the LIC weights (see Transmission Subsystem for description of LIC weights) and for keeping them up to date when line protocols or speeds are changed. This information is required for subsequent MES orders.

  A 3727 console must be ordered for each 3725, unless the 3725 is to share a console via the 7427 Console Switching Unit (RPQ 8J5008).

- For an MES:

  From the Graphic Configuration file stored on the MOSS diskette, a diagram of the actual machine configuration is obtained on the host printer. The HONE Configurator or the *Configurator Guide* and this diagram of the machine may be used to configure the MES. This procedure yields a list of feature codes and specify codes (including LIC weights), which is used to order the MES, and an updated pictorial diagram of the LABs, LICs and ICCs. A copy of the updated configuration on the Graphic Configuration printout marked with the MES order number must be sent by the marketing representative to the servicing branch office for use by the CE detailing plugging information for installation planning purposes. This updated configuration is required by the CE as it provides the only source of internal machine feature location and plugging information for the LICs and ICCs.

  To assist the customer and CE the MES number for the ordered LICs and ICCs as well as the LIC types and weights should be entered in the Graphic Configuration File when the MES is ordered.

3725 Communication Controller Mdl 1 (cont'd)

After installation of the MES, the CE verifies that the LICs and their weights in the Graphic Configuration File are consistent with the installation.

- For cables:

  External cables, except the cable for the primary console, are ordered via AAS . Cables for the 3726 Communication Controller Expansion must be ordered with the 3726.(Canada, Latin America, Taiwan) IBM supplies LIC cables and alternate console cable at standard length, 13.5 meter (45 feet) long, except for direct attached DTEs on LIC4A, LIC4B where the standard length is 30 meter (100 feet): order the corresponding cable group as defined in the IMPP. For shorter cables, or for the alternate operator console cable up to 20 meter (64 feet) long or for channel cables, order the corresponding cable group at the specified length as defined in the IMPP. For longer cables, order cables by P/N at the specified length on an MES. These cables include installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file for prices.

The primary operator console is installed with a attachment cable of 7.5 meters (25 feet) maximum, which is included in the shipping group of the 3725. For the Alternate Operator Console, IBM supplies a cable of up to 20 meters (65 feet) . This cable is obtained by ordering cable group **#0099**. Additional length up to 150 meters (490 feet) may be ordered by RPQ.

Channel Adapters: The 3725/3726 Channel Adapter attaches to a host channel to provide communications with S/370 (except mdls 115 and 125), 303X, 308X, 43XX Processors.

A Two-Processor Switch allows a Channel Adapter to be connected to two processor channels instead of one. The channels may belong to the same or different processors. Data transfers occur on only one channel interface at a time. Manual switches on the 3725 control panel allow the user to enable both channel interfaces, one interface or the other, or neither interface. In the case where both interfaces are enabled, the processors are responsible for resolving any contention, since only one interface can transfer data at a time. In this mode the TPS provides functions comparable to the 3705 CA Type 3.

The Channel Adapters must occupy contiguous positions beginning with position 1. This means that two Channel Adapters must be installed in the 3725 before any may be installed in the 3726. A Two-Processor Switch will always be installed in the first available position.

Transmission Subsystem (TSS): The Transmission Subsystem consists of Line Attachment Bases (LAB), Line Interface Couplers and Internal Clock Controls. Three types of LABs are available: LABs Type A, LABs Type B and CLABs. LABs Type A and CLABs provide one communication scanner and LABs Type B provide two communication scanners. Two CLABs are included in the base machine. They are not provided as optional features. Optionally an additional LAB of either type A or B may be installed in the 3725.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode, i.e., in a mode of operation similar to the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 or 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NCP V2, i.e. in a mode of operation similar to the one of Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64k bps with EP/3725 R2. In addition, the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3725 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to 8 LICs can be installed on a Line Attachment Base (LAB), for a maximum of 32 lines per LAB.

Each LIC is assigned a scanner "weight", which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on a scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the *3725 Configuration Guide,* SA33-0012, for detailed explanations of the configuration rules used on the TSS.

Internal Clock Control features are required to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly attached synchronous terminals.

Performance: The maximum number of lines capable of concurrent operation is a function of line speed, line protocols, the 3725 control program installed and the application work load. The number of lines which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in the customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

Direct Attachment: The 3725 allows direct, i.e. modemless, attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols at speeds up to 1200 bps (9600 bps if they use external clocking) or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 56K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 56K bps.

Directly-attached DTEs require the ICC feature in the 3725. At speeds of up to 1200 bps, the speed is set at the time of control program generation and must match that of the DTE's internal clock. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3725) and the speed is set by hardware in the 3725. At the plant the speed will be set to 9600 bps. At installation time, it may be changed by the CE on a per-LIC basis to 2400, 4800, 19.2K or 56K bps.

For information on the available direct attachment cable types and lengths, refer to the *Installation and Physical Planning Manual,* GC22-7064.

Bibliography: GC20-0001

SPECIFY

The voltage and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3725, if the default options specified below are satisfactory.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Voltage default option is 208V. Specify **#9914** for 240V. If the 4.3 meter (14 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) power cable.
- Color: The standard color is pearl white .
  For other colors, specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue , **#9064** for charcoal brown, **#9065** for pebble gray .

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Storage Increment 256K (#7100): Provides main storage increments of 256K bytes to allow up to two megabytes of memory. **Maximum:** Six per 3725. **Field Installation:** Yes.

Two-Processor Switch (#8320): Provides a second channel interface to attach CA #1561 to a Multiprocessor System (MP) or to two channels of the same or different processors. One or both channel interfaces are enabled by a manual switch on the 3725 control panel. The enabled channel interface is operational when selected by the host channel. Data transfer cannot occur concurrently on both channel interfaces. Order channel cable groups #3920 and #1178 with this feature. **Maximum:** Two per 3725. **Prerequisites:** #1561 in the corresponding position. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Channel Adapter (#1561): Provides the logical and physical interface between a 3725 and a S/370 (except mdls 115 and 125), 303X, 308X, 43XX processor. It attaches to a byte multiplexer, block multiplexer or selector channel. Each one may be equipped with a Two-Processor Switch (TPS). With this feature order channel cable groups #3920 and, if required, #1178. **Maximum:** Two per 3725. The possible combinations of CAs and TPSs are:

Number of CA	CA Position	TPS Position
0	–	–
1	1	1
2	1,2	1,2

Prerequisites: None. **Field Installation:** Yes.

Internal Clock Control (#4666): Provides bit clocking when the attached external DCE does not provide this clocking, or when direct attachment of the DTE is required. It provides clocking for eight LICs (up to 32 lines) at 50, 110, 134.5, 200, 300, 600 and 1200 bps for operation with or without a DCE and at speeds of 2400, 4800, 9600, 19K and 56K bps for operation without a DCE (direct attachment). At

3725 Communication Controller Mdl 1 (cont'd)

speeds up to 1200 bps, the speed is set at the time of control program generation and must match that of the internal clock of the attached DTE. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3725) and the speed is set by hardware in the 3725. At the plant the speed will be set to 9600 bps. At installation time, it may be changed by the CE on a per LIC basis to 2400, 4800, 19K or 56K bps. **Maximum:** Two per base machine plus one per LAB Type A or Type B. **Field Installation:** Yes.

Line Attachment Base Type A (#4771): Provides a communication scanner and a physical base for up to eight LICs Type 1 (#4911) or Type 4A (#4941). **Limitations:** The sum of LIC weights must not exceed 100. Except by MES, only LICs with weight 12 or 18 may be installed on the LAB Type A. Exclusive with LAB Type B (#4772). **Maximum:** One per 3725. **Prerequisites:** Specify **#9671** only to order a LAB Type A without any associated LIC. **Field Installation:** Yes.

Line Attachment Base Type B (#4772): Provides two communication scanners and a physical base for up to eight LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942). Each scanner controls up to four LICs. **Limitations:** The sum of the four LIC weights attached to one communication scanner must not exceed 100. Exclusive with LAB Type A (#4771). **Maximum:** One per 3725. **Prerequisites:** Specify **#9672** only to order a LAB Type B without any associated LIC. **Field Installation:** Yes.

Line Interface Coupler Type 1 (#4911): Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs at 2400, 4800, 9600 or 19.2K bps and of externally clocked start stop DTE's at 2400, 4800 and 9600 bps, if it is associated with an ICC. The DTEs attached directly to a given LIC must operate at the same speed. In addition, direct attachment of asynchronous devices is provided at speeds up to 1200 bps.

LIC 1 provides modem attachment of asynchronous devices (not clocked by the DCE) at speeds up to 1200 bps, if it is associated with an ICC. The asynchronous DTE's using DCE clocking can also be attached at speeds above 1200 bps and up to 9600 bps, without associated ICC.

Depending on the options chosen at the generation of the control program, each port of LIC Type 1 can support one of the following interfaces:

Duplex or half-duplex EIA RS 232/CCITT V.24 at speeds up to 19.2K bps
EIA RS-366/CCITT V.25 Autocall Equipment
X.21bis
X.20bis

Cables: For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group **#1404** for DCE attachment, cable group **#0082** for attachment to automatic calling units cable group **#0085** for direct attachment of 3101 and TTY 33/35, or cable group **#1400** for direct attachment of other DTEs.

EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The LIC Type 1 (#4911) can support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35 meters (115 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35 meters (115 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier: A 3863 or 3864 or 3865 modem which does *not* have Data Multiplexer #3260 installed must have EC **344120** installed ... a 3865 modem with Data Multiplexer #3260 installed must have EC **323406** installed.
3. Order the cable: See "Ordering Procedures".

Limitations: If the transmission speed of any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** 16 per basic 3725, plus eight additional per LAB Type A (#4771) or Type B (#4772). **Prerequisites:** LAB Type A (#4771) or Type B (#4772) in LAB position 3. An ICC on the same LAB, if direct attachment is required or if DCE does not provide clocking. **Specify:** LIC weights in accordance with Table 1. **Field Installation:** Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Control		Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
- ACF/NCP 3725 or EP/3725, except EP/3725 R1 for BSC tributary operation					
AUTOCALL		N/A	12	**#9101**	N/A
BSC	EBCDIC ASCII	9600 4800	12	**#9101**	**#9121**
	ASCII	9600	25	**#9102**	**#9122**
	EBCDIC ASCII	19200 19200	50	**#9103**	**#9123**
SDLC	HDX DX	9600 4800	12	**#9101**	**#9121**
	DX	9600	25	**#9102**	**#9122**
	DX HDX	19200 19200	50	**#9103**	**#9123**
- EP/3725 R1, for BSC tributary operation					
	Ch Mode	1200	42	N/A	**#9113**
- ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1.(Speeds above 1200 bps are supported only for externally clocked DTEs.)					
S/S(*)		1200(1)	12	N/A	**#9121**
		2400(1)	25	**#9102**	**#9122**
		4800(1)	50	**#9103**	**#9123**
		9600(1)	100	**#9104**	**#9124**
- ACF/NCP V2 and EP/3725 R1					
S/S		300	12	N/A	**#9121**
Ch Mode		600	18	N/A	**#9111**
		1200	37	N/A	**#9112**

* Weights and specify codes apply to most commonly used DTE's, i.e. those DTE's using transmission codes with at least 10 bits per character (start, data/parity, stop(s)) like ASCII. DTE's using transmission codes with less than 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

Line Interface Coupler Type 2 (#4921): Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. **Cables:** For each LIC type 2 order one cable group **#0086**. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths. **Limitations:** When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per basic 3725, plus eight additional per LAB Type B (#4772). **Prerequisites:** LAB Type B (#4772) for LICs in LAB position 3. **Specify:** LIC weights in accordance with Table 2. **Field Installation:** Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control		Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
BSC (See Note)	EBCDIC	64000	25	**#9201**
	ASCII	32000		
	ASCII	64000	42	**#9202**
SDLC	HDX DX	64000 32000	25	**#9201**
	DX	64000	42	**#9202**
	HDX DX	230400 230400	100	**#9203**

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, "BSC Char. Mode").

Line Interface Coupler Type 3 (#4931): Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 56K bps, if it is associated with an ICC. **Cables:** For each LIC Type 3, order one cable group **#0087** for DCE attachment or cable group **#0088** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs

3725 Communication Controller Mdl 1 (cont'd)

may have to be further reduced. **Maximum:** Eight per basic 3725, plus eight additional per LAB Type B (#4772). **Prerequisites:** LAB Type B (#4772) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 3. **Field Installation:** Yes.

Table 3: LIC Type 3 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
BSC EBCDIC (See Note)	64000	25	#9301	#9321
ASCII	32000			
ASCII	64000	42	#9302	#9322
SDLC HDX	64000	25	#9301	#9321
DX	32000			
DX	64000	42	#9302	#9322
HDX	256000	100	#9303	N/A
DX	256000			

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, BSC "Char. Mode").

Line Interface Coupler Type 4A (#4941): Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps, if it is associated with an ICC. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. **Cables:** For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group **#0089** for DCE attachment or cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** 16 per basic 3725, plus eight additional per LAB Type A (#4771) or Type B (#4772). **Prerequisites:** LAB Type A (#4771) or Type B (#4772) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 4A. **Field Installation:** Yes.

Table 4A: LIC Type 4A Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
SDLC HDX	9600	12	#9401	#9421
DX	4800			
DX	9600	25	#9402	#9422

Line Interface Coupler Type 4B (#4942): Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 64K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 64K bps. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 56K bps, if it is associated with an ICC. **Cables:** For each LIC Type 4B, order one cable group **#0089** for DCE attachment or one cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per basic 3725, plus eight additional per LAB Type B (#4772). **Prerequisites:** LAB Type B (#4772) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 4B. **Field Installation:** Yes.

Table 4B: LIC Type 4B Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
SDLC HDX	64000	25	#9403	#9423
DX	64000	42	#9404	#9424

Configurating and Ordering Procedures of Specified Configurations:

- General:
  - It is possible to configure a 3725 without following all the rules described in the *IBM 3725 Communication Controller Configuration Guide,* (Chapter "Graphic Configuration Procedure").
  - This configuring procedure allows flexibility in placing Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match to match very specific configuration requirements.
  - Such configurations are called: "Specified Configurations" and should be ordered with Specify Code **#6000.**
  - Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory mandatory configuring rules.
  - For configuring information, refer to the *IBM 3725 Communication Controller Configuration Guide,* appendix "Configuring and ordering specified configurations", and to the HONE Configurator CF3725.
- Ordering Procedure:
  - Use CF3725 to configure the 3725 to the customer's requirement.
  - Enter the order directly into AAS or via HONE-AAS link. Specify Code **#6000** is required.
  - Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.
  - Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department"Dept 447, Research Triangle Park, Raleigh, N.C..
  - Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

ACCESSORIES (None)

SUPPLIES (None)

3725 COMMUNICATION CONTROLLER MDL 2

PURPOSE

The 3725 model 2 controls data communications between modem-attached or directly-attached (without a modem) terminal devices and one or more directly- or remotely-connected S/370 (except models 115 and 125), 303X, 308X, 43XX host processors, or between two host processors. Remote connection may be via common carrier-provided or customer-owned communication facilities. A 3727 console is required for installation, operation and maintenance.

The following is a brief summary of the 3725 Communication Controllers.

Communic. Controller	Max Lines*	Max Storage	Host Program	Comm Control Program
3725 Model 1	256	2M	VTAM/TCAM	ACF/NCP-PEP
	256	1M	BTAM	EP
3725 Model 2	24	512K	VTAM/TCAM	ACF/NCP-PEP
	24	512K	BTAM	EP

* Maximum lines that can physically attach, CF3725 is required to predict actual line attachment capabilities

See individual pages for each Communication Controller for information on additional features.

MODELS

Model 2 002

Prerequisites: If channel-attached, the 3725 mdl 2 requires a control unit position on a system channel. See processor pages for details.

When attaching to a 4321 or 4331 in EP mode, restrictions are imposed on the number of available subchannels which may be used by the 3725 mdl 2.

HIGHLIGHTS

The 3725 mdl 2 is a modular, programmable communication controller, which runs under the control of:

- Either ACF/NCP Version 2 for the 3725 or EP/3725 R1 or both in PEP mode.
- Or ACF/NCP Version 3 or EP/3725 R2 or both in PEP mode. (SEe Program Products and SCP sections for details.)

Its programmability allows a high degree of flexibility in tailoring a data communications system to the customer's requirements. In addition, it plays an active role in Communications Network Management (CNM) by providing data to the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA).

The machine structure is simplified by having a small number of features: Five types of line interfaces and one type of channel adapter. This allows easy additions and changes to the machine configuration.

The 3725 mdl 2 is field upgradable to 3725 mdl 1.

Characteristics of the 3725 mdl 2 include:

- LSI technology for good RAS characteristics and low power consumption.
- The same internal performance as the 3725 mdl 1.
- Attachment of high-speed lines which use the modulo 128 function of ACF/NCP for INN links.
- 512K bytes of main storage
- Internal Clock Control included in the base machine.
- Maintenance and Operator Subsystem (MOSS), a functionally separate processor, facilitates maintenance and problem determination by providing:
  - Box error logging
  - Alert mechanisms
  - Display of machine status
  - Diagnostics for the Central Control Unit (CCU), channel adapters, scanners and line interfaces
  - Utilities to:
    - collect microcode dumps and send them to the host for printing
    - provide actual configuration data, help the customer to plan for MES, and store this information on the MOSS diskette via the Graphic Configuration File for further console display or update. This information can be transferred to the host where the machine diagram can be printed by ACF/SSP
    - allow the operator to keep a current Line Description File, providing the physical address, symbolic name, speed, and protocol of each connected line. This file, stored on the MOSS diskette, may be transferred to the host and printed by ACF/SSP.
- Same RAS Characteristics as the 3725 mdl 1:
  - Reliability and availability of the 3725 are enhanced by the following elements:
    - Extensive error detection, including storage protection against inadvertent overlays.
    - Functional building block design (most adapter errors are contained within a single building block and thus will not take the system down)
    - Error correcting code for the main storage and scanner storage
    - Error by-pass facilities: Microcode re-IPLs, system re-IPLs and dynamic reconfiguration of SNA resources
    - Automatic first-level problem determination with alert messages, which report hardware errors to the network operator and recommend actions
    - Enhanced problem determination aids
    - Automatic power-on when power returns after loss
    - Port Swapping which allows the operator to logically swap a line from a failing port to a spare port without involvement of the host processor.
  - Same serviceability as the 3725 mdl 1, including:
    - Many host-independent functions for installation and maintenance
    - Error information logging/retrieval
    - Diagnostics and trouble shooting facilities
    - Concurrent maintenance for MOSS diskette drive and console.
- Same Network Management and Problem Determination as the 3725 mdl 1: Considerable function has been designed into this communication controller to provide maximum availability to the customer. The 3725 MOSS provides problem determination and recovery procedures that are designed to be easily understood and used by the operator e.g.:
  - Stand Alone Link Test facility to test an SDLC Communication link attaching another 3725 or 3705, without involvement of a host or a control program.
  - Line Interface Display to monitor at the console the status of most of the control leads on a line interface.

  The 3725 supports IBM's CNM (Communications Network Management) direction by sending error related information to the Network Problem Determination Application (NPDA) running in a host processor under the support of the Network Communications Control Facility (NCCF). This enhanced CNM support provides better problem determination in SNA networks. The basic NCP problem determination functions (alerts) are also offered in the non-NPDA environment, but they are not available in EP mode.
- Attachment of up to 24 duplex or half-duplex lines to the 3725 mdl 2. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.
- One or two channel adapters in the 3725 mdl 2 to connect to the byte multiplexer, block multiplexer or selector channels of host processors.
- Configuration Aids: The HONE Configurator CF3725 and the *Configuration Guide,* SA33-0022, are available to IBM representatives to assist in configuring a 3725 mdl 2 to specific network requirements. The CF3725 configurator provides configurations with feature and specify codes, cable lists as well as storage and performance estimates. In CF3725 and in these pages a number of sample configurations are also available for guidance.

Sample Configurations

To ease the task of configuring and ordering a 3725 mdl 2, several sample configurations representing popular combinations of lines have been defined here and in CF3725 response files.

If one of the sample configurations matches the customer's requirements, it may be ordered directly without running CF3725. If none of the sample configurations matches the customer's requirements, then CF3725 or the *Configurator Guide,* SA33-0012, should be used to configure the 3725 mdl 2.

Presentation of the sample configurations C1 to C7:

The first column of each table describes the different categories of lines by groups of protocols. Then, each configuration CONF1 to CONF7 provides a combination of those lines and the related feature/specify codes to be ordered.

3725 Communication Controller Mdl 2 (cont'd)

13 LINES 3 LIC Type 1 and 1 LIC Type 3

Line Protocol	Line Speed up to	CONF 1	CONF 2
BSC EBCDIC SDLC HDX	64K bps 64K bps	1	1
BSC EBCDIC(1) SDLC HDX S/S(2) AUTOCALL	9600 bps 9600 bps 1200 bps	12	8
BSC(1) SDLC S/S(2) AUTOCALL	19.2K bps 19.2K bps 4800 bps	0	4
Configuration to be ordered		**1x#4931 3x#4911 1x#9301 3x#9101**	**1x#4931 3x#4911 1x#9301 1x#9103 2x#9101**

16 LINES 4 LICs Type 1

Line Protocol	Line Speed up to	CONF 3	CONF 4	CONF 5
BSC EBCDIC(1) SDLC HDX S/S(2) AUTOCALL	9600 bps 9600 bps 1200 bps	12	8	0
BSC(1) SDLC DX S/S(2) AUTOCALL	9600 bps 9600 bps 2400 bps	0	4	16
BSC(1) SDLC S/S(2) AUTOCALL	19.2K bps 19.2K bps 4800 bps	4	4	0
Configuration to be ordered		**4x#4911 3x#9101 1x#9103**	**4x#4911 2x#9101 1x#9102 1x#9103**	**4x#4911 4x#9102**

24 LINES 6 LICs Type 1

Line Protocol	Line Speed up to	CONF 6	CONF 7
BSC EBCDIC(1) SDLC HDX S/S(2) AUTOCALL	9600 bps 9600 bps 1200 bps	24	20
BSC(1) SDLC DX S/S(2) AUTOCALL	9600 bps 9600 bps 2400 bps	0	4
Configuration to be ordered		**6x#4911 6x#9101**	**6x#4911 5x#9101 1x#9102**

(1) Excluding character mode (See Table 1: LIC Type 1).

(2) Not supported with control program level prior to ACF/NCP V3 and EP/3725 R2 (See Table 1: LIC Type 1).

Note: For each of these sample configurations you must also order:

- The 3725 mdl 2 base machine (select voltage, and color from "Specify").
- As many #1561s (channel adapters) as are needed (maximum 2).
- One 3727 Operator Console (separate order).

Machine Organization

The 3725 mdl 2 contains:

Central Control Unit: Executes instructions to control the communication scanner and the channel adapters. The CCU runs under the control of ACF/NCP V2, EP/3725 or both in PEP mode.

Main Storage: Houses a control program (NCP, EP, PEP) and other program products loaded from the host processor and provides buffers for the data exchanged with the channel adapters and the lines. The base machine includes 512K bytes of storage.

Maintenance and Operator Subsystem (MOSS): Provides IPL and utility procedures for the 3725 mdl 2 operator. It includes an independent processor with its microcode, a diskette drive and an attachment for the operator console.

Transmission Subsystem (TSS): Provides the physical connection to communication facilities. It consists of one Line Attachment Base (LAB) with a microprocessor based scanner and Internal Clock Control (ICC).

The 3725 mdl 2 may also contain:

Channel Adapters (CAs): Provide physical connection to host channels. The base machine provides a physical base for two Channel Adapters.

Line Interface Couplers (LICs): Provide interfaces to communication lines. The base machine provides a physical base for up to six LICs.

The 3725 mdl 2 does not attach the 3726.

Console: The 3725 mdl 2 requires a primary 3727 Operator Console for installation, operation and maintenance; see M3727 pages for details. A second 3727 Operator Console may be used as an alternate operator console. The operator consoles are directly attached, i.e., no DCEs (modems) are required. Only one operator console is active at a given time. The active console is selected by a switch on the 3725 mdl 2 control panel. See "Service Requirements" for additional information.

Customer Responsibilities: See M2700 pages. Also see EP and NCP Programming pages for attachment capability.

Communications Facilities: The 3725 mdl 2 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

Remote Communication Controller: The 3725 mdl 2 can be used without channel connection to a host processor. Such a 3725 mdl 2 is termed 'link-attached' and is connected via one or more communication links to channel-attached 3705s, 3725 mdl 1s and/or 3725 mdl 2s. A link-attached controller has the same networking capabilities as a channel-attached one. Link attachment is a standard capability of the 3725 mdl 2; no special feature is needed. For more information on the functions of a link-attached Communication Controller, see the Advanced Communications Functions for NCP (ACF/NCP) in the Program Products section.

Service Requirements: The 3725 mdl 2 requires a local (primary) 3727 Operator Console as the console for operation, as well as for installation and maintenance. Maximum distance is 7.5 meters (25 feet). The 7427 Console Switching Unit (Special Product provided by RPQ 8J5008) offers the capability to allow up to four 3725 mdl 2 and/or 3725 mdl 1 machines to share a single primary operator console.

Service limitations are: A primary console is required for maintenance and must be available whenever service is to be performed. There must be no obstructing wall or door between the primary console and any attached 3725 mdl 2. The primary console must be available for maintenance personnel when called for servicing a 3725 mdl 2.

Data Communication Equipment:

Modems: The following modems or units may be used with the 3725 mdl 2:

3863 mdl 1/2	2400 bps
3864 mdl 1/2	4800 bps
3865 mdl 1/2	9600 bps
3867	2400 to 9600 bps Link Diag Unit
3868 mdl 1	2400 bps
3868 mdl 2	4800 bps
3868 mdl 3/4	9600 bps
3872	2400 bps
3874	4800 bps

Public Data Networks: Public Data Networks are attached as listed in the charts of the M2700 pages.

Non-IBM DCEs: Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35 or X.21 may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.

Automatic Calling Equipment: Automatic calling equipment which comply with EIA RS-366 or CCITT Recommendation V.25 may be attached under the provisions of the IBM Multiple Supplier Systems Policy.

Data Encryption Equipment: The following devices may be attached to the 3725 mdl 2: 3845 Data Encryption Device ... 3846 Data Encryption Device.

3725 Communication Controller Mdl 2 (cont'd)

Configuring and Ordering Procedures:

- For a new machine:

  A new machine must be configured with the aid of the HONE Configurator CF3725 or the *Configuration Guide,* SA33-0022, unless one of the sample configurations is ordered. Either procedure yields a list of feature codes and specify codes, which is used to order the machine, and a pictorial diagram showing the positions of the LICs. A copy of this diagram should be given to the customer, as it will be needed when the NCP or EP is generated. At order confirmation time, the machine configuration must be verified by the configurator CF3725. A copy of the CF3725 output must be given to CE, as it will be needed to order and install the DCE and other communication cables. Approximately 30 days before the machine is to be shipped, the plant will send a similar pictorial diagram to the branch office. It will include two more copies of this diagram with the machine documentation. One of these should be given to the customer, the other to CE.

  A similar pictorial diagram, called the Graphic Configuration File, is stored on the MOSS diskette. Most of this file is generated by the 3725 mdl 2, but the customer is responsible for adding the LIC weights (see "Transmission Subsystem" for description of LIC weights) and for keeping them up to date when line protocols or speeds are changed. This information is required for subsequent MES orders.

  A 3727 console must be ordered for each 3725 mdl 2, unless the 3725 mdl 2 is to share a console via the 7427 Console Switching Unit (RPQ 8J5008).

- For an MES:

  From the Graphic Configuration file stored on the MOSS diskette, a diagram of the actual machine configuration is obtained on the host printer. The HONE Configurator CF3725 or the **Configuration Guide** and this diagram of the machine may be used to configure the MES. This procedure yields a list of feature codes and specify codes (including LIC weights), which is used to order the MES, and an updated pictorial diagram of the LICs. A copy of the updated configuration on the Graphic Configuration printout marked with the MES order number must be sent by the marketing representative to the servicing branch office for use by the CE detailing plugging information for installation planning purposes. This updated configuration is required by the CE as it provides the only source of internal machine feature location and plugging information for the LICs.

  To assist the customer and CE, the MES number for the ordered LICs, as well as the LIC types and weights, should be entered in the Graphic Configuration File when the MES is ordered. After installation of the MES, the CE verifies that the LICs and their weights in the Graphic Configuration File are consistent with the installation.

- For cables:

  External cables, except the cable for the primary console, are ordered via AAS. . Cables for the 3726 Communication Controller Expansion must be ordered with the 3726.(Canada, Latin America, Taiwan) IBM supplies LIC cables and alternate console cable at standard length, 13.5 meter (45 feet) lone, except for direct attached DTEs on LIC4A, LIC4B where the standard length is 30 meter (100 feet): order the corresponding cable group as defined in the IMPP. For shorter cables, or for the alternate operator console cable up to 20 meter (64 feet) long or for channel cables, order the corresponding cable group at the specified length as defined in the IMPP. For longer cables, order cables by P/N at the specified length on an MES. These cables include installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file for prices.

The primary operator console is installed with an attachment cable of 7.5 meters (25 feet) maximum, which is included in the shipping group of the 3725 mdl 2. For the Alternate Operator Console, IBM supplies a cable of up to 20 meters (65 feet). This cable is obtained by ordering cable group **#0099.** Additional length up to 150 meters (490 feet) may be ordered by RPQ.

Channel Adapters: The 3725 mdl 2 Channel Adapter attaches to a host channel to provide communications with S/370 (except mdls 115 and 125), 303X, 308X, 43XX Processors.

Transmission Sub-System (TSS): The Transmission Subsystem consists of a Line Attachment Base (LAB), Line Interface Couplers, an Internal Clock Control and a communication scanner. Only Line Interface Couplers are available as optional features.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 mdl 2 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode, i.e., in a mode of operation similar to the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 or 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NCP V2, i.e. in a mode of operation similar to the one of the Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64K bps with EP/3725 R2. for tributary addressing under EP or PEP. In addition the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3725 mdl 2 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to six LICs can be installed on the Line Attachment Base (LAB), for a maximum of 24 lines.

Each LIC is assigned a scanner 'weight', which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on the scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the *Configuration Guide,* SA33-0022, available to IBM representatives, for detailed explanations of the configuration rules used for the TSS.

Internal Clock Control (ICC) is used to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly attached synchronous terminals. This ICC is part of the base 3725 mdl 2.

Performance: The maximum number of lines capable of concurrent operation is a function of line speed, line protocols, the 3725 mdl 2 control program installed and the application work load. The number of lines which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in the customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

Direct Attachment: The 3725 mdl 2 allows direct, i.e., modemless, attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols at speeds up to 1200 bps (9600 bps if they use external clocking) or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 56K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 56K bps.

Directly attached DTEs use the ICC in the 3725 mdl 2. At speeds of up to 1200 bps the speed is set at the time of control program generation and must match that of the DTE's internal clock. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3725 mdl 2) and the speed is set by hardware in the 3725 mdl 2. At the plant the speed will be set to 9600 bps. At installation time, it may be changed by the CE on a per-LIC basis to 2400, 4800, 19.2K or 56K bps.

For information on the available direct attachment cable types and lengths, refer to the *Installation and Physical Planning Manual,* GC22-7064.

Bibliography: GC20-0001

SPECIFY

The voltage and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3725 mdl 2, if the default options specified below are satisfactory.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Voltage default option is 208V. Specify **#9914** for 240V. If the 4.3 meter (14 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) power cable.
- Color: The standard color is pearl white .
  For other colors, specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue , **#9064** for charcoal brown, **#9065** for pebble gray .

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES (None)

COMMUNICATIONS FEATURES

Channel Adapter (#1561): Provides the logical and physical interface between a 3725 mdl 2 and a S/370 (except mdls 115 and 125), 303X,

3725 Communication Controller Mdl 2 (cont'd)

308X, 4300 processor. It attaches to a byte multiplexer, block multiplexer or selector channel. With this feature, order channel cable group **#3920** and, if required, **#1178**. **Maximum:** Two per 3725 mdl 2. **Prerequisites:** None. **Field Installation:** Yes.

Line Interface Coupler Type 1 (#4911): Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs at 2400, 4800, 9600 or 19.2K bps and of externally clocked start stop DTE's at 2400, 4800 and 9600 bps, if it is associated with an ICC. The DTEs attached directly to a given LIC must operate at the same speed. In addition, direct attachment of of asynchronous devices is provided at speeds up to 1200 bps. Depending on the options chosen at the generation of the control program each port of LIC Type 1 can support one of the following interfaces:

- Duplex or half-duplex EIA RS-232/CCITT V.24 at speeds up to 19.2K bps
- EIA RS-366/CCITT V.25 Autocall Equipment
- X.21bis switched or nonswitched
- X.20bis switched or nonswitched

LIC 1 provides modem attachment of asynchronous DTE's at speeds up to 1200 bps. At speeds above 1200 bps and up to 9600 bps, the start stop DTE's can be attached, provided they use modem clocking.

Cables: For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group **#1404** for DCE attachment, cable group **#0082** for attachment to automatic calling units cable group **#0085** for direct attachment of 3101 and TTY 33/35, or cable group **#1400** for direct attachment of other DTEs.

EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The LIC Type 1 (#4911) can support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35 meters (115 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35 meters (115 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier: A 3863 or 3864 or 3865 modem which does *not* have Data Multiplexer #3260 installed must have EC **344120** installed. ... a 3865 modem with Data Multiplexer #3260 installed must have EC **323406** installed.
3. Order the cable: See "Ordering Procedure".

Limitations: If the transmission speed of any of the lines connected to the communication scanner exceeds 9600 bps, the maximum number of LICs is four. Due to the sum of LIC weights the number of LICs may have to be further reduced. **Maximum:** Six per basic 3725 mdl 2. **Specify:** LIC weights in accordance with Table 1. **Field Installation:** Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Control	Transmission Speed up to	LIC Weight	Specify Code
-ACF/NCP 3725 or EP/3725, except EP/3725 R1 for BSC tributary operation			
AUTOCALL	N/A	12	**#9101**
BSC EBCDIC	9600	12	**#9101**
ASCII	4800		
ASCII	9600	25	**#9102**
EBCDIC	19200	50	**#9103**
ASCII	19200		
SDLC HDX	9600	12	**#9101**
DX	4800		
DX	9600	25	**#9102**
DX	19200	50	**#9103**
HDX	19200		
-EP/3725 R1, for BSC tributary operation			
BSC Char.Mode	1200	42	**#9113**
-ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1. (Speeds above 1200 bps are supported only for externally clocked DTEs.)			
S/S(*)	1200	12	**#9101**
	2400	25	**#9102**
	4800	50	**#9103**
	9600	100	**#9104**
-ACF/NCP V2 and EP/3725 R1			
S/S	300	12	**#9101**
Ch Mode	600	18	**#9111**
	1200	37	**#9112**

* Weights and specify codes apply to the most commonly used DTE's, i.e. those DTE's using transmission codes with at least 10 bits per character (start, data/parity, stop(s)), like ASCII. DTE's using transmission codes with less than 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

Line Interface Coupler Type 2 (#4921): Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. **Cables:** For each LIC type 2, order one cable group **#0086**. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths. **Limitations:** When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Four per basic 3725 mdl 2. **Specify:** LIC weights in accordance with Table 2. **Field Installation:** Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
BSC EBCDIC (See Note)	64000	25	**#9201**
ASCII	32000		
ASCII	64000	42	**#9202**
SDLC HDX	64000	25	**#9201**
DX	32000		
DX	64000	42	**#9202**
HDX	230400	100	**#9203**
DX	230400		

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, "BSC Char. Mode").

Line Interface Coupler Type 3 (#4931): Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 56K bps. **Cables:** For each LIC Type 3, order one cable group **#0087** for DCE attachment or cable group **#0088** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Four per basic 3725 mdl 2. **Specify:** LIC weights in accordance with Table 3. **Field Installation:** Yes.

3725 Communication Controller Mdl 2 (cont'd)

Table 3: LIC Type 3 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
BSC EBCDIC (See Note)	64000	25	**#9301**
ASCII	32000		
ASCII	64000	42	**#9302**
SDLC HDX	64000	25	**#9301**
DX	32000		
DX	64000	42	**#9302**
HDX	256000	100	**#9303**
DX	256000		

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC Type 1 BSC "Char. Mode", in Table 1).

Line Interface Coupler Type 4A (#4941): Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operations are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. **Cables:** For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group **#0089** for DCE attachment or cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Six per basic 3725 mdl 2. **Specify:** LIC weights in accordance with Table 4A. **Field Installation:** Yes.

Table 4A: LIC Type 4A Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
SDLC HDX	9600	12	**#9401**
DX	4800		
DX	9600	25	**#9402**

Line Interface Coupler Type 4B (#4942): Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 64K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 64K bps. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 56K bps, if it is associated with an ICC. **Cables:** For each LIC Type 4B, order one cable group **#0089** for DCE attachment or one cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Four per basic 3725 mdl 2. **Specify:** LIC weights in accordance with Table 4B. **Field Installation:** Yes.

Table 4B: LIC Type 4B Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
SDLC HDX	64000	25	**#9403**
DX	64000	42	**#9404**

Configurating and Ordering Procedures of Specified Configurations:

- General:
  - It is possible to configure a 3725 without following all the rules described in the *IBM 3725 Communication Controller Configuration Guide,* (Chapter "Graphic Configuration Procedure").
  - This configuring procedure allows flexibility in placing Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match to match very specific configuration requirements.
  - Such configurations are called: "Specified Configurations" and should be ordered with Specify Code **#6000.**
  - Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory mandatory configuring rules.
  - For configuring information, refer to the *IBM 3725 Communication Controller Configuration Guide,* appendix "Configuring and ordering specified configurations", and to the HONE Configurator CF3725.
- Ordering Procedure:
  - Use CF3725 to configure the 3725 to the customer's requirement.
  - Enter the order directly into AAS or via HONE-AAS link. Specify Code **#6000** is required.
  - Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.
  - Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department"Dept 447, Research Triangle Park, Raleigh, N.C..
  - Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

MODEL CONVERSIONS

The following model conversion is field installable: 3725 model 2 to 3725 model 1. Conversion time is 12 hours.

ACCESSORIES (None)

SUPPLIES (None)

3726 COMMUNICATION CONTROLLER EXPANSION

PURPOSE

Provides additional line and/or channel attachment capability to the 3725 Communication Controller.

MODELS

Model 1 001

Prerequisites: If channel-attached, the 3726 requires a control unit position on a system channel. See processor pages.

HIGHLIGHTS

One 3726 Communication Controller Expansion only attaches to a 3725 Communication Controller, which is required for its operation and maintenance. It expands the capability of the 3725 by providing physical attachment for up to four Channel Adapters without Two-Processor Switches or two Channel Adapters with Two-Processor Switches and up to five Line Attachment Bases supporting up to 160 lines.

The HONE Configurator CF3725 or the *Configuration Guide,* SA33-0012, must be used to configure a 3726.

Communications Facilities: The 3726 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

Data Communication Equipment: The 3726 attaches the same DCEs as the 3725.

Ordering Procedures: See the M3725 pages.

Transmission Subsystem (TSS): The Transmission Subsystem consists of Line Attachment Bases (LAB), Line Interface Couplers and Internal Clock Control. Two types of LABs are available: LABs Type A and LABs Type B. LABs Type A provide one communication scanner and LABs Type B provide two communication scanners.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode, i.e., in a mode of operation similar to the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 or 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NPC V2, in a mode of operation similar to the one of Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64K bps with EP/3725 R2. In addition, the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3726 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to 8 LICs can be installed on a Line Attachment Base (LAB), for a maximum of 32 lines per LAB.

Each LIC is assigned a scanner "weight", which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on a scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the *Configuration Guide,* SA33-0012, available to IBM representatives, for detailed explanations of the configuration rules used for the TSS.

Internal Clock Control features are required to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly-attached synchronous terminals.

Performance: The maximum number of lines capable of concurrent operation is a function of line speed, line protocols, the 3725 control program installed and the application work load. The number of lines which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in the customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

Direct Attachment: The 3726 allows direct (i.e., modemless) attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols at speeds up to 1200 bps or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 56K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 56K bps.

Directly attached DTEs require the ICC feature in the 3726. At speeds of up to 1200 bps the speed is set at the time of control program generation and must match that of the DTE's internal clock. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3726) and the speed is set by hardware in the 3726. At the plant the speed will be set to 9600 bps. At installation time it may be changed by the CE on a per-LIC basis to 2400, 4800, 19,200 or 56,000 bps.

For information on the available direct attachment cable types and lengths, refer to the *Installation and Physical Planning Manual,* GC22-7064.

SPECIFY

The voltage and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3726, if the default options specified below are satisfactory.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Voltage default option is 208V. Specify **#9914** for 240V. If the 4.3 meter (14 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) power cable.
- Color: The standard color is pearl white .
  For other colors, specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue , **#9064** for charcoal brown, **#9065** for pebble gray .

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Line Increase Feature (#3602): Allows the installation of more than three LABs Type A (#4771) or Type B (#4772) in the 3726. It is required for LABs in positions 7 and 8 of the 3726. **Maximum:** One per 3726. **Field Installation:** Yes.

Two-Processor Switch (TPS) (#8320): Provides a second channel interface to attach CA #1561 to a Multiprocessor System (MP) or to two channels of the same or different processors. One or both channel interfaces are enabled by a manual switch on the 3725 control panel. The enabled channel interface is operational when selected by the host channel. Data transfer cannot occur concurrently on both channel interfaces. Order channel cable groups #3920 and #1178 with this feature. Each #8320 installed in the 3726 reduces the number of installable Channel Adapters in the 3726 by one. **Maximum:** Two per 3726. **Prerequisites:** #1561 in the corresponding position. Two TPSs must be installed in the attached 3725 before any TPS can be installed in the 3726. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Channel Adapter (CA) (#1561): Provides the logical and physical interface between a 3726 and a S/370 (except mdls 115 and 125), 303X, 308X, 43XX processor. It attaches to a byte multiplexer, block multiplexer or selector channel. Order channel cable groups #3920 and #1178 with this feature. **Limitations:** Each TPS installed in the 3726 reduces the number of installable CAs by one. **Maximum:** Four per 3726. The possible combinations of CAs and TPSs Switches are:

Number of CA	CA Position	TPS Position
0	–	–
1	3	3
2	3,4	3,4
3	3,4,5	3
4	3,4,5,6	–

Prerequisites: Two #1561s must be installed in the attached 3725 before any #1561 can be installed in the 3726. **Field Installation:** Yes.

Internal Clock Control (#4666): Provides bit clocking when the attached external DCE does not provide this clocking, or when direct attachment of the DTE is required. It provides clocking for eight LICs (up to 32 lines) at 50, 110, 134.5, 200, 300, 600 and 1200 bps for operation with or without a DCE and at speeds of 2400, 4800, 9600, 19,200 and 56,000 bps for operation without a DCE (direct attachment). At speeds up to 1200 bps the speed is set at the time of control program generation and must match that of the internal clock of the attached DTE. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3726) and the speed is set by hardware in the 3726. At the plant the speed will be set to 9600 bps. At installation time it may be changed by the CE on a per LIC basis to 2400, 4800, 19,200 or 56,000 bps. **Maximum:** One per LAB Type A or Type B. **Field Installation:** Yes.

Line Attachment Base Type A (#4771): Provides a communication scanner and a physical base for up to eight LICs Type 1 (#4911) or Type 4A (#4941). **Limitations:** The sum of LIC weights must not exceed

3726 Communication Controller Expansion (cont'd)

100. Except by MES, only LICs with weight 12 or 18 may be installed on the LAB Type A. **Maximum:** Five per 3726, including LABs Type B (#4772). **Prerequisites:** #3602 for #4771 in position 7 of the 3726. A LAB Type A or B must be installed in position 3 of the attached 3725 before any LAB can be installed in the 3726. Specify **#9671** only to order a Line Attachment Base Type A without any associated LIC. **Field Installation:** Yes.

Line Attachment Base Type B (#4772): Provides two communication scanners and a physical base for up to eight LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942). Each scanner controls up to four LICs. **Limitations:** The sum of the four LIC weights attached to one communication scanner must not exceed 100. Exclusive with LAB Type A (#4771). **Maximum:** Five per 3726, including LAB Type A (#4771). **Prerequisites:** #3602 for #4772 in position 7 of the 3726. A LAB Type A or B must be installed in position 3 of the attached 3725 before any LAB can be installed in the 3726. Specify **#9672** only to attach a Line Attachment Base Type B without any associated LIC. **Field Installation:** Yes.

Line Interface Coupler Type 1 (#4911): Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs at 2400, 4800, 9600 or 19,200 bps, if it is associated with an ICC. The synchronous DTEs attached directly to a given LIC must operate at the same speed. Lines connected via DCEs to this LIC may operate at a different speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400, 4800 or 19,200 bps in the field. Direct attachment of asynchronous devices is provided at speeds up to 1200 bps. Depending on the options chosen at the generation of the control program, each port of LIC Type 1 can support one of the following interfaces:

- Duplex or half-duplex EIA RS 232/CCITT V.24 at speeds up to 19.2K bps
- EIA RS-366/CCITT V.25 Autocall Equipment
- X.21bis
- X.20bis

Cables: For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group **#1404** for DCE attachment, cable group **#0082** for attachment to automatic calling units cable group **#0085** for direct attachment of 3101 and TTY 33/35, or cable group **#1400** for direct attachment of other DTEs.

EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The LIC Type 1 (#4911) can support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35 meters (115 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35 meters (115 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier: A 3863 or 3864 or 3865 modem which does *not* have Data Multiplexer #3260 installed must have EC **344120** installed ... a 3865 modem with Data Multiplexer #3260 installed must have EC **323406** installed.
3. Order the cable: See "Ordering Procedure".

Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** If the transmission speed of any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per LAB Type A (#4771) or Type B (#4772). **Prerequisites:** LAB Type A (#4771) or Type B (#4772). An ICC on the same LAB, if direct attachment is required or if DCE does not provide clocking. **Specify:** LIC weights in accordance with Table 1. **Field Installation:** Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
-ACF/NCP 3725 or EP/3725, except EP/3725 R1 for BSC tributary operation				
AUTOCALL	N/A	12	**#9101**	N/A
BSC EBCDIC ASCII	9600 4800	12	**#9101**	**#9121**
ASCII	9600	25	**#9102**	**#9122**
EBCDIC ASCII	19200 19200	50	**#9103**	**#9123**
SDLC HDX DX	9600 4800	12	**#9101**	**#9121**
DX	9600	25	**#9102**	**#9122**
DX HDX	19200 19200	50	**#9103**	**#9123**
-EP/3725 R1, for BSC tributary operation				
Ch Mode	1200	42	N/A	**#9113**
-ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1. (Speeds above 1200 bps are supported only for externally clocked DTEs.)				
S/S(*)	1200(1) 2400(1) 4800(1) 9600(1)	12 25 50 100	N/A **#9102** **#9103** **#9104**	**#9121** **#9122** **#9123** **#9124**
-ACF/NCP V2 and EP/3725 R1				
S/S Ch Mode	300 600 1200	12 18 37	N/A N/A N/A	**#9121** **#9111** **#9112**

* Weights and specify codes apply to most commonly used DTEs, i.e. those DTEs using transmission codes with at least 10 bits per character (start, data/parity, stop(s)) like ASCII. DTEs using transmission codes with less then 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

Line Interface Coupler Type 2 (#4921): Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. **Cables:** For each LIC type 2 order one cable group **#0086**. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths. **Limitations:** When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per LAB Type B (#4772). **Prerequisites:** #4772. **Specify:** LIC weights in accordance with Table 2. **Field Installation:** Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	Specify Code
BSC EBCDIC (See Note)	64000	25	**#9201**
ASCII	32000		
ASCII	64000	42	**#9202**
SDLC HDX DX	64000 32000	25	**#9201**
DX	64000	42	**#9202**
HDX DX	230400 230400	100	**#9203**

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC1, "BSC Char. Mode").

Line Interface Coupler Type 3 (#4931): Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 56K bps, if it is associated with an ICC. **Cables:** For each LIC Type 3, order one cable group **#0087** for DCE attachment or cable group **#0088** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per LAB Type B (#4772). **Prerequisites:** LAB Type B (#4772). An ICC on the same

3726 Communication Controller Expansion (cont'd)

LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 3. **Field Installation:** Yes.

Table 3: LIC Type 3 Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
BSC EBCDIC (See Note)	64000	25	**#9301**	**#9321**
ASCII	32000			
ASCII	64000	42	**#9302**	**#9322**
SDLC HDX	64000	25	**#9301**	**#9321**
DX	32000			
DX	64000	42	**#9302**	**#9322**

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, BSC "Char. Mode").

Line Interface Coupler Type 4A (#4941): Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps, if it is associated with an ICC. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. **Cables:** For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group **#0089** for DCE attachment or cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per LAB Type A (#4771) or Type B (#4772). **Prerequisites:** LAB Type A (#4771) or Type B (#4772). An ICC on the same LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 4A. **Field Installation:** Yes.

Table 4A: LIC Type 4A Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
SDLC HDX	9600	12	**#9401**	**#9421**
DX	4800			
DX	9600	25	**#9402**	**#9422**

Line Interface Coupler Type 4B (#4942): Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 64K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 64K bps. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 56K bps, if it is associated with an ICC. **Cables:** For each LIC Type 4B, order one cable group **#0089** for DCE attachment or one cable group **#0091** for direct attachment. Refer to the *Installation and Physical Planning Manual,* GC22-7064, for information on available cable lengths and types. **Limitations:** Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. **Maximum:** Eight per LAB Type B (#4772). **Prerequisites:** LAB Type B (#4772). An ICC on the same LAB, if direct attachment is required. **Specify:** LIC weights in accordance with Table 4B. **Field Installation:** Yes.

Table 4B: LIC Type 4B Weight Specify Codes

Line Control	Transmission Speed (bps) LT/EQ	LIC Weight	...Specify Code... no ICC req'd	ICC req'd
SDLC HDX	64000	25	**#9403**	**#9423**
DX	64000	42	**#9404**	**#9424**

Configurating and Ordering Procedures of Specified Configurations:

- General:
  - It is possible to configure a 3725 without following all the rules described in the *IBM 3725 Communication Controller Configuration Guide,* (Chapter "Graphic Configuration Procedure").
  - This configuring procedure allows flexibility in placing Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match to match very specific configuration requirements.
  - Such configurations are called: "Specified Configurations" and should be ordered with Specify Code **#6000**.
  - Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory mandatory configuring rules.
  - For configuring information, refer to the *IBM 3725 Communication Controller Configuration Guide,* appendix "Configuring and ordering specified configurations", and to the HONE Configurator CF3725.
- Ordering Procedure:
  - Use CF3725 to configure the 3725 to the customer's requirement.
  - Enter the order directly into AAS or via HONE-AAS link. Specify Code **#6000** is required.
  - Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.
  - Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department"Dept 447, Research Triangle Park, Raleigh, N.C..
  - Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

ACCESSORIES (None)

SUPPLIES (None)

3727 OPERATOR CONSOLE

PURPOSE

An 3727 operator console when attached to the 3725 Communication Controller provides an operator interface to the Maintenance and Operator Subsystem (MOSS) of the 3725. One primary operator console is required for installation, operation and maintenance of the 3725. An optional alternate operator console may be located at up to 150 meters (492 feet) from the 3725.

MODELS

Model 70 070 Operator Console 3727

Note: One order of a 3727 mdl 70 Operator Console automatically provides one logic unit, one keyboard feature, and one display feature, unless otherwise requested.

Note: Language - English US only, Keyboard - English US only.

Prerequisites: One 3725 Communications Controller.

HIGHLIGHTS

- Operator console consisting of three elements: The logic unit, the display feature and the keyboard feature.
- Display of 1,920 characters in 24 rows of 80 characters with operator status on a 25th line.
- Buffered transmission of data as well as field manipulation of data by use of attribute characters.
- English US Keyboard: 59 keys for alphameric and special characters, 12 keys for numeric keypad, 8 keys for cursor control, editing and MOSS interrupt, 5 keys for program functions, and 3 dedicated keys for direct display of MOSS messages, Central Control Unit (CCU) functions and cursor positioning for function selection.

Operator Factors: The operator console has a contrast enhancement filter. The screen is organized by functional areas: 3725 current machine status on the first three lines, pre-prepared menus and operation options in the central part, alarms, messages, and operator information on the last two lines. An audible alarm is provided to alert the operator who may adjust its volume. The display element can be tilted and swivelled to change the screen angle for the operator. The cable-connected keyboard can be moved and has separators to help prevent accidental striking of control keys.

Input Editing Capability: Eight keys control the cursor without affecting any information on the screen: New line, tab, back tab, move-cursor, and backspace keys. In addition three editing keys are provided: Insert character, delete character, and erase keys. All alphameric special characters, and move-cursor keys have typamatic capability.

Maintenance: On-site maintenance will be provided for the 3727.

Cables: The 3727 Operator Console requires an attachment cable to communicate with the 3725 Communication Controller. The primary 3727 operator console is installed with a cable of 7.5 meters (25 feet), which is included in the shipping group of the 3725 Communication Controller.

The alternate operator console is supplied with a cable of 13.5 meters (45 feet). This cable is obtained by ordering cable group #0099 of the 3725. Shorter or longer cable up to 150 meters (490 feet) may be ordered . For details, see "Configuring and Ordering Procedures of Specified Configurations" in the M3725 pages.

SPECIFY

Power and Power Cable:

- Power (120V, AC, 1 phase, 3-wire, 50/60 Hz):

  Power cable: 1.8 meters (6 feet), non-locking plug

SPECIAL FEATURES

Display (#3255): Provides display screen for the 3727. Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7x14 dot matrix in the 9x16 contiguous box matrix. Displays 70 graphic characters: 26 upper case alphabetics, 10 numerics and 33 special characters plus a space.

Keyboard (#4655): Provides movable keyboard for the 3727. All alphamerics, special characters, and move cursor keys have typamatic capability. A 12 key numeric keypad, five program function keys and three special keys are also provided.

MODEL CONVERSIONS (None)

ACCESSORIES

4300 Processors Console Table (#1550).

3081 Processors Console Table (#1560).

SUPPLIES (None)

3732 TEXT DISPLAY STATION

PURPOSE

Provides a text entry and editing keyboard and display for the 3730 Distributed Office Communication System and the 8100 Information System.

MODELS

Model 1: 001

Prerequisites: Either 3791 Controller, mdl 11C, 12A, or 12B, with **#9171** installed (refer to M3791 pages for details) or an 8100 Information System with #1501 or #1502 (refer to M8100 pages for details).

HIGHLIGHTS

The 3732 consists of a display and keyboard (special feature) that have been designed specifically to provide text entry and editing facilities for the 3730 Distributed Office Communication System and 8100 Information System. The 3732 displays all the text characters that can be entered at the keyboard. In addition, special graphic characters are displayed to denote certain text control functions. The 3732 must be installed with a keyboard.

Display: The display is a 15-inch (diagonal) cathode ray tube display providing 24 lines of 80 characters each, to give a total of 1920 characters. For text entry and editing, lines 1 and 24 are reserved for system use, leaving 22 lines for text entry (line 1 displays a scale to indicate character position, and is used to display formatting information such as margin settings and tab stops, and to track cursor position; line 24 is used to display status information). When, with user-programming, the 3732 is used for full-screen processing, the user has control over all 24 lines (except for minor restrictions on the use of lines 1 and 24). The display includes an anti-glare screen.

Keyboards: One of three keyboards may be ordered (as special features): a 77-Key Typewriter Keyboard (#4621), a 77-Key ASCII Typewriter Keyboard (#4622), or a 75-Key Typewriter Keyboard (#4623). The keyboards contain a central text entry section that is similar in layout to typewriter keyboards. Both upper and lower case characters may be entered. In addition, the keyboards contain 29 function and control keys concerned with document creation, editing, formatting, and printing.

Text Functions: The following text entry and editing functions are provided by the 3732:

Automatic new line and word spill (allowing an operator to enter text without being concerned about line endings)

Temporary left margin (providing automatic indentation)

Adjustable right margin

Adjust and no-adjust entry mode

Insert mode

Tabulation (providing normal, decimal, and centering tab stops)

Column tabulation (allowing an operator to enter tabular material column-by-column)

Required characters (new line, space, backspace, hyphen)

Special characters (such as superscripts, subscripts, temporary left margin)

Delete character, word

Backspace deletion

Underscore character, word, or group of words (separated by required spaces)

System Functions: The following system functions are invoked using function keys on the 3732 keyboard:

Block insert, copy, move, return, delete

Delete line, sentence

Screen advance, return

Page advance, return

Go to End, Go to Top of document

A HELP key to aid users who have problems when operating the 3732.

A PRINT key to send the currently displayed document to a preassigned print queue, for printing as soon as the assigned printer is available.

An ADJST key to adjust the line length of the currently displayed document and to divide the document into pages.

When attached to the 8100 Information System, the following system functions may be invoked using function keys on the 3732 keyboard: Screen Left ... Screen Right ... Column Edit.

Additional 3732 functions:

Cursor-positioning keys to move the display cursor to any position within the display area (up, down, left, right, and "home" - the first available text character position).

An audible alarm tone, similar to the bell on a typewriter, warns an operator that a line or a screen is nearly full (for example, in no-adjust mode the alarm tone sounds when a character is entered or moved into a position five characters from the right margin.

A DISP key to allow or inhibit the display of certain special characters (such as space, and tabs).

Attachment: The 3732 attaches to a 3791 Controller mdl 11C, 12A, 12B or to the 8100 Information System with the Display and Printer Attachment via a coaxial cable at a distance up to 609 meters (2,000 feet).

Security And Integrity Features: A Security Keylock (#6340) helps prevent unauthorized use of the 3732. Text cannot normally be displayed or modified unless the key is in the On position.

Problem Determination Procedures: To minimize machine downtime, users are encouraged to determine the cause of 3732 malfunctions using IBM-provided Problem Determination Procedures. Data obtained from these procedures is used to correct customer operating or programming errors, or is passed to a CE to aid in isolating a machine malfunction. The Problem Determination Procedures are presented in an easy-to-follow graphic form and are contained in the *3732 Problem Determination Guide* (GA33-3024 without **#9610** and GA33-3087 with **#9610**), which is stored in the Keyboard.

Publications: Refer to the latest level of *IBM System/370 Bibliography of Industry Systems and Application Programs* (GC20-0370), for details of 3730 system publications including 3732 on 3730. Refer to *8100 Information System Bibliography* (GC20-8100), for details of publications including 3732 on 8100.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.
- Power Cable: If standard 2.8 meter (9 foot) power cable is not required, specify **#9511** for 1.8 meter (6 foot) cable, **#9512** for 3.7 meter (12 foot) cable, **#9513** for 4.5 meter (15 foot) cable.
- Character Set: Specify one of the following: **#9082** for EBCDIC character set (word processing) [Used with 77-Key Typewriter Keyboard (#4621)]. **#9084** for ASCII character set [Used with 77-Key ASCII Typewriter Keyboard (#4622)].
- Keyboard Layouts: Keyboard layouts are shown in *3730 Distributed Office Communication System: Introduction* (GA33-3021), for 3732 without the 8100 attachment **#9610** and in *IBM 3732 Text Display Station for the 8100 Information System Introduction and Configurator* (GA33-3084), for 3732 with **#9610**.
- 8100 Attachment: **#9610** for attachment to 8100 Information System. When thus specified, the 3732 cannot be attached to a 3791 Controller. **Field Installation:** Yes.
- Cables: See "Accessories" for cables... also for cable specifications, when the 3732 is attached to a 3730 System, see *3790 Communication System Installation Manual Physical Planning* (GA27-2769). For cable specifications when the 3732 is attached to an 8100 Information System see *IBM 3732 Text Display Station for IBM 8100 Information System Installation Manual Physical Planning* (GA33-3082).

SPECIAL FEATURES

77-Key Typewriter Keyboard (#4621): Movable typewriter-like layout, with 48 text entry keys and 29 function and control keys. EBCDIC Character Set (**#9082**). See "Specify". **Maximum:** One keyboard (#4621, #4622 or #4623). **Field Installation:** Yes. **Prerequisites: #9082.**

77-Key ASCII Typewriter Keyboard (#4622): Movable, ASCII typewriter-like layout, with 48 text entry keys and 29 function and control keys. See "Specify". **Maximum:** One keyboard (#4621, #4622 or #4623). **Field Installation:** Yes. **Prerequisites: #9084.**

75-Key Typewriter Keyboard (#4623): Movable typewriter-like layout, with 46 text entry keys and 29 function and control keys. See "Specify". **Maximum:** One keyboard (#4621, #4622 or #4623). **Field Installation:** Yes. **Prerequisites: #9082.**

Security Keylock (#6340): A lock and key that normally prevent modification or display of the data in the display when the key is in the Off position. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

3732 Text Display Station (cont'd)

ACCESSORIES

Keylock, Keys: The 3732 with Keylock (#6340) is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser.) A letter of authorization with key identification number must accompany each order. Specify **P/N 2577741**. Allow three weeks for delivery.

Cables: The twinaxial cables and/or associated parts to interconnect the 3732 and attached systems may be purchased from IBM or from a customer-selected source. The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine. See "Cables" under "Specify".

Twinax® Connector Kit (**P/N 7362268**): Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (Individual connectors **P/N 7362229** are available for replacement.)

Twinax Wire (**P/N 7362211**): Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (**P/N 7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (**P/N 3762230**): Permits two Twinax Cables Assemblies to be joined together. Allow a lead time of 120 days.

Twinax Station Protector Kit (**B/M 7361807**): Two protectors. One is required at each end of each Twinax Attachment Cable installed outdoors (either above or below ground level). Individual Twinax Station Protectors, **P/N 7362426**, are available for replacement purposes. Allow a lead time of 120 days.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order **P/N 7362063** for Teflon-covered cable. Individual connectors **P/N 7362229** are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order **P/N 7362061** for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order **P/N 7362062** for Teflon-covered cable assembly.

SUPPLIES (None)

3741 DATA STATION/ WORKSTATION

Effective February, 1984, all models of the 3741 will no longer be available. All RPQs, special features, and accessories will also be withdrawn and will not be available. Model conversions will continue to be available.

PURPOSE

Used to record keyed data onto a magnetic disk by manual operation of the keyboard. Also, to verify data that has been previously keyed. Also, to execute programs written in the Application Control Language. Disks can be used as a data storage medium, for batch transmissions via a binary synchronous adapter, or read into a 3747 Data Converter to convert captured data onto one-half inch computer tape for subsequent processing. Diskettes can also be read directly into a S/370 model 115, 125, 135, 145, 148, 155 II, 158, 165 II, or 168 via a 3540 Diskette I/O Unit. Diskettes can also be read directly into a System/32, System/34, or a System/3 with a 3741 Attachment Feature.

MODELS

Model 1 001 — A single data entry station with: variable record size, 1 to 128 characters, 10 program levels standard, auxiliary duplication, 240-character CRT display, and operator guidance.

Model 2 002 — Same functional characteristics as model 1. Also includes a binary synchronous communications adapter, switched or nonswitched, point-to-point, or non-switched multipoint, auto-answer, EBCDIC transparency standard (except when transmitting or receiving blocked data), can be used as a remote terminal at 1200, 2000, or 2400 bps over appropriate communications facilities. See "Communication Facilities" below.

Model 3 003 — Executes programs written in the Application Control Language. Optionally can create object programs from source programs. Can operate with same functional characteristics as a mdl 1 when not under ACL program control.

Model 4 004 — Same functional characteristics as model 3. Adds the binary synchronous communications capability of the model 2 and can operate with the same remote characteristics as the model 2 when not under ACL program control.

Prerequisites:

- S/360 communications: Mdl 22 through 75 (except mdl 44 or 67 in TSS mode) and 195, via a 2701 Data Adapter Unit, 2703 Transmission Control, or a 3704 or 3705 Communications Controller equipped with appropriate features. See M2701, 2703, 3704, 3705 pages.
- S/370 communications: Mdl 115 through 195, via an Integrated Communications Adapter (#4640), or 2701, 2703, 3704, or 3705.
- System/3 communications:

  Mdl 4, 6, 10 Disk, or mdl 15: Via the Binary Synchronous Communications Adapter (#2074) on the mdl 4, or 6, and (#2074 or #2084) on the mdl 10 Disk and mdl 15. The 3741 mdl 2 or 4 may also be attached directly, via its external modem cable, to the Local Communications Adapter (#4765) on the mdl 6, mdl 10 Disk, and mdl 15.

  Mdl 8 and 12: Via the Binary Synchronous Communications Adapter (#2074) or the Integrated Communications Adapter (#4645 and #6202), on mdl 8, and on mdl 12 via the Binary Synchronous Communications Adapter (#2074 and/or #2084) or the Integrated Communications Adapter (#4645 and #6202). The 3741 mdl 2 or 4 may also be attached directly, via its external modem cable to the Integrated Communications Adapter (#4645 and #4802) on the mdl 8 or 12.
- System/32 communications: Via the Binary Synchronous Communications Adapter (#2074) on the 5320 System Unit.
- System/34 communications: Via its Communications Adapter on the 5340 System Unit.
- System/38 communications: Via its appropriately configured BSC adapter and subfeatures.
- 5230 Data Collection System communications: Via the BSC Adapter (#2074) on the 5231 mdl 2. Transmission is batch mode only via single diskette transfer, point-to-point unidirectional transmission only.
- 5280 communications: Via the Communications Adapter (#2500) on the 5285 and 5288.

HIGHLIGHTS

Has a buffered storage area into which data is keyed prior to recording on disk, thus allowing for correction of detected errors before record is written. Ten program levels are standard. Programs control the automatic functions of skipping, duplicating, field definition, etc. Automatic program selection provided by program-chaining enables operator to key up to a 1,280-character logical record. Modes of operation (Enter, Update, Verify (#4002), or Search) are under keyboard control. Data record lengths can be variable from 1 to 128 characters. **Limitations:** All records within a single data set must be the same length, however, more than one data set can be written on the same disk.

Keyboard: Has a standard 64-character alphameric combination keyboard with "EL" character set for key entry and verifying. In addition to standard keys, the keyboard has: Record-Field-Character Backspace, Record-Field-Character Advance, and Repeat keys.

CRT Display: Up to 240 characters can be displayed in six rows with 40 characters per row. The first row displays machine status (mode of operation, column indicator and error codes). Rows 2, 3, 4 and the first eight positions of row 5 display either the data being keyed or the active program, at operator's option. Data is displayed progressively as it is keyed to build full records for visual verification. The last 30 characters of row 5 display, at operator's option, either field prompting information or current field format. Row 6 provides an isolated display of current field data, as it is being keyed.

Operator Guidance: Utilizes two display lines of the CRT display (row 5 and row 6) for the purpose of describing to the operator the type of information which is required to be keyed. Display lines are updated on a field-by-field basis. The first line displays a prompting message associated with the field being keyed. The second line displays the data as it is being keyed. The even-numbered program levels are used for guidance information storage.

Magnetic Disk: Diskette 1 storage capacity to record up to 1,898 data records (128-characters each). Maximum of 19 data sets per disk. Removable and interchangeable among 3741s. All data is recorded serially on disk as standard EBCDIC code. One Diskette for data recording is provided as standard. For additional diskettes, see "Supplies" below.

Search Address: Provides a means for direct access to a record that the operator specifies by it's track and sector address.

Search EOD: Provides a means to directly access the last record of a data set.

Search on Content: Allows user to retrieve and display data previously recorded on disk by comparing the contents of the desired data record to a search argument. Argument may be equal to all or portion of the data record. Blank characters in the search argument are treated as "don't care" characters. Search terminates when equal condition occurs between argument and data record or if a match cannot be found.

Search Sequential Content: Provides a search by content that is much faster than "Search Content". The records must be arranged in the data set in ascending alphameric order within the portion of the record that corresponds to the search argument.

Application Control Language (ACL): Allows the user to execute programs containing arithmetic, logical, branching, I/O, and control statements. These source statements are translated to executable code by the optional Application Control Language Translator, see "Special Features". Up to four disk data sets, the printer, the keyboard, and display can be controlled in one program. The Second Disk (#6677) can be written on as well as read when under ACL control. Includes 4K of "Read/Write Storage".

Printer Attachment: Matrix Printer Attachment (#8111) allows the attachment of the 40 characters per second 3713 Printer. Printer formatting can be controlled by programs in the program buffers or by printer control characters in the data stream. Reformatting within a record can be accomplished during printing. Records can also be printed with no format control with one record printed per line. A single record, a complete data set, or records that satisfy a mask record can be printed. The Matrix Printer Attachment also allows the attachment of the 40 cps 3715 Printer mdl 1 or the 80 cps 3715 mdl 2. In addition to the functions provided for the 3713 Printer described above, the functions provided for the 3715 Printer include:

Print edit flexibility.
Printing from second disk drive.
Print constant data stored in program levels.
Print program chaining.
Print disk address along with record.
Page numbering and page headings.
Re-expansion of compressed data streams.

3717 Expansion Feature: Allows the attachment of the 155 lines per minute 3717 Printer and/or the Second Disk Feature to the 3741 mdls 1 and 3, or 2 and 4 respectively. The 3717 Printer includes all of the functions described above for the Matrix Printer Attachment feature and also offers 48/64-character set print belt interchangeability by the operator.

I/O Adapter Feature: Allows the direct attachment of the 3741 mdl 1, 2, 3 or 4 to a System/3 equipped with the 3741 Attachment feature.

3741 Data Station/Workstation (cont'd)

The 3741 can be used as the System/3 Reader (for OCL) or Punch, and RPG II object programs can read records from, or write records to a diskette (RPG II Telecommunications feature is not required).

Communications: The binary synchronous communications adapter on the mdl 2 or 4 operates in half-duplex mode over: facilities C4, C5, D3, D4 or X1M.

Binary Synchronous Transmission allows for transmission rates of 1200, 2000, or 2400 bps. May communicate over point-to-point switched or nonswitched facilities to another 3741 mdl 2 or 4, or a 3747 Data Converter with the appropriate communications adapter.

The 3741 mdl 2 or 4 may communicate over dial or leased facilities to:

- System/3 mdl 4, 6, or 8, mdl 10 Disk, mdl 12 and 15
- 5280 (switched or nonswitched, point-to-point only)
- System/32 (switched or nonswitched point-to-point only)
- System/34 (switched or nonswitched point-to-point only)
- 5231 mdl 2 (switched or nonswitched point-to-point unidirectional only)
- S/360 mdls 22 through 75 and 195 (except mdl 44 or mdl 67 in TSS mode)
- S/370 mdls 115 through 195

See "Programming" section for core size limitations. Code is EBCDIC.

When the 3741 mdl 2 or 4 without Expanded Communications (#1680), is connected to a 3863 mdl 2 modem, the modem configuration switch S1-2 must be set in the down (V.26-bits) position if the 3741 will be the first device to transmit after a line connection is established.

Customer Responsibilities: See M2700 pages.

Publications: *IBM 3741 Data Station Reference Manual* (GA21-9183), and *IBM 3741 Data Station Operator Guide* (GA21-9131).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Standard non-locking plug uses customer standard type receptacle. Specify **#9881** for 115V, **#9885** for 208V, or **#9887** for 230V. A locking plug requires customer locking type receptacle. Specify **#9880** for 115V, **#9884** for 208V or **#9886** for 230V. Voltage changes cannot be made in the field.
- Color: **#9041** red, **#9042** yellow, **#9043** blue, **#9045** gray. **Note:** Color accent is provided on front and back panels only. Top and sides will always be white. Color changes cannot be made in the field.
- Data Set Attachment: [Mdls 2, 4] The 3863 and 3872 modems are recommended for 2,400 bps operation on C5 or D4 facilities. One of the following, depending on facility, must be specified:

  #9120 for C5M/D4M (2000 bps)
  #9121 for C5/D4 or X1M (2400 bps)
  #9122 for D3M (1200 bps)
  #9123 for C4M (1200 bps).

  For attachment to the Local Communications Adapter (#4675) or ICA (#4645 and #4802) on the System/3, specify **#9121. Prerequisites: #9122** or **#9123** requires #7705. See "Special Features".
- Data Set Cable: [Mdls 2, 4] A 6m (20 foot) modem cable is provided as standard. If a 12m (40 foot) cable is desired, specify **#9021.** On field upgrades from mdl 1 to 2 or 4, or mdl 3 to 4, the 12m (40 foot) cable may be specified.

SPECIAL FEATURES

ACL (#1350): [Mdls 3, 4] The Application Control Language Translator provides the capability of translating programs written in the Application Control Language into executable code. A program listing is prepared optionally, and diagnostic messages are printed. **Field Installation:** Yes. **Note:** Purchase customers who may elect to later upgrade to 8K storage should consider the purchase of #4975 initially, because the field upgrade requires replacement of the original 4K storage. **Prerequisites:** #6677.

Expanded Communications (#1680): [Mdls 2, 4] Consists of the following:

Expanded Communications Buffer: Expands the size of the communications buffer from 128 bytes to 512 bytes providing an increase in transmit and receive throughput. Multiple records can be transmitted or received per block (up to 512 bytes), each record being separated by IRS characters. Transparent mode cannot be used when sending or receiving blocked data.

Transmit Selected Fields: Provides the capability of transmitting selected field from data records, thus increasing communications line efficiency. Fields are selected under a special program level loaded prior to initiating the teleprocessing function (cannot be used in conjunction with "Transmit Selected Records" function).

Transmit Selected Records: Provides the capability of transmitting selected records from a data file, thus increasing communication line efficiency. Records are selected under a special program level loaded prior to initiating the teleprocessing function. All records matching a search argument are transmitted (cannot be used in conjunction with "Transmit Selected Fields" function).

Receive Data and Insert Constants: Provides the capability of receiving data on a communication line and inserting constant information prior to writing records onto the diskette. The constant information and location is controlled by a special program level loaded prior to initiating the teleprocessing function.

Unattended Print Mode: Allows the printer attached to the 3741 mdl 2 to print the first data set received at the completion of the teleprocessing function without operator intervention. It is accomplished by proper loading of printer program levels and specific operator set-up procedures. **Maximum:** One.

Expanded Comm./MDLC (#1685): [Mdls 2, 4] The Expanded Communications/Multipoint Data Link Control provides all of the capabilities listed under Expanded Communications (#1680) plus Inquiry. Inquiry provides the capability of keying an inquiry message, logging it on the diskette, and transmitting it to a host CPU. The response will be written onto the diskette. A number of records can be received for a long response; after the last record is received, the diskette read/write head will be positioned at the first record received, and it will be displayed on the CRT. The operator can then "record advance" to look at subsequent records in the response. Also allows multiple 3741 mdl 2s to reside on a dedicated network as tributary stations along with other BSC devices. 3741 mdl 2 can be polled or selected when acting as a tributary station in a multipoint system. All 3741 mdl 2s installed on the same line facility require this feature, and they must all use the same type of modem. See "Modems" and M2700 pages. **Limitations:** Cannot be installed with Terminal Identification (#7850). **Maximum:** One.

Data Recorder Attachment (#3200): To attach either a 129 Card Data Recorder mdl 2 equipped with 3741/5320 Attachment (#8201), or a 5496 Data Recorder mdl 1 equipped with a 2772/3741/5320 Attachment (#7850). **Limitations:** Cannot be installed with I/O Adapter (#3265/3266). **Maximum:** One.

I/O Adapter (#3265/#3266): To attach any mdl of the 3741 to a System/3. #3265 for 3741 mdls 1 and 2. #3266 for 3741 mdls 3 and 4. A cable with a maximum length of 12m (40 feet) is provided with an I/O Adapter (#3265/3266). Specify **#9018** indicating length as a quantity of 6m (20 feet) or 12m (40 feet). **Limitations:** Cannot be installed with Data Recorder Attachment (#3200). See limitations for the 3741 Attachment (#8220) on System/3. **Maximum:** One. **Prerequisites:** #8220 on the 5406, 5408, 5410, 5412 or 5415.

3713 Expansion (#3891, #3892): Provides additional capacity to permit installation of Second Disk (#6677) and/or Matrix Printer Attachment (#8111). #3891 for 3741 mdl 1 or 3. #3892 for 3741 mdl 2 or 4. **Limitations:** Cannot be installed with 3715 Expansion (#8120 or #8121) or 3717 Expansion (#8122 or #8123). **Maximum:** One. **Field Installation:** Yes.

Feature Group A (#4002): Consists of the following:

Verify: Provides the capability to check the accuracy of pre-recorded records. If any recorded data is changed as a result of verification, the disk record will be updated upon completion of record. Fields that do not require verification may be bypassed by program control.

Production Statistics: Provides machine statistics for customer use in measurement of workload or production, analysis of errors, and job accounting. Counts automatically under machine control (no programming) data and functional keystrokes, verify correction keystrokes, and records processed. Displaying and/or recording of totals on disk is under operator keyboard control.

Field Totals: Provides the ability to create a hash total for a group of records or a batch of work, or to crossfoot and write totals in the same record or in a following record under program control. Feature consists of three 19-position individual accumulators that add any manually keyed or duplicated numeric fields into any accumulator, under program control. The maximum size of the input field is 14 decimal positions. If overflow beyond 19 digits occurs in an accumulator, it will not be indicated. In addition to the numbers 0-9, a field-total field may include any of the 256 EBCDIC characters. All characters with the low order 4 bits of the character being 0-9 will accumulate with numeric values 0-9 respectively. All other characters will accumulate with the value zero. Arithmetic sign control will be determined by the zone portion of the data keyed into the units position of the field. Responsibility for input size limitation and accumulator overflow is left to the user. Maximum output field size is 19 positions. Accumulators carry true totals in Enter mode. In Update or Verify mode, accumulators contain the net difference between the data read from the disk and the modified data in the accumulate fields. Thus, the net difference totals provide an auto-balance capability. Accumulators can be displayed on the CRT display at operator's option. In addition to keying, totals can be accumulated on an offline basis. Function provides for automatic processing of: each pre-recorded disk record as it is read, adds designated field contents to appropriate counters, reads out/resets and records

3741 Data Station/Workstation (cont'd)

data from counters, and automatic program level selection based on type of record being processed.

Self-Checking Number (Modulus 10 and 11): Feature assures that all digits of a number, such as account or item field, have been correctly keyed. The self-checking number consists of two parts, the basic identifying number, and its check digit. A detected error locks the keyboard. Operates in Enter, Verify and Update mode. **Note:** Self-checking numbers of modulus 10 are not compatible with those of modulus 11. Left-base numbers are not accommodated. Self-checking numbers and left-zero insertion are mutually exclusive within the same field. Self-check number-generating ability is not available.

Disk Initialization: Disks sold by IBM will be initialized at time of manufacture. Disks which develop bad tracks in use can be re-initialized with this feature, so that bad tracks are automatically bypassed.

Keylock (#4655): [Mdls 2, 4] A key-operated switch. When the switch is in the "locked" position, entry into the communications mode of operation is prevented. The 3741 may be used for communications provided it was set up to do so prior to the keylock being set to the "locked" position. **Note:** For additional and/or replacement keys, see "Accessories".

Storage Addition 4K (#4975): Expands storage to 8K for use by an ACL program. **Limitations:** Programs using the 4K additional storage must be translated on a machine with this feature. **Field Installation:** Yes.

Operator Identification Card Reader (#5450): [Mdls 2, 4] Provides the capability of reading a small, 2-1/8 inch by 3-3/8 inch (credit card size), plastic card with a magnetic stripe on the back. This card can be encoded with up to 40 numeric characters, including control characters. This feature provides the ability to read an operator identification card to allow identification of the station operator, thus enhancing system data security capability. Available with 115V (**#9880** or **#9881**) only. For complete information on the availability of operator identification cards, contact IBM. **Maximum:** One.

Integrated Modem, Nonswitched (#5500): [Mdls 2, 4] A modem for nonswitched, 1200 bps, 2- or 4-wire operation over voice grade channel, Type 3002. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7705. The terminal device with which the 3741 mdl 2 or 4 is communicating must also be equipped with an 1200 bps Integrated Modem.

1200 bps Integrated Modem (#5501): Switched With Auto-Answer. [Mdls 2, 4] A modem with auto-answer for switched operation at 1200 bps over a telecommunications network via FCC registered protective circuitry of the CBS Type (or equivalent) provided by the user. **Maximum:** One. **Prerequisites:** #7705. The terminal device with which the 3741 mdl 2 or 4 is communicating must also be equipped with a 1200 bps Integrated Modem.

Proof Keyboard (#5901): Modifies the standard alphameric keyboard to provide an alphameric keyboard with a numeric key arrangement similar to the adding machine. **Field Installation:** Yes. **Note:** Customers who elect to purchase a 3741 with #5901 only and later add Feature Group A (#4002) and/or Record Insert (#6123) should consider initially purchasing the additional features because this field upgrade requires replacement and re-installation of #5901 along with Feature Group A and/or Record Insert.

Record Insert (#6123): Provides capability to add records within an existing data file. Sequential files can be updated or corrected by inserting records in their proper location within the sequence. **Maximum:** One.

Second Disk (#6677): Provides a second disk drive that allows the user to accomplish the following functions:

- Merge: Records can be merged *from* the second disk and the keyboard onto the first disk.
- Copy: A data file from the second disk can be copied onto the first disk.
- Pooling: Data can be copied from more than one disk onto a single disk. The disks that are to be copied are mounted on the second disk drive and the data is written onto the disk mounted on the standard disk drive.
- BSCA: The second disk may be used to expand the data storage capacity when transmitting or receiving. All second disk functions are read-only functions except when used in conjunction with BSCA feature or on the 3741 mdls 3 and 4 when under ACL program control. **Prerequisites:** #3891 or #3892, or #8120 or #8121, or #8122 or #8123. **Note:** Customers wanting Second Disk *only* (no printer) should order Expansion Feature #3891 or #3892. However, customers who may elect to purchase a 3741 with Second Disk only and later add either a 3715 Printer or a 3717 Printer should consider purchase of Expansion Feature #8120, #8121, #8122, or #8123.

Synchronous Clock (#7705): [Mdls 2, 4] Provides business machine clocking of the data onto and off of the transmission line. To be used only when the attached modem does not provide such clocking. The terminal device with which the 3741 mdl 2 or 4 is communicating must also be equipped with business machine provided clocking. **Field Installation:** Yes. **Prerequisites: #9122** or **#9123.** See "Specify".

Terminal Identification (#7850): [Mdls 2, 4] Provides an expanded identification function when operating on a switched (dial-up) facility. Station transmits a four-character identification sequence when initiating or responding to a line bid. Station can check far-end device identification sequence. Four character identification sequence consists of a one-character terminal type code (this code is the same for all 3741 mdl 2s or 4s), followed by a three-character sequence that specifically identifies that station from any other 3741. The specific terminal identification is a plant-installed sequence assigned by IBM from a randomly generated master list. Also, with this feature, a 3741 can identify if a legitimate station within the user's network is initiating the line bid. This is accomplished by comparing an operator-keyed sequence of characters to a terminal identification sequence received after a connection has been established. Transmission or reception of data can commence only after the received terminal identification sequence matches character-for-character with the operator-keyed sequence. **Limitation:** Cannot be installed with Expanded Communications/Multipoint Data Link Control (#1685).

Matrix Printer Attachment (#8111): Provides the capability to attach a 3713 Printer (40 cps), a 3715 Printer mdl 1 (40 cps bidirectional), or mdl 2 (80 cps bidirectional). **Limitations:** Cannot be installed with 3717 Expansion Feature (#8122 or #8123). **Maximum:** One. **Prerequisites:** #3891, #3892, #8120, or #8121.

3715 Expansion Feature (#8120, #8121): Provides additional capacity to permit installation of Second Disk (#6677) and/or Matrix Printer Attachment (#8111). #8120 for 3741 mdls 1 and 3 or #8121 for 3741 mdls 2 and 4. **Limitations:** Cannot be installed with 3713 Expansion Feature (#3891 or #3892) or 3717 Expansion Feature (#8122 or #8123). **Maximum:** One. **Field Installation:** Yes.

3717 Expansion Feature (#8122, #8123): Provides the capability to attach a 3717 Printer (155 lpm) and/or the Second Disk (#6677) to the 3741. #8122 for 3741 mdls 1 and 3 or #8123 for 3741 mdls 2 and 4. **Limitations:** Cannot be installed with Matrix Printer Attachment (#8111) or 3713 Expansion Feature (#3891 or #3892) or 3715 Expansion Feature (#8120 or #8121). **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model conversions are field installable. **Note:** Purchase customers who wish to upgrade to a model 2 or 4 with Expansion Feature from a model 1 or 3, with or without Expansion Feature (#3891), must purchase Expansion Feature (#3892) at time of upgrade.

ACCESSORIES

Locks and Keys: [Mdl 2, 4] The 3741 with Keylock (#4655) special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys only to original purchaser.) Order via MES from Rochester, Minnesota. A letter of authorization must accompany each order. Allow six to eight weeks for delivery.

SUPPLIES

Diskettes: For magnetic Diskettes, contact IBM.

Operator Identification Cards: For complete information on availability of operator identification cards, contact IBM.

3742 DUAL DATA STATION

PURPOSE

The 3742 is used to record keyed data onto a magnetic disk by manual operation of the keyboard, and also to verify data that has been previously keyed. Disks are read into a 3747 Data Converter to convert captured data onto one-half inch computer tape for subsequent processing. Diskettes can also be read into an S/370 models 115, 125, 135, 145, 155-II, 158, 165-II, and 168 via the 3540 Diskette Input/Output Unit. Diskettes can be read directly into System/32 or System/34.

MODELS

Model 1 001

HIGHLIGHTS

- Two independently operating stations housed in a single physical unit.
- 80-character fixed record size.
- Verify, production statistics, auxiliary duplicating, and six program levels standard per station.
- 120-character CRT display.

The optional 128-Character feature replaces the 80-character record with a record length that is variable from 1 to 128 characters.

The 3742 has buffered storage area into which data is keyed prior to recording on disk, thus allowing for correction of detected errors before record is written. Six program levels are standard. Programs control the automatic functions of skipping, duplicating, field definition, etc. Automatic program selection provided by program chaining enables operator to key up to a 480-character logical record. Modes of operation (ENTER, VERIFY, UPDATE, or SEARCH) are under keyboard control.

Keyboard: Has a standard 64-character alphameric combination keyboard with "EL" character set for key entry and verifying. In addition to standard keys, the keyboard has Record-Field-Character Backspace, Record-Field-Character Advance, and Repeat keys.

CRT Display: Up to 120 characters can be displayed to each operator, three rows of 40 characters per row. The first row displays machine status (mode of operation, column indicator, and error codes). Rows 2 and 3 display either the data being keyed or the active program, at the operator's option. Data is displayed progressively as it is keyed to build full records for visual verification.

Magnetic Disk: Diskette 1 storage capacity to record up to 1,898 80- or 128-character records, with a maximum of 19 data sets per disk. It is removable and interchangeable among data stations. All data is recorded serially on the disk as standard EBCDIC code. One diskette per station for data recording is provided as standard. For additional diskettes, see "Supplies".

Verify: Provides the capability to check the accuracy of pre-recorded records. If any recorded data is changed as a result of verification, the disk record will be updated upon completion of the record. Fields that do not require verification may be bypassed by program control.

Production Statistics: Provides machine statistics for customer use in measurement of workload or production, analysis of errors, and job accounting. Counts automatically under machine control (no programming), data and functional keystrokes, verify correction keystrokes, and records processed. Displaying and/or recording of totals on disk is under operator keyboard control.

Search Address: Provides a means for direct access to a record that the operator specifies by its track and sector address.

Search EOD: Provides a means to directly access the last record of a data set.

Publications: *IBM 3742 Dual Data Station Reference Manual* (GA21-9184) and *IBM 3742 Dual Data Station Operator Guide* (GA21-9136).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): For locking plug, specify **#9880** for 115V, **#9884** for 208V, or **#9886** for 230V. For nonlocking plug, specify **#9881** for 115V, **#9885** for 208V, or **#9887** for 230V. Voltage changes cannot be made in the field.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for gray. **Note:** Color accent is provided on the workspace divider and the front and back panels only; top and sides will always be white. Color changes cannot be made in the field.

SPECIAL FEATURES

Feature Group A (#4003, #4004): #4003 for 80-character machine, #4004 for 128-character machine. **Field Installation:** Yes. **Prerequisites:** #4004 requires #5455. Consists of the following:

Disk Copy: Reads disk records from disk two (secondary station) and writes those records onto disk one (primary station). Initiating the disk copy can occur only from the primary operator station; control must be relinquished by the secondary operator station before operation can begin. This feature allows the user to accomplish the following functions: Merge - records can be merged from the secondary station disk and the primary station keyboard onto the primary station disk; Copy - a data file from the secondary station disk can be copied onto the primary station disk; Pooling - data can be copied from more than one disk onto a single disk. The disks that are to be copied are mounted on the secondary station disk drive, and the data is written onto the disk mounted on the primary station disk drive. **Note:** All secondary disk operations associated with this feature are "read-only" functions.

Disk Initialization: Diskettes sold by IBM will be initialized at time of manufacture. Disks which develop bad tracks in use can be re-initialized with this feature, so that the bad tracks are automatically bypassed. **Note:** Initialization can only be performed at the primary operator station. During the disk initialization process, the secondary operator station is inoperative.

Offline Field Totals: Provides the ability to create a hash total for a group of records or a batch of work, or to crossfoot and write totals in the same record or in a following record under program control.

This feature consists of three 19-position individual accumulators. Data can be summed in accumulators from a specified field or fields in specific or all records of a batch of work. The summation is under program control. Function provides for automatic processing of each pre-recorded disk record as it is read, adds designated field contents to appropriate counters, reads out and records data from counters, reads out/resets and records data from counters, and provides automatic program level selection based on type of record being processed.

Maximum size of input field(s) is 14 decimal positions. Overflow beyond 19 digits in the accumulator will not be indicated. In addition to the digits 0-9, a field total field may include any of the 256 EBCDIC characters. All characters with the low order four bits of the character being 0-9 will accumulate with numeric values of 0-9 respectively. All other characters will accumulate with the value of zero. Arithmetic sign control will be determined by the zone portion of the data keyed in the units position of the fields being processed. Responsibility for input size limitation and accumulator overflow is left to the user. Maximum output field size is 19 positions. **Note:** Offline field total operations can be initiated at either the primary or secondary operator station; however, the non-initiating station is inoperative until completion of run.

Search on Content: Allows user to retrieve and display data on disk by comparing the contents of the desired data record to a search argument. Argument may be equal to all or any portion of the data record. Blank characters in argument are treated as "don't care" characters. Search terminates when equal condition occurs between argument and data record or if a match cannot be found.

Search Sequential Content: Provides a search by content that is much faster than Search on Content. The records must be arranged in the data set in ascending alphameric order within the portion of the record that corresponds to the search argument.

Self-Checking Number (Modulus 10 and 11): This feature assures that all digits of a number, such as an account of item field, have been correctly keyed. The self-checking number consists of two parts, the basic identifying number and its check digit. A detected error locks out the keyboard. Operates in ENTER, VERIFY, and UPDATE mode. **Note:** Self-checking numbers of Modulus 10 are not compatible with those of Modulus 11. Left-base numbers are not accommodated. Self-checking numbers and left-zero insertion are mutually exclusive within the same field. Self-check number generating ability is not available.

128-Character (#5455): Provides record length that is variable from 1 to 128 characters and four additional program levels for a total of 10. Automatic program selection provided by program chaining enables operator to key up to a 1,280-character logical record. Automatic scrolling of the CRT data display permits viewing of the entire 128-character record. A maximum of 80 data characters is visible at any one time. Two added keys provide manual scrolling. **Note:** If field installing 128-Character and Feature Group A (#4003) has been previously installed, Feature Group A (#4003) must be removed and Feature Group A (#4004) installed. In addition, if Record Insert (#6125) has been previously installed, Record Insert (#6125) must be removed and Record Insert (#6126) installed. **Field Installation:** Yes.

Proof Keyboard (#5902): Modifies the standard alphameric keyboard to provide both key stations of the 3742 with alphameric keyboards having numeric key arrangements similar to an adding machine. **Note:** Customers who may elect to purchase a 3742 with #5902 only and later add Feature Group A (#4003 or #4004) should consider purchase of the additional feature initially because this field upgrade requires replacement of #5902 and the re-installation of #5902 along with Feature Group A. **Maximum:** One. **Field Installation:** Yes.

Reading Board Extension (#6065): The extension can be attached to the front edge of the standard reading board to provide an additional 4x40 inch working area to the left of the keyboard. Feature provides

3742 Dual Data Station (cont'd)

extension board for each station. **Maximum:** One. **Field Installation:** Yes.

Record Insert (#6125, #6126): Provides capability to add records within an existing data file. Sequential files can be updated or corrected by inserting records in their proper location within the sequence. #6125 is for 80-character machines, #6126 for 128-character machines. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

There are no model conversions. Customers who may elect to purchase an 80-character 3742 with Feature Group A and/or Record Insert and later upgrade to a 128-character 3742 should consider purchase of the 128-character machine initially rather than the 80-character machine.

ACCESSORIES (None)

SUPPLIES

Diskettes: For magnetic diskettes, contact IBM.

3747 DATA CONVERTER

Effective February, 1984, the 3747 will no longer be available. RPQs, special features, and accessories will also be no longer available. Model conversions will continue to be available.

PURPOSE

The 3747 is a stand-alone buffered machine used primarily to convert batched data from diskette to one-half inch magnetic tape. Special features provide conversion from tape to disk, tape blocking and deblocking, record reformatting, and basic processing of IBM magnetic tape labels. The communications special feature allows point-to-point BSC communications with other BSC devices. This feature also allows the 3747 to be used as a tape transmission device.

MODELS

Model 1 001

HIGHLIGHTS

The basic 3747 consists of a control unit, control panel, disk drive and autoloader, and magnetic tape drive. The basic function of this machine is to convert data from disk to tape as a stand-alone offline unit. It provides a fast input medium to the CPU via the tape, relieving the computer operator from handling unit records. Errors in data transmission or tape and disk writing are detected and corrected with minimal operator involvement. Job statistics are available via a control panel display.

Special features provide the ability to transcribe data from tape to disk. Basic tape label processing is also possible as a special feature. Another feature permits reformatting of records as well as blocking and deblocking of records. With the Communications Adapter, the 3747 can be used as a binary synchronous terminal for point-to-point communications with various BSC devices.

Communications: The 3747 may communicate over point-to-point switched or nonswitched facilities (C4, C5, D3, D4, or X1M) with another 3747 or 3741 mdl 2 or 4 with the appropriate communications adapters. For further information concerning these facilities, see the M2700 pages.

Communications are also possible with a 5280 via its Communications Adapter; a System/32 via Binary Synchronous Communications; a System/34 via its Communications Adapter; an S/360 mdls 22-75 (except mdls 44 and 67 in TSS mode) and mdl 195; an S/370 mdls 115, 125, 135, 135-3, and 138 via Integrated Communications Adapters; and an S/370 mdls 115-195 via a 2701 Data Adapter Unit, a 2703 Transmission Control, or a 3704 or 3705 Communications Controller equipped with appropriate BSC adapters and features.

See programming pages for storage size requirements for teleprocessing support. Code is EBCDIC.

Magnetic Tape: The following tapes and reels can be used: IBM Series 500, IBM Heavy Duty, IBM Dynexcel, or equivalent formulations which meet the tape and reel criteria in *Tape Specifications* (GA32-0006).

Publications: *3747 Data Converter Reference Manual and Operator Guide* (GA21-9170).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Specify **#9880** for 115V, locking plug. For nonlocking plug, specify **#9881** for 115V, **#9885** for 208V, or **#9887** for 230V. For raised floor applications, specify **#9902** for 208V or **#9904** for 230V. Voltage changes cannot be made in the field.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for gray. **Note:** Color accent is provided on the top covers only. The front, side, and back panels will always be white. Color changes cannot be made in the field.
- Modem Attachment: The 3863 or 3872 modem is recommended for 2400 bps operation on C5 or D4 facilities. One of the following must be specified, depending upon the line facilities to be used, if the Communications Adapter (#1660) is selected: **#9120** for C5M/D4M (2000 bps), **#9121** for C5/D4/X1M (2400 bps), **#9122** for D3M (1200 bps), or **#9123** for C4M (1200 bps). **Prerequisites: #9122** or **#9123** requires #7705. See "Special Features".
- Modem Cable: A 20 foot modem cable is provided as standard. If more than 20 feet of cable are required, specify **#9021** for a 40 foot length and indicate 40 as the quantity.
- Tape Control: A tape control (#7880, #7885, #7890, or #7895) must be specified. See "Special Features".

SPECIAL FEATURES

Selection of a tape control feature determines whether any other special feature can be added. One of the tape control features must be selected.

Blocking/Reformatting (#1480): Provides capability to block or deblock records on tape or to BSCA up to limits of available storage. Also provides ability to reformat records by rearrangement of fields, deletion of fields, insertion of constants, and splitting and joining of records. Reformatting may be done in conjunction with blocking or deblocking. With an appropriate Storage feature (#7690, #7691, or #7692) and Communications Adapter (#1660), provides the ability to send or receive long records (up to limits of available storage) to a similarly configured 3747, or under programming support. See programming section for information on programming support. Although transmission blocks up to 8,000 bytes may be sent or received by an appropriately featured 3747, it is recommended that transmission blocks be limited to 512 bytes when communicating with supported systems. Use of larger blocks may be limited by host system buffer size, multiplexer buffer size, line quality, or effects on total system throughput. **Limitations:** Not available with Tape Control, Write-Only (#7880). **Field Installation:** Yes. **Prerequisites:** #3888; #7690, #7691, or #7692; and #7885, #7890, or #7895.

Communications Adapter (#1660): Provides the 3747 with a serializer/deserializer, associated registers, and line control logic for binary synchronous operation. The necessary interface is included for point-to-point half-duplex mode operations on a switched or nonswitched network. Transmission is provided at rates of 1200, 2000, or 2400 bps. Included as standard with this feature are user options for Auto-Answer, EBCDIC Transparency, Terminal Identification, and Far-End Device (also called CPU) Identification. **Note:** For increased transmission rates up to 9600 bps, order RPQ S40093. See "Modem Attachment" under "Specify" for facilities. **Field Installation:** Yes. **Prerequisites:** #7885, #7890, or #7895.

Expanded Function (#3888): Provides additional capacity to permit installation of Storage (#7690, #7691, or #7692) and Blocking/Reformatting (#1480). Also provides capability to position tape to add records to a file, add a file to a tape, or replace a file on tape. Provides checking of diskette label names during disk to tape operations and also for writing and checking of a diskette conversion mark. With Communications Adapter (#1660), provides the ability to select from files recorded on one tape to send each to a different location, and to restart communications without retransmission of data correctly received. **Limitations:** Not available with Tape Control, Write-Only (#7880). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7885, #7890, or #7895.

Int. Modem, Nonswitched (#5500): An integrated modem for nonswitched operation at 1200 bps, 2- or 4-wire voice grade channel, Type 3002. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1660; #7705; and #7885, #7890, or #7895. The terminal device with which the 3747 is communicating must also be equipped with a 1200 bps integrated modem.

Modem, Switched with Auto-Answer (#5501): An integrated modem with auto-answer for operation at 1200 bps over a switched telecommunications network via FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1660; #7705; #7885, #7890, or #7895. The terminal device with which the 3747 is communicating must also be equipped with a 1200 bps integrated modem.

Storage (#7690, #7691, #7692): Storage for use with Blocking/Reformatting (#1480). #7690 provides 2K bytes of storage, #7691 provides 4K bytes of storage, and #7692 provides 8K bytes of storage. **Limitations:** Not available with Tape Control, Write-Only (#7880). **Maximum:** One per 3747. **Field Installation:** Yes. **Prerequisites:** #1480; #3888; and #7885, #7890, or #7895.

Synchronous Clock (#7705): Provides business machine clocking of the data onto and off of the transmission line. To be used only when the attached modem does not provide such clocking. **Field Installation:** Yes. **Prerequisites:** #1660 and #7885, #7890, or #7895. The terminal device with which the 3747 is communicating must also be equipped with business machine provided clocking. See also "Modem Attachment" under "Specify".

Tape Control, Write-Only (#7880): Provides a 9-track, 1600 bpi, PE write-only tape control. This tape cannot be read. No other special features can be installed on a machine with this control. **Field Installation:** Yes.

Tape Control, Read/Write (#7885): Provides a 9-track, 1600 bpi, PE read or write tape control. The tape can be read as well as written, thus providing a tape-to-disk capability. Other special features may be installed on a machine with this control. **Note:** Customers who may elect a write-only machine and later upgrade to the read/write 1600 bpi should consider the 1600 bpi Tape Control, Read/Write (#7885) initially, rather than Tape Control, Write-Only (#7880). **Field Installation:** Yes.

Tape Control, Read/Write (#7890): Provides a 9-track, 800 bpi, NRZI read or write tape control. The tape can be read as well as written, thus providing a tape-to-disk capability. Other special features may be attached to a machine with this control. **Field Installation:** Yes, only to replace #7895. Not recommended to replace a Phase Encoded tape control (#7880 or #7885).

Tape Control, Read/Write (#7895): Provides a 7-track, NRZI read or write tape control. User-selectable options at job time are density

3747 Data Converter (cont'd)

(800/556 bpi) and parity (even/odd). Translate on and convert off are standard fixed modes. The tape can be read as well as written, thus providing a tape-to-disk capability. Other special features may be attached to a machine with this control. **Field Installation:** Yes, only to replace #7890. Not recommended for field installation to replace a Phase Encoded tape control (#7880 or #7885).

Tape Label (#7900): Provides the logic to check and build IBM magnetic tape labels. Also provides accessibility to secured tapes via a Keylock/Cipher Lock and an Erase-to-Tape Indicate facility. This assists the user in providing protection for sensitive data. **Note:** For additional or replacement keys, see "Accessories". **Field Installation:** Yes. **Prerequisites:** #7885, #7890, or #7895.

MODEL CONVERSIONS (None)

ACCESSORIES

Locks and Keys: The 3747 Tape Label (#7900) is shipped with a lock and two keys. Additional keys may be purchased only from IBM. Key identification number must accompany each order. Allow six to eight weeks for delivery. A new keylock with two keys must be ordered by MES if the key identification number cannot be supplied.

SUPPLIES (None)

3760 DUAL KEY ENTRY STATION

PURPOSE

Used to key data on to the 3791 Controller disk. The disk in the 3791 is used as a data storage medium prior to transmission of batched data by channel or SDLC communications facilities to any virtual storage S/370 or 4300 processors. Data extraction can be done by diskettes.

MODELS

Model 1: 001 A Dual Key Entry Station ... Display Panel ... attaches to the 3791 with Device Attachment Type I (#7900) or Device Attachment Type I Add'l (#7922).

Model 2: 002 Same external appearance as model 1. First model 2 is attached to model 1 via 3760 model 2 Attachment (#7920). Second model 2 is attached to model 1 via a second model 2 Attachment (#7920).

Model 3: 003 A Single Key Entry Station ... Display Panel. Has same functional characteristics as model 1. Attaches to the 3791 with Device Attachment Type I (#7900) or Device Attachment Type I, Add'l (#7922). Can be optionally attached to up to four 3791 3791 Controllers simultaneously with the capability to switch between them. 3760 model 2s cannot be attached.

Prerequisites: For 3760 mdl 1 and mdl 3 ... **#9175** or **#9195**, #7900 or #7922, a #3220 , #3221 or #1590 and one or more #1602s or #1612s. For 3760 mdl 2 ... 3760 mdl 1 and #7920. For details, see M3791 pages.

HIGHLIGHTS

Mdl 1 and mdl 2 ... each physical station provides two keyboard operator positions each with keyboard and display panel area. Mdl 3 provides one operator position with keyboard and display panel area.

Has buffered storage area into which data is keyed prior to recording on the 3791 disk storage thus allowing for correction of detected errors before record is stored. Formats control the automatic functions of skipping, duplicating, editing, etc. Modes of operation are under keyboard control.

Keyboard: Has a standard 66-character alphameric combination keyboard with "EL" character set for key entry and verifying. In addition to standard keys, the keyboard has: Record-Field-Character Backspace, Field-Character Advance, Auto Skip/Dup and Auto Entry Key Switch, Display Record, Next Format, Record Position, Insert and Delete, Cursor Up and Down, Cursor Placement at Command Line, Mark Record and Scan Next Record keys . Command Keys (**#9079**) are provided as a specify feature. Optionally available are ASCII Keyboard and proof arrangements of both the EBCDIC and the ASCII keyboard.

Display Panel: Up to 236 characters can be displayed to each operator, six rows of 40 positions each. First row is the command line on which messages, commands, error types, and mode of operation are displayed, row two through six display keyed data as it is entered. A fill-in-the-blanks format may be displayed and as data is entered the cursor will automatically skip over the indicative format data. Status Indicators on the left and right side of the panel. Left side indicators are: Operator Attention, Auto Skip/Dup, Display Record, Auto Enter, Verify Mismatch . Right side indicators are: Operator Attention, Station Available, Enter, Verify, Insert Mode and Dup Not Allowed.

Publications: GC20-0370

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking Plug -- **#9980** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking Plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V. **Note:** Mdl 1 and the two attached mdl 2s require the same power specifies.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

  Note: Color accent is provided on the knee panel only and may be any of the above colors. Top and side panels will always be white.
- Cables: See "Accessories". For cable specifications see *3790 Information Manual - Physical Planning* (GA27-2769).
- Command Keys **#9079**: Provides, through the command key at the left side of the space bar, the ability to issue commands: HELP, COPY, FLAG, ACCEPT, RETURN, CONTINUE SEARCH, SAVE and FORMAT DISPLAY by pressing the command key first and then the appropriate top row key of the keyboard. A label on the keyboard cover, just above the top row, identifies the command functions of the keys. **Maximum:** Two per 3760 mdls 1 and 2 ... one per mdl 3. **Field Installation:** Yes. **Prerequisites:** #7115.
- Conditional Display **#9220**: This option may be specified to prevent Keyboard overrun in some situations. For details see IBM. **Maximum:** One per mdl 1. This function works on all operator positions attached to the mdl 1 with this feature. **Field Installation:** Yes. **Prerequisites:** #7115 (mdl 1 only) and **#9175** or **#9195** on 3791.
- Keyboard Arrangements: EBCDIC is standard. If required, specify **#9393** for ASCII. Proof versions have the alphameric keyboard with a numeric key arrangement similar to that of an adding machine. All 3760 mdl 2s will have the same arrangement as the attached 3760 mdl 1. If required, specify: **#9425** for proof keyboard, ASCII; **#9426** for proof keyboard, EBCDIC. **Field Installation:** Yes ... specify **#9391** for field installation of standard EBCDIC keyboard. **Prerequisites:** #7115 [mdl 1] and **#9175** or **#9195** on the 3791.

SPECIAL FEATURES

Security Keylock (#6350): [Mdl 1, 3] A key operated switch. When the switch is in the "locked" position, entry of data into the 3760 mdl 1s, mdl 3s and all attached mdl 2s is prevented. **Note:** For additional and/or replacement keys, see "Accessories". **Field Installation:** Yes.

Selector Switch (#6660): [Mdl 3] Provides a 4-position rotary switch, allowing a 3760 mdl 3 to be switched between up to four 3791 Controllers. **Maximum:** One per 3760 mdl 3. **Field Installation:** No. **Prerequisites:** #6350.

Storage Extension (#7115): Provides additional storage in 3760 mdl 1, permitting installation of Command Keys (#9079), Proof Keyboard **#9425** or **#9426** on 3760 mdl 1 and 2 and Conditional Display (**#9220**) on 3760 mdl 1. **Maximum:** One per 3760 mdl 1. **Field Installation:** Yes.

3760 Mdl 2 Attachment (#7920): To attach one 3760 Dual Key Entry Station mdl 2 to a 3760 mdl 1. **Maximum:** Two per 3760 mdl 1. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Keys: The 3760 with Security Keylock (#6350) is shipped with two keys. Additional keys may be purchased only from IBM. Order via MSORDER (Category = Supplies/Accessories; Group Code = DP Supply Order) on AAS. A letter of authorization must accompany order and serial number of lock must be included.

SUPPLIES (None)

3762 PAYMENT TRANSACTION PROCESSOR

PURPOSE

To process payment transactions by scanning OCR-A encoded data from turn-around documents (stubs), validating keyed-in payment amounts and storing selected payment information onto the disk in the 3791 Controller, to which the 3762 attaches. One-step processing is achieved with the appropriate special features, producing proper batches of inscribed and endorsed checks for deposit in the bank with user-specified audit trail information, complete with deposit ticket and journal tape listing. A storage extension feature allows handling of agent transactions, user-programmable subroutines, OCR-B, 1428 and 0.095 inch standard 1403 fonts.

MODELS

Model 1: 001

Prerequisites: In 3791 ... #7900 and #7922 depending upon the number of units attached ... #3221, #1590, and #1603, #1613 as required. For details, see M3791 pages. Configuration guidelines are given in GA33-4572.

HIGHLIGHTS

A 3762 provides two operator positions, each equipped with a keyboard, a 240-character display, a document transport and a scanner to read one line of up to 60 machine-printed numeric digits in either OCR-A, OCR-B, 0.095 inch standard 1403 or 1428 font. OCR-A is standard, other fonts require Storage Extension (#7500). The appropriate recognition logic is loaded into the 3762 automatically. Different OCR fonts can be used by different 3762s in one 3790 communication system/data entry configuration simultaneously, but the two operator positions on one 3762 must use the same font. Documents are entered by hand into the document entry slot in front of the operator. They are transported under machine control past the OCR read station which incorporates a solid state scanning device to collect character images. These images are analyzed and recognized within the 3762 recognition and control processor.

The table of "Acceptable Characters and Printing Devices" below shows the characters which are acceptable from typewriters, high-speed printers and offset printing using the designated font. Non-recognized OCR data as well as the payment amount can be entered by the operator via the keyboard. After (user-specified) editing and checking of the data entered, the amount paid is checked for acceptability (according to user-specified criteria). The output record is subsequently prepared and transferred to the attached 3791 Controller for intermediate storage on the 3791 disk. Special features include audit trail printing on stubs, checks and deposit tickets, E13B inscribing of checks and deposit tickets, endorsing of checks, and journal tape printing of the amounts processed. Printing is under program control.

Acceptable Characters and Printing Devices

	OCR-A	OCR-B (6)	0.095 inch Standard 1403 (1,6)	1428 (6)
Digits	0 - 9	0 - 9	0 - 9	0 - 9
Delimiters	Hook Fork Chair LVM (2) Double Blank (3) Single Blank (4) Margins (5)	< + > LVM (2) Double Blank (3) Single Blank (4) Margins (5)	– LVM (2) Double Blank (3) Single Blank (4) Margins (5)	LVM (2) Double Blank (3) Single Blank (4) Margins (5)
Printers	Selectric® 1403 3203 3211 3800 Offset	Selectric® 1403 3203 3211 3800 Offset	1403 3203 3211 Offset	1403 3203 3211 Offset

Notes:

(1) Also called 407-I font. Train arrangements must have suffix 2, e.g., HN2.

(2) The LVM is a pre-printed vertical line, 3.70mm (0.145 inches) minimum height, centered in the print band, having the normal character stroke width and occupying a full character space.

(3) A Double Blank is a blank space of at least 4.3mm (0.170 inch). Single and double blanks may not be specified intermixed in one codeline.

(4) A Single Blank is a blank space of at least 2.3mm (0.090 inch) and less than 4.3mm (0.170 inch).

(5) The Right and Left Margins are each 6.35mm (0.250 inch) wide.

(6) The OCR-B, 0.095 inch standard 1403 and 1428 fonts can only be recognized when the Storage Extension feature is installed.

The 3762 can process single-stub, multi-stub and agent transactions. Agent transactions require Storage Extension (#7500). A transaction may contain one or more checks. All data entry operating modes available for the 3760 Dual Key Entry stations are also available on the 3762. For details, see M3760 pages. Moreover, 3760 operations such as updating of a customer's address can be performed intermixed with payment transaction processing. See *IBM 3790 Communication System - 3762 Payment Transaction Introduction* (GA33-4570), and *IBM 3790 Communication System - 3762 Payment Transaction Functional Description* (GA33-4571).

Keyboard: Has a standard 66-character alphameric combination keyboard with EL character set for key entry and verifying in 3760 mode. In addition to standard keys, the keyboard has: Record-, Field-, and Character-Backspace ... Field-Character-Advance ... Auto Skip/Dup and Auto Enter Key Switch ... Display Record ... Next Format ... Record Position ... Insert and Delete ... Cursor Up and Down ... Command Line and Command ... Mark Record ... Hex/Alternate ... Scan Next Record ... and PF keys. Use of the top row of keys as command keys for the following 12 commands is standard: Help, Copy, Flag, Accept, Return, Continue Search, Save, Format Display, Total, Check,Purge, and Notice (only active with Agent Processing).

Optionally available are ASCII keyboard, and proof arrangements of the EBCDIC and the ASCII keyboards. The proof keyboard modifies the standard keyboard to provide a numeric key arrangement similiar to that of an adding machine. See "Specify" below for details.

Display Panel: Up to 236 characters can be displayed to each operator on six rows of 40 positions each ... first row is the command line on which entered commands, messages, error types, and mode of operation are displayed ... data entered may be displayed on rows two through six ... a fill-in-the-blanks format may be displayed and the cursor will automatically skip over the prompting information as data is entered ... status indicators on the left and right side of the panel ... left side indicators are: Operator Attention, Auto Skip/Dup, Display Record, Auto Enter, and Verify Mismatch ... right side indicators are: Operator Attention, Station Available, Enter, Verify, Insert Mode and Dup Not Allowed ... as on the 3760. A special format screen is displayed for payment transaction processing.

Transport: Contains an entry slot, a document transport mechanism, a pocket selector and two pockets ... documents are hand-fed. Documents move from the entry slot past the scanner to the pockets. The transport accepts stubs ranging from 76.2 to 152.4mm (3.0 to 6.0 inches) high and 69.85 to 222.25mm (2.75 to 8.75 inches) long, provided the height/length ratio is 1.4:1 or less, and checks with standard ABA check sizes. Allowable weight ranges from 16 to 32 lbs and card stock. For details, see *3762 Paper and Printing Requirements* (GA33-4576).

Scanner: Consists of four lamps, a lens, and a linear array of 64 photodiodes and is located in the transport. Its vertical position is operator-settable to the appropriate position of the codeline of printing to be scanned on the document. For details on permissible codeline locations, see *3762 Paper and Printing Requirements* (GA33-4576).

Pockets: Provided are two document pockets with a depth of 44.4mm (1.75 inches) each. Stubs and checks are automatically selected to the two pockets.

Documents and Printing: The input documents and printing must conform to the specifications described in *3762 Paper and Printing Requirements* (GA33-4576). Ribbons and background inks meeting the outlined criteria will give good performance. See "Accessories" and "Supplies".

Document Tray: Two document trays are provided with every 3762, one for each operator position. The document tray can be used by an operator to hold the stack of stubs and checks to be entered. For additional or replacement document trays, see "Accessories".

Publications: GC20-0370

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking plug -- **#9880** for 115v, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray. **Note:** Color accent is provided on the knee panel only and may be any one of the above colors ... top and side panels will always be white.

3762 Payment Transaction Processor (cont'd)

- Cables: For cable specifications, see *IBM 3790 Information Manual - Physical Planning* (GA27-2769).
- Keyboard/Language Arrangements: Proof versions have the alphameric keyboard with a numeric key arrangement similiar to that of an adding machine.

  #9420 for ASCII
  #9421 for EBCDIC
  #9423 for Proof Keyboard (ASCII)
  #9424 for Proof Keyboard (EBCDIC)

  Note: All 3762 stations attached to the same 3791 Controller must have the same keyboard/language arrangement. The proof version may be intermixed with the non-proof version in a 3790 system but not in the 3762 unit.

SPECIAL FEATURES

Audit Trail Printers (#1310): This feature consists of two matrix-print devices, one in each transport. It prints 7x7 dot characters with a pitch of 8.5 characters per inch ... a maximum of 40 print positions on one line. Printing is on the back of the documents starting at 3.0mm (0.12 inches) from the leading edge, on stubs, checks and deposit tickets, centered 66.5mm (2.62 inches) from the bottom edge. Fields to be printed on stubs and checks are selected by the user during format definition (not for Deposit Tickets). The character set consists of ten digits, 26 letters, seven symbols and blank. See "Supplies" for cartridge ribbon. **Field Installation**: No.

Endorsers (#3805): This feature consists of two endorsing stations, one in each transport. It prints a user-designed endorsement legend on the reverse side of the checks. The maximum size of the legend is 28 x 33mm (1.1 x 1.3 inches). The user can specify the horizontal endorsement position close to the leading or the trailing edge during format definition. See "Accessories" for endorser plates. **Field Installation**: No. **Specify**: Endorser Ink Roll -- **#9145** for black, **#9147** for purple, **#9148** for red.

Journal Tape Printers (#4660): This feature consists of two journal tape print devices, one for each operator. It lists the check amounts processed within a deposit and the deposit total as well as the appropriate deposit identification. When processing agent transactions, the individual stub amounts are printed. With the individual amounts, a 3-digit item identification number is printed in italics in the three leftmost character positions. The two rightmost positions are reserved for a code that identifies the printed line. In total, 15 character positions are avaialble. The printed tape is within reach of the operator for tear-off at completion of the deposit. See "Supplies" for Ink Ribbons and Journal Tape. **Field Installation**: No.

MICR Inscribers (#5100): This feature consists of two MICR (E13B) inscribing units, one in each transport. It encodes the amount on checks of acceptable transactions. At the user's option it encodes in the same pass, amount, process control, account number and transit routing fields on deposit tickets. All fields are encoded in accordance with the Bank Check Specifications for MICR, ANSI X3.3-1970. See "Supplies". **Field Installation**: No.

Security Keylock (#6350): A key-operated switch ... one per 3762. When the key is in the "locked" position, entry of data via a scanner or a keyboard is prevented. Automatic Re-IMI occurs when unlocking. Note: For additional and/or replacement keys, see "Accessories". **Field Installation**: Yes.

Storage Extension (#7500): This feature provides an 8K byte storage extension in the 3762. It must be installed when processing agent transactions ... applying user-programmable subroutines ... 1428, OCR-B 0.095 inch standard or 1403 numeric font recognition is required. Only one type font can be recognized in the 3762 at any one time, but different 3762s may recognize different fonts. **Maximum**: One. **Field Installation**: Yes.

ACCESSORIES

Document Gauge: The 3762 Document Gauge can be ordered as GX33-8505.

Document Trays: The 3762 is shipped with two document trays. Additional or replacement trays may be purchased. Order on MES from Raleigh. Document Tray, P/N 2716872.

Endorser Plates: For ordering, see SSD sales manual and use SSD form Z170-1479.

Locks and Keys: The 3762 with Security Keylock (#6350) is shipped with two keys. Additional keys may be purchased only from IBM. A letter of authorization must accompany order and serial number of lock must be indicated.

SUPPLIES

Ribbons for Printing Input Documents:

Film Ribbon Selectric - P/N 1136310 or 1136391
Fabric Ribbon Selectric - P/N 1136138
1403 (mdl 2 and N1) - P/N 1136430, 414486 and 424325
3211 Ribbon - P/N 1136626 or 1136627
3203 (mdls 1, 2 and 3) - P/N 1136430.

Ribbons not having similiar characteristics may result in reduced recognition performance.

Audit Trail Printer (#1310):

Cartridge Ribbon ... P/N 1136970 or equivalent.

Journal Tape Printers (#4660):

Ink Ribbon ... recommended material Nylon or Vinylon fiber (FF40). Spool diameter ... 35.1mm (1.38 inches). Spool type ... standard only, ribbon width 12.7mm (0.5 inch), length 6,096mm (240 inches), P/N 1299087 (black) or equivalent.

Journal Tape ... single- or two-ply width 57.2mm (2.25 inches), roll diameter 81.0mm (3-3/16 inches) maximum.

Single-ply ... recommended paper weight 16 lbs at 5% (approx. 60 gr/sq.m), tape has to be colored through the last 1.8m (6 feet) approx., P/N 457297 or equivalent.

Two-ply ... recommended paper weight 16 lbs at 5% (approx. 60 gr/sq.m) per ply, tape has to be colored through the last 1.8m (6 feet) approx., P/N 457298 or equivalent.

MICR Inscriber (#5100):

MICR ribbon P/N 431555 or equivalent.

A MICR gauge is available for checking inscriber output registration.

3767 COMMUNICATION TERMINAL

PURPOSE

A keyboard printer terminal for transmission of data or text to or from any virtual storage S/370, 4300 processor via a 3704, 3705, or 3725 Communications Controller, to a 4321, 4331 or 4361 via its Communications Adapter, or to the 8100 Information System via the 8130, 8140 and/or 8101. The 3767 uses Synchronous Data Link Control (SDLC) line discipline.

Also attaches to System/3 or System/7 via RPQ. See Start/Stop feature description.

MODELS

Model 1	001	40 cps average bidirectional printer.
Model 2	002	80 cps maximum bidirectional printer; includes dual 256-byte line buffers and full buffer editing capability.
Model 3	003	120 cps maximum bidirectional printer; includes dual 256-byte line buffer and full buffer edit capability.

Note: Throughput on all models is dependent upon output format, line control, buffering and transmission speed.

Customer Set-Up (CSU): The 3767 is designated as a customer set-up device thereby offering the customer early availability and relocation flexibility. The IBM Marketing Representative must advise customers of their responsibilities before receipt of the machine.

The CSU Allowance is one day.

HIGHLIGHTS

The 3767 consists of control functions, printer keyboard, control keys and indicator lights in one integrally designed desk-top unit. This configuration allows an operator/machine relationship that is most favorable for both interactive and batch operations. Special features available permit tailoring of the terminal to the user's requirements.

Control Functions: Provides the control for all online and offline operations; facilitates communication at speeds up to 2400 bps in SDLC line discipline and controls single line data editing on the base mdl 1. It also controls, on both mdls, basic functions such as Automatic Terminal Identification, Station Control, Internal Communication Clocking, Transmit and Receive Interrupt, End of Line Alarm, Buffer Full Alarm and Auto (EOB/EOM) switch.

Printer: [Mdl 2] Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. Electronic tabbing over the full 132 printable positions is provided. The printer dot matrix is 4 or 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 6 lines to the inch. Forms of up to six parts (total thickness 0.018 inches) may be used. For any multipart or pre-printed continuous forms, the Variable-Width Forms Tractor (#8700) is recommended. Five- and six-part continuous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. Single part continuous or up to four part cut forms can be used with the standard friction feed platen. The Paper Roll Holder and Forms Guide with Paper Bail **#9180** is available for use with roll paper and is recommended for use with single part fan-fold paper when the Variable-Width Forms Tractor (#8700) is not used. Maximum overall forms width is 15 inches. Card stock forms are not recommended. See GA24-3488 for form specifications and limitations.

Printer: [Mdl 3] Same as described above for mdls 1 and 2 with the exception that Forms Tractor is required for all continuous forms.

Keyboard: Provides several keyboard arrangements and includes typamatic on hyphen, underscore, backspace and space keys. In addition to the standard 44 alphanumeric data keys, are function keys, indicator lights, operating mode switches, and a 3-position numeric "print position indicator" display to aid the operator.

Security Enhancement Features: Print Suppress (standard) allows selected data fields to be entered without being printed. The Security Keylock (optional) with the power switch "On" allows the 3767 to be operational.

The Magnetic Stripe Reader (optional) is provided to allow operator identification to be transmitted.

Communication Facilities: The 3767 operates in half-duplex mode over the public switched telephone network, a nonswitched voice grade line or the Dataphone® Digital Service. For details, see M2700 pages.

® Registered Trademark of AT&T

Synchronous Data Link Control: Allows for transmission rates of 600, 1200 or 2400 bps.

The 3767 can communicate on a switched or nonswitched point-to-point facility, or as a secondary station on a multipoint or duplex multipoint facility to any virtual storage S/370 or 4300 processor, or nonswitched point-to-point or multipoint on the 8100 Information System.

Modems: One integrated Modem or External Modem can be used. See "Special Features" for options. Synchronous clock is a standard feature.

Problem Determination Procedures: Significant function has been designed into the 3767 to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See *IBM 3767 Operator's Guide,* GA18-2000.

Customer Responsibilities: The customer is responsible for:
- –unpacking, placement, set-up and checkout of the 3767 at time of delivery, or when relocating the 3767.
- –removal and packing of the 3767 at time of discontinuance.
- –relocation of the 3767 (if required) to allow IBM service access.
- –using and following the Problem Determination Procedures and filling out the Trouble Report prior to calling IBM for service.

See M2700 pages for additional responsibilities.

Publications: See KWIC Index G320-1621 or specific system bibliography

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug.
- Keyboard Arrangement: **#9381** for Correspondence or **#9391** for EBCDIC.
- SDLC transmission speed selection:

  #9533 (2400 bps)
  #9532 (1200 bps)
  #9531 (600 bps)

  See "Special Features" for modems and modem attachments.
- SDLC transmission speed selection:
- SDLC transmission speed selection:

  See "Special Features" for modems and modem attachments.
- Integrated/External Modem Cable: A 20-foot cable is provided as standard. If a longer cable is required, specify **#9021**, indicating length in feet as a quantity of 25, 30, 35 or 40.
- 6-foot Power Cord: Specify **#9986**; otherwise a 10-foot power cord will be provided.
- Variable-Width Forms Tractor Covers: Specify **#9850** for cover change if the Variable-Width Forms Tractor (#8700) accessory is ordered.
- Paper Roll Holder and Forms Guide (**#9180**): [Mdls 1, 2] with Paper Bail **#9180** must be ordered on all machines without Variable-Width Forms Tractor Covers (#9850). A customer using the Variable Width Forms Tractor has the option of ordering specify feature **#9180** at no additional charge, once per machine, for friction feeding of single part continuous roll and fan fold paper. Specify feature **#9180** is used interchangeably with the Variable-Width Forms Tractor and is attached and removed by the customer.
- Paper Roll Holder and Forms Guide (**#9180**): Provides a paper holder for roll paper supply. Also provides a guide for single part, fan-fold when Variable Width Forms Tractor (#8700) is not used. Accepts roll sizes -- up to 14-7/8 inch width, up to 5-1/2 inch diameter.
- SNA Terminal Address: **#9857** must be specified on all orders ... supplemental specs available for giving one EBCDIC byte address. Any two "Hex" characters, excluding "00" and "FF" may be used.
- Blower (**#9030**): [Mdls 1, 2] Must be specified for 3767 expected to operate in an environment above 90 degrees F ambient temperature (specification limit is up to 105 degrees F).
- Paper Tear Bar (**#9422**): [Mdls 1, 2] A device for tearing continuous forms. **Prerequisites:** #9180.

SPECIAL FEATURES

Note: Customers who elect to purchase one of the features* listed in Group #1 or Group #2 and later order additional features within that group should consider purchase of all features initially because these field upgrades require replacement of the initial feature and installation of the new combination.

* Except when Vertical Forms Control (#8731) has previously been installed and the Magnetic Stripe Reader (#4930) is the additional feature being ordered.

Group #1: Vertical Forms Control (#8731), Magnetic Stripe Reader (#4930), Calculate-Scientific (#1572).

3767 Communication Terminal (cont'd)

Group #2: Start/Stop Feature -- 2740-1 (#7111), -- 2740-2 (#7112) -- 2741 (#7113), Alternate Character Set (#1291), Buffer with Edit -- 512 (#1481), Buffer with Edit - 1024 (#1482).

Acoustic Coupler - 600 bps (#1110): Provides an acoustic coupler for communications through a telephone handset at speeds up to 600 bps. Requires a 1200 bps Integrated Modem on host end of communication facility. **Maximum:** One. **Field Installation:** Yes. Customer will set up at time of 3767 delivery -- FE will install if ordered via MES. **Prerequisites:** 1200 bps Integrated Modem (#5502 or #5506), 600 bps (**#9531**), in addition, if Start/Stop Feature (#7111 or #7113) is ordered, 300 bps (**#9540**). **Note:** Due to the nature of the public switched network environment, line conditions may cause a 3767 to be inoperable with an acoustic coupler. For limitations on public switched network, consult M2700.1.

ASCII Feature (#1201): Provides ASCII Keyboards (48-Key) and graphics in lieu of those normally provided by Keyboard Specify Codes. **Maximum:** One. **Field Installation:** Not recommended. **Limitations:** Cannot be installed with Start/Stop Features (#7111, #7112, #7113), Alternate Character Set (#1291), or Keyboard Arrangement **#9381** (Correspondence) or **#9391** (EBCDIC).

Alternate Character Set (#1291): Provides a switch control for alternate printed graphics, to those selected by the keyboard specification. Compatible with Start/Stop Feature #7113 (2741) and #7111 (2740-1). Only specify codes #9394 and #9395 (EBCDIC-Mono) are compatible with #7112 (2740-2). Keytop engraving remains the same. Key front decals will be provided for easy operator reference in using this feature. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with ASCII (#1201).

CHART A

		SDLC					Start/Stop							
		Graphics				Data Code	Graphics			Line Code				
Keybd	Alt Char Set	CORRES	EBCDIC	APL	MONO(2)	EBCDIC	CORRES	EBCD(2)	APL	MONO(2)	CORRES	PTTC/EBCD	Keybd Prereq Specify Code	Select Only One (1)
Corres		X				X	X				X		#9381	
	EBCDIC		X			X		X				X		#9382
	APL			X		X			X		X			#9383
EBCDIC			X			X		X				X	#9391	
	Corres	X				X	X					X		#9392
	APL			X		X			X			X		#9393
	Mono(3)				X	X				X		X		#9394
	Mono(4)				X	X				X		X		#9395

(1) Alternate Character Set (#1291) is a prerequisite.

(2) Subset of EBCDIC.

(3) Upper case alpha printed from keyboard - upper/lower case may be printed from the communications line.

(4) Upper case alpha printed from keyboard or the communications line regardless of key shift or line code shift.

Buffer Edit (#1481, #1482): #1481 (mdl 1 only) provides two 256-byte buffers for receiving data. #1482 (mdls 1, 2 or 3) provides two additional 256-byte buffers for receiving data. On key entry these two features provide full buffer (up to 512- or 1024-bytes) edit capability under key control. With the Edit switch "off", a single data line may be transmitted. When used with 2740 mdl 2 Start/Stop(#7112), single buffer 120-, 248-, 440-byte operation is provided. The Buffer Full Alarm warns the operator 10 positions before full capacity. **Maximum:** One of each. **Field Installation:** Yes. **Limitations:** This feature is not active if Start/Stop feature (#7111 or #7113) is active. A 512-byte buffer (equivalent to #1481) is standard on 3767 mdl 2 or 3. **Prerequisites:** #1482 requires #1481 on mdl 1 only.

Calculate - Scientific (#1572): In offline mode, this feature, under switch control, using the same keyboard (with supplied keyfront label) allows the following type calculations to take place: addition; subtraction; multiplication; division; inverse calculation; square root; statistical value (mean and standard deviation) logarithm; natural logarithm; exponential constant; circular constant and trigonometrical functions (sin, cos, tan, arcsin, arccos, arctan). Two memories are provided for temporary storage of totals. Sixteen digit input/output is allowed. **Maximum:** One. **Field Installation :** Yes.

EIA/CCITT Interface - No Clock (#3718): Provides one EIA/CCITT interface for the attachment of an 3863, 3872 or other external modem, with modem clocking (3767 clock disabled). **Maximum:** One. **Field Installation:** Yes. **Specify:**

- **#2834** (line speed select) provides a switch, if 3872 Modem is not attached, to allow speed changes as follows (SDLC only):
  600/1200 bps switch when **#9532** is specified.
  1200/2400 bps switch when **#9533** is specified.
- **#9707** for attaching 3863 Modem or
  3872 Modem (line speed select included in this feature)
- **#9619** for switched facilities

Limitations: Cannot be installed with 1200 bps Integrated Modem (#5500, #5502 or #5505), Start/Stop (#7111, #7112 and #7113) or EIA/CCITT Interface with Clock (#3719).

EIA/CCITT Interface - With Clock (#3719): Provides one EIA/CCITT interface for the attachment of an external modem with business machine (3767) clocking.
Note: This feature may be used for local attachment to 3704 or 3705 equipped with Line Set Type 1F for operation at 600 or 1200 bps. See "specify" below.

Maximum: One. **Field Installation:** Yes. **Specify:**

- **#2834** (line speed select) provides a switch to allow the following speed changes (SDLC only):
  600/1200 bps switched when **#9532** is specified.
- **#9619** for switched facilities.
- **#9404**, if this feature is to be used with Line Set Type 1F.

Limitations: Cannot be installed with 1200 bps Integrated modem (#5500, #5502 or #5505) or EIA/CCITT Interface - No Clock (#3718). **Prerequisites:** One of the following must be specified; **#9532** (1200 bps) or **#9531** (600 bps) for C2 and D3 Facility. If Start/Stop feature is installed, also specify that feature line speed prerequisite.

Note: One IBM modem can be attached.

Modem	Speed	Line
3872	1200/2400 bps	Nonswitched
3976-1	200 bps	Nonswitched
3976-2	200/300 bps	Switched
3976-3	600/1200 bps	Nonswitched or switched

Magnetic Stripe Reader (#4930): A small self-enclosed device for reading information from a magnetically-striped and encoded identification card and a magnetic credit card (2-1/8 inches x 3-3/8 inches). Reads up to 40 ABA standard numeric characters,including control characters. See IBM for information on cards. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Not functional when operating in Start/Stop (#7111, #7112, #7113) mode.

1200 bps Integrated Modem, Nonswitched (#5500): A modem for operation at 300, 600 or 1200 bps over 2- or 4-wire nonswitched voice-grade channels. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with EIA/CCITT Interface (#3718 or #3719) or 1200 bps Integrated Modem (#5502 or #5505). **Prerequisites:** For SDLC operation, specify either **#9532** (1200 bps) or **#9531** (600 bps). If Start/Stop feature is installed, also specify **#2717** (200 bps), **#9540** (300 bps), or **#9541** (600 bps).

1200 bps Integrated Modem (#5502): Switched. A manual answer modem for operation at 300, 600 or 1200 bps over Public Switched Telephone Networks. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with EIA Interface (#3718 or #3719) or 1200 bps integrated Modem (#5500, #5505 or #5506). **Prerequisites:** **#9532** (1200 bps) or **#9531** (600 bps) facilities. If Start/Stop Feature is installed, that feature's line speed specify. **Note:** This feature requires either Acoustic Coupler - 600 bps (#1110) or FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

1200 bps Integrated Modem/Interrupt, Nonswitched (#5505): [Mdls 1, 2] modem for operation at 300 bps (Start/Stop), 600 or 1200 bps (SDLC) over 2-wire nonswitched voice-grade channels. This modem includes a bidirectional reverse channel capability. This interrupt signal is transmitted when the ATTN key on the 3767 keyboard is depressed. **Note:** This featured modem is required to transmit or receive an interrupt only with 2741 Start/Stop (#7113) operating at 300 bps in Start/Stop mode on a 2-wire (**#9402**) nonswitched voice-grade channel and the EIA/CCITT Interface is not used. Line Set Type 8C on 3704 or Line Set Type 12A on 3705 is required to support the feature. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with EIA/CCITT Interface (#3718 or #3719) or 1200 bps Integrated Modem (#5500 or #5502). **Prerequisites:** Specify either **#9532** (1200 bps) or **#9531** (600 bps) or **#9540** (300 bps).

1200 bps Integrated Modem/Interrupt (#5506): [Mdls 1, 2] Switched. A manual answer modem for operation at 300 bps (Start/Stop), 600 bps or 1200 bps (SDLC) over Public Switched

3767 Communication Terminal (cont'd)

Telephone Networks. This modem includes a bidirectional reverse channel capability. This interrupt signal is transmitted when the ATTN key on the 3767 keyboard is depressed. **Note:** This featured modem is required to transmit or receive an interrupt only with Start/Stop 2741 (#7113) operating at 300 bps in Start/Stop mode on a half-duplex switched channel and EIA Interface #3719) is not used. Line Set Type 8D on the 3704 or Line Set Type 12B on the 3705 is required to support this feature. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with EIA Interface (#3718 or #3719) or 1200 bps Integrated Modem (#5500, #5502, or #5505). **Prerequisites: #9532** (1200 bps) or **#9531** (600 bps) or **#9540** (300 bps) facilities. **Note:** This feature requires either Acoustic Coupler - 600 bps (#1110) or FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

Security Keylock (#6660): Provides a key-operated switch. When in the "locked" position, the machine operations cannot be performed. Two keys are supplied. For additional or replacement keys, see "Locks and Keys" in "Accessories". **Maximum:** One. **Field Installation:** Yes.

Start/Stop Feature (#7111, #7112, #7113): These features provide a Type 1 Start/Stop line control migration aid on the 3767 to allow operation with existing program support (see Programming pages). This feature allows data transmission to or from a Virtual Storage S/370 mdl 115 through 168MP or a 3031 Processor via a 3704 or 3705 at 300 bps (2740-1 or 2741 Line Control) or at 600 or 1200 bps (2740-2 Line Control) or via a 2701 at 600 bps (2740-2 Line Control). It also allows transmission, via communications facility to or from a 3115 ICA, 3125 ICA, 3135 ICA, 3135-3 ICA or 3138 ICA at 300 bps (2740-1 or 2741 Line Control) or at 600 bps (2740-2 Line Control), 1200 bps (2740-2 Line Control) also supported by 3115 ICA and 3125 ICA. It allows communications via a 3704/3705 Communications Controller attached to a channel of a S/360 mdls 30, 40, 50, 65, 67 (in 65 mode), 75 and 195 at 300 bps (2740-1 or 2741 Line Control) or at 600 bps or 1200 bps (2740-2 Line Control); via a 2701 attached to a channel of a S/360 mdls 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75 and 195; or a S/370 mdl 155, 165 and 195 at 600 bps (2740-2 Line Control); or via an Integrated Communications Attachment on S/360 mdl 25 at 600 bps (2740-2 Line Control). An SDLC/Start-Stop switch is provided to allow operation in either mode. Communications facility must be specified for this feature. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with ASCII Feature (#1201).

Select One:

#7111 -- 2740-1 Line Control [Mdls 1, 2] **Specify: #9540** (300 bps). **Note:** For multipoint -- specify **#9560** (Station Control) and see "Terminal and Group Addresses" (below) for additional information to be specified. **Note:** On a given nonswitched line, one terminal within each group and one terminal for the entire line (All Call) must provide the necessary checking and addressing responses for that group and/or for the entire line. Specify **#9197** for a group responding and/or **#9035** for an All Call responding terminal. **Limitations:** Group or All Call addressing requires duplex communications facilities. Nonswitched facility required for SDLC if Station Control (**#9560**) is specified. Cannot be installed with 2400 bps (**#9533**) or EIA Interface - No Clock (#3718).

#7112 -- 2740-2 Line Control [Mdls 1, 2, 3] Buffer Receive mode is standard operation. **Limitations:** Group or All Call addressing requires duplex communications facilities. If multi-dropped on the same communication line with 2740-2s the 3767 must not be designated as the Group or All Call Responding terminal. Nonswitched facility required for SDLC with this feature installed. Cannot be installed with Correspondence Keyboard (#9381). **Specify:** See "Terminal and Group Addresses" (below) for additional information to be specified. **Note:** On a given nonswitched line, one terminal within each group and one terminal for the entire line (All Call) must provide the necessary checking and addressing responses for that group and/or for the entire line. Specify **#9197** for a group responding and/or **#9035** for an All Call responding terminal. Specify Line Speed -- **#9541** (600 bps) or **#9542** (1200 bps). Buffer Positions **#9015** for 120, **#9016** for 248, or **#9017** for 440. **Note:** This specified feature has no effect on buffer size under SDLC line discipline. **Prerequisites:** On mdl 1, Buffer with Edit (#1481 or #1482).

#7113 -- 2741 Line Control [Mdls 1, 2] **Specify: #9540** (300 bps). **Limitations:** Cannot be installed with 2400 bps (#9533) or EIA Interface - No Clock (#3718). **Note:** See "Terminal Identification" (below) for additional information to be specified.

The 2741 Transmit & Receive Interrupt Function on the 3767 with #7113 (2741 Line Control) is supported via the following:

	1200 bps Intg'd Modem			External Modem		
	Sw'd	Nonswitched		Switched	Nonswitched	
	2-wire	2-wire	4-wire	2-wire (1)	2-wire (1)	4-wire
3115 ICA	--- ---	--- ---	#1231 #4781	#1231	#1231	#1231
3125 ICA	--- ---	--- ---	#1231 #4781	#1231	#1231 or #1232	#1231 or #1232
3135 ICA	--- ---	--- ---	--- ---	9593-9600 9721-9728 9737-9744 9745-9752 9625-9632	9593-9600 9721-9728 9737-9744 9745-9752	9593-9600 9721-9728 9737-9744 9745-9752
3704	#4786	#4785	#4781	#4711 or #4714	#4711 or #4714	#4711 or #4714
3705	#4786	#4785	#4781	#4711 or #4714	#4711 or #4714	#4711 or #4714
3767	#5506	#5505	#5500	#3719	#3719	#3719
8130	---	---	#5500	#3701	#3701	#3701
8140	---	---	#5500	#3701	#3701	#3701
8101	---	---	#5500	#3701	#3701	#3701

(1) Modem must be full duplex.

Terminal and Group Addresses

Terminal and group addresses must be selected when one of the following Start/Stop Features is ordered:

#7111 for 2740 mdl 1 Line Control with Station Control **#9560** specified.

#7112 for 2740 mdl 2 Line Control.

For Terminal Address and Group Address, a 2-character code must be selected as described below. The first character must be the Terminal Address, and the second character must be the Group Address. (The same character may be ordered for both addresses. However, in this case, the terminal will be wired at the factory as a Group Responding **#9197** terminal.)

Depending on the Keyboard Arrangement specified for the base machine, the following characters may be selected for Terminal and Group Addresses:

With EBCDIC Keyboard Arrangement **#9391**, select characters from:

A through Z, 0 through 9, and special characters @ (at sign) ... $ (dollar sign) ... & (ampersand) ... - (hyphen) ... . (period).

† With Correspondence Keyboard Arrangement **#9381**, select characters from:

A through Z (except B and X), 0 through 8, and special characters = (equal) ... / (slash) ... ; (semi-colon) ... , (comma) ... . (period) ... ' (apostrophe) ... - (hyphen).

† Not available with #7112.

If Alternate Character Set (#1291) is installed on the terminal, the Terminal and Group Address line code bit configuration remains the same for either switch setting.

Specify: #9644 (Terminal and Group Addresses) .

Terminal Identification

If Terminal Identification is used in the customers application (provided by RPQ E46148 Auto Address Answer-back on the 2741), a 4-character Terminal Identification must be selected when Start/Stop Feature - 2741 Line Control (#7113) and one of the following are ordered: #5502, #5506, or #3719 with **#9619** (switched line operation) specified.

Depending on the Keyboard Arrangement specified on the base machine, the following characters may be selected for the Terminal Identification code.

With EBCDIC Keyboard Arrangement (**#9391**), select characters from:

A through Z, 0 through 9, and special characters # (number sign) ... / (slash) ... $ (dollar sign) ... & (ampersand) ... @ (at sign) ... , (comma) ... . (period) ... - (hyphen) ... C/R (carriage return) ... (space).

3767 Communication Terminal (cont'd)

With Correspondence Keyboard Arrangement (**#9381**), select characters from:

A through Z, 0 through 9, and special characters = (equal) ... / (slash) ... ' (apostrophe) ... - (hyphen) ... ; (semi-colon) ... . (period) ... , (comma) ... C/R (carriage return) ... (space).

The same character may be selected for all four positions except C/R may only be used in the fourth position.

If Alternate Character Set (#1291) is installed on the terminal, the Terminal ID line code bit configuration remains the same for either switch setting.

Specify: Note: For "space" character, enter %. For C/R character, enter * (available in fourth position only).

Variable-Width Forms Tractor (#8700): A forms-feeding device for continuous edge-punched forms. Forms with overall widths of from 3 to 15 inches can be fed. **Prerequisites: #9850**

Vertical Forms Control (#8731): Allows vertical forms skipping to a pre-set page header location or pre-set vertical tab position. Page size, header location and vertical tab stops are entered from the keyboard or received from the host under SDLC line control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Variable-width forms tractor covers (**#9850**) and Variable-Width Forms Tractor (#8700). **Limitations:** This feature is non-functional in Start/Stop (#7111, #7112, #7113) mode.

MODEL CONVERSIONS

Field conversion is possible for models 1 to 2, 1 to 3, and 2 to 3.

ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order feature number indicated below.

Forms Stand (#4450): A two-shelf forms stand that permits placement of continuous forms on a stand above floor and provides for stacking after printing. . Order via MSORDER (Category = Supplies/ Accessories; Group Code = 31) on AAS.

Locks and Keys: The 3767 with Keylock special feature is shipped with two keys. Additional or replacement keys may be obtained only from IBM (purchase only). Order via MSORDER (Category = Supplies/Accessories; Group Code = Supply Order) on AAS. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 10 to 12 weeks for shipment. A new Keylock (#6660) special feature must be ordered if the key identification number cannot be supplied.

SUPPLIES

Ribbons: P/N 1136653, or equivalent, is required.

3771 COMMUNICATION TERMINAL

PURPOSE

This desk-style console-keyboard-printer is a member of the 3770 Data Communication System. Communication features permit operation over switched or nonswitched facilities at speeds up to 4800 bps, using SDLC or BSC transmission techniques. Special features permit the attachment of one card reader or card punch operating at 50 cpm. The card punch can optionally be equipped with a special feature for Card Read to permit single-path card reading or card punching.

MODELS

Model 1	001	40 cps average print rate, bidirectional
Model 2	002	80 cps maximum, bidirectional
Model 3	003	120 cps maximum, bidirectional

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard and console printer are standard. For other configurations, refer to special features below.

Prerequisites:

For SDLC Communications with S/370 or 4300 Processors: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program (NCP/VS) attached to any virtual storage S/370 or 4300 processor operating under DOS/VS, OS/VS1 or OS/VS2; or these operating systems running under VM/370. SDLC Communication is also available via the Communications Adapter on 4331 -- see "Programming" for software support available.

For BSC Communications with S/360, S/370 or 4300 Processors: A virtual storage S/370 operating under BTAM or VTAM and DOS/VS, or under BTAM, TCAM or VTAM and OS/VS1 or OS/VS2; or these operating systems running under VM/370. The 3770 Communication Terminals use 2770 BSC programming support when operating in BSC mode. Operation with S/360, S/370 and 4300 Processors using 2770 BSC programming is also permitted. The customer may have to modify existing 2770 application programs for operation with 3770. See GA27-3097 for BSC compatibility considerations. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller or a 2701 Data Adapter Unit attached to a channel of any S/370 or 4300 processor; or via an Integrated Communications Adapter on S/370 mdls 115, 125 135, 135-3, 138 or via the Communications Adapter feature on 4331. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in mdl 65 mode), 75, and 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in mdl 65 mode), 75, and 195; or via an Integrated Communications Attachment on S/360 mdl 25.

HIGHLIGHTS

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer: Prints serially by character, while the wire-matrix print head is moving in either direction: bidirectional printing. Print span is 132 positions at 10 characters per inch. Line spacing is six lines per inch. Single-part continuous forms or cut forms of up to three parts can be handled with the standard friction-feed platen. A variable-width forms tractor, available as a special feature, is required for feeding multipart or preprinted continuous forms of up to six parts maximum (total thickness not greater than 0.018 in.). Five- and six-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality. Overall form widths of from 3.0 to 15.0 in. can be accommodated. To facilitate handling of continuous forms, the Forms Stand (a special feature) is recommended. Card stock continuous forms are not recommended. Refer to GA24-3488 for forms design considerations. A 94-character set is standard.

Dual 256-byte Buffers: Transfer data between the input and output devices. The buffers alternate in providing input and output service to permit overlapped operation.

Buffer Edit: Allows corrections to be made on the contents of a buffer during key entry jobs. Corrections can be made by character, by line or by entire buffer (up to 256 bytes).

Extended Buffer: Combines the dual 256-byte buffers into a single 512-byte buffer under operator control for keyboard-to-line jobs. Buffer edit capability applies to the full 512 bytes. Buffer transfers to line are in 256-byte increments and cannot be overlapped.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Format controls can be entered from keyboard, or from an attached card reader, or can be system-defined.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards. A 2-byte sequence is substituted for each occurrence of three or more consecutive blank card columns (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 63 consecutive blank columns are read. The terminal monitors the non-transparent data received which is destined for printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks. A similar capability is provided when using SDLC procedures.

Input/Output Selection: Is under control of keyboard set-up with an option for entering one set of printer format controls from keyboard or the card reader. A fully-configured 3771 will allow the following:

	INPUT	OUTPUT
Offline Jobs	Keyboard Card Reader Keyboard*	Printer Printer Card Punch
Online Batch Jobs	Card Reader Line Line	Line** Printer Card Punch**
Online Interactive Jobs	Keyboard* Line	Line Printer

* Output to printer is automatic.
** Monitor Print is an output option in addition to line or card punch.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem identification and recovery routines and procedures that are easily understood and used by the operator. See *IBM 3771/3773 Operating Procedures Guide,* GA27-3100.

Communications: See "Special Features". Transmission speeds of up to 4800 bps over switched or nonswitched facilities are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on communication facilities and other attachment information; also to M3863, 3864, 3872, and 3976 pages.

Customer Responsibilities: It will be the customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Bibliography: GC20-0001

SPECIFY

- Voltage (115 V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Color: **#9041** - Red, **#9042** - Yellow, **#9043** - Blue, **#9045** - Gray
  Note: Available at time of manufacture only.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006.

SPECIAL FEATURES

For Communication Capability: Select one Communication feature (#1460, #1461, or #1470), one Communication Driver (#1481 or #1482), and one Integrated Modem (#5500, 5501 or 5502) or EIA Interface (#3701). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

ASCII Feature (#1201): A 48 data keyboard (produces 94 ACSII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with BSC features #1460, #1461 or #1462, or with SDLC features #1460 or #1470. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1390): Sounds an alarm to alert the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

SDLC/BSC, Switched Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes.

BSC, Point-To-Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1461 or #1460.

3771 Communication Terminal (cont'd)

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. **Limitations:** Not with #1460 or #1461. **Maximum:** One. **Field Installation:** Yes. **Specify:** Specify one of the following: **#9977** for DOS/VS VTAM, **#9988** for OS/VS1 VTAM, **#9989** for OS/VS2 VTAM, or **#9993** for all other combinations of operating systems and access methods.

Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1460, #1461, #1470.

With 1200 bps Business Machine Clocking (#1482): Provides communication driver with 1200-bps clocking. **Limitations:** Not with #1481. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1460, #1461, or #1470.

EIA Interface (#3701): Provides a cable and interface meeting RS-232C characteristics for attachment of an IBM Modem or non-IBM modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-out (#3901) on an adjacent terminal, or on an IBM 3863, 3864 or 3872 Modem. This feature in combination with #1482 can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Cannot be installed with any Integrated Modem feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1481 or #1482.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. Refer to "Accessories" for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

Operator Identification Card Reader (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 in. x 2-1/8 in. ranging from 0.007 to 0.045 in. thick may be read. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One. **Field Installation:** Yes.

1200 bps Integrated Modem, Nonswitched (#5500): Provides for point-to-point or multipoint operation over nonswitched communication facilities. **Limitations:** Not with #3701 or with another integrated modem. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1482.

1200 bps Integrated Modem, Switched, Auto Answer (#5501): Provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Field Installation:** Yes. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Prerequisites:** #1482.

1200 bps Integrated Modem, Switched, Manual Answer (#5502): Provides for point-to-point operation over switched networks using manual originate/manual answer for establishing connection. **Limitations:** Cannot be installed with #3701, or another Integrated Modem. **Maximum:** One. **Field Installation:** Yes. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Prerequisites:** #1482.

3501 Card Reader Attachment (#8050): Provides for attachment of the 3501 Card Reader. **Limitations:** Not with #8150. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): Provides for attachment of the 3782 Card attachment unit mdl 1 and the 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** Not with #8050. **Maximum:** One. **Field Installation:** Yes.

Variable Width Forms Tractor (#8700): Provides a forms feeding device for continuous edge-punched forms. Overall forms width from 3.0 in. to 15.0 in. can be fed. Refer to *Forms Design Reference Guide for Printers,* GA24-3488. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model changes are field installable:

Model 1 to Model 2
Model 1 to Model 3
Model 2 to Model 3

ACCESSORIES

The following items are available on a purchase only basis. For shipment with machine, order the feature number indicated below.

Forms Stand (#4450): A two-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing.

Locks and Keys: Keylock (#4650) is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization must accompany each order. Allow six to seven weeks for shipment.

SUPPLIES

Ribbons: A black ribbon, P/N **1136653**, or equivalent, is required.

3773 COMMUNICATION TERMINAL

[NO LONGER AVAILABLE]

PURPOSE

This desk-style console-keyboard-printer includes as standard a diskette storage device with removable, reusable diskette. It is a member of the 3770 Data Communication System. Communication features permit operation over switched or nonswitched facilities at speeds up to 4800 bps. It uses the SDLC or BSC transmission technique.

MODELS

Model 1, P1	001, P01	40 cps average print rate, bidirectional
Model 2, P2	002, P01	80 cps maximum, bidirectional
Model 3, P3	003, P03	120 cps maximum, bidirectional

The prefix "P" on the model number designates user-programmable.

HIGHLIGHTS

Not applicable for a withdrawn machine.

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Color Group: **#9041** - Red, **#9042** - Yellow, **#9043** - Blue, **#9045** - Gray. Note: Available at time of manufacture only.
- Remote Power Off: **#9501** ... specify this feature for capability to "power down" terminal from the host CPU using a controlled data sequence over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning*, GA27-3006.

SPECIAL FEATURES

Special features are on an "As Available" basis for field installation, except #1201 and #4660 which cannot be field installed.

For communication capability: Select one Communication feature (#1460, #1461, or #1470); one Communication Driver (#1481 or #1482); and one Integrated Modem (#5500, 5501, 5502 or EIA Interface (#3701). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

Communication Features

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Point-to-point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1460 or #1461.

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. **Limitations:** Not with #1460 or #1461. **Maximum:** One.

Communication Driver Without Business Machine Clocking (#1481): Provides a communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

Communication Driver With 1200 bps Business Machine Clocking (#1482): Provides communication driver with 1200-bps clocking. **Limitations:** Not with #1481. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

EIA Interface (#3701): Provides a cable and interface meeting RS-232-C characteristics for attachment of an IBM Modem or non-IBM modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-out (#3901) on an adjacent terminal, or on a 3863, 3864, 3872 or 3874 Modem. This feature in combination with #1482 can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Cannot be installed with any Integrated Modem feature. **Maximum:** One. **Prerequisites:** #1481 or #1482.

1200 bps Integrated Modem, Nonswitched (#5500): Provides for point-to-point or multipoint operation over nonswitched communication facilities. **Limitations:** Not with #3701 or with another integrated modem. **Maximum:** One. **Prerequisites:** #1482.

1200 bps Integrated Modem, Switched, Auto Answer (#5501): Provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1482. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

1200 bps Integrated Modem, Switched, Manual Answer (#5502): Provides for point-to-point operation over switched network facilities using manual originate/manual answer for establishing connection. **Limitations:** Cannot be installed with #3701, or another Integrated Modem. **Maximum:** One. **Prerequsites:** #1482. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

Non-Communication Features

ASCII Feature (#1201): A 48-key data keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage and BSC features #1460, #1461 or #1462, or with SDLC features #1460 or #1470. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1390): Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. Refer to "Accessories" for information on additional or replacement keys. **Maximum:** One.

Keypad, Numeric (#4660): Provides a keypad in adding machine arrangement to facilitate rapid entry of numeric only data. **Limitations:** Not available for mdls 1, 2 or 3. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** Mdl P1, P2 or P3.

Operator Identification Card Reader (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 in. x 2-1/8 in. ranging from 0.007 in. to 0.045 in. thick may be read. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. For programmable terminal the Operator ID Reader (#5450) is under control of the 3770 application program. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One.

Storage Increment 4K (#6800): Provides an additional 4,096 bytes of programmable storage. **Limitations:** Not available for mdls 1, 2 or 3. Not with #6800. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Mdl P1, P2 or P3.

Storage Increment 8K (#6801): Provides an additional 8,192 bytes of programmable storage. **Limitations:** Not available for mdls 1, 2 or 3. Not with #6800. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Mdl P1, P2 or P3.

Variable Width Forms Tractor (#8700): Provides a forms feeding device for continous edge-punched forms. Overall forms width from 3.0 to 15.0 in. can be accommodated. Refer to *Forms Design Reference Guide for Printers*, GA24-3488. **Maximum:** One.

MODEL CONVERSIONS (None)

ACCESSORIES

The following items are available on a purchase only basis.

Forms Stand (#4450): A two-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing.

Locks and Keys: Keylock (#4650) is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization must accompany each order. Allow seven weeks for shipment.

SUPPLIES (None)

3774 COMMUNICATION TERMINAL

[3774 MODELS 1 AND 2 ARE NO LONGER AVAILABLE]

PURPOSE

This desk-style console-keyboard-printer is a member of the 3770 Data Communication System. The basic printer operates at a maximum speed of 80 or 120 characters per second and prints bidirectionally, serially by character, using a wire-matrix print head. Special features permit one or two diskette storage devices and provide for the attachment of an additional printer, the 3784 Line Printer, and one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150, or 300 cards per minute. The card punch operates at 50 cards per minute.

Communication features allow for operation over switched or non-switched facilities at speeds of up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

MODELS

Mdl 1, P1	001, P01	80 cps maximum, bidirectional printer
Mdl 2, P2	002, P02	120 cps maximum, bidirectional printer

The prefix "P" in the model number designates user-programmable.

HIGHLIGHTS (All Models)

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space and "Print Character" ("Character" on programmable models) keys have typamatic operation. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer: Prints serially by character at a maximum rate of 80 or 120 characters per second while the wire-matrix print head is moving in either direction: bidirectional printing. Print span is 132 positions at 10 characters per inch. Line spacing is 6 lines per inch. The 3774 mdls P1 and P2 (without Emulator) provide for line spacing of 6 or 8 lines per inch. Single-part continuous forms or cut forms of up to three parts can be handled with the standard friction feed platen. A variable-width forms tractor, available as a special feature, is required for feeding multipart or preprinted continuous forms of up to six parts maximum (total thickness not greater than 0.018 in.). Five- and six-part continuous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. Overall form widths of from 3.0 in. to 15.0 in. can be accommodated. To facilitate handling of continuous forms, the Forms Stand (an accessory) is recommended. Card stock continuous forms are not recommended. Refer to GA24-3488 for forms design considerations. A 94-character set is standard.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem identification and recovery routines and procedures that are easily understood and used by the operator. See *IBM 3774/3775 Operating Procedures Guide,* GA27-3094 or *IBM 3773, 3774, and 3775 Programmable Communication Terminals Operator's Guide,* GA27-3114.

Communications: See "Special Features". Transmission over switched or nonswitched facilities at speeds of up to 4800 bps are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on Customer Responsibilities, Communication Facilities, and other attachment information, and to M3872 pages.

The 2400 bps Integrated Modem and IBM 3872 Modem, when appropriately configured, can be intermixed on the same communication facility.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Prerequisites:

For SDLC Communications with S/370 or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program/Virtual Storage (NCP/VS) attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1, or OS/VS2; or these operating systems running under VM/370.

For BSC Communications with S/360, S/370 or 4300 Processors: A virtual storage S/370 or 4300 processor operating under DOS/VS, OS/VS1 or OS/VS2, or under RSCS (non-programmable terminals only) and VM/370, or any of these operating systems running under VM/370. The 3770 Communication Terminals use 2770 BSC programming support when operating in BSC mode. Operation with S/360, S/370, or 4300 processors using 2770 BSC programming is also permitted. The customer may have to modify existing 2770 application programs for operation with non-programmable models of the 3774. The customer will have to modify existing application programs for operation with programmable mdls of the 3774. See GA27-3097 for BSC compatibility considerations. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller or a 2701 Data Adapter Unit attached to a channel of any virtual storage S/370 or 4300 processor or via an Integrated Communications Adapter on S/370; or via a Communications Adapter feature on the 4331 or 4361 processor. BSC attachment can be made via a 3704/3705 Communications Controller attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75, and 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75, and 195; or via an Integrated Communications Attachment on S/360 mdl 25. Note: The 3725 is not connectable to S/360.

HIGHLIGHTS (Mdls 1, 2 and P1, P2 With Emulator)

Dual 256-Byte Buffers: Transfer data between the input and output devices. The buffers alternate in providing input and output service to permit overlapped operation.

Buffer Edit: Allows corrections to be made on the contents of a buffer during key entry jobs. A 256-byte diskette record, if the diskette feature is present, can also be retrieved into the buffer using Update Mode and be corrected using buffer edit functions. Corrections can be made by character, by line, or by entire buffer (up to 256 bytes).

Extend Buffer: Combines the dual 256-byte buffers into a single 512-byte buffer under operator control for keyboard-to-line or keyboard-to-diskette jobs. Buffer edit capability applies to the full 512 bytes. Buffer transfers to line or diskette are in 256-byte increments and cannot be overlapped.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Format controls for up to five jobs can be entered from keyboard, or from diskette or card if either one of these devices is attached.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards. A 2-byte sequence is substituted for each occurrence of three or more consecutive blank card columns (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 64 consecutive blank columns are read. The terminal monitors the non-transparent data received that is destined for printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks. A similar capability is provided when using SDLC procedures.

Auto Interrupt: Allows the terminal to automatically interrupt an offline job for an online job initiated by the host processor. The terminal stops the offline job, executes the online job for receiving line data, and automatically restarts the offline job without operator intervention. A manual switch on the keyboard enables/disables this mode of operation. See "Operating Characteristics-Automatic Interrupt" in *3770 System Components Manual,* GA27-3097.

Input/Output Job Definitions: Can be operator- or terminal-defined. Up to five operator-defined jobs can be read from diskette or card reader to facilitate rapid job set-up when the terminal is equipped with either of the special features; otherwise they can be entered from keyboard under control of a prompting sequence and executed from temporary storage. Printer format controls can be part of the job definition. An appropriately configured 3774 will permit input/output job designations as follows:

3774 Communication Terminal (cont'd)

Input	Output
Offline Jobs	
Keyboard[1]	Console Printer, Diskette, Card Punch, or Printer Second
Diskette[2]	Console Printer, Diskette, Card Punch, or Printer Second
Card Reader[2]	Console Printer, Diskette, Card Punch, or Printer Second
Keyboard & Diskette[3]	Console Printer & either Diskette or Card Punch
Keyboard and Card Reader[3]	Console Printer & either Diskette or Card Punch
Online Batch Jobs	
Diskette or Card Reader[2]	Line
Line[2]	Console Printer, Diskette, Card Punch, or Printer Second
Online Interactive Jobs	
Keyboard[1]	Line
Line	Console Printer

Notes:
[1] One input and one output device per job. Output-to-console printer is automatic when input is keyboard.
[2] One input device and one output device per job. Monitor print is an additional output option when Diskette, Card Punch, or Line is the output device.
[3] Record Format feature (#6010) is required in addition to I/O devices to allow multiple input and output devices for a job.

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard and console printer are standard. For other configurations, refer to "Special Features" below.

HIGHLIGHTS
(Mdls P1 and P2 Without Emulator)

Offline Operations: Are controlled by a user-written program. The 3774 interprets the user-written program after it is loaded into program storage from diskette storage. The 3774 has 6K bytes of program storage as standard. Additional 4K-, 8K-, 12K- and 16K-byte increments of program storage are available by special feature to a maximum of 16K additional bytes of program storage. A program can be selected and invoked by the operator, by a prior program call, or by an auto execute command from the host processor. Valid data sources for offline operations are the Operator Identification Card Reader, keyboard, diskette storage, and card reader. Valid data output devices are the console printer, diskette storage, card punch, 3784 Printer, and display.

3774P system utilities provide additional capabilities for the following operations:

- Card reader to console printer, diskette, card punch, or 3784 Printer
- Card print (Read Interpret)
- Keyboard-to-Card Punch
- Create, copy, list diskette
- Data set support for bypass, create, delete, erase, rename, and write protect data set
- Data set update for create, read, write, and dump data set
- Copy data set
- Program library support
- Print error log
- Set date
- Set configuration.

Storage Considerations: Storage is used for executing a 3770 application program that is loaded from diskette storage for Communications Mode, for data buffers, and for execution of device-related functions that are specified by the opening statement in the application program. Storage may also be allocated for devices and functions at power-on time through options available in the Terminal Configuration Utility. The amount of storage required for devices specified in the opening statement is:

Device or Function	Bytes
Supervisor Control Code Resident	3.0K
Programmable Communications - BSC	2.0K
Programmable Communications - SDLC	7.0K
Communications Mode	
Basic (Diskette and Console Printer I/O)	6.0K
Additional Storage for Card I/O and 3784 Printer	
Using BSC Communications	4.0K
Using SDLC Communications	5.75K
Additional Storage Using SDLC	
Multiple SYS.INTR Function	0.75K
Format Image Buffer (Power on Allocation Only)	256
3501 Card Reader	1.75K
2502 Card Reader	2.5K
Display Feature	2.5K
3521 Card Punch	3.0K
Read-Next Buffers (optional for diskette operation)	0.25K for each data set to a maximum of five

The amount of storage required is also dependent on the following variables:

Size of 3770 application program	xK bytes
Working storage for tables, storage-to-storage operations, buffers, etc., including 0.75K bytes for basic 3 buffers	xK bytes

Online Communications Operation: Terminals equipped with the appropriate I/O and Communications Features can operate as follows:

Transmission is controlled by the Communications Mode function or by a user-written program using the Programmable Communications function. *Communicate Mode* provides for selection of diskette datasets, card reader, or keyboard (Logon) for input data. Output data can be directed to a diskette data set, card punch, console printer, or 3784 Printer. Support is provided for printer horizontal or vertical format control. The *Programmable Communications* capability allows for transmission of data with any I/O device under control of a user-written program.

Diskette Storage Device: There are 99,840 bytes of storage available as standard on a non-removable diskette. Characteristics of the non-removable diskette are one read/write surface, 30 data tracks, 26 sectors per track and 128 bytes per sector. Up to 390 256-byte records or up to 780 128-byte records can be stored on the non-removable diskette. Programmable communication (SDLC) reduces the amount of storage for user data from 30 to 28 tracks.

Two additional Diskette Storage Devices providing 242,944 bytes of storage - each on removable reusable diskettes - are provided by special feature.

The diskettes can be used for storage of 3770 application programs and for application data. The maximum number of user-written data sets that can reside on the non-removable diskette and each removable diskette is 18. A maximum of seven data sets can be opened for any one program. A program library data set can contain a maximum of 99 user-written programs. Program identification can be numbered from 01 to 99.

Processor Interrupt: Can automatically occur during offline programs in order to receive an unsolicited processor message. The message is stored on diskette storage (or, under certain conditions, printed on the console printer) and the offline program is automatically resumed. A manual switch on the keyboard enables/disables this mode of operation.

Address Stop Function: Is provided to facilitate debugging of 3770 application programs at the terminal site. The status of program resources at the stop-address can be outputted to the printer or display.

Publications: GC20-0001

SPECIFY

- Voltage: (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Color: One must be specified. **#9041** for Red, **#9042** for Yellow, **#9043** for Blue, **#9045** for Gray. **Note:** Available at time of manufacture only.
- Remote Power Off (**#9501**): Specify this feature for capability to "power down" terminal from the host processor using a controlled data sequence sent over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006.
- Emulator (**#9141**): Specify this feature to equip the terminal with the non-programmable function in lieu of the standard programmable

3774 Communication Terminal (cont'd)

function. This feature supplies non-programmable notation on the keyboard and operator panel. This feature is not recommended for field installation. It can be field removed to change the terminal from non-programmable to programmable function.

SPECIAL FEATURES

All special features can be field-installed except ASCII feature (#1201) or Keypad feature (#4660) for which field installation is not recommended. Special features for 3774 mdls 1 and 2 are on an "As Available" basis for field installation.

Communications Features

For Communication Capability Select one from each group:

- One Communication Feature (#1460, #1461 or #1470)*
- One Communication Driver (#1481 or #1482)
- EIA Interface (#3701) or One Integrated Modem (#5500, #5501, #5502, #5600, #5602, or #5610).

*#1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Point-To-Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** BSC point-to-point (#1461) or SDLC/BSC (#1460).

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. **Maximum:** One. **Limitations:** Not with #1460 or #1461.

Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Prerequisites:** Communication Feature (#1460, #1461, or #1470).

With 1200 bps Business Machine Clocking (#1482): Provides communication driver with 1200 bps clocking. **Limitations:** Not with #1481. **Maximum:** One. **Prerequisites:** Communication Feature (#1460, #1461, or #1470).

EIA Interface (#3701): Provides a cable and interface meeting RS-232-C characteristics for attachment of an IBM Modem or non-IBM modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature, in combination with #1481, can be used to attach to Modem Fan-Out (#3901) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. This feature, in combination with #1482, can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Not with Integrated Modem features. **Maximum:** One. **Prerequisites:** Communication Driver (#1481 or #1482).

1200 bps Integrated Modem, Nonswitched (#5500): Provides for point-to-point or multipoint operation over nonswitched communication facilities. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1482).

1200 bps Integrated Modem, Switched, Auto Answer (#5501): Provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1482).

1200 bps Integrated Modem, Switched Manual Answer (#5502): Provides for point-to-point operation over switched network facilities using manual originate/manual answer for establishing connection. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1482).

2400 bps Integrated Modem, Nonswitched Point-To-Point (#5600): This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1481).

2400 bps Integrated Modem, Nonswitched Multipoint (#5602): This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1481).

This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** Communication Driver (#1481).

Modem Fan-Out (#3901): [2400 bps Integrated Modem] Equips the 2400 bps Integrated Modem, Nonswitched Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5602.

Switched Network Backup (#7951): [2400 bps Integrated Modem] Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an 3872 Modem equipped for operation over the public switched network (#7941, #7951, or #7952) attached to a 3704, 3705, or ICA of 3115 or 3125. **Note:** To use this feature operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1, and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. **Limitations:** Not with #3701. **Maximum:** One. **Prerequisites:** 2400-bps Integrated Modem, Nonswitched (#5600 or #5602). Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

Non-Communications Features

ASCII Feature (#1201): Provides a 48 data key keyboard (produces 94 ASCII graphics) in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features and 3784 Printer Attachment feature, and with BSC features #1460, #1461, or #1462 or with SDLC features #1460 or #1470. **Limitations (Mdls P1, P2 only):** The GETKB programming statement cannot be used in programs that are to be run on an ASCII machine. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1390): Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

Display (#3250): [Mdls P1, P2] Provides a 480-character (12 lines of 40 characters each) information display under the control of the 3770 application program. **Limitations:** Cannot be installed with Emulator (#9141). **Maximum:** One.

Door Keylock (#3401): [Single use charge] Provides one keylock and two keys for the desk-console door. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylocks, Dual (#3402): [Single use charge] Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** #4902.

Keylock (#4650): [Single use charge] Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

Keypad, Numeric (#4660): [Mdls P1, P2] Provides a keypad in adding machine arrangement to facilitate rapid entry of numeric-only data. **Limitations:** Cannot be installed with Emulator #9141. **Maximum:** One. **Field Installation:** Not recommended.

Diskette Storage, First (#4901): One device with a customer-removable diskette is placed in the left cabinet. Additional diskettes are available. Characteristics of the diskette storage device are: one movable read/write head, one read/write surface, 73 data tracks, 26 sectors per track, and 128 bytes per sector. Up to 949 256-byte records can be stored on the diskette (one 256-byte data record is reserved for job identification information in 3774 mdl 1 and 2.). Each 256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode (3774 mdl 1 and 2). An Update Switch on the 3774 mdl 1

3774 Communication Terminal (cont'd)

and 2 provides the operator with the capability of reading a 256-byte diskette record into the terminal buffer where it can be printed, edited, or deleted. **Maximum:** One.

Diskette Storage, Second (#4902): Provides a second diskette storage device with the same characteristics as the first (#4901). It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for:
Copy: Data can be copied from diskette 1 to diskette 2 (single data set or all active data sets.) **Concatenate (pool):** The ability to concatenate on a data set basis. **Continue (3774 mdls 1, 2):** Allows a read or write operation to automatically continue to diskette 2 if it has been placed in a ready condition. Continue is not allowed while keying data. **Record Update (3774 mdls 1, 2):** Allows a record to be read into the buffer from diskette 1, updated from keyboard, and written to the other diskette. Record Format feature (#6010) is a prerequisite for this update capability. **Maximum:** One. **Field Installation:** Yes. Color will be the same as that specified for the base machine. **Prerequisites:** #4901.

Operator Identification Card Reader (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 in. x 2-1/8 in. ranging from 0.007 to 0.045 in. thick may be read. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. For a programmable terminal, the Operator Identification Card Reader is under control of the 3770 application program. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5.0 in. and 40.0 in. per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One.

Record Format (#6010): Provides an offline capability for constructing records using more than one input and output device. Input can be keyboard, and either diskette or an attached card reader. Output can be console printer, and either diskette or an attached card punch. A record format specification record stored on diskette can be defined and changed by the user to permit selection, by field, for merging or creating, in any sequence within a transaction cycle. It also permits selecting output by field. There may be multiple fields within a transaction and multiple transaction cycles within a job. Provision is also made with this feature for self-checking, decimal insertion, right justify and fill, and numeric checking. A record format specification record can be loaded to diskette from the line, keyboard, or card reader. This feature increases the size of "extend buffer" from 512 to 2,048 bytes. **Limitations:** Extend buffer and update operation is not permitted for a record format job. A record format job cannot be interrupted by the processor automatically; operator intervention is required. This feature is not compatible with terminal programming and will be removed from 3774 mdls P1 and P2 whenever Emulator (#9141) is removed. **Maximum:** One. **Prerequisites:** For mdl 1 or 2: #4901. For mdl P1 or P2: #4901 and #9141.

Storage Increment, 4K (#6800): [Mdls P1, P2] Provides an additional 4,096 bytes of programmable storage **Limitations:** Not available with other storage increments (#6801, #6802, or #6803). Cannot be installed with Emulator (#9141). **Maximum:** One.

Storage Increment, 8K (#6801): [Mdls P1, P2] Provides an additional 8,192 bytes of programmable storage. **Limitations:** Not available with other storage increments (6800, 6802, or 6803). Cannot be installed with Emulator (#9141). **Maximum:** One.

Storage Increment, 12K (#6802): [Mdls P1, P2] Provides an additional 12,288 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6800, #6801, or #6803). Cannot be installed with Emulator (#9141). **Maximum:** One.

Storage Increment, 16K (#6803): [Mdls P1, P2] Provides an additional 16,384 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6800, #6801, or #6802). Cannot be installed with Emulator (#9141). **Maximum:** One.

3501 Card Reader Attachment (#8050): Provides for attachment of the 3501 Card Reader. **Limitations:** Not with 3782/2502 Card Reader Attachment (#8149). **Maximum:** One.

3782/2502 Card Reader Attachment (#8149): Provides for the attachment of the 3782 Card Attachment Unit mdl 2 and 2502 Card Reader mdl A1 or A2. The 2502 can be equipped with special features for 51/80 or 66/80 column cards and/or Optical Mark Read. A companion Optical Mark Read special feature is required on the 3782 mdl 2. **Limitations:** Not with 3501 Card Reader Attachment (8050). **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): Provides for attachment of the 3782 Card Attachment Unit mdl 1 and the 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print . **Limitations (3774 mdl 1 or 2 only):** If a 2502 or 3501 Card Reader is also attached (#8149 or #8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

3784 Printer Attachment (#8155): Provides for the attachment of the 3784 Line Printer as a second printer. **Maximum:** One.

Variable-Width Forms Tractor (#8700): Provides a forms feeding device for continuous edge-punched forms. Overall forms width from 3.0 in. to 15.0 in. can be fed. Refer to *Forms Design Reference Guide for Printers,* GA24-3488. **Maximum:** One.

MODEL CONVERSIONS

Are field installable. For 3774 mdl 1 and 2 are on an "As Available" basis. **Limitations:** Model downgrades from programmable models to non-programmable models are not permitted.

ACCESSORIES

Forms Stand (#4450): A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. For shipment with the machine, order by feature number.

Locks and Keys: The Keylock **#4650** special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment. **SUPPLIES**

Ribbons: A black ribbon, P/N 2236653 , or equivalent, is required. Contact IBM.

3775 COMMUNICATION TERMINAL

PURPOSE

This desk-style console-keyboard-printer is a member of the 3770 Data Communication System. The basic printer operates at a maximum speed of 120 lines per minute using a 64-character set or 80 lines per minute using a 94-character set . An engraved character font print belt can be interchanged by the operator. Special features permit one or two diskette storage devices and provide for the attachment of one card reader and one card punch. One of three card readers may be selected for operation at a speed of 50, 150, or 300 cards per minute. The card punch operates at 50 cards per minute.

Communication features allow for operation over switched or non-switched facilities at speeds of up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

MODELS

Model 1 001 [NO LONGER AVAILABLE] (Non-programmable): 80/120 lpm printer

Model P1 P01 (User-programmable): 80/120 lpm printer

The prefix "P" on the model number designates user-programmable.

HIGHLIGHTS (All Models)

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space and "Print Character" ("Character" on programmable mdls) keys have typamatic operation. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer: During a key entry job, the print platen lowers to provide print line visibility. Printing is from characters engraved on a revolving print belt. Included as standard is one interchangeable print belt (either 64or 94-character set) . Also included are a variable-width forms tractor for feeding continuous forms up to 15 inches overall width, paper jam detection, and 132 print positions. Character spacing is 10 per inch; line spacing is 6 or 8 per inch. Maximum print speed is 120 lines per minute with the 64-character set, 80 lines per minute with the 94-character set, . Continuous card stock forms are not recommended. Refer to GA24-3488 for forms design considerations.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem identification and recovery routines and procedures that are easily understood and used by the operator. See *IBM 3775/3775 Operating Procedures Guide* GA27-3094 or *IBM 3773, 3774, and 3775 Programmable Communications Terminals Operator's Guide,* GA27-3114.

Communications: See "Special Features".

Transmission over switched or nonswitched facilities at speeds of up to 4800 bps are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on Customer Responsibilities, Communication Facilities, and other attachment information, and to M3872 and 3874 pages.

The 2400 bps Integrated Modem and 3872 Modem, when appropriately configured, can be intermixed on the same communication facility.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Prerequisites:

For SDLC Communications with S/370 or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program/Virtual Storage (NCP/VS) attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1, or OS/VS2; or these operating systems running under VM/370.

For BSC Communications with S/360, S/370 or 4300 Processors: A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2, or under RSCS (non-programmable terminals only) and VM/370, or any of these operating systems running under VM/370. The 3770 Communication Terminals use 2770 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770 BSC programming is also permitted. The customer **may** have to modify existing 2770 application programs for operation with **non-programmable** mdls of the 3775. The customer **will** have to modify existing application programs for operation with **programmable** mdls of the 3775. See GA27-3097 for BSC compatibility considerations. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller or a 2701 Data Adapter Unit attached to a channel of any virtual storage S/370 or 4300 Processor; or via an Integrated Communications Adapter on S/370 processor; or via a Communications Adapter feature on a 4331 or 4361 processor. BSC attachment can be made via a 3704/3705 Communications Controller attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in mdl 65 mode), 75, and 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in mdl 65 mode), 75, and 195; or via an Integrated Communications Attachment on S/360 mdl 25. **Note:** The 3725 is not connectable to S/360.

HIGHLIGHTS (Mdls 1 and P1 With Emulator)

Dual 256-Byte Buffers: Transfer data between the input and output devices. The buffers alternate in providing input and output service to permit overlapped operation.

Buffer Edit: Allows corrections to be made on the contents of a buffer during key entry jobs. A 256-byte diskette record, if the diskette feature is present, can also be retrieved into the buffer using Update Mode and be corrected using buffer edit functions. Corrections can be made by character, by line, or by entire buffer (up to 256 bytes).

Extend Buffer: Combines the dual 256-byte buffers into a single 512-byte buffer under operator control for keyboard-to-line or keyboard-to-diskette jobs. Buffer edit capability applies to the full 512 bytes. Buffer transfers to line or diskette are in 256-byte increments and cannot be overlapped.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Format controls for up to five jobs can be entered from keyboard, or from diskette or card if either one of these devices is attached.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards. A 2-byte sequence is substituted for each occurrence of three or more consecutive blank card columns (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 64 consecutive blank columns are read. The terminal monitors the non-transparent data received that is destined for printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks. A similar capability is provided when using SDLC procedures.

Auto Interrupt: Allows the terminal to automatically interrupt an offline job for an online job initiated by the host processor. The terminal stops the offline job, executes the online job for receiving line data, and automatically restarts the offline job without operator intervention. A manual switch on the keyboard enables/disables this mode of operation. See *Operating Characteristics-Automatic Interrupt in 3770 System Components Manual,* GA27-3097.

Input/Output Job Definitions: Can be operator-or terminal-defined. Up to five operator-defined jobs can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from keyboard under control of a prompting sequence and executed from temporary storage. Printer format controls can be part of the job definition. An appropriately configured 3775 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Keyboard [1]	Console Printer, Diskette, or Card Punch
Diskette [2]	Console Printer, Diskette, or Card Punch
Card Reader [2]	Console Printer, Diskette, or Card Punch
Keyboard and Diskette [3]	Console Printer and either Diskette or Card Punch
Keyboard and Card Reader [3]	Console Printer and either Diskette or Card Punch

3775 Communication Terminal (cont'd)

Online Batch Jobs

Diskette or Card Reader[2]	Line
Line[2]	Console Printer, Diskette, or Card Punch

Online Interactive Jobs

Keyboard[1]	Line
Line	Console Printer

Notes:
1. One input and one output device per job. Output-to-console printer is automatic when input is keyboard.
2. One input device and one output device per job. Monitor print is an additional output option when Diskette, Card Punch, or Line is the output device.
3. Record Format (#6010) is required in addition to I/O devices to allow multiple input and output devices for a job.

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard and console printer are standard. For other configurations, refer to "Special Features" below.

HIGHLIGHTS
(Mdl P1 Without Emulator)

Offline Operations: Are controlled by a user-written program. The 3775 interprets the user-written program after it is loaded into program storage from diskette storage. The 3775 has 6K bytes of program storage as standard. Additional 4K-, 8K-, 12K- and 16K-byte increments of program storage are available by special feature to a maximum of 16K additional bytes of program storage.

A program can be selected and invoked by the operator, by a prior program call, or by an auto execute command from the host processor. Valid data sources for offline operations are the Operator Identification Card Reader, keyboard, diskette storage, and card reader. Valid data output devices are the console printer, diskette storage, card punch, and display.

3775P system utilities provide additional capabilities for the following operations:

- Card reader to console printer, diskette, or card punch
- Card print (Read Interpret)
- Keyboard to Card Punch
- Create, copy, list diskette
- Data set support for bypass, create, delete, erase, rename, and write protect data set
- Data set update for create, read, write, and dump data set
- Copy data set
- Program library support
- Set date
- Set configuration.

Storage Considerations: Storage is used for executing a 3770 application program that is loaded from diskette storage for Communications Mode for data buffers, and for execution of device-related functions that are specified by the application program. Storage may also be allocated for devices and functions at power-on time through options available in the Terminal Configuration Utility. The amount of storage required for devices specified in the opening statement is:

Device or Function	Bytes
Supervisor Control Code Resident	3.0K
Programmable Communications - BSC	2.0K
Programmable Communications - SDLC	7.0K
Communications Mode	
Basic (Diskette and Console Printer I/O)	6.0K
Additional Storage for Card I/O	
Using BSC Communications	4.0K
Using SDLC Communications	5.75K
Additional Storage Using SDLC	
Multiple SYS.INTR Function	0.75K
Format Image Buffer (Power on	
Allocation Only)	256
3501 Card Reader	1.75K
2502 Card Reader	2.5K
Display Feature	2.5K
3521 Card Punch	3.0K
Read-Next Buffers (optional for diskette operation)	0.25K for each date set to a maximum of five

- The amount of storage required is also dependent on the following variables:

Size of 3770 application program	xK bytes
Working storage for tables, storage-to-storage operations, buffers, etc., including 0.75K bytes for basic 3 buffers	xK bytes

Online Communications Operation: Terminals equipped with the appropriate I/O and Communications Features can operate as follows:

Transmission is controlled by the Communications Mode function or by a user-written program using the Programmable Communications function. *Communicate Mode* provides for selection of diskette datasets, card reader, or keyboard (Logon) for input data. Output data can be directed to a diskette data set, card punch, console printer, or 3784 Printer. Support is provided for printer horizontal or vertical format control. The *Programmable Communications* capability allows for transmission of data with any I/O device under control of a user-written program.

Diskette Storage Device: There are 99,840 bytes of storage available as standard on a non-removable diskette. Characteristics of the non-removable diskette are one read/write surface, 30 data tracks, 26 sectors per track and 128 bytes per sector. Up to 390 256-byte records or up to 780 128-byte records can be stored on the non-removable diskette. Programmable communication (SDLC) reduces the amount of storage for user data from 30 to 28 tracks.

Two additional diskette storage devices providing 242,944 bytes of storage - each on removable reusable diskettes - are provided by special feature.

The diskettes can be used for storage of 3770 application programs and for application data. The maximum number of user-written data sets that can reside on the non-removable diskette and each removable diskette is 18. A maximum of seven data sets can be opened for any one program. A program library data set can contain a maximum of 99 user-written programs. Program identification can be numbered from 01 to 99.

Processor Interrupt: Can automatically occur during offline programs in order to receive an unsolicited processor message. The message is stored on diskette storage (or, under certain conditions, printed on the console printer) and the offline program is automatically resumed. A manual switch on the keyboard enables/disables this mode of operation.

Address Stop Function: Is provided to facilitate debugging of 3770 application programs at the terminal site. The status of program resources at the stop-address can be outputted to the printer or display.

Bibliography: GC20-0001

SPECIFY

- Voltage: (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.
- Color: One must be specified. **#9041** for Red, **#9042** for Yellow, **#9043** for Blue, **#9045** for Gray. Note: Available at time of manufacture only.
- Remote Power Off **(#9501):** Specify this feature for capability to "power down" terminal from the host processor using a controlled data sequence sent over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006.
- Print Belt Character Set: One must be specified. Available at time of manufacture only. See Print Belt under "Accessories" for additional print belts. **#9491** for 64-Character Set EBCDIC, **#9492** for 94-Character Set EBCDIC, **#9494** for 64-character Set ASCII, **#9495** for 94-Character Set ASCII. **#9494** and **#9495** require ASCII Feature (#1201).
- Emulator (#9141): Specify this feature to equip the terminal with the non-programmable function in lieu of the standard programmable function. This feature supplies non-programmable notation on the keyboard and operator panel. This feature is not recommended for field installation. It can be field removed to change the terminal from non-programmable to programmable function.
- Alternate Address (#9011): [Mdl P1] Order this optional feature to specify that diskettes containing terminal control code engineering changes are to be mailed to an alternate address supplied by Field Engineering using a Teleprocessing Control number. The alternate address selected is usually the central site location. **Field Installation:** Yes. **Limitations:** Not with Emulator **#9141.** Each EC control diskette has been manufactured for use on the specific machine type/serial shown on the diskette label. EC diskettes for the 3775 terminal are unconfigured when they are mailed from IBM and have 23 tracks of storage available for user data. After the diskette is configured on the machine type/serial on which it is to be used, the amount of storage for user data is as follows:

  30 tracks - Configured to not use programmable communication SDLC

3775 Communication Terminal (cont'd)

28 tracks - Configured to use programmable communications SDLC.

For additional information see "Data Set Support" in the *Operator's Guide,* GA27-3114.

SPECIAL FEATURES

All special features can be field-installed except ASCII feature (#1201), Keypad feature (#4660) and Dual Independent Forms Feed (#3551) for which field installation is not recommended. Special features for 3775 mdl 1 are on an "as available" basis for field installation.

Communications Features

For communication capability, select one from each group:

- One Communication Feature (#1460, #1461 or #1470)*
- One Communication Driver (#1481 or #1482)
- EIA Interface (#3701) or One Integrated Modem (#5500, #5501, #5502, #5600, #5602, or #5610).

*#1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Point-To-Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1461 or #1460.

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. **Maximum:** One. **Limitations:** Not with #1460 or #1461.

Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

With 1200 bps Business Machine Clocking (#1482): Provides communication driver with 1200 bps clocking. **Limitations:** Not with #1481. **Maximum:** One. **Prerequisites:** Communication Feature #1460, #1461, or #1470.

EIA Interface (#3701): Provides a cable and interface meeting RS-232-C characteristics for attachment of an IBM Modem or non-IBM modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature, in combination with #1481, can be used to attach to Modem Fan-Out (#3901) on an adjacent terminal, or on 3863, 3864, 3872 or 3874 Modem. This feature in combination with #1482 can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Not with Integrated Modem features. **Maximum:** One. **Prerequisites:** #1481 or #1482.

Modem Fan-Out (#3901): Equips the 2400 bps Integrated Modem, Nonswitched Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5602.

1200 bps Integrated Modem, Nonswitched (#5500): Provides for point-to-point or multipoint operation over nonswitched communication facilities. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1482.

1200 bps Integrated Modem, Switched, Auto Answer (#5501): Provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1482.

1200 bps Integrated Modem, Switched, Manual Answer (#5502): Provides for point-to-point operation over switched network facilities using manual originate/manual answer for establishing connection. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1482.

2400 bps Integrated Modem, Nonswitched Point-To-Point (#5600): This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

2400 bps Integrated Modem, Nonswitched Multipoint (#5602): This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisite:** #1481.

2400 bps Integrated Modem, Switched With Manual Answer (#5610): This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Limitations:** Not with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

Switched Network Backup (#7951): Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an 3872 Modem equipped for operation over the public switched network **#7941, #7951, or #7952** attached to a 3704, 3705, or ICA of 3115 or 3125. **Note:** To use this feature operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1, and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. **Limitations:** Not with #3701. **Maximum:** One. **Prerequisite:** 2400 bps Integrated Modem, Nonswitched (#5600 or #5602). Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

Non-Communications Features

ASCII Feature (#1201): [Mdl P1] Provides a 48 data key keyboard (produces 94 ASCII graphics) in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features and 3784 Printer Attachment feature, and with BSC features #1460, #1461, or #1462 or with SDLC features #1460 or #1470. **Limitations:** The GETKB programming statement cannot be used in programs that are to be run on an ASCII machine. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1390): Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

Display (#3250): [Mdl P1] Provides a 480-character (12 lines of 40 characters each) information display under the control of the 3770 application program. **Limitations:** Cannot be installed with Emulator **#9141. Maximum:** One.

Door Keylock (#3401): [SUC] Provides one keylock and two keys for the desk-console door. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylocks, Dual (#3402): [SUC] Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisite: #4902.**

Keylock (#4650): [SUC] Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

Keypad, Numeric (#4660): [Mdl P1] Provides a keypad in adding machine arrangement to facilitate rapid entry of numeric-only data. **Limitations:** Cannot be installed with Emulator **#9141. Maximum:** One. **Field Installation:** Not recommended.

Dual Independent Forms Feed (#3551): [Mdl P1] Provides two independently indexed pinfeed mechanisms on the console line printer with visibility platen. They operate under control of a 3775 application program. Different sizes of forms can be handled in each paper feed. Refer to GA24-3488 for forms design considerations. **Limitations:** Cannot be installed with Emulator **#9141. Maximum:** One. **Field Installation:** Not recommended.

Diskette Storage, First (#4901): One device with a customer-removable diskette is placed in the left cabinet. Additional diskettes are available ... contact IBM. Characteristics of the diskette storage device are: one movable read/write head, one read/write surface, 73 data tracks, 26 sectors per track, and 128 bytes per sector. Up to 949 256-byte records can be stored on the diskette (one 256-byte data record is reserved for job identification information in mdl 1.). Each

3775 Communication Terminal (cont'd)

256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode mdl 1. An Update Switch on the mdl 1 provides the operator with the capability of reading a 256-byte diskette record into the terminal buffer where it can be printed, edited, or deleted. **Maximum:** One.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first (#4901). It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for:

Copy: Data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets.)

Concatenate (pool): The ability to concatenate on a data set basis.

Continue (mdl 1): Allows a read or write operation to automatically continue to Diskette 2 if it has been placed in a ready condition. Continue is not allowed while keying data.

Record Update (mdl 1): Allows a record to be read into the buffer from Diskette 1, updated from keyboard, and written to the other diskette. Record Format feature (#6010) is a prerequisite for this update capability.

Maximum: One. **Field Installation:** Yes. Color will be the same as that specified for the base machine. **Prerequisite:** #4901.

Operator Identification Card Reader (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 inches x 2-1/8 inches ranging from 0.007 to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. For a programmable terminal, the Operator Identification Card Reader is under control of the 3770 application program. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One.

Record Format (#6010): Provides an offline capability for constructing records using more than one input and output device. Input can be keyboard, and either diskette or an attached card reader. Output can be console printer, and either diskette or an attached card punch. A record format specification record stored on diskette can be defined and changed by the user to permit selection, by field, for merging or creating, in any sequence within a transaction cycle. It also permits selecting output by field. There may be multiple fields within a transaction and multiple transaction cycles within a job. Provision is also made with this feature for self-checking, decimal insertion, right justify and fill, and numeric checking. A record format specification record can be loaded to diskette from the line, keyboard, or card reader. This feature increases the size of "extend buffer" from 512 to 2,048 bytes. **Limitations:** Extend buffer and update operation is not permitted for a record format job. A record format job cannot be interrupted by the processor automatically; operator intervention is required. This feature is not compatible with terminal programming and must be removed from mdl P1 whenever Emulator **#9141** is removed. **Maximum:** One. **Prerequisite:** For mdl 1: #4901. For mdl P1: #4901 and #9141.

Storage Increment, 4K (#6800): [Mdl P1] Provides an additional 4,096 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6801, #6802, or #6803). Cannot be installed with Emulator **#9141. Maximum:** One.

Storage Increment, 8K (#6801): [Mdl P1] Provides an additional 8,192 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6800, #6802, or #6803). Cannot be installed with Emulator **#9141. Maximum:** One.

Storage Increment, 12K (#6802): [Mdl P1] Provides an additional 12,288 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6800, #6801, or #6803). Cannot be installed with Emulator **#9141. Maximum:** One.

Storage Increment, 16K (#6803): [Mdl P1] Provides an additional 16,384 bytes of programmable storage. **Limitations:** Not available with other storage increments (#6800, #6801, or #6802). Cannot be installed with Emulator **#9141. Maximum:** One.

3501 Card Reader Attachment (#8050): Provides for attachment of the 3501 Card Reader. **Limitations:** Not with 3782/2502 Card Reader Attachment (#8149). **Maximum:** One.

3782/2502 Card Reader Attachment (#8149): Provides for the attachment of the 3782 Card Attachment Unit mdl 2 and 2502 Card Reader mdl A1 or A2. The 2502 can be equipped with special features for 51/80 or 66/80 column cards and/or is required on the #3782 mdl 2. **Limitations:** Not with 3501 Card Reader Attachment (#8050). **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): Provides for attachment of the 3782 Card Attachment Unit mdl 1 and the 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print . **Limitations mdl 1:** If a 2502 or 3501 Card Reader is also attached (#8149 or #8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

MODEL CONVERSIONS

Are field-installable. Model 1 to Model P1. For 3775 model 1, are on an "As Available" basis. **Limitations:** Model downgrade from model P1 to model 1 is not permitted.

ACCESSORIES

Accessories are available on a purchase-only basis. For shipment with machine, order feature numbers indicated below.

Forms Stand (#4450): A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. For shipment with the machine, order by feature number. **Note:** For the 3775, it is recommended that forms be used out of carton.

Locks and Keys: The Keylock **#4650** special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

@SS@

Print Belt, Add'l: Supplies a print belt in addition to the one that is provided as standard with the machine (see "Specify").

64-character	ASCII	**(#5812)***
94-character	ASCII	**(#5813)***
64-character	EBCDIC	**(#5822)**
94-character	EBCDIC	**(#5823)**

* ASCII Feature (#1201) is a prerequisite.

SUPPLIES

Ribbons: A black ribbon, P/N 1136634, or equivalent, is required. Contact IBM.

3776 COMMUNICATION TERMINAL MDL 1, 2

PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776 mdls 1 and 2 are SNA Single Logical Unit (SLU) and BSC terminals. A keyboard is used for terminal control and for operator communication with the host processor. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, or 94character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150 or 300 cards per minute. The card punch operates at 50 cpm.

Communication features permit operation over switched or non-switched facilities at speeds up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

MODELS

		Maximum Lines Per Minute	Character Set
Model 1	001	300	48
		230	64
		160	94
Model 2	002	400	48
		300	64
		230	94

Prerequisites:

For SDLC Communications with S/370, 4331 or 4341 processors: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or these operating systems running under VM/370 (OS/VS2 is not supported by the 4300 Processors).

For BSC Communications with S/360, S370 or 4300 Processor: A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3776 Communicafion Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3776. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370, 4331 or 4341 Processor; or via an Integrated Communications Adapter on S/370 mdl 115, 125, 135-3 or 138; or via a Communications Adapter feature on the 4331 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25. **Note:** The 3725 is not connectable to S/360.

For BSC Communications with System/38: All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment (#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See *IBM System/38 Data Communications Programmer's Guide,* SC21-7825, for BSC function and compatibility considerations.

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard and printer are standard. For other configurations, refer to "Special Features" below.

HIGHLIGHTS

Keyboard -- EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space, and Character Advance keys have typamatic operation. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer -- line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, , or 94-character set) ... see "Specify" ... variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3488 for forms design considerations.

Buffers -- transfer data between the input and output devices and the communication line. Buffers also transfer data between input and output devices during offline operation. The buffers alternate in providing input and output service to permit overlapped operation. Dual 256-byte or dual 512-byte buffers are used to BSC or SDLC operation and are under operator control.

Printer Format Controls -- facilitate the formatting or printed data. Vertical and horizontal control characters in data initiate vertical and horizontal tabbing.

Compression/Expansion -- provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards or diskette. A 2-byte sequence is substituted for each occurrence or three or more consecutive blanks (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 63 consecutive blanks are read. The terminal monitors received non-transparent data that is destined for the printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks.

SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Transmission Reversal -- permits keyboard initiation of interrupt of host data transmission for terminal data transmission and for resumption of the host transmission upon completion of the terminal transmission. The function is dependent upon associated host programming.

Record Compress -- using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3776 diskette for subsequent batch transmission. The compressed records are written on the 3776 diskette in 3770 mode. Record Compress using one diskette storage device permits the compression of Basic Exchange diskette records into blocks of 256 bytes of 512 bytes for transmission.

Dual Data Path -- provides for concurrent operation of a line-to-printer job and a card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line and transfer it to the printer. A single 256-byte or single 512-byte buffer is used for data buffering between card I/O and diskette or diskette and diskette. Throughput for both online and offline jobs is degraded when run concurrently using dual data path.

Automatic Card to Line Job -- when an online job is completed and the 3776 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.

Input/Output Form Definitions -- can be operator- or terminal-defined. Up to five operator-defined forms can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from the keyboard. Printer format controls can be part of the job definition. An appropriately configured 3776 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Diskette[1]	Printer, Diskette or Card Punch
Card Reader[1]	Printer, Diskette or Card Punch
Online Batch Jobs	
Diskette or Card Reader[1]	Line
Line[1]	Printer, Diskette or Card Punch
Dual Data Path Jobs	
Line[2]	Printer
Card Reader[2]	Diskette
Diskette[2]	Card Punch
Diskette[2]	Diskette

[1] One input device and one output device per job.
[2] Line-to-printer occurs concurrently with card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printer, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System.* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3776 Operating Procedures Guide,* GA27-3107.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

3776-1 -2 (cont'd)

Communications: See "Special Features". Transmission speeds up to 4800 bps over switched or nonswitched facilities are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information. Also refer to M3863 and 3872 pages. The 2400 bps Integrated Modem and 3872 Modem when appropriately configured can be intermixed on the same communication facility.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.

- Color Group: One only must be specified.
  Available at time of manufacture only.
  #9041 for red, **#9042** for yellow, **#9043** for blue,
  #9045 for gray.

- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine. See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

  #9489 -- 48-character set EBCDIC (HN Character Set)*
  #9490 -- 48-character set EBCDIC (Standard Character Set)*
  #9491 -- 64-character EBCDIC
  #9492 -- 94-character set EBCDIC
  #9493 -- 48-character set ASCII†
  #9494 -- 64-character set ASCII†
  #9495 -- 94-character set ASCII†

  † ASCII Feature (#1201) is required.

  * These belts are identical except for the special character differences:
    HN Character Set has) (±
    Standard Character Set has % # @

  Print Belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

	Data Stream Character	Printed Character
HN Character Set Specified		
HN Belt Installed	) (±	) (±
HN Belt Installed	% # @	) (±
Std Belt Installed	) (±	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) (±	
HN Belt Installed	% # @	) (±
HN Belt Installed	) (±	

- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006

- Remote Power Off (**#9501**): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.

MODEL CONVERSIONS

Changes from model 1 to model 2, 3 or 4 and from model 2 to model 4 are field installable. **Note:** Customer price quotations and customer order acknowledgment letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM".

SPECIAL FEATURES

All special features can be field installed , except #1201 for which field installation is not recommended.

For Communication Capability -- select one Communication Feature (#1460, #1461 or #1470); a Communication Driver (#1481); one Integrated Modem (#5600, #5602, #5610, #5700, #5702, #5710) or EIA Interface (#3701). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. **Maximum:** One

Field Installation: Not recommended. **Specify:** Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Point To Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1460 or #1461.

SDLC (#1470): Provides for switched or nonswitched SDLC procedures. For record purposes, also identify the primary CPU/Program Environment code. Specify one of the following: **#9977** for DOS/VS VTAM, **#9988** for OS/VS1 VTAM, **#9989** for OS/VS2 VTAM, or **#9993** for all other combinations of operating systems and access methods. **Limitations:** Cannot be installed with #1460 or #1461. **Maximum:** One.

Communication Driver Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Maximum:** One. **Prerequisites:** #1460, #1461 or #1470.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with these locks can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** Diskette Storage, 2nd (#4902).

EIA Interface (#3701): Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. **Limitations:** Cannot be installed with any Integrated Modem Feature. **Maximum:** One. **Prerequisites:** #1481.

Modem Fan-Out (#3901): Equips the 2400 bps Integrated Modem, Nonswitched, Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5602.

Modem Fan-Out (#3902): Equips the 4800 bps Integrated Modem, Nonswitched, Multipoint (#5702) with the capability to be shared by up to two other terminals in addition to the terminal containing the integrated modem. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5702.

Forms Stand: Integrated into the machine covers for the 3776 mdl 1 and 2.

Front Feed (#3951): Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

Diskette Storage, 1st (#4901): Provides one device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM . Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records or up to 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in

3776-1 -2 (cont'd)

interchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive sectors in interchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code insensitive in SDLC mode, non-transparent only in BSC mode. **Maximum:** One.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. *The second diskette allows additional capabilities for: *Copy* - data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets - 3770 mode only) ... *Concatenate* (pool) - the ability to concatenate on a data set basis ... *Continue* -- allows a read or write operation to automatically continue to Diskette 2 if it has been placed in a Ready condition. **Maximum:** One. **Prerequisites:** #4901. Orders for field installation must specify color -- **#9081** for red. **#9082** For yellow, **#9083** for blue, or **#9085** for gray. Color must be the same as that specified for the base machine.

Operator ID Feature (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" ranging from 0.007" to 0.045" thick may be read. See SSD Sales Manual for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. **Limitations:** The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. BSC programming for 2770 and 3780 does not support this feature. **Maximum:** One.

2400 bps Integrated Modem, Nonswitched, Point-To-Point (#5600): This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

2400 bps Integrated Modem, Nonswitched, Multipoint (#5602): This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

2400 bps Integrated Modem Switched, With Auto Answer (#5610): This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

4800 bps Integrated Modem, Nonswitched, Point-To-Point (#5700): This self-clocked modem provides for point-to-point operation over 4-wire nonswitched communication facilities. This modem features automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

4800 bps Integrated Modem, Nonswitched, Multipoint (#5702): This self-clocked modem provides for multipoint operation over 4-wire nonswitched communication facilities. This modem feature automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

4800 bps Integrated Modem, Switched, With Auto Answer (#5710): This self-clocked modem provides for point-to-point operation over switched network facility using manual originate/auto answer for establishing connection. This modem features automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

Switched Network Backup (#7951): Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an IBM 3872 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. **Note:** To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required at the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1 and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Prerequisites:** 2400 bps Integrated Modem (#5600 or #5602). Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

Switched Network Backup (#7952): Provides the capability of attaching 4800 bps Integrated Modem (#5700 or 5702) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 4800/2400 bps with an IBM 3874 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. **Note:** To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. Additional customer program routines will be required in existing programming to fully utilize the capabilities of this feature. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Prerequisites:** #5700 or #5702. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

3501 Card Reader Attachment (#8050): To attach a 3501 Card Reader. **Limitations:** Cannot be installed with #8149. If a 3521 is also attached (#8150), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

3782/2502 Card Reader Attachment(#8149): To attach a 3782 Card Attachment Unit mdl 2 and a 2502 Card Reader mdl A1 or A2. **Limitations:** Cannot be installed with #8050. If a 3521 is also attached via #8150, the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print . **Limitations:** If a 2502 or 3501 Card Reader is also attached (#8149 or 8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

Print Belt, Add'l: Supplies a print belt in addition to the one that is provided as standard with the machine (see "Specify").

48-character ASCII (**#5811**)*	48-character EBCDIC (**#5821**) [Standard Character Set]
64-character ASCII (**#5812**)*	64-character EBCDIC (**#5822**)
94-character ASCII (**#5813**)*	94-character EBCDIC (**#5823**)
48-character EBCDIC (**#5820**) [HN Character Set]	

* ASCII Feature (#1201) is a prerequisite @SS@

Locks and Keys: The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

Mercury Battery (P/N 1743456): Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. **Note:** Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

SUPPLIES

Ribbons: A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

3776 COMMUNICATION TERMINAL MDLS 3, 4

PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776-3 and 3776-4 are SNA Multiple Logical Unit (MLU) terminals. A keyboard and a console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, or 94character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm.

MODELS

		Maximum Lines Per Minute	Character Set
Model 3	003	300	48
		230	64
		160	94
Model 4	004	400	48
		300	64
		230	94

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard, console display, terminal storage and printer are standard. One communications feature (#3701, #4501, #5605 or #5651) is required. For other configurations, refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full-duplex communications facilities only.

Prerequisites for SDLC Communications with S/370 or 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370, 4331 or 4341 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS or VTAM.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

HIGHLIGHTS

Communications -- Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided using the appropriate modems and communications facilities. Duplex -- simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level. May also be locally attached in either a duplex or half-duplex mode to a 3705 at 14.4K bps or a 3725 at 19.2K bps.

Keyboard -- EBCDIC arrangement with 44 data keys. The keyboard, in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display, provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display -- contains 16 lines of 64 characters each for a total of 1024 characters. The 3776-3 and 3776-4 reserve the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input. Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time, the operator is prompted to specify date and time. As messages are received, they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign (>) in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state, a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer -- line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, or 94character set) ... see "Specify". Also standard are a variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3844 for forms design considerations.

Forms Stand -- is integrated into the machine covers for the 3776 mdl 3 and 4.

Terminal Storage -- is standard for message spooling, terminal control, utility programs and user-generated procedures.

Diskette Storage -- There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3776-1 and 3776-2, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape -- may be used as either an input or as an output device. One 3411-1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411-1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-track tape operation is not provided. The 3411-1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4000 bytes. Maximum record size is 255 bytes.
A block size of up to 2000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411-1. Refer to M3411 for ordering information. Feature #7003 is required on the 3411 mdl 1.

Buffers -- transfer data between the input and output devices and the communication line. SDLC communications uses a customer-defined Request/Response Unit (RU) of 256 or 512 byte buffer. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. Buffers also transfer data between input and output devices during local operation.

Printer Format Controls -- facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion -- implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Decompaction -- provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function depends upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided.

Automatic Card Reading -- capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control -- initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

3776-3, -4 (cont'd)

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

Record Formats -- consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic Exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 120 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off -- see **#9501** under "Specify" below.

Encrypt/Decrypt Feature -- available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature (Program Number 5735-RC2) (Feature Number 6010) and Programmed Cryptographic Facility Program Product (Program Number 5740-XY5).

Performance Considerations -- The line-to-printer performance of the 3776-3 is up to 300 lpm with a 48-character set print belt. The line-to-printer performance of the 3776-4 is up to 400 lpm with a 48-character set print belt.

The 3776-3 and 3776-4 MLU terminals will operate, however, with concurrent input-output processing in either a Duplex or Half Duplex data communications mode as a function of the base Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations. The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and system facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, cryptographic processing, etc., must all be considered in determining actual throughput.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3776-3 or 3776-4 operating Duplex at 19.2K bps on a terrestrial link may, however, present a variance of from greater to degrade overall terminal throughput when compared to comparable operation in a Half Duplex mode.

Problem Determination Procedures: Function has been designed into this unit to help provide availability to the customer. See *IBM 3770 Multiple Logical Unit Operator's Guide for 3776-3, 3776-4, 3777-3,* GA27-3125.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Communications: See "Special Features" ... Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are on nonswitched facilities. Direct local attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. ASCII is available as a special feature. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps, the 3776-3 and 3776-4 may use either the EIA Interface or the High-Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704, 3705, or 3725 Communications Controller Line Set Type 1G (#4717) at the central processor. This type of communication requires modems which are line compatible (suitable for inter-connection) and which provide optional EIA RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via Communications Adapter feature on a 4321 or 4331 processor ... see M4321, 4331 pages for details.

IBM Modem	Speed	Switched	Nonswitched
3863 - I/II	2400	X	X
3864 - I/II	4800	X	X
3865 - I/II	9600		X

Communications Adapter without Business Machine Clocking: Standard -- integrated to provide SDLC communications over switched or nonswitched facilities.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See M3411 for Magnetic Tape Unit voltage requirements.
- Color Group: Blue is supplied as standard except for field model conversions where installed color groups will be matched (do not specify).
- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine). See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry. Print belts are interchangeable by the operator.

  #9489 -- 48-character set EBCDIC (HN Character Set)*
  #9490 -- 48-character set EBCDIC (Standard Character Set)*
  #9491 -- 64-character EBCDIC
  #9492 -- 94-character set EBCDIC
  #9493 -- 48-character set ASCII†
  #9494 -- 64-character set ASCII†
  #9495 -- 94-character set ASCII†

  † ASCII Feature (#1201) is required.

  * These belts are identical except for the special character differences:
    HN Character Set has) (=
    Standard Character Set has % # @

  Print belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

	Data Stream Character	Printed Character
HN Character Set Specified		
HN Belt Installed	) (=	) (=
HN Belt Installed	% # @	) (=
Std Belt Installed	) (=	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) (=	- - -
HN Belt Installed	% # @	) (=
HN Belt Installed	) (=	- - -

- Cabling: Fixed-length cables except for 3411 Magnetic Tape and Control are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006. 3411 cables must be separately ordered.
- Remote Power Off (**#9501**): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.
- EIA RS-232C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps.
- Alternate Address (#9011): Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by Field

  Engineering using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.

SPECIAL FEATURES

All special features can be field installed , except #1201 for which field installation is not recommended.

ASCII Feature (#1201): A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). **Maximum:** One. **Field Installation:** Not recommended. **Specify:** Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII.

3776-3, -4 (cont'd)

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with these locks can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** #4902.

Encrypt/Decrypt (#3680): Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. **Maximum:** One. **Prerequisites:** A mercury battery, IBM P/N 1743456 or equivalent is required. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

EIA Interface (#3701): Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with DDS Adapter, Point-to-Point (#5650), DDS ADapter, Multipoint (#5651), High-Speed Digital Interface (#4501), or V35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see "Specify".

Front Feed (#3951): Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

High-Speed Digital Interface (#4501): Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations:** Cannot be installed with #3701 or #4720 or #5650 or #5651 . **Maximum:** One.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

V35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150.0m (491 ft). **Limitations:** Cannot be installed with #3701, #4501. **Field Installation:** Yes.

Diskette Storage, 1st (#4901): Provides one device with a customer removable diskette placed in the left desk cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format data set. Diskette capabilities allow for: *Concatenate* (pool) - the ability to concatenate on a data set basis ... *Multivolume* - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive. **Maximum:** One.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: *Copy* - data can be copied from Diskette 1 to Diskette 2. **Maximum:** One. **Prerequisites:** #4901.

Operator ID Feature (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" x 2-1/8" ranging from 0.007" to 0.045" thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. **Limitations:** The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. **Maximum:** One.

DDS Adapter (DDSA) (#5650 -- For Point-to-Point Operation ... #5651 -- For Multipoint Operation): Provides adapter for SDLC data transmission at speeds of 2400, 4800, or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. **Limitations:** Cannot be installed with #3701 or #4501 or #4720. **Maximum:** One. **Specify: #9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps.

3411 Magnetic Tape Unit And Control Mdl 1 Attachment (#7801): To attach one 3411 Magnetic Tape Unit and Control mdl 1. **Maximum:** One. **Prerequisites:** #7003 on the 3411-1.

3782/2502 Card Reader Attachment (#8149): To attach a 3782 Card Attachment Unit Mdl 2 and a 2502 Card Reader Mdl A1, A2, or A3. **Limitations:** OMR is not supported. **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

MODEL CONVERSIONS

Changes from model 3 to model 4 are field installable.

Note: Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

Print Belt, Add'l: Supplies a print belt in addition to the one that is provided as standard with the machine (see "Specify").

48-character ASCII (**#5811**)*	48-character EBCDIC (**#5821**) [Standard Character Set]
64-character ASCII (**#5812**)*	64-character EBCDIC (**#5822**)
94-character ASCII (**#5813**)*	94-character EBCDIC (**#5823**)
48-character EBCDIC (**#5820**) [HN Character Set]	

* ASCII Feature (#1201) is a prerequisite @SS@

Locks and Keys: The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

Mercury Battery (P/N 1743456): Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. **Note:** Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

SUPPLIES

Ribbons: A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

3777 COMMUNICATION TERMINAL MDL 1

PURPOSE

The 3777 mdl 1 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A printer is used for output. The 3777 mdl 1 is not designed as an interactive terminal. The printer is not integrated into the 3777 mdl 1 but is a stand-alone IBM 3203 mdl 3 printer which is cable-attached to the 3777 mdl 1. The 3203 mdl 3 uses the IBM 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features permit one or two diskette storage devices, and provide for the attachment of one card reader. One of three card readers can be selected for operation at 150, 300 or 400 cards per minute. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

Communication features permit operation at speeds of up to 9600 bps and at 19.2K bps using BSC or SDLC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or to a 3725 at 19.2K bps via appropriate features.

Maximum Lines Per Minute		
Standard 3203-3	**Featured 3203-3**	**Character Set**
1000	1200	48 AN, HN
870	1020	60 PN

See Type Catalog for additional character sets and speeds. See M3203 pages for 1200 lpm Speed Enhancement feature information.

MODELS

Model 1 001

Limitations: The input/output capabilities are dependent upon appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 1, while the 3203 Printer mdl 3 is a stand-alone unit. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

Prerequisites:

For SDLC Communications With S/370 or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under VTAM or TCAM through VTAM with OS/VS1 or OS/VS2, VTAM with DOS/VS; or these operating systems running under VM/370 (OS/VS2 is not supported by the 4300 Processors).

For BSC Communications With S/360, S/370 or 4300 Processors: A virtual storage S/370 or 4300 Processor operating under BTAM or VTAM and DOS/VS, or under BTAM, TCAM or VTAM and OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370 (OS/VS2 is not supported by the 4300 Processors). The 3777 mdl 1 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360 or 4300 processor using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3777 mdl 1. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370 processor; or via an Integrated Communications Adapter on S/370 mdls 115, 125, 135, 135-3 or 138; or via a Communications Adaptor feature on the 4331 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25.

For BSC Communications With System/38: All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment (#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See *IBM System/38 Data Communications Programmer's Guide*, SC21-7825, for BSC function and compatibility consideration.

HIGHLIGHTS

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space and Character Advance keys have typamatic action. Associated with the keyboard are indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer: A stand-alone 3203 mdl 3 Printer cable-attached to the 3777. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 1 supports fifteen Print Train Arrangements (AN, HN, OAA, ONA, ODA, OAB, GN, PCS-AN, PCS-HN, PN, QN, QNC, RN, SN, TN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. Refer to the Type Catalog. If the International Print Support specify feature **#9351** is installed, the 3777 mdl 1 will support Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN and PCS-HN arrangements. The 3203 mdl 3 accepts continuous forms of up to 20 inches wide and 132 print positions. Character spacing is 10 per inch; line spacing is 6 or 8 per inch under operator control. Maximum print lines are 127 per page when attached to the 3777 mdl 1. Refer to M3203 pages for further description of the 3203 mdl 3 Printer. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Buffers: Transfer data between the input and output devices and the communication line. The buffers also transfer data between input and output devices during offline operation. Buffers alternate in providing input and output services to permit overlapped operation. Dual 256-byte or 512-byte buffers are used for BSC or SDLC operation and are under operator control.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from card and diskette. A two-byte sequence is substituted for each occurrence of three of more consecutive blank bytes (63 consecutive blanks is the upper limit). A second two-byte sequence is appended if more than 63 consecutive blank bytes are read. Incoming non-transparent data (destined for the printer) is monitored by the terminal which automatically expands this two-byte sequence to the correct number of blanks.

SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function is dependent upon transmission receipt, and subsequent 3777 mdl 1 storage, of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction function is available only under SDLC operation. Decompaction occurs only for data directed to the printer. Compaction by the 3777 mdl 1 of data inbound to the host is not provided.

Transmission Reversal: Data transmission from the host may be temporarily interrupted, via the keyboard, to permit data transmission from the terminal. When the terminal has completed its data transmission, the host automatically resumes its own transmission of data. This function is dependent upon associated host programming.

Record Compress: Using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3777 mdl 1 diskette for subsequent batch transmission. The compressed records are written on the 3777 diskette in 3770 mode. Record Compress, using one diskette storage device, permits the compression of basic exchange diskette records into blocks of up to 256 or 512 bytes for transmission.

Dual Data Path: Provides for concurrent operation of a line-to-print primary job and a card reader-to-diskette or diskette-to-diskette secondary job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line for printing. A single 256-byte or single 512-byte buffer is used for data buffering between card-and-diskette or diskette-and-diskette. The primary line-to-printer job will not normally be degraded during Dual Data Path operation. The secondary job will be degraded during periods of concurrent operation.

Automatic Card-to-Line Job: When an online job is completed and the 3777 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.

Remote Power Off: This feature can be used to conserve energy: The host CPU application program can initiate "power down" at the terminal by sending a controlled data sequence over communication special facilities. The terminal must also be equipped with the appropriate special communication features. This capability is in addition to the standard, manually operable "power down" switch.

Input/Output Form Definitions: Can be operator or terminal defined. Up to five operator defined forms settings can be read from diskette or card reader to facilitate rapid job set-up when the terminal is equipped with either of the special features, otherwise they can be entered from keyboard. Printer format controls can be part of the job definition. An appropriately configured 3777 mdl 1 will permit input/output job designation as follows:

3777 Communication Terminal Mdl 1 (cont'd)

	INPUT	OUTPUT
Offline Jobs	Diskette [1]	Printer or Diskette
	Card Reader [1]	Printer or Diskette
Online Batch Jobs	Diskette or Card Reader [1]	Line
	Line [1]	Printer or Diskette
Dual Data Path Jobs	Line [2]	Printer
	Card Reader [2]	Diskette
	Diskette [2]	Diskette

(1) One input device and one output device per job.
(2) Line-to-printer occurs concurrently with card reader-to-diskette or diskette-to-diskette.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures

These are easily understood problem identification routines and procedures for use by the operator. See *IBM 3777-1 Operating Procedures Guide,* GA27-3124.

Customer Responsibilities

It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Communications

See "Special Features". Transmission speeds of up to 9600 bps and at 19.2K bps are allowed by selecting the appropriate modem and communication facility. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 1 may use either the EIA or the High-Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor ... see M4331 pages for details.

IBM Modem	Speed
3863	2400
3864	4800
3865	9600

Note: 4-wire Switched Network Backup is available on 3863, 3864 and 3865. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See 3203 mdl 3 for 3-phase power requirements.
- Color Group: Blue is supplied as standard.
- International Print Support **(#9351)**: Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN Print Train Arrangements. See "Type Catalog". **Note**: Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006 and to Customer Site Preparation Planning Guide, GA27-3103.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics

SPECIAL FEATURES

Communication Features

For Communication Capability, select one of the following Communication features (#1460, #1461 or #1470); a Communication Driver (#1481); and EIA Interface (#3701) or High-Speed Digital Interface (4501) BSC Multipoint (#1462) is required in addition to #1460 or #1461 for multipoint operation using BSC.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with 1462. **Limitations**: Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum**: One. **Field Installation**: Yes.

BSC, Point-To-Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations**: Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum**: One. **Field Installation**: Yes.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations**: See GA27-3097 for BSC compatibility considerations. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #1460 or #1461.

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. Specify one of the following: **#9977** for DOS/VS VTAM, **#9988** for OS/VS1 VTAM, **#9989** for OS/VS2 VTAM, or **#9993** for all other combinations of operating systems and access methods. **Limitations**: Cannot be installed with #1460 or #1461. **Maximum**: One. **Field Installation**: Yes.

Communication Driver Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: Communication Feature (#1460, #1461 or #1470).

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations**: Cannot be installed with #4501 or #4720.**Maximum**: One. **Prerequisites**: For 19.2K bps operation, **#9481** is required ... see item under "Specify".

High-Speed Digital Interface (#4501): Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations**: Cannot be installed with #3701 . **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #1481.

V35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or to a 3725 at 19.2K bps with a maximum cable distance of 150m (491 ft). **Limitations**: Cannot be installed with a #3701, #4501. **Field Installation**: Yes. **Prerequisites**: #1481.

Non-Commmunication Features

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. A #1416 interchangeable Train Cartridge containing an ASCII GN print train is required for the 3203 Printer mdl 3 if 1201 is ordered for the 3777. **Maximum**: One. **Field Installation**: Not recommended.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum**: One. **Field Installation**: Yes.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations**: The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum**: One. **Field Installation**: Yes.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations**: The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #4902.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output or control of data at the terminal. Each machine will have its own unique key. Two identical key are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum**: One. **Field Installation**: Yes.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records, or 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in exchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive numbered sectors in exchange mode, or four non-

3777 Communication Terminal Mdl 1 (cont'd)

consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode. **Maximum:** One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: **Copy** - Data can be copied from diskette 1 to diskette 2 (single data set or all active data sets - 3770 mode only). **Concatenate (Pool)** - The ability to concatenate on a data set basis. **Continue** - Allows a read or write operation to automatically continue onto diskette 2 if it has been placed in "ready" condition. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4901.

Operator Identification Reader (#5450): Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches, and cards ranging in thicknesses of from 0.007 inches to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic-stripe card cannot be printed. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 and 3780 does not support this feature. **Maximum:** One. **Field Installation:** Yes.

Print Speed Enhancement (#5595): Provides support for 3203 Printer mdl 3 operating with 1200 lpm Speed Enhancement feature (#6360). **Maximum:** One. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model upgrades are field installable: Model 1 to model 2 and model 2 to model 3. **Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES

Locks and Keys: The Keylock **#4650** special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

SUPPLIES

Ribbons: For 3203 mdl 3 ribbons, Contact IBM.

3777 COMMUNICATION TERMINAL MDL 2

PURPOSE

The 3777 model 2 is a high speed remote job entry terminal which operates as a S/360-20 Submodel 5 BSC MULTI-LEAVING Workstation. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A 3203 model 3 Printer is used for output. The 3203 model 3 uses the 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features provide for the attachment of one 1024-character console display, one diskette storage device for logging of console display messages, one diskette Storage Device for reading of card image Basic Exchange datasets (processed as 80-column card images), one card reader and one card punch. One of three 2502 Card Reader models can be selected for operation at 150, 300 or 400 cards per minute. The 3521 card punch operates at 50 cpm. A minimum configuration includes a 3777 model 2 Communication Terminal, a 3203 Printer model 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required. A console display is also required if the keyboard is to be used for operator console communication with the host processor.

Communications features permit operation at speeds of up to 9600 bps and at 19.2K using BSC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps via appropriate features.

MODELS

	Maximum Lines Per Minute	
Standard 3203-3	Featured 3203-3	Character Set
1000	1200	48 AN, PN
870	1020	60 PN

See Type Catalog for additional character sets and speeds. See M3203 pages for 1200 lpm Speed Enhancement feature information.

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 2 while the 3203 Printer is a stand-alone unit. A minimum configuration includes a 3777 Communication Terminal mdl 2, a 3203 Printer mdl 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required.

Prerequisites: For BSC Communications with S/360 or 4300 Processor: The 3777 mdl 2 will interface to current host MULTI-LEAVING programming systems as a S/360-20 Submodel 5. BSC attachment can be made via a 3704/3705 Communications Controller, a 2701 Data Adapter Unit or a 2703 Transmission Control attached to a channel of any S/360, or S/370, supporting BSC MULTI-LEAVING Workstations. Also attaches via a Communications Adapter feature on the 4331 Processor.

HIGHLIGHTS

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Space and Character Advance keys have typamatic action. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display. The keyboard, in conjunction with the optional console display, provides a console function for the 3777 mdl 2.

Printer: A stand-alone 3203 Printer mdl 3 cable attached to the 3777 mdl 2. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 2 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, TN) as standard.

When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces.

If the International Print Support specify feature is installed, the 3777 mdl 2 will support Print Train Arrangements corresponding to the 48-, 64- and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PSC-HN arrangements. The 3203 Printer mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum form length is 24 inches when attached to the 3777 mdl 2. Refer to the 3203 write up for further description of the 3203 mdl 3. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Console Display: Contains up to 1024 characters of information formatted into 16 lines of 64 character positions each. Operator messages are displayed in the top 14 lines of the display. Operator originated keyboard data is displayed in the bottom two lines of the display and will be displayed as keyed.

Operator messages larger than 64 characters overflow to subsequent lines. Subsequent lines of the message are indented. The latest message displayed is identified with a special character. If the display becomes full, the oldest message is overlayed retaining the most recent messages on the display. The operator may defer subsequent messages in order to complete reference to a particular message.

Console Display Spooling: A diskette storage device may be attached to the 3777 mdl 2 by special feature to provide storage for operator console messages. Two options are available to the operator when the diskette becomes filled. First, automatic rewrite occurs. New messages are overlaid upon older messages commencing with the initial message written upon the diskette. Second, an end of diskette signal is provided to the operator and messages are suspended pending replacement of the used diskette by a new diskette. The diskette may also be used to IPL the 3777 in lieu of the 2502 once the workstation program has been written on the diskette from a card reader.

Operator access to the diskette is via the keyboard. The diskette may be paged backward a defined number of messages and displayed for reference. In addition, the diskette may be written to the printer.

Diskette Input Device: A diskette storage device may be attached to the 3777 mdl 2 by special feature for reading of card image Basic Exchange datasets. Basic Exchange datasets will be processed by the 3777 mdl 2 as 80-column card images. The datasets may be multivolume. Individual datasets or all active datasets may be read. Volume label and dataset labels may be printed. Initial Program Load of the workstation program may take place from the Diskette Input Device if the Console Spool Device is not present. Diskette IPL must take place from the Console Spool Device if both diskette devices are present. IPL is available from the 2502 Card Reader if that device is attached.

If the 3777 mdl 2 configuration includes both a 2502 Card Reader and the Diskette Input Device, diskette input may be alternated with cards; however, both devices will not operate simultaneously. If the 3777 mdl 2 configuration includes a Diskette Input Device instead of a 2502 Card Reader, and IPL is executed from the Diskette Input Device or the Console Spool Device, the IPL diskette containing the workstation program must have been written on a 3777 mdl 2 configuration containing a 2502 Card Reader and a diskette device.

Buffers: Transfer data between the input and output devices and the communication line. The buffers alternate in providing input and output services to permit overlapped operation. Storage is provided in the 3777 mdl 2 for dual buffers for each input and output device attached. The buffer size is variable, dependent upon the workstation program. The recommended buffer size is 512-bytes.

Communications Adapter: Integrated to provide and BSC point-to-point operation over switched or nonswitched facilities.

Printer Format Controls: Facilitate the formatting of printed data. Vertical forms definition provides forms set-up for the printer by means of the keyboard or card reader. The definition may be displayed on the console display, if present, or printed for verification.

Extended forms definition may be used in conjunction with the Diskette Input Device (#3201). Standard forms definition provide for the definition of five printer forms. Extended forms definition provides for greater than five printer forms. The Diskette Input Device (#3201) is a prerequisite to the use of extended forms definition.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. Provides options of (dependent upon the workstation program) trailing blank truncation, blank or data compression/expansion.

Performance Considerations: The line-to-printer performance of the 3777 mdl 2 and attached 3203 Printer mdl 3 is up to 1,000 lpm (up to 1200 lpm with 3203 mdl 3 Speed Enhancement feature) with 48-character AN or HN set and up to 870 lpm (up to 1020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60 character PN set. The 3777 mdl 2 may operate, however, with concurrent input/output processing as a function of the MULTI-LEAVING capability. The card reader, punch and display console may have a degrading effect on printer performance while transferring data to and from the 3777 mdl 2 buffers and the host as communications line time is shared by all 3777 mdl 2 I/O units.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression charcteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3777-2 Operating Procedures Guide,* GA27-3129.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

3777 Communication Terminal Mdl 2 (cont'd)

Communications: See "Special Features". Transmission speeds of up to 9600 bps and at 19.2K bps. Point-to-point transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are on nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the only supported transmission code. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 2 may use either the EIA or the High Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communications Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor ... see M4331 pages for details.

IBM Modems	Speed
3863	2400
3864	4800
3865	9600

Note: 4-Wire Switched Network Backup is available on 3863, 3864 and 3865. For communications capability, product utilization and features, see M3863, 3864, 3865 and 2700 pages.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See M3203 mdl 3 pages for 3-phase power requirements.
- Color Group: Blue is supplied as standard.
- International Print Support **(#9351)**: Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN Print Train Arrangements. See "Type Catalog". Note: Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006 , and to Customer Site Preparation Planning Guide, GA27-3103.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics.

SPECIAL FEATURES

Communication Features

Communication Driver Without Business Machine Clocking (#1481): [Required] Provides communication driver without clocking. **Maximum:** One. **Field Installation:** Yes. bps is permitted. Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150 meters (491 feet). **Limitations:** Cannot be installed with #3701, #4501. Contact IBM

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with High Speed Digital Interface (#4501) , DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651) or V.35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify".

High-Speed Digital Interface (#4501): Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations:** Cannot be installed with #3701 or #2911. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1481.

V.35 Interface (#4720): Required for direct High Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet. **Limitations:** Cannot be installed with a #3701, #4501. **Field Installation:** Yes. **Prerequisites:** Communication Driver (#1481).

Non-Communication Features

Audible Alarm(#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

Console Display (#1601): Provides a 1024-character (16 lines of 64 characters each) console information display. **Maximum:** One. **Field Installation:** Yes.

Console Display Spooling (#1602): Diskette storage device for spooling of console display messages. One device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1601.

Diskette Input Device (#3201): Diskette storage device for reading of card image Basic Exchange Datasets. One device with a customer removable diskette placed in the right cabinet. Additional diskettes are available from IBM. contact IBM.

3777 COMMUNICATION TERMINAL MDL 3

PURPOSE

The 3777 model 3 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3777 model 3 is an SNA Multiple Logical Unit (MLU) terminal. A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 model 3 but is a stand-alone 3203 Printer model 3 which is cable-attached to the 3777 model 3. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm. A minimum configuration includes a 3777 model 3 Communication Terminal and a 3203 model 3 Printer.

MODELS

Maximum Lines Per Minute		
Standard 3203-3	Featured 3203-3	Character Set
1000	1200	48 AN, PN
998	1195	52 RN
870	1020	60 PN

See "Type Catalog" for additional character sets and speeds. See M3203 for 1200 lpm Speed Enhancement feature information.

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3203 and 3262 Printers are stand-alone units. A minimum configuration includes a 3777 mdl 3 Communication Terminal and a 3203 Printer mdl 3. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full duplex communications facilities only.

Prerequisites: For SDLC Communications with S/370, 4331 or 4341 Processor - A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 Processor or 4300 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS and VTAM.

Note: 4300 MVS and JES2-3 support is limited to 4341 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for duplex data stream operation.

HIGHLIGHTS

Communications: Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided using the appropriate modems and communications facilities. Duplex-- simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level. May also be locally attached in either a Duplex or Half-Duplex mode to a 3705 at 14.4K bps or a 3725 at 19.2K bps.

Keyboard: EBCDIC arrangement with 44 data keys. The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display: Contains 16 lines of 64 characters each for a total of 1,024 characters. The 3777 mdl 3 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the (>) in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer: A standalone 3203 Printer mdl 3 cable attached to the 3777 mdl 3. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 3 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, RN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. See "Type Catalog" pages. International Print Support is provided supporting Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, and PCS-HN arrangements. The 3203 mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum forms length is 24 inches when attached to the 3777 mdl 3. Refer to 3203 for further description of the 3203 mdl 3. Refer to "Type Catalog" for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Terminal Storage: Is standard for message spooling, terminal control, utility programs and user-generated procedures.

Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape: May be used as either an input or as an output device. One 3411 mdl 1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-Track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed- or variable-length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 pages for ordering information, #7003 is prerequisite for attachment.

Buffers: Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/Response Unit (RU) of up to 512 bytes. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers also transfer data between input and output devices during local operation.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion: Implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and output device.

3777 Communication Terminal Mdl 3 (cont'd)

Automatic Card Reading: Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control: Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

Record Formats: Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off: This feature can be used to conserve energy used by the terminal by providing the capability for the host CPU application program to inititate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated. **Note:** The 3262 Line Printer requires manual powering down.

Encrypt/Decrypt Feature: Available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature 5735-RC2, feature #6010 and Programmed Cryptographic Facility Program Product 5740-XY5.

Performance Considerations: The line-to-printer performance of the 3777 mdl 3 and attached 3203 mdl 3 is up to 1,000 lpm (up to 1,200 lpm with 3203 mdl 3 Speed Enhancement feature #6360) on the 3203 mdl 3 and Print Speed Enhancement (#5595) on the 3777 mdl 3 with 48-character AN or HN set, and up to 870 lpm (up to 1,020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60-character PN set. For other speeds, see the *3770 Data Communication System,* GA27-3097.

The 3777 mdl 3 MLU terminal will operate, however, with concurrernt input-output processing in either a Duplex or Half-Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half-Duplex communications are employed as opposed to Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, and cryptographic processing, must all be considered in determining actual throughput. See *3776 and 3777 Component Description Manual,* GA27-3145, for additional information.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half-Duplex communications mode. The 3777 mdl 3 operating Duplex 19.2K bps on a terrestrial link may however present a variance of from greater to degraded overall terminal throughput when compared to comparable operation in Half-Duplex mode. Reference the *Component Description Manual for the IBM 3776/3777 Communication Terminals,* GA27-3145, for specific performance considerations.

Problem Determination Procedures: Function has been designed into this unit to help provide availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3770 Multiple Logical Unit Operator's Guide for the 3776-3, 3776-4, 3777-3,* GA27-3165.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700, 3203 and 3262 pages.

Communications: See "Special Features". Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. ASCII is available as a special feature on the 3777 and by RPQ on the 3262. Refer to M2700 pages for information on customer responsibilities, communication facilities and other attachment information.

For 19.2K bps, the 3777 mdl 3 may use either the EIA Interface (#3701) or the High-Speed Digital Interface (#4501) to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection and which provide optional EIA RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature(#1601) on the 4331 Processor. The 4331 must be equipped with a Local Attachment Interface (#4801) and its prerequisites ... see "Special Features" in M4331 pages.

IBM Modems	Speed
3863	2400
3864	4800
3865	9600

Note: 4-Wire Switched Network Backup is available on 3863 mdl 1, 3864 mdl 1 or 3865 mdls 1 or 2. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

Communications Adapter: An integrated communications adapter without business machine clocking is standard. It provides SDLC communications over switched or nonswitched facilities.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See M3203, 3262 and 3411 for their power requirements.
- **Color Group:** Blue is supplied as standard (no specify required).
- Cables: Fixed-length cables except for the 3602 and the 3411 Magnetic Tape are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006. 3411 cables must be separately ordered.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics and used for record purposes.
- Alternate Address: **#9011** ... for record purposes only. Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by CE using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.

SPECIAL FEATURES

ASCII Feature (#1201): A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII. **Maximum** One. **Field Installation:** Not recommended. **Note:** ASCII on the 3262 requires an RPQ ... see M3262 pages.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitation:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitation:** The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4902.

3777 Communication Terminal Mdl 3 (cont'd)

Encrypt/Decrypt (#3680): Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. **Maximum:** One. **Field Installation:** Yes. Note: A mercury battery, P/N 1743456 or equivalent, is required. A battery is shipped with this feature. See M10000 pages for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with High Speed Digital Interface (#4501), DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651) or V.35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify". .

High-Speed Digital Interface (#4501): Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitation:** Cannot be installed with EIA Interface (#3701), V.35 Interface (#4720) or DDS Adapter (#5650, #5651). **Maximum:** One. **Field Installation:** Yes.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to M10000 pages for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

V.35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150 meters (491 feet). **Limitations:** Cannot be installed with a #3701, #4501. **Field Installation:** Yes. **Prerequisites:** #1481.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format dataset. Diskette capabilities allow for:

Concatenate (pool) - the ability to concatenate on a data set basis.

Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: **Copy** - Data can be copied from diskette 1 to diskette 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4901.

Operator Identification Reader (#5450): Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches ranging from 0.007 inches to 0.045 inches thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. **Limitation:** The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. **Maximum:** One. **Field Installation:** Yes.

Print Speed Enhancement (#5595): Provides support for 3203 Printer mdl 3 operating with 1,200 lpm Speed Enhancement feature (#6360). **Maximum:** One. **Field Installation:** Yes.

DDS Adapter (DDSA) (#5650, #5651): Provides adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. Available at three speeds; 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #3701, #4501 or #4720. **Maximum:** One. **Specify #9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. For point-to-point (#5650); for multipoint tributary (#5651). Note: Cable length is 55 feet. **Maximum:** One. **Specify:** Record purposes only. **#9822** for 2400 bps, **#9823** for 4800 bps, or **#9825** for 9600 bps.

3411-1 Magnetic Tape Unit And Control Attachment (#7801): To attach one 3411-1 Magnetic Tape Unit and Control. **Maximum:** One. **Prerequisites:** #7003 or 3411 mdl 1. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. **Limitation:** OMR is not supported. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitation:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One. **Field Installation:** Yes.

ACCESSORIES (None)

SUPPLIES

For 3203 mdl 3 ribbons, contact IBM.

3777 COMMUNICATION TERMINAL MDL 4

PURPOSE

The 3777 model 4 is a high-speed remote job entry terminal providing an SNA Multiple Logical Unit (MLU). A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 model 4 but is a stand-alone IBM 3262 model 2 or 12 Printer which is cable attached to the 3777 model 4. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader, one card punch and an additional printer. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operated at 50 cpm. A minimum configuration includes a 3777 model 4 Communication Terminal and a 3262 model 2 or 12 Printer.

MODELS

Model 1 001

3262 NOMINAL RATED SPEED (LINES PER MINUTE)

CHARACTER SET	MODEL 2	MODEL 12
48 Character (AN)	650	325
64 Character	467	230
96 Character	364	180
63 Optimized	625 (max)	310 (max)

Limitations: The input/output capabilites outlines under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3262 Printer is a standalone unit. A minimum configuration includes a 3777 mdl 4 Communication Terminal with the appropriate communications capabilities and a 3262 Printer. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3777 mdl 4 is operational on nonswitched full duplex communications facilities only.

Prerequisites

For SDLC Communications With S/370 or a 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Pr ogram (NCP/VS) and attached to any virtual storage S/370 Processor or 4300 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, Power/VS and VTAM.

Note: 4300 MVS and JES2-3 support is limited to 4341 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

HIGHLIGHTS

Communications: Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided via an integrated communications adapter using the appropriate modems and communications facilities. Duplex-simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level.

Keyboard: EBCDIC arrangement with 44 data keys. The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Character Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display: Contains 16 lines of 64 characters each for a total of 1024 characters. The 3777 mdl 4 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character, any new data keystroke will cuase the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer: The 3262 is a standalone unit providing 132 print positions. Horizontal spacing is 10 characters per inch (25.4 mm). Vertical spacing is limited to 6 or 8 lines per inch (25.4 mm). Forms skipping and spacing are program controlled within the 3262, and is optimized by the 3777 to provide the closest comparison possible with the other 3776/3777 MLU models and their associated programming interfaces.

There are character set variations forms control variations between the 3262 and the other printers associated with the IBM 3776/3777. The user should refer to the *3776/3777 Component Description Manual* (GA 27-3145) and the *Forms Design Reference Guide for Printers* (GA 24-3488) for the specific variations. Refer to M3262 for ordering information.

Second Printer Attachment: Adding a second printer to the 3777 mdl 4 will yield a higher output to the 3777. As an example:

	SECOND PRINTER		48 CHARACTER Nominal Rated
3262 Mdl 2	3262 Mdl 2	3262 Mdl 12	LPM
650			650
650		325	975
650	650		1300

Terminal Storage: Is standard for message spooling, terminal control, utility programs and user generated procedures.

Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used logically for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape: May be used as either an input or as an output device. One 3411 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. Seven track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or ouput. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 for ordering information, #7003 is prerequisite on 3411 mdl 1 for attachment to 3777.

Buffers: Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/ Response Unit (RU) of 256 or 512 byte buffers. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers are used for transferring data between input and output devices during local operation.

Printer Format Controls: Facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a vaiable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion: Implemenation in the 3777 mdl 4 by providing a terminal option for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed the printers, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data

3777 Communication Terminal Model 4 (cont'd)

inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and ouput device.

Automatic Card Reading: Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control: Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette, or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local Utility: Jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printers, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printers, Diskette, Card Punch
Diskette(s)	Printers, Magnetic Tape, Diskette, Card Punch

Record Formats: Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape datasets, are also applicable to diskette as a function of Basic Exchange datasets (128 byte maximum). Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off: This function can be used to conserve energy via the capability of the user written host CPU application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. This capability is in addition to the standard power down switch which can be manually operated. Note: The 3262 Line Printer requires manual powering down.

Performance Considerations: The line to printer performance of the 3777 mdl 4 and attached 3262 mdl 2 is up to 650 lpm with 48 character set. For other speeds see M3262.

The 3777 mdl 4 MLU terminal will operate, however, with concurrent input-output processing in either a Duplex of Half Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3777 mdl 4 operating Duplex 19.2K bps on a terrestrial link may, however, present a variance of from greater to degraded overall terminal throughput when compared to comparable operation in Half Duplex mode. Reference the Component Description Manual for the IBM 3776/3777 Communication Terminals (GA 27-3145) for specific performance considerations.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression/compaction characteristics, characters read/printed, forms skipping, application processing, and SNA pacing, must all be considered in determining actual throughput. See *IBM Component Description 3776 & 3777 Manual* GA 27-3145 for additional information.

cProblem Determination Procedures:c Significant function has been designed into this unit to help provide greater availability to the customer. This has benn done through the use of problem indentification routines and procedures that are easily understood and used by the operator. See IBM 3777 mdl 4, iCommunications Terminal Operator's Guidei, (GA27-3309).

Customer Responsibilities: It will be a customer's responsibilityto use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 and M3262 pages. The 3262 is designated as Customer Setup Unit (C.S.U.).

Communications: See Special Features. Transmission speeds from 2400 bps to 9600 bps and at 19.2K Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 9600 bps are nonswitched facilities. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 4 uses the EIA Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA RS-232-C DTE interface Also attaches via a Communications Adapter feature pn the 4331 Processor. See M4331 for details.

IBM Modems	Speed
3863	2400
3864	4800
3865	9600

Note: 4 Wire Switched Network Backup is available on 3863, 3864 and 3865. For Communications capability, product utilization and features, see M3863, M3864 and M3865 pages.

Bibliography: GC 20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug or **#9881** for non-locking plug. See 3411-1 Magnetic Tape Unit voltage requirements. See M3262 power requirements.
- Color Group: Blue is supplied as standard (do not specify).
- Cabling: All cables are supplied with fixed lengths with 3777 shipment except the 3411 Magnetic Tape and the 3262 Printer. Refer to *Installation Manual-Physical Planning,* GA27-3006. 3411 cables must be separately ordered (see M3411). The 3262 provides a 1.8 meter (6 foot) standard or 4.3 meter (14 feet) optionally specified Signal Cable (#9405) which connects to the 3777 mdl 4. The 3262 Customer Set-Up (CSU) must be performed prior to installation of the 3777 mdl 4.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps.
- Alternate Address: (90ll ... For record purposes only. Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by Field Engineering using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.

SPECIAL FEATURES

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). **Maximum:** One. **Field Installation:** Not Recommended.
NOTE: ASCII on 3262 requires an RPQ (see M3262).

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with DDS Adapter, Point-to-Point (#5650); DDS Adapter, Multipoint (#5651). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify".

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operations related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to M10000 pages for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange dataset or in a 3770 format dataset. Diskette capabilities allow for:

Concatenate - the ability to concatenate on a data set basis.

3777 Communication Terminal Model 4 (cont'd)

Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Data can be copied from diskette 1 to diskette 2 or vice-versa. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Diskette Storage, 1st (#4901).

DDS Adapter (DDSA) (#5650, #5651): Provides adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. Available at three speeds; 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Field Installation:** Yes. **Specify #9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. For point-to-point (#5650); for multi-point tributary (#5651). **Note:** Cable length is 55 feet.

Second Printer Attachment (#6302): Supports the attachment of a second 3262 Printer. Either a Mdl 2 or a Mdl 12 may be attached. **Maximum:** One.

3411-1 Magnetic Tape Unit And Control Attachment (#7801): To attach one 3411-1 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader Model A1, A2 or A3. **Limitations:** OMR is not supported. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Model 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field conversion is possible from Model 3 to Model 4.

ACCESSORIES (None)

SUPPLIES

For 3262 Belts and Ribbons, see M3262. For 3203 mdl 3 ribbons: Contact IBM.

3780 DATA COMMUNICATIONS TERMINAL

[NO LONGER AVAILABLE]

PURPOSE

A data transmission terminal using the BSC technique. It can communicate over appropriate communications facilities to another 3780, a S/360 models 22 through 195, any S/370 processor, or a 2780 Data Transmission Terminal. May be locally attached to a 3704/3705 Communications Controller. Communication is also possible with the 4300 processors via channel attached 2701, 3704, 3705 or via a Communications Adapter on the 4331 or 4361. For requirements, see "Prerequisites".

MODELS

Model 1 001

Prerequisites:

S/360 mdl 25 ... communications can be via the Integrated Communications Attachment (#4580) with appropriate binary synchronous features on the 2025, or via a 2701 Data Adapter Unit or 2703 Transmission Control ... see below.

S/360 mdls 22 through 195 (except mdl 44 or 67 in TSS mode), or any S/370 processor ... communications can be via a 2701 Data Adapter Unit or 2703 Transmission Control equipped with appropriate binary synchronous features ... see M2701, 2703 pages. **Notes:** [1] To utilize OLT support, the host processor requires a minimum of 32K bytes of storage ... [2] The 3780 communicates only in EBCDIC or ASCII codes ... [3] Only EBCDIC Transparency (#3601) is available on the 3780. Therefore, a 2701 or 2703 must be configured with 3780 restrictions and limitations for compatibility ... [4] All 3780s on a multipoint line must have the same code, EBCDIC or ASCII.

S/360 (except mdls 22, 25, 44, 67 in TSS mode, or 85), or any S/370 processor ... communications can be via a 3704/3705 Communications Controller. **Note:** See the 3704 and 3705 Machines and Programming pages for attachment capability and refer to Host System Programming pages for possible restrictions to any of the above attachments.

S/370 mdls 115, 125, 135, 135-3, 138 ... communications can be via the Integrated Communications Adapter (#4640) and appropriate binary synchronous features on the 3115, 3125, 3135, 3135-3, 3138 as well as via a 2701, 2703 or 3704/3705. Communication is also possible with the 4300 processors via channel attached 2701, 3704 or 3705; or via a Communications Adapter on the 4331 and 4361 processor.

3704/3705 Medium Speed Local Attachment ... attachment without modem at speeds up to 2400 bps via IBM-provided cables. Requires #7705 ... see "Specify".

Another 3780 ... communications require (**#9711**) and the same (**#9761** or **#9762**) on both units ... see "Specify".

2780 Data Transmission Terminal ... [mdls 1, 2, 4] communications require that both terminals have **#9761** on 3780, **#9762** on 2780 and #3601 on 3780, #8030 on 2780. Communications can be in EBCDIC Transparency mode only. The 3780 may not have multiple records in Transparent mode.

HIGHLIGHTS

Provides medium-speed, batch-oriented, buffered card reading and printing via appropriate communications facilities ... see "Communications Facilities". Punched card output is provided via attachment of a 3781 Card Punch ... see M3781 pages.

Card Reader: Reads at a rated speed of 600 cards/minute. Provides hopper capacity of 1200 cards and stacker capacity of 1300 cards. Only 80-column cards can be read.

Printing: Prints at a rated speed of 350 lines/minute utilizing the basic 52-character set. Interchangeable type bars of 39- and 63-character sets are available with rated speeds of 425 lpm and 300 lpm, respectively. Only the 63-character set may be employed when using ASCII transmission code. The printer provides 120 print positions standard with feature expansion to 144 positions ... see "Special Features". Horizontal and vertical format control are provided as standard functions of the printer.

Buffers: Provides two 512-character buffers which service the transmission line and the I/O units alternately to provide overlap operation for efficiency.

Buffer Checking: All characters are checked on the data path when sent to or received from the buffer.

Variable Record Length: End-to-end characters are used to define the end of a record, allowing for complete variable length. Full buffer-blocks with variable-length records can be transmitted or received. On card transmission, blank positions are removed from the end of the card record to increase the transmission efficiency.

Space Compression/Expansion: Operable under switch control, this capability provides for the removal of consecutive spaces in transmitted data and their re-insertion in received data. A 2-character sequence is substituted for from two to 63 consecutive spaces. If more than 63 consecutive spaces are to be transmitted, a second 2-character sequence will be substituted for the number of consecutive spaces greater than 63. If only one space is to be transmitted, it will be transmitted as a normal space. This feature is inoperable when transmitting in transparency mode or operating in home mode.

Home Mode: Provides card reader-to-buffer-to-printer operation in an offline non-communications mode.

Integrated 2400/1200 bps Modem: Provides 2400 bps transmission with half-speed backup on leased facilities ... compatible with 3872 modem.

Conversation Mode: Allows a CPU to turn the communications line around after receiving text and return text without additional selection.

Audible Alarm: Alerts the operator when manual intervention is required in line mode ... unattended operation is not provided.

Speed Select Switch: A switch allowing the control of switched network operation at either 600 or 1200 bps.

Communications Facilities: The 3780 operates in half-duplex mode over the types of facilities listed below ... for information concerning these facilities, see M2700 pages.

- PTT Public Switched Telephone Networks
- PTT Nonswitched Voice Grade lines
- PTT Public Switched Data Networks
- Privately owned communication facilities

Notes: When operating at 2400 bps on PTT-supplied switched or nonswitched facilities, there may be additional restrictions and limitations to the facility and the operation. For details, see *Bisynchronous General Information Manual* (GA27-3004). When operating at speeds above 2400 bps to 7200 bps, the facility requirements may vary by data set (modem) type. The data set (modem) manufacturer should provide this information to the customer at his request.

Binary Synchronous Transmission: Allows for transmission rates of 1200, 2000, 2400, 4800, 7200/3600 bps ... see "Modems" below and "Data Set Attachment" under "Specify". Communications can be with another 3780, a 2780 mdl 1, 2 or 4, a S/360 mdls 22 through 195 (except mdl 44 or mdl 67 in TSS mode), or any S/370 Processor. Communication is also possible with the 4300 processors via channel attached 2701, 3704 or 3705; or via a Communications Adapter on the 4331. For requirements, see "Prerequisites". In addition, the 3780 may be multidropped on the same line facility with other BSC devices (1826, 2715, 2780, 3271, 3275, 3735) as tributary stations on a multipoint line with a S/360 mdls 22-195 (except mdl 44 or mdl 67 in TSS mode), any 4300 processor or any S/370 processor as the control station. In a switched control network, it may use the same termination (phone number) at the computer that is used for the other BSC devices.

Transmission Code: One of two codes can be selected ... see "Specify". For printable graphics, see "Type Catalog" pages.

EBCDIC Code:	256-character set, which is the basic code of S/360 and S/370.
ASCII Code:	Industry standard code with a 128-character set.

Transmission Checking: A redundancy check is performed on all data. EBCDIC uses a 16-bit cyclic check transmitted as two 8-bit bytes ... ASCII uses an odd-parity VRC on each character, including the LRC character and an LRC check transmitted as a single 8-bit odd parity byte. Format check plus an odd/even block check is provided on both code sets.

Modems: One Integrated 2400/1200 bps modem feature, 3863 (2400 bps) modem, 3864 (4800 bps) modem, bps), 3872 modem (2400/1200), can be attached to the 3780. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3872 pages and "Integrated Modem" under "Special Features" below.

Card Limitations: Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, S-1 and ID-3. Two sizes only, 2 x 3-1/4 inches or 2-3/16 x 3-3/4 inches. **Note:** When using OM-2 or OM-3, reading must be terminated prior to the scored column.

External Scores (after separation): M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. OM-3 may be used if the score is on the column 1 end. **Note:** Upper left corner cut required when the M-11 or CF-11 is used on the column 1 end.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

Customer Responsibilities: See M2700 pages. In addition, the customer must be advised that when non-IBM data sets or privately owned communications facilities are used, he is responsible for

3780 Data Communications Terminal (cont'd)

ensuring that signal levels and impedances are compatible with the IBM communications interface.

Publications: GA24-3089

SPECIFY

- Power (AC, 1-phase):

50 Hz	60 Hz
100V **#2804**	100V **#2730**
110V **#2805**	115V **#9901**
123.5V **#2811**	200V **#2732**
200V **#2806**	208V **#9902**
220V **#2813**	230V **#9904**
235V **#2814**	

- Transmission Code: **#9761** for EBCDIC, **#9762** for ASCII. **Field Installation:** Yes.
- Character Set: One of the available character sets and the type size must be specified (no charge) on the initial order ... see "Type Catalog" pages for specified characters in each set and price for additional sets.
- Printer Tape Punch: Order under P/N 120910 on MES

  ... one punch is furnished per installation at no charge.
- Identification: **#9350** provides an identification function by which a CPU under stored program control and operating on a switched public network, can identify a legitimate 3780. **Prerequisites:** #7651.
- Terminal Use (point-to-point): **#9711** for communications with another 3780 or 2780. Provides "Bell" key and light indicator to signal remote terminal that voice mode is desired. Receipt of "Bell" code sounds alarm. When communication is alternatively with a CPU and another 3780 or 2780, via switched network. **Field Installation:** Yes.
- 3704/3705 Medium Speed Local Attachment: Specify Modem or Data Set Attachment ... see below. Either **#2903** (2000 or 2400 bps) or **#2983** (1200 bps), only. Also Communications Facilities ... see below. **#9402** for half-duplex.
- Modem or Data Set Attachment: One of the following, depending upon facility to be used, must be specified:

  #2903: For attachment to the 3977 mdl 2 for operation at 2000 or 2400 bps. **Prerequisites:** #7705 and either **#2995** for 2000 bps or **#2996** for 2400 bps.

  #2981: Switched Network Attachment. Required for operation on PTT switched facilities. **Note:** See #7705 to determine if required. **Maximum:** One. The 3976 mdl 3 will operate on the switched network without **#2981**. **Prerequisites:** #7651 ... not required for Manual Answer.

  #2982: Required for the 3976 Modem mdl 3 on switched lines or PTT mandatory modems at 1200 bps on switched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. Includes the function of **#2981**. **Prerequisites:** #7705.

  #2983: Required for the 3976 Modem mdl 3 on nonswitched lines or PTT mandatory modems at 1200 bps on nonswitched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. **Prerequisites:** #7705.

  #9120: Required for PTT mandatory modems at 2400 bps on switched lines complying with CCITT Recommendations (1976) V.24, V.26bis, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

  #9121: Required for IBM 2400 bps Integrated Modem or the 3872 modem or PTT mandatory modems at 2400 bps on nonswitched lines complying with CCITT Recommendations (1976) V.24, V.26, V.28 and ISO Standard 2110 . Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

  #9124: Provides 4800 bps. Required for the 3874 Modem or PTT mandatory modems at 4800 bps on nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.27 or V.27bis, and ISO Standard 2110 . Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

  #9126: For 3875 at 7200 bps with backup half-speed on leased facilities.
- Communications Facilities: Features specify 3780 control of the data set and do not necessarily correspond to the communications facility. **Field Installation:** Yes. Specify as indicated below:

  #9402:

  Switched Network Operation

  Leased Private Line (or equivalent privately owned).

  Multipoint ... (half-duplex), although the communications facility may be 2- or 4-wire.

  Point-to-point ... for 2-wire (half-duplex) communications facilities.

  If the 3780 Integrated Modem or the 3872, or 3875 Modem is used.

  #9404:

  For 4-wire (full-duplex) facilities.
- Extended Retry Transmission: **#9150** extends the maximum retry count from three (12 seconds) to a maximum of 15 (48 seconds) in an effort to recognize a valid response to the last block of data transmitted, prior to sending an EOT code and timing out with an error condition.
- Data Set Cable: A 20 foot data set cable is provided as standard. If a longer cable is required, specify **#9021**, indicating length as a quantity of 25, 30, 35 or 40 feet.
- WACK Response: **#9936** if initial WACK (Wait before transmit - positive ACKnowledge) is to be transmitted immediately. All subsequent WACK responses are transmitted after a 2-second delay.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Component Selection (#1601): Provides the capability of specific 3780 I/O device selection. In addition to component selection, it provides priority output selection and Multipoint Data Link Control selection capability. It is a prerequisite for attachment of a 3781 Card Punch. **Field Installation:** Yes.

Direct Line Attachment (#2939): Provides modem/line isolation required by PTTs. **Prerequisites:** #5600 or #5602.

EBCDIC Transparency (#3601): Allows the 3780 to receive and transmit all 256 EBCDIC bit combinations as data characters. Variable length records cannot be transmitted if card I/O or printer is selected. Either normal or transparent text can be *received* without the "transparency" switch being in the transparency position. The switch must be "On" for *transmitting* in transparency. If a terminal on a multipoint line requires this feature, all terminals on that line must also have this feature. **Field Installation:** Yes. **Prerequisites: #9761.**

Keylock (#4650): A key-operated Power-On switch for the 3780. The key must be inserted and turned to the "On" position before the control unit Power-On switch is operative. When the key is turned off, power is removed from the control unit. For additional or replacement keys, see "Accessories". **Field Installation:** Yes.

Multipoint Data Link Control (#5010): Allows multiple 3780s to be used on the same communications line with a CPU. Terminal can be polled or selected when operating as a tributary station on a multipoint system. All 3780s installed on the same line facility require this feature and must use the same transmission code and data set attachment. Other BSC devices (2780, S/360, S/370, 4300 processors) as tributary stations, can be on a multipoint line with a processor control station. **Limitations:** If Terminal Use (**#9711**) is installed, it must be removed prior to installation of this feature. **Field Installation:** Yes.

Integrated 2400/1200 bps Modem (#5600, #5602,): Provides an integrated 2400 bps modem with half-speed backup capability. Equivalent to and compatible with similarly featured 3872 modems. versions cover different communications requirements, as described in the separate feature descriptions. Operator controls are integrated with the 3780 operator panel. Built-in diagnostic functions are provided for local and remote testing. See M2700, 3872 pages and "Prerequisites" above for additional information on allowable machine/system combinations and required features. **Maximum:** One #5600 or #5602.

Leased Line Point-to-Point Modem (#5600): Provides point-to-point terminal-terminal and terminal-CPU communications with a similarly equipped 3780 or a 2780, 3780, S/360, S/370 or 4300 Processors equipped with appropriate features and an equivalent featured 3872 modem. Includes manual equalization control. **Field Installation:** Yes. **Prerequisites: #9121, #9402. #9711** may be required, depending upon application. **Specify: #9021** plus length, if non-standard cable length is required.

Leased Line Multipoint Tributary Modem (#5602): Operates on a multipoint network with a controlling CPU. Other 3780s on the same line facility must have either #5602 or a 3872 modem with Multipoint Tributary (#5101 or #5102); other BSC tributary devices on the same line facility must have a 3872 modem with #5101 or #5102. **Limitations: #9711** cannot be installed. **Field Installation:** Yes. **Prerequisites: #9121, #9402,** #5010. **Specify: #9021** plus length, if non-standard cable length is required.

3780 Data Communications Terminal (cont'd)

Print Positions, Add'l (#5701): Provides an additional 24 print positions for the 3780 printer. **Field Installation:** Yes.

Switched Network Control (#7651): To attach to a switched network, provides automatic answering of incoming calls initiated by another terminal or central computer over common carrier switched (dial-up) facilities. The line must be equipped with an appropriate data set with auto answer capability and the terminal must be in "ready" status. Provides automatic disconnect when disconnect sequence is received or when no data is transmitted/received for 20 seconds. Disconnect causes audible alarm to sound. **Field Installation:** Yes.

Synchronous Clock (#7705): A synchronous clock for use with modems which do not have an internal clock, or for use with 3704/3705 Medium Speed Local Attachment Line Set, Type 1F. Will operate at 600 bps, 1200 bps, 2000 bps, or 2400 bps. The device with which the 3780 will communicate must also have an internal clock operating at the same bps rate. **Specify: #2701** for 600 bps, **#2702** for 1200 bps, **#2703** for 2000 bps, **#2704** for 2400 bps. If speed is 1200 bps, alternative speed of 600 bps will be provided via speed selector switch. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Locks and Keys: The 3780 with Keylock (#4650) is shipped with two keys. Additional or replacement keys must be ordered only from IBM. A letter of authorization with key identification number (stamped on key) must accompany the order. **Note:** Without key identification number, a new Keylock (#4650) special feature must be ordered. Allow seven weeks for delivery.

SUPPLIES (None)

3782 CARD ATTACHMENT UNIT

PURPOSE

Used to attach the 2502 Card Reader model A1 or A2 to a 3774, 3775, 3776 model 1 or 3776 model 2 Communication Terminal or 3289 Printer model 3 (2502 model A1 only) or to attach a 3521 Card Punch to a 3771, 3774, 3775, 3776, 3777 Communication Terminal (except model 1), or 3289 Printer model 3. Used to attach the 2502 Card Reader model A3 to a 3776 Communication Terminal model 3 or 4.

MODELS

Model 1 001 Attaches a 3521 Card Punch

Model 2 002 Attaches a 2502 Card Reader mdl A1, A2 or A3

Prerequisites:

Mdl 1: Requires 3782/3521 Card Punch Attachment (#8150) on the 3289 mdl 3, 3771, 3774, 3775, 3776 or 3777 mdl 2 or 3 and a 3521 Card Punch.

Mdl 2: Requires 3782/2502 Card Reader Attachment (#8149) on the 3289 mdl 3, 3774, 3775, 3776 mdl 1 or 2, and a 2502 Card Reader mdl A1 or A2. Requires 3782/2502 Card reader Attachment (#8149) on the 3776 mdl 3 or 4 and a 2502 Card Reader mdl A1, A2 or A3 and **#9046** for white color. The following specify feature is required on the 2502: **#9901** for 115V AC,

HIGHLIGHTS

The unit supplies power and attachment circuits and services as a stand for mounting the card machine.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug or **#9881** for nonlocking plug.
- Color: Blue **#9043**, Red **#9041**, Gray **#9045**, Yellow **#9042**.
- Cabling: Fixed length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

SPECIAL FEATURES

Optical Mark Read (#5455): [Mdl 2] Required when the attached 2502 is equipped with Optical Mark Read (#5450). **Maximum:** One. **Limitations:** Refer to M2502 pages for feature description and card limitations. Not permitted if 2502 is attached to 3776 mdl 3, 3776 mdl 4 or 3777. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3784 LINE PRINTER

PURPOSE

A line printer for attachment to a 3774 Communcation Terminal for use as a second printer or attachment to a 3651 model 50 Retail Store Controller or a 3651 model 75 Programmable Store Controller.

MODELS

Model 1: 001

Limitations: Refer to *Forms Design - Printers Reference Guide* (GA24-3488) for forms design considerations. Printed output is not supported for optical character reading.

Prerequisites: #8155 on the 3774 or #8154 on the 3651 mdl 50 or a 3651 mdl 75.

HIGHLIGHTS

Maximum print speed of 115 lpm with 48-character set, 120 lpm with 64-character set, or 80 lpm with 94-character set . Line printing is from characters engraved on a revolving metal print belt.

Included as standard is one interchangeable print belt (48-, 64- or 94-character set) ... see "Specify". A variable-width forms tractor for feeding continuous forms up to 15 inches overall width, paper jam detection, compress/expand, printer forms control, dual buffers, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch.

Publications: Biblioghaphy, GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, **#9881** for non-locking plug.
- Color: Blue **#9043**, Red **#9041** Gray **#9045**, Yellow **#9042**. Available at time of manufacture only.
- Remote Power-Off: **#9501** ... specify this feature for capability to power-down the 3774 and 3784 from the host CPU using a controlled data sequence sent over communications facilities. The 3774 must also be equipped with **#9501**. **Limitations:** Not available with 3651 mdl A50, B50, A75 or B75 attachment (**#9716**) or the 3651 mdl C75 or D75 attachment (**#9717**).
- Print Belt Character Set: Specify one. Available at time of manufacture only. See "Accessories" if more than one print belt is required.

  #9490 -- 48-Character Set, EBCDIC
  #9491 -- 64-Character Set, EBCDIC
  #9492 -- 94-Character Set, EBCDIC
  #9493 -- 48-Character Set, ASCII - #1201 req'd on 3774
  #9494 -- 64-Character Set, ASCII - #1201 req'd on 3774
  #9495 -- 94-Character Set, ASCII - #1201 req'd on 3774
- Cabling: Fixed length cables are supplied as standard. Refer to *Installation Manual - Physical Planning* (GA27-3006).
- 3651 Retail or Programmable Controller Attachment: Specify **#9716** for attachment of a 3784 mdl 1 to a 3651 mdl A50, B50, A75, or B75. Specify **#9717** for attachment of a 3784 mdl 1 to a 3651 mdl C75 or D75. **Prerequisites:** The 3651 mdl 50 or mdl 75 must be equipped with #8154 and have a minimum of 48K of storage. **Note:** Remote Power-Off (**#9501**) not available with attachment to 3651 mdl 50 or mdl 75.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the Feature Number indicated below.

Forms Stand (#4450): Permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. This accessory is a two-shelf forms stand .

Print Belt, Add'l (#5811, #5812, #5813, #5821, #5822, #5823): Permits the customer to obtain more than one character print belt for various applications.

48-char ASCII **#5811***	48-char EBCDIC **#5821**
64-char ASCII **#5812***	64-char EBCDIC **#5822**
94-char ASCII **#5813***	94-char EBCDIC **#5823**

* ASCII (#1201) on the 3774 is prerequisite. ASCII (**#9022**) is required on the 3791.

SUPPLIES

Ribbon: A black ribbon, P/N 1136634, or equivalent, is required ... see IBM.

3791 CONTROLLER MDLS 1, 2

PURPOSE

The 3791 Controller serves as an intelligent base for clusters of operator stations attached to the 3790 Communication System or the 3790 Communication System/Data Entry Configuration. The 3791 communicates with the Host System (any virtual storage S/370, 4331 or 4341 processor**) by local channel attachment using byte and/or block multiplexer channel or the 3704, 3705 or 3725 Communications Controller over switched or nonswitched lines using Synchronous Data Link Control (SDLC). Also attaches via a Communications Adapter feature on the 4341 or 4361 processor.

MODELS

Model 1A	A01	[NO LONGER AVAILABLE]
Model 1B	B01	[NO LONGER AVAILABLE]
Model 1C	C01	Provides 10 million bytes* of disk storage
Model 2A	A02	Provides 20 million bytes* of disk storage
Model 2B	B02	Provides 30 million bytes* of disk storage

Maximum: One 3791 per 3790 system.

Prerequisites: Direct attachment to a S/370 or 4300 Processor byte and/or block multiplexer channel with Local Channel Attachment (#1515) or remote attachment utilizing one SDLC Communication feature (#6301, #6302 or #6303) for host system communications. If Batch Data Exchange (**#9037**) or Magnetic Tape Attachment (#7840) is installed with Configuration Support (**#9431, #9165** or **#9169**), the Host Communication Features or Channel Feature are not required.

Communications with a 3704, 3705 or Communications Adapter on a 4331 Processor is via a 1200 bps Integrated Modem (#5500, #5501, #5502) or an external modem attached via the EIA Interface feature (#3701). See M2700 pages.

To operate a 3790 Communication System Configuration Support **#9431, #9165, #9169**, at least one 3793 Keyboard-Printer or 3277 Display Station with keyboard is necessary.

To operate a 3790 Communication System/Data Entry Configuration Support (**#9175** or **#9195**) at least one 3760 Key Entry Station mdl 1 is necessary.

For standalone systems, not host attached, the appropriate SDLC feature is required for service of the 3791.

HIGHLIGHTS

3790 Communication System (#9431, #9165, #9169): When used in the 3790 Communication System, the 3791 is a programmable controller providing users with remote processing capability, disk storage data files, and control of terminal clusters. Flexibility of the 3791 enables the user to efficiently configure his 3790 system for initial requirements with the ability to change system hardware and functions to meet future needs. This configuration flexibility is attained by the selection of "special feature" and "specify" codes.

Configuration Support (#9431): When used with Configuration Support (**#9431**), the 3791 provides for attachment of 3277 Display Stations mdls 1 and 2, and 3284/3286/3287 and/or 3288 mdl 2 Line Printers. The 3791 Controller will permit up to a maximum of thirty-one 3277 and/or 3284, 3286, 3287, 3288 devices to be attached in any combination. In addition, up to a maximum of four 3793 Keyboard Printers can be attached to the 3791 Control Unit giving a maximum possible total of 35 devices attached to the 3791 Controller. Up to three 3792 Auxiliary Control Units may also be attached. Higher speed print capability of up to 410 lpm is provided by the 3791 printer feature.

In addition to the Host Link attachment, the 3791 has the capability to operate independently of the host via the Batch Data Exchange feature (**#9037**). The 3791 Controller performs all the logic and arithmetic functions to support concurrent operation of 16 user tasks, one host communication task, and two system printers. Removable diskette storage and up to 26.9* million bytes of disk storage are provided.

All 3790 programs are compiled and can be tested at the host computer prior to use at the remote locations, minimizing program development costs and helping assure uniformity of operations through the system. User-oriented application programs allow byte-by-byte and field editing, host file update, file organization option, and operator sharing of 3791 programs and data sets.

Reliability, Availability and Serviceability (RAS) capabilities ensure efficient system option by minimizing the loss of system data.

The 3790 has several features that assist in preventing unauthorized use of the system. Optional security and power-on keylocks prevent units from being made operational unless a key switch is operated. Operator-identification codes and password checking help prevent unauthorized personnel from using the system.

Configuration Support (#9165): When used with this Configuration Support, the 3791 supports the functions and terminals offered by Configuration Support (**#9431**) and provides expanded 3790 system capabilities. The additional capabilities of this Configuration Support consist of 3270 compatibility, full screen processing, RJE function, host link line speeds of up to 9600 bps (subject to carrier availability),ASCII support up to 31 concurrent tasks, including the Systems Printer tasks, and expanded 3790 DB/DC and VTAM host support.

Configuration Support (#9169): The 3790 Communication System now provides a data link adapter feature which allows communications with geographically dispersed displays and printers. When used with **#9169**, the 3791 supports the functions and terminals offered by Configuration Support **#9431** and **#9165** and provides additional 3790 system capabilities. The additional capabilities of **#9169** include attachment to the 3791 Controller via the Data Link Adapter of the 3276 Display Station Control Unit, 3278 Display and 3287 Printers (see 3791 Data Link Adapter for mdl) and attachment of the 3411 Tape and Control Unit mdl 1 (#7840) and 3410 Tape Unit mdl 1. Additional storage is also provided.

3791 Test Site Designation (#9595) for all configurations. The purpose of **#9595** is to provide the 3790 customer with the ability to designate a test site location at which he wants to install a Mandatory Control Code Engineering Change. Receipt of changes at this location will occur before a new production unit can reach the customer network and before the change is distributed to other installed locations requiring the change.

3791 Alternate Mailing Address (#9596) for Control Code Engineering Changes: The purpose of **#9596** is to provide the 3790 customer with the option to have Mandatory Control Code Engineering Changes shipped to a single address, generally Central Site, for greater Network Management Control. The alternate address is controlled by Field Engineering through assignment of a Teleprocessing Control Number (TPC #) or Microcode Control Number (MC#). Redistribution of the control code EC is the responsibility of the customer.

Installation of the Mandatory Control Code Engineering Change should be coordinated between the Central Site FE Manager and the customer central site coordinator to ensure a smooth and non-disruptive upgrade.

3790 Communication System/Data Entry Configuration (#9175, #9195): When used in the 3790 Communication System/Data Entry Configuration, the 3791 will provide Data Entry users with editing and checking capability that results in improved data accuracy and productivity. Flexibility in configuration is attained by the selection of Configuration Support, special feature and specify feature codes.

Configuration Support (#9175): When used with Configuration Support **#9175**, the 3791 provides for attachment of 3760 Dual Key Entry Station mdl 1 and 2 and 3. The 3791 Controller will permit up to a maximum of eight 3760 mdl 1s and/or 3s to be attached in any combination. Up to two 3760 mdl 2s can be attached to a 3760 mdl 1. A maximum of twelve stations equal to a maximum of twenty-four operator positions is supported if not combined with 3760 mdl 3s. For each attached 3760 mdl 3, the maximum number of operator positions is reduced by one.. In addition, support for user-programmable subroutines (#9850) and the attachment of the 3411 Magnetic Tape Control Unit mdl 1 (#7840) is available. For combinations and limitations, refer to *Configuration Guidelines,* GA33-4562. Supports 3791 mdls 1B, 1C, 2A and 2B. Printing at the 3791 is provided by the Line Printer feature (#4710). Data extraction can be done by host communications, magnetic tape or diskette.

The Data Entry Batch Transfer Program (BTP) SCP is available to support the extraction and reverse extraction of data between the 3790 Communication System/Data Entry Configuration and a S/370, 303X or 4300 virtual storage system.

Configuration Support (#9195): With Configuration Support **#9195**, the 3791 supports 3762 Payment Transaction Processing in addition to the functions, stations and output facilities offered by Configuration Support **#9175** and the attachment of the 3411 Magnetic Tape and Control Unit mdl 1 (#7840). The 3791 Controller will permit up to a maximum of eight 3762 Payment Transaction Processors and/or 3760 mdl 1 or 3 stations to be attached in any combination. A maximum of sixteen operator positions is supported if only 3762s are attached. If 3762s are mixed with 3760s, a maximum of twenty-four operator positions may be supported. For combinations and limitations, see *Configuration Guidelines,* GA33-4572. Supports 3791 mdls 1B, 1C, 2A and 2B.

The maximum number of specific terminals attached to the 3791 is dependent upon the 3790 system. In addition, the number of attached terminals that may be operational will depend on the number of tasks and task mixes. The following manuals will provide additional details for system configuration:

* Disk storage available for user programs and data storage is configuration dependent. Minimum storage based on a maximum 3791 configuration is 3.9 to 26.5 million bytes for Configuration Support #9431. 3.4 to 26.0 million bytes for Configuration Support #9165, and #9431 with Expanded Index #9142. 2.4 to 25.1 million bytes for Configuration Support #9169 and Configuration Support #9165 with Configuration Conversion #9530, and #9431 with #9142 and #9350. 7.2 to 25.7 million bytes for Configuration Support #9175. 7.2 to 25.7 million bytes for Configuration Support (#9195).

** See CICS pages in Programming for restrictions.

3791 Controller Mdls 1, 2 (cont'd)

For Configuration Support #9431, #9165 and #9169:

An Introduction to the IBM 3790 Communication System, GA27-2807,
IBM 3790 Communication System Configurator, GA27-2768,
IBM 3790 Communication System Installation Manual - Physical Planning, GA27-2769.

For Configuration Support #9175:

IBM 3790 Communication System Data Entry Configuration Introduction, GA33-4550,
IBM 3760 Key Entry Station Introduction, GA33-4560,
IBM 3760 Key Entry Station Configuration Guidelines, GA33-4562,
IBM 3760 Key Entry Station Functional Description, GA33-4561,
IBM 3790 Communication System Installation Manual - Physical Planning, GA27-2769,
IBM 3790 Communication System Data Entry Configuration User Programmability Planning Guide, GC33-5903.

For Configuration Support #9195:

IBM 3790 Communication System/Data Entry Configuration
IBM 3762 Payment Transaction Processor Introduction, GA33-4570,
Configuration Guidelines, GA33-4572,
Functional Description, GA33-4571,
IBM 3790 Communication System Installation Manual - Physical Planning, GA27-2769,
IBM 3762 Payment Transaction Processor Paper and Printing Requirements, GA33-4576,
Document Gauge, GX33-8505,
IBM 3790 Communication System/Data Entry Configuration User Programmability Planning Guide, GC33-5903.

Communication Facilities: Direct Attachment to a S/370 or 4300 processor byte and/or block multiplexer channel utilizing Local Channel Attachment (#1515).

Synchronous Data Link Control (SDLC) using switched point-to-point lines at speeds of up to 4800 bps, or nonswitched point-to-point, or nonswitched multipoint lines at speeds of up to 9600 bps subject to carrier availability via the 3704, 3705 or 3725. Also attaches via a Communications Adapter feature on the 4331 Processor. See M2700 pages.

For the 3791-to-3704,3705,3725,4331 Communications Adapter SDLC link, IBM offers a 1200 bps integrated modem or an EIA feature for the attachment of external modems.

For the 3792-to-2741 link, IBM offers a Leased Line Adapter for communication at 134.2 bps, or an EIA feature for the attachment of external modems.

Note: For communication capabilities and modem attachment data, see M2700, 3872, 3791, 3792, 3704, 3705, 3725, or 4331 pages for further information.

Host/3791 Communication

Byte and/or Block multiplexer channel
1200 bps Integrated Modem, Nonswitched
1200 bps Integrated Modem, Switched
3872 Modem, Nonswitched
3872 Modem, Switched

The Data Link Adapter provides the capability for the 3791 Controller to attach via nonswitched communication lines the 3276 Control Unit Display Station mdls 2, 3, 4, 12, 13 and 14, with the appropriate 3278 Display Station mdls 2, 3 or 4, 3287 Printer mdls 1 or 2, or 3289 Line Printers mdls 1 or 2. The 3791 Controller supports only SDLC communication and the 1920-character format on the Data Link Adapter. 3276 mdls 2, 3 and 4 attached to a 3791 require the SDLC/BSC switch (#6315) to be in the SDLC position. 3276 mdls 3, 4, 13 and 14 and 3278 mdls 3 and 4 require the character made to be 1920 characters. The 3791 Controller Communication Link is provided by selection of #3703 with the Data Link Adapter (#3210 or #3211) at speeds of up to 9600 bps or the Integrated Modem (#4781) with the Data Link Adapter (#3210) at speeds of 1200 bps. See M2700 pages for available communication facilities.

The maximum number of Data Link Adapter features (#3210 and/or #3211) attached to a 3791 Controller is five. The maximum number of 3276 Control Units that can be attached to each Data Link Adapter is five to a 3791 Controller. The 3790 will allow the attachment of a total of 80 units and devices in any combinations on the five Data Link Adapters.

IBM Terminal Communications

1200 bps Integrated Modem - Nonswitched*
3872 Modem**
3874 Modem**

* Half-speed or 600 bps is not attainable
** If Switched Network Backup, switching is done manually.

Control Storage Feature: The amount of control storage to be ordered is fixed for the 3790 Communication System/Data Entry Configuration (**#9175** or **#9195**). See *3790 Communication System/Data Entry Configurator,* GA33-4562 or GA33-4572.

Publications: GC20-0370

SPECIFY

For details pertaining to specify codes, refer to the following: For Configuration Support **#9431, #9165, #9169**): *3790 Communication System Configurator,* GA27-2768. For Configuration Support **#9175** or **#9195**: *3790 Communication System/Data Entry Configurator,* GA33-4562 (**#9175**) or GA33-4572 (**#9195**).

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Moisture proof plug -- **#9902** for 208V or **#9904** for 230V. Locking plug --- **#9880** for 115V (mdl 1A, 1B only), **#9884** for 208V, or **#9886** for 230V. Field conversion is possible between **#9880** and **#9884** or **#9880** and **#9886**. No other field conversions are possible.
- Color: [Available at time of manufacture only] Blue **#9043**, Red **#9041**, Gray **#9045**, Yellow **#9042**.
- Up-ending Kit (in the event the 3791 must be placed on end to enter installation area): **#9840**. Required for mdls 1C, 2A and 2B only.
- Cables: See "Accessories" for ordering instructions.
- Specify **#9022** for ASCII support: ASCII support is provided for the Host Link, Diskette, 3276, 3277, 3278, 3284, 3286, 3287, 3288, 3289, 3791 Line Printers (#4710, #4711 or #4715) and Magnetic Tape Attachment (#7840). Only ASCII support type B is provided for the 3276, 3287 and 3278 and 3279. Not available with Configuration Support **#9431**. ASCII support for **#9175, #9195** is limited to keyboard and displays.
- Print Belt Character Set: Specify for 3791 Line Printer (feature codes #4710, #4711 or #4715) one of the following. These specify codes are available at time of manufacture only.)

  If additional print belts are required, see Print Belts in "Accessories". The 48-character print belt can be used for ASCII or EBCDIC.

	#9431	#9165	#9169	#9175	#9195
#9071–48-char set, EBCDIC	X	X	X	X	X
#9072–64-char set, EBCDIC	X	X	X	X	X
#9073–96-char set, EBCDIC	X	X	X		
#9071–48-char set, ASCII		X	X		
#9074–64-char set, ASCII		X	X		
#9075–96-char set, ASCII		X	X		

- Configuration Support: The 3791 System Configuration Support must be determined before specifying the functions required and ordering special features. **Field Installation:** Yes. Specify one of the following:

  – **#9431** must be specified for up to 16 concurrent device operations. Must be ordered for all 3791s without **#9165, #9169, #9175**or **#9195. Limitations:** Not available with **#9165, #9169, #9175** or **#9195**.

  – **#9165** must be specified for up to 31 concurrent device operations and expanded 3791 System capabilities. **Limitations:** Not available with Configuration Support **#9431, #9169, #9175** or **#9195 Prerequisites:** #3220 or #3221 ... One #1590 ... Following Control Storage Increments: Three Type I-A (#1603) and One Type II-A (#1613).

  – **#9169** for support of Data Link Adapter, 3276 Display Control unit, 3278 Display station, 3287 and 3289 Printers Additional Storage and attachment of the 3411 Tape and Control Unit mdl 1 (#7840), 3410 Tape Unit mdl 1 (#7840). **Limitations:** Not available with Configuration Support **#9431, #9165, #9175**or **#9195**.

    Available only with machines at EC level 744565 shipped after July 1, 1976.

    Field Installation: Yes. **Prerequisites:** #3220 or #3221 ... one #1591 ... six #1603s ... one #1613.

  – **#9175** for 3790 Communication System/Data Entry Configuration and the attachment of the 3411 Magnetic Tape and Control Unit mdl 1. **Limitations:** Not available with 3791 mdl 1A and with Configuration Support **#9431, #9165, #9169. Prerequisites:** #7900 ... #3221 for mdls 1B, 2A and 2B ... one #1590 ... and the following Control Increments: One #1603 ... three #1613s.

  – **#9195** for 3790 Communication System/Data Entry Configuration using the 3762 Payment Transaction Processor and the attachment of the 3411 Magnetic Tape and Control Unit mdl 1 (#7840). **Limitations:** Not available with 3791 mdl 1A and with Configuration Support **#9431, #9165, #9169, #9175. Prerequisites:** Device Attachment Type 1 (#7900) ... Add'l Disk Heads (#3221 for mdls 1B, 1C, 2A and 2B) ... Control

3791 Controller Mdls 1, 2 (cont'd)

Storage Expansion (#1590) and the following Control Storage Increments: One Type IA (#1603) and three Type II-As (#1613). Add'l Card Read Support (**#9852**) for attachment of one or more RPQs MH7024 (3762 mdl 21).

- Configuration: For each 3790 System Configuration Support **#9431, #9165, #9169, #9175**or **#9195**), the 3791 must be conditioned to support the function being provided and the terminals attached. Future modifications to a 3790 system must be specified by changes to the configuration features for the 3791.

3790 Communication System (#9165, #9169,#9431): The selection of the following function and attachment specify codes are required to complete the 3791 configuration order. **Limitations:** Not available with Configuration Support (**#9175**or **#9195**). Purchase customers must submit an RPQ for field conversion from **#9431** or **#9165** to **#9169**. **Field Installation:** Yes.

Device/Facility

On 3791 Controller:

3792 Attachment	**#9110**	First 3792
	#9120	Second 3792
	#9130	Third 3792
		Prerequisites: #9431, #9165, #9169.
3793 Attachment	**#9011**	Specify total number of 3793s attached by ordering quantity. **Maximum:** Four with **#9431** ... three with **#9165, #9169.** **Prerequisites: #9431, #9165, #9169.**
3277, 3284, 3286, 3287,	**#9200**	Specify total number of devices attached by ordering quantity.
3288 Attachment		**Maximum:** 31. **Prerequisites: #9431, #9165** or **#9169.**
	#9250	Specify for any mdl 2 device. **Maximum:** One. **Prerequisites: #9431, #9165.**
On 3792 Auxiliary Control Unit:		**Prerequisites: #9431, #9165** or **#9169.**

Terminals (and maximum per 3792)

	2741 (Two)	3793 (Four)	Line Printer (One)
First 3792	**#9115**	**#9111**	**#9119**
Second 3792	**#9125**	**#9121**	**#9129**
Third 3792	**#9135**	**#9131**	**#9139**

Specify the above codes by ordering quantity. Order once for each unit attached. **Note:** Only one 3792 line printer feature may be attached to a 3790 system. The one printer can be attached to any one of the 3792 Auxiliary Controllers. See "Limitations" in M3792 pages for details.

Configuration Support **#9165** provides all the functions of Configuration Support **#9431**. Some of the functions may not require ordering for Configuration Support **#9165**. Prerequisites will determine ordering requirements for **#9431** or **#9165**.

Support Functions #9431 and #9165:

Functions	Specify	Comment
Line Printer Support	**#9561**	132 print positions **Prerequisites: #9431**, or **#9165.**
	#9562	96-character print belt support. **Prerequisites: #9431.**
Print Data Set Specify one:	**#9421**	1,024 Records
	#9422	2,048 Records
	#9423	4,096 Records
	#9424	8,192 Records **Prerequisites: #9431, #9165.**
Transaction Data Set Specify One:	**#9771**	1,024 Records
	#9772	2,048 Records
	#9773	4,096 Records
	#9774	8,192 Records **Prerequisites: #9431, #9165.**
Control Storage Configuration	**#9531**	Control Storage Configuration 1
	#9532	Control Storage Configuration 2
	#9533	Control Storage Configuration 3 **Prerequisites: #9431.**
Operational Changes to the 3791	**#9431**	Installed on all 3791s shipped after May,1976. Prerequisite for any MES ordered after May,1976.
Additional 3790 Functions	**#9430**	Optional; order only if required. **Prerequisites: #9431.**
Expanded Program Index	**#9142**	Optional, order only if required. **Prerequisites: #9431** and **#9430.** See Note 1.
Batch Data Exchange via Diskette	**#9037**	Optional, order only if required. **Prerequisites:** One **#9431** or **#9165** and #6301, #6302, #6303,#1515.
Configuration: Conversion	**#9350**	Optional, order only if required. **Prerequisites: #9431** and **#9142, #9430, #9424** and **#9774** or **#9165** and **#9424** and **#9774.** See Note 2.

Note 1: Machines shipped prior to July 1, 1976 and not at EC level 744209 or higher cannot take advantage of the installation assist function of **#9142**. Configuration Support **#9165** can be field installed on these machines but requires reinstallation of the data base. See "Field Installation" of #3220 and #3221.

Note 2: Machines shipped prior to July 1, 1976 and not at Factory EC level 744565 or higher cannot install **#9350** on Configuration Support **#9169**. Mdls 2A and 2B with serial numbers 20113 through 20196, excluding numbers 20165, 20190 and 20194, must have Field EC 746445 installed with Configuration Conversion **#9350** on second and third position disk storage files to avoid reinstall later for feature #3221 on these files.

User Data Set	**#9501**	For first additional 16 user data sets. **Maximum:** One. **Prerequisites: #9431, #9165.**
	#9502	For second additional 16 user data sets. **Maximum:** One. **Prerequisites: #9431, #9165.**
User Sessions	**#9344**	Optional number of 31 available. **Maximum:** 16 with **#9431**, 31 with **#9165. Minimum:** One. **Prerequisites: #9431, #9165.**
System Activity	**#9149**	Specify to define concurrent device activity. **Maximum:** 31. **Minimum:** One. **Prerequisites: #9165.**
	#9150	Specify **#9150** once for each device that is operational when host is active. **Prerequisites: #9431.**
	#9151	Specify **#9151** once for each additional device that is operational when host is inactive. **Prerequisites: #9431.**
RJE Function for #9165	**#9541**	Specify only if required. **Prerequisites: #9165.**
	#9542	RJE Console. One required. **Prerequisites: #9541.**
	#9543	Specify if RJE Reader is required. **Maximum:** One. **Prerequisites: #9541.**
	#9544	Specify if RJE Writer is required. **Maximum:** One. **Prerequisites: #9541.**
	#9545	Line Printer. **Maximum:** Two. **Prerequisites: #9541.**
	#9546	RJE Logical Unit. **Maximum:** Five. **Minimum:** One. **Prerequisites: #9541.**
Test Site	**#9595**	To Designate a 3791 location as a test site for Mandatory Control Code Engineering Changes.
Alternate Mailing Address	**#9596**	To designate that an alternate mailing address is available for Control Code Engineering Changes

Support Functions (#9169): Configuration Support **#9169** provides all the functions of Configuration Support **#9431** and **#9165**. Only the following functions require ordering for Configuration Support **#9169**.

Line Printer	**#9561**	132 print positions. **Prerequisites: #9169.**
System Activity	**#9149**	Specify to define concurrent device activity. **Minimum:** One. **Maximum:** 31. **Prerequisites: #9169.**
Batch Data Exchange via Diskette/Tape	**#9037**	Optional, order only if required. **Prerequisites: #9169** and #6301, #6302, #6303, #1515.
RJE Function	**#9541**	Specify only if required. **Prerequisites: #9169.**
Test Site	**#9595**	To designate a 3791 location as a test site for Mandatory Control Code Engineering Changes.
Additional User Sessions	**#9345**	Optional, order only if required. Provides 15 additional user sessions. Basic system provides 16 user sessions. **Prerequisites: #9169.**

3791 Controller Mdls 1, 2 (cont'd)

3790 Communication System/Data Entry Configuration (#9175 or #9195): The selection of the following function and attachment specify codes is required to complete the 3791 configuration. The prerequisite for each specify code will indicate the availability of that capability with the selected Configuration Support (**#9175** or **#9195**). **Limitations:** Not available with Configuration Support **#9431, #9165, #9169. Prerequisites: #9175** or **#9195. Field Installation:** Yes.

Function	Specify	Comment
1-6 stations	#9156	Specify if maximum number of stations planned for attachment is six. **Prerequisites: #9175** or **#9195. Field Installation:** Yes.
1-9 stations	#9157	Specify if maximum number of stations planned for attachment is nine. **Prerequisites: #9175** or **#9195. Field Installation:** Yes.
1-12 stations	#9158	Specify if maximum number of stations planned for attachment is twelve. **Prerequisites: #9175** or **#9195. Field Installation:** Yes.
User-Programmable Subroutines	#9850	Specify only if required. **Prerequisites: #9175** or **#9195** on 3791 and #7500 on 3792.
Line Printer	#9561	132 print positions. **Prerequisites: #9175** or **#9195.**
Test Site	#9595	To Designate a 3791 location as a test site for Mandatory Control Code Engineering Changes.
Alternate Mailing Address	#9596	To designate that an alternate mailing address is available for Control Code Engineering Changes

SPECIAL FEATURES

Non-Communications Features

Control Storage Expansion (#1590): Provides capability for expansion of control storage. **Limitations:** Must be specified for Configuration Support **#9165, #9175** or **#9195**. Not available with **#9169. Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9431, #9165, #9175** or **#9195.**

Control Storage Expansion Type I (#1591): Provides capability of expanding control storage. **Maximum:** One. **Field Installation:** Limited to those machines shipped after July 1, 1976 and at Factory EC level 744565 or higher. **Limitations:** Cannot be installed with Control Storage Expansion (#1590). Purchase customers must submit an RPQ for a field change from Control Storage Expansion (#1590). **Prerequisites: #9169.**

Control Storage Increment, Type I (#1602): Provides 8,192 positions of additional control storage. **Limitations:** Not available with **#9165, #9175** or **#9195**. See Note below. **Maximum:** One for **#9431, #9169. Field Installation:** Yes. **Prerequisites:** #1590 for **#9431**. #1591 for **#9169.**

Control Storage Increment, Type I-A (#1603): Provides 16,384 positions of additional control storage. **Limitations:** Three 1602s are required for Configuration Support **#9165**. Six 1603s are required for Configuration Support **#9169** and one is required for **#9175** or **#9195. Maximum:** Three for **#9431** or **#9165**. One for **#9175** or **#9195**. Seven with **#9169. Field Installation:** Yes. **Prerequisites:** #1590 for **#9431, #9165, #9175** or**#9195**. #1591 for **#9169.**

Control Storage Increment, Type II (#1612): Provides 8,192 positions of additional control storage. **Limitations:** Not available with **#9165, #9175** or **#9195**. See Note below. **Maximum:** One for **#9431, #9165, #9169. Field Installation:** Yes. **Prerequisites:** #1590 for **#9431**. #1591 for **#9169.**

Control Storage Increment, Type II-A (1613): 16,384 positions of additional control storage. **Limitations:** One #1613 is required for Configuration Support **#9165 and #9169.** Three are required for **#9175** or **#9195**. See 3793 Attachment features (#7901, #7902 or #7903) for additional restrictions. **Maximum:** One for **#9165, #9431**, three for **#9175** or **#9195**, five for **#9169. Field Installation:** Yes. **Prerequisites:** #1590 for **#9431, #9165, #9175** or **#9195**. #1591 for **#9169.**

Note: Customers who elect to purchase Storage Increment Type I or Type II and plan to order additional storage at a later date should consider purchase of Storage Increment Type I-A or Type II-A initially because some field upgrades of storage may require replacement of initial feature and installation of new feature.

Add'l Disk Heads (#3220, #3221): [#3220 for mdl 1A, #3221 for mdl 1B, 1C, 2A, 2B] Provides additional disk heads necessary for use with Configuration Support **#9165, #9169, #9175** or **#9195. Limitations:** One is required on a mdl 1A, 1B, 1C, 2A or 2B for Configuration Support **#9165 or #9169.** With Configuration Support **#9175** or **#9195,** one is required on a mdl 1B or 1C, two are required on a mdl 2A, and three are required on a mdl 2B. Not available with **#9431. Maximum:** One for **#9165**; three for **#9169, #9175** or **#9195. Field Installation:** Yes. **Prerequisites: #9165, #9169, #9175**or **#9195.** Machines shipped prior to July 1, 1976 and not at EC level 744209 or higher require the removal of disk storage. Mdls 2A and 2B with serial numbers 20113 through 20196, excluding numbers 20165, 20190 and 20194, at Factory EC level 744209 or higher require removal of disk storage in the second and third position to field install #3221. See chart below to verify replacement requirement of each disk storage (enclosure).

	Mdl 1A	Mdls 1B,1C,2A,2B
Label color on each disk storage (enclosure) indicates replacement necessary for additional heads.*	White	Orange
Label color on each disk storage (enclosure) indicates additional heads installable without replacement of enclosure.	Pink	Blue

* Adequate provision must be made for retaining data contained on all disk storage in machine and elimination of user-proprietary information. All replaced parts become the property of IBM.8

Line Printed, 80 Print Positions (#4710): [155 lpm - 6 lines per 2.54cm (1.0 in.)] Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, 80 lpm with 96-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, or 96-character set) . ASCII or EBCDIC character set must be specified Capability to print on continuous fanfold paper up to 80 print positions on a 20cm (8.0 in.) print line with line spacing of 6 lines per 2.54cm (1.0 in.). Paper up to six parts plus carbon (maximum total thickness is 0.50mm or 0.020 in.) can be accommodated. Maximum paper width is 15.0 in. overall. Refer to form design reference guide for printers (GA24-3488) for form design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1136634 or equivalent for replacement ribbons. **Limitations:** Line printers on the 3791 and 3792 must have the same number of print positions . The 96- and ASCII character sets are not available with Configuration Support **#9175** or **#9195. Maximum:** One per 3791; with 3792, two per system. **Field Installation:** Yes. **Specify:** See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96--character sets.

Line Printer, 132 Print Positions (#4711): [155 lpm - 6 lines per 2.54cm (1.0 in.)] Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, 80 lpm with 96-character set. Included as standard are one operator interchangeable print belt (48-, 64-, or 96-character set) . Capability to print on continuous fanfold paper up to 132 print positions ASCII or EBCDIC character set must be specified on a 33.5cm (13.2 in.) print line with line spacing of 6 lines per 2.54cm (1.0 in.). Paper of up to six parts plus carbon (maximum total thickness is 0.50mm or 0.020 in.) can be accommodated. Refer to *Forms Design Reference Guide for Printers* (GA24-3488) for form design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1136634 or equivalent for replacement ribbons. **Limitations:** Line printers on the 3791 and 3792 must have the same number of print positions. The 96- and ASCII character sets are not available with Configuration Support **#9175** or **#9195. Maximum:** One. **Field Installation:** Yes. **Specify:** See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96-character sets.

Line Printer - 132 Print Positions (410 lpm) (#4715): Provides a higher speed line printer with maximum speeds of 410 lpm with 48-character set, 300 lpm with 64-character set, 230 lpm with 96-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, or 96-character set) , and a forms stand which is an integral part of this feature. ASCII or EBCDIC character set must be specified. Capability to print on continuous fanfold paper up to 132 print positions on a 33.5cm (13.2 in.) print line with line spacing of 6 lines per 2.54cm (1 in.) with **#9431**. With Configuration Support **#9165** or **#9169**, line spacing of 6 or 8 lines per inch is available and is program selected. Paper of up to six parts plus carbon (maximum total thickness is 0.50mm or 0.020 in.) can be accommodated. Refer to *Forms Design Reference Guide for Printers* (GA24-3488) for forms design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1299160 or equivalent for replacement ribbons. **Limitations:** Line printer on the 3792 must have 132 print positions (#4713). The ASCII or EBCDIC character set must be specified not available with Configuration Support **#9175** or **#9195. Maximum:** One. **Field Installation:** Yes. **Specify:** See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96-character sets.

Security Keylock (#6350): Allows the 3791 to be "powered-on" only with key. Removing the key does not turn power off. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

3791 Controller Mdls 1, 2 (cont'd)

Magnetic Tape Attachment (#7840): Provides for the attachment of the 3411 Magnetic Tape and Control Unit mdl 1. Additional tape capacity is provided by attachment of the 3410 mdl 1 via the 3411 Magnetic Tape Unit. The total number of tape units (3410 and 3411) on a 3791 Controller is four. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7003, #3211 or #3221 and **#9169, #9175** or **#9195**. **Limitations:** Not available with Configuration Support **#9431, #9165**. Configuration Support **#9175** or **#9195** does not support attachment of the 3410 Tape Unit mdl 1. Only the 3411 Single Density (#3211) and Dual Density (#3221) are supported by the 3791 Controller.

Device Attachment Type I (#7900): Allows attachment of up to three 3792 Auxiliary Control Units or four 3760 Dual Key Entry Station mdl 1s , or four 3760 Key Entry Stations mdl 3s, , or four 3762 Payment Transaction Processors, or any combination of four of these stations at a distance of 2,000 feet. Each 3760 mdl 1 can attach up to two 3760 mdl 2s. **Limitations:** All attached units must be the same machine type. The mixing of 3792 and 3760 units is not allowed, except for **#9195** which allows mixing of 3760 and 3762 units. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9175 or #9195)** for 3760 attachment, **#9195** for 3760 and 3762 attachment, or (**#9431, #9165** or **#9169)** for 3792 attachment.

3793 Attachment (#7901): Allows one 3793 Keyboard-Printer to to be attached to the 3791. (See M3793 pages). **Limitations:** Cannot be installed with Configuration Support **#9175** or **#9195**. **Maximum:** For Configuration Support **#9165** the maximum is three. For Configuration Support **#9431** the maximum is three when Control Storage Increment Type II (#1612) or Type II-A (#1613) is installed. For Configuration Support **#9169** the maximum is three, however, if Control Storage Increment Type II (#1612) or more than one Type II-A (#1613) is installed, the maximum is one. Four per 3791 mdls 1C, 2A and 2B. One per 3791 mdls 1A and 1B. Mdls 1A and 1B require a 3793 Attachment, 2nd (#7902) for a second 3793, and an 3793 Attachment, Add'l (#7903) for a third or fourth. Maximum of two with Magnetic Tape Attachment (#7840). **Field Installation:** Yes.

3793 Attachment, 2nd (#7902): Allows a second 3793 to be attached to a 3791 mdl 1A or 1B. **Maximum:** One. **Limitations:** Not available with Configuration Support **#9169** when Control Storage Increment Type II (#1612) or more than one Control Storage Increment Type II-A (#1613) is installed. **Field Installation:** Yes. **Prerequisites:** #7901.

3793 Attachment, Add'l (#7903): Allows a third or fourth 3793 to be attached to a 3791 mdl 1A or 1B. **Limitations:** If Control Storage Increment Type II (#1612) or Type II-A (#1613) is installed, only three 3793s can be attached with Configuration Support **#9431**. For **#9165** or **#9169**, maximum is three 3793s. Not available with Magnetic Tape Attachment (#7840). **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #7902.

Device Attachment Type II (#7911): Allows attachment of up to any combination of four 3277s and/or 3284s, 3286s, 3287s, 3288s attached to the 3791. For Display and Printer features supported by the 3790 System, see *3790 Communication Configurator,* GA27-2768, and *Introduction to the 3790 System* for details. **Limitations:** Not available with Configuration Support **#9175** or **#9195**). **Maximum:** One. **Field Installation:** Yes.

Device Attachment Type II, Add'l (#7912): Each feature allows attachment of any combination of up to four additional 3277s and/or 3284s, 3286s, 3287s, 3288s attached to the 3791. **Maximum:** Seven, but restricted to a maximum of 31 devices. **Prerequisites:** #7911. **Field Installation:** Yes. **Limitations:** If printer feature #4710, #4711 or #4715 is attached, maximum number of 3277s, 3284s, 3286s, 3287s and/or 3288s is restricted to 30 devices. If a 3792 is attached, maximum is six, with a maximum of 28 devices. The attachment of a line printer feature does not reduce the maximum of 28 devices.

Device Attachment Type I, Add'l (#7922): Allows attachment of up to four 3760 Dual Key Entry Station mdl 1s, or four 3760 Key Entry Station mdl 3s, or four 3762 Payment Transaction Processors or any combination of four of these stations at a distance of 2000 feet. Each 3760 mdl 1 can attach up to two 3760 mdl 2s. **Limitations:** A maximum of 24 operator positions is supported for attachment to a 3791 Controller. Not available with Configuration Support **#9431, #9165, #9169**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9175, #9195** and #7900.

The amount of control storage to be ordered for the 3790 Communication System (**#9431** or **#9169**) depends on both the quantity and type of attachments in the system configuration. The amount of control storage is fixed for **#9165**. See *3790 Communication System Configurator,* GA27-2768, to determine the correct ordering quantities of control storage.

Communications Features

Local Channel Attachment (#1515): Provides for direct attachment to any S/370 or 4300 processor* via an integrated byte and/or block multiplexer channel or via a 2870 byte multiplexer or 2880 Block Multiplexer Channel. Maximum distance from the channel is 200 feet. **Limitations:** Cannot be installed with SDLC Communications feature (#6301, #6302 or #6303). Not available on the block multiplexer channel with Configuration Support (**#9431**). **Maximum:** One. **Field Installation:** Yes.

*This feature attaches to only one channel of a multiprocessing system.

Data Link Adapter With Business Machine Clock (#3210): Required for attachment to data link through the 1200 bps Integrated Modem (#4781) or via #3703 at 1200 bps, to any external modem which does not provide its own clocking. Half-speed or 600 bps is not attainable with this feature. **Maximum:** Five. Maximum reduced by one for each #3211 attached. **Field Installation:** Yes. **Prerequisites: #9169. Limitations:** All 3276s and 3278s must have keyboards. Cannot be installed with **#9165, #9431, #9175** or **#9195**.

Data Link Adapter Without Business Machine Clock (#3211): Required for attachment to Data Link via #3703 and external modem which provides its own clocking of up to 9600 bps. **Maximum:** Five. Maximum reduced by one for each #3210 attached. **Field Installation:** Yes. **Prerequisites: #9169. Limitations:** Cannot be installed with Configuration Support **#9165, #9431, #9175** or **#9195**.

EIA Interface (#3701): Provides EIA Interface for the attachment of an IBM or other external modem. **Limitations:** Cannot be installed with the 1200 bps modems (#5500 or #5501). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301, #6302 or #6303.

EIA Interface (#3703): Provides EIA Interface for the attachment of an IBM or other external modem. **Maximum:** Five. **Field Installation:** Yes. **Prerequisites:** #3210 or #3211.

1200 bps Integrated Modem Nonswitched (#4781): Provides an integrated modem for communications from the Data Link Adapter over nonswitched lines. No external modem is required. **Specify:** Unless otherwise specified, 4-wire strapping will be provided. Specify **#9654** for 2-wire strapping. **Maximum:** Five. **Field Installation:** Yes. **Prerequisites:** #3210.

Modem, 1200 bps Integrated, Nonswitched (#5500): Provides an integrated modem for communication with the host system over nonswitched lines. No external modem is required. **Limitations:** Cannot be installed with communications features #3701 or #5501 or #6302 or #6303. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301. **Specify:** **#9651** for 4-wire strapping, or **#9652** for 2-wire strapping .

Modem, 1200 bps Integrated Switched (#5501): Provides an integrated modem with an answering capability for communication from the host system over switched lines via FCC registered protective circuitry of the CBS type or equivalent) provided by the user. The coupling device determines whether the answering capability is manual or automatic. **Prerequisites:** #6301. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with communications features #3701, #5500, #6302 or #6303.

SDLC Communication Feature With Business Machine Clock (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500 or #5501) or, via an EIA Interface (#3701), to any external modem which does not provide its own clocking. Half-speed or 600 bps is attainable with this feature. **Limitations:** Cannot be installed with SDLC features (#6302, #6303) or Local Channel Attachment (#1515). **Maximum:** One. **Field Installation:** Yes.

SDLC Communication Feature Without Business Machine Clock (#6302): Required for attachment to communication lines via an EIA Interface (#3701) and an external modem which provides its own clocking up to 2400 bps with **#9431** or **#9165**, and up to 4800 bps with **#9175** or **#9195**. **Limitations:** Cannot be installed with SDLC features (#6301, #6303), 1200 bps modem features (#5500 or #5501), or Local Channel Attachment (#1515). With Configuration Support **#9175** or **#9195**, the number of stations which may be active concurrently with host communications at 4800 bps is dependent on the workload. **Maximum:** One. **Field Installation:** Yes.

SDLC Communication Feature Without Business Machine Clock (#6303): Required for attachment to communication lines via an EIA Interface (#3701) and an external modem which provides its own clocking of up to 9600 bps. **Limitations:** Cannot be installed with communication features #1515, #5500 or #5501 , #6301, #6302 or Configuration Support **#9431, #9175** or **#9195**. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model changes may be field installed: Model 1C to models 2A and 2B.

Model upgrade requires replacement of disk storage unit. Adequate provision must be made for retaining data contained on disk storage unit and elimination of user-proprietary information.

ACCESSORIES

Forms Stand (#4450): [For 155 lpm Line Printer features #4710 and #4711 only] A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after print. A forms stand is an integral part of the 410 lpm

3791 Controller Mdls 1, 2 (cont'd)

Line Printer feature (#4715). For shipment with machine, order by feature number.

Cables: Cables to attach 3790 units may be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of these cables. Coaxial cables, connections, and accessories for the 3277 and 3288 are applicable when these units are attached to the 3790 system. Refer to M3270 pages for part numbers.

Unit	Cable Assm No	Use	Maximum Length	Notes
3791	1832533	Keyboard Printer	48 ft	1
3792	1832533	Keyboard Printer	48 ft	1
	1454167	75 Cond. Cable Bulk		
	1836445(P/N)	Connector Group		2
3791	2577672	Aux. Control Unit	2000 ft	3
3791	2577672	3760 mdl 1 & 3	2000 ft	3
3791	2577672	3732/3736 (indoor)	2000 ft	
3791	1833108	3732/3736 (outdoor)	2000 ft	

Notes:

1. Communication cable consisting of bulk cable #1454167 and connector group #1836445.
2. Contains connector assemblies for both ends of communication cable.
3. Indoor Cable. For coax wire and connector kit part numbers, refer to M3270 pages.

Locks and Keys: The 3791 with the Security Key Lock (#6350) is shipped with two keys. Additional keys may be purchased only from IBM. A letter of authorization must accompany order and serial number of lock must be indicated. .

Print Belt, Add'l: A metal belt with engraved font that permits the customer to obtain more than one character set print belt for various applications. See "Specify" for restrictions and limitations. The belt can be used interchangeably with the one provided on the machine.

	Feature
155 lpm Max - Available in EBCDIC and ASCII character arrangements.	
48-character ASCII	**#5811****
64-character ASCII	**#5812****
94-character ASCII	**#5813****
48-character EBCDIC	**#5821**
94-character EBCDIC	**#5823**
96-char EBCDIC (word processing) Courier Typestyle	**#5831**
96-char EBCDIC (word processing) Artisan Typestyle	**#5832**
128-char EBCDIC (data & word processing) & ASCII	**#5833**
410 lpm Max - Available in EBCDIC and ASCII character arrangements.	
48-character EBCDIC/ASCII	**#5825**
64-character EBCDIC	**#5826**
94-character EBCDIC	**#5827**
128-char EBCDIC (data & word processing) & ASCII	**#5834**

** ASCII Feature **(#9022)** required.

SUPPLIES

Contact IBM.

3791 CONTROLLER MDLS 11, 12

PURPOSE

The 3791 Controller, models 11C, 12A or 12B, serves as an intelligent base for clusters of operator stations attached to the 3730 Distributed Office Communication System.

MODELS

Model 11C	C11	Provides 10 million bytes* of disk storage
Model 12A	A11	Provides 20 million bytes* of disk storage
Model 12B	B11	Provides 30 million bytes* of disk storage

*The minimum disk storage available for data storage and user programs (based on a maximum 3791 configuration) is:

Mdl 11C: 5.2 million bytes
Mdl 12A: 14.5 million bytes
Mdl 12B: 23.8 million bytes

Maximum: One 3791 per 3730 system.

Prerequisites: Local Channel Attachment feature (#1515), or one SDLC Communication feature (#6301, #6302 or #6303) is required for CE maintenance purposes. To operate a 3730 system, at least one 3732 Text Display Station with keyboard and either a 3736 Printer or a 3791 Line Printer feature is required.

HIGHLIGHTS

The 3791 Controller mdl 11C, 12A or 12B with configuration support **#9171** installed, serves as the Controller for the 3730 Distributed Office Communication System to support the 3730 functions of document creation, editing, storage, retrieval, formatting, printing, archiving and (with **#9275**) automated text.

Additional controller features and facilities include:

- Non-removable disk storage for customer use
- Line printer feature
- Host system attachment (**#9285**) through an SDLC communications feature, or through a local channel attachment feature.

Communication Facilities: Direct Attachment to a S/370 or 3031, 3032, 3033, 4331 or 4341 processor byte and/or block multiplexer channel utilizing Local Channel Attachment (#1515).

Synchronous Data Link Control (SDLC) using switched point-to-point lines at speeds of up to 2400 bps, or nonswitched point-to-point, or nonswitched multipoint lines at speeds of up to 9600 bps subject to carrier availability via the 3704 or 3705. See M2700 pages.

For the 3791-to-3704/3705 SDLC link, IBM offers a 1200 bps integrated modem or an EIA feature for the attachment of external modems.

Note: For communication capabilities and modem attachment data, see M2700, 3863, 3864, 3865, 3872, 3791, 3792, 3704, or 3705 pages for further information.

Host/3791 Communication:

Byte and/or Block multiplexer channel
1200 bps Integrated Modem, Nonswitched
1200 bps Integrated Modem, Switched
3863 Modem, 2400 bps Switched and Nonswitched
3864 Modem, 4800 bps Switched and Nonswitched
3865 Modem, 9600 bps Nonswitched
3872 Modem, Nonswitched
3872 Modem, Switched
TCTS Dataroute Network at 2400, 4800 or 9600 bps (Canada)
CN/CPT Infodat Network at 2400, 4800 or 9600 bps (Canada)
Facilities K3M, K4M and K5M at 2400, 4800 or 9600 bps (Canada)
NTT DDC Network at 2400, 4800 or 9600 bps (Japan)
NTT DDX Network at 2400, 4800 or 9600 bps (Japan)

3791 Test Site Designation (#9595): The purpose of **#9595** is to provide the 3730 customer with the ability to designate a test site location at which he wants to install a mandatory Microcode Engineering Change. Receipt of changes at this location will occur before a new production unit can reach the customer network and before the change is distributed to other installed locations requiring the change.

This feature should be limited to one per network.

3791 Alternate Mailing Address (#9596) for Microcode Updates: **#9596** provides the 3730 customer with the option of having Mandatory Microcode Updates shipped to a single address, generally a central site, for better network management control. The alternate address is controlled by Field Engineering through assignment of a Teleprocessing Control Number (TPC#) or Microcode Control Number (MC#). Redistribution of the micocode updates is the responsibility of the customer.

Installation of the Mandatory Microcode Engineering Change should be coordinated between the Central Site FE manager and the customer central site coordinator to ensure a smooth and non-disruptive upgrade.

Control Storage Features: The amount of control storage to be ordered for the 3730 Distributed Office Communication System (**#9171**), depends on both the quantity and type of attachments in the system configuration. See *3790 Communication System Configurator,* GA27-2768 to determine the correct ordering quantities of control storage.

Publications: Refer to the latest level of *IBM System/370 Bibliography of Industry Systems and Application Programs,* GC20-0370, for details of 3791 and 3730 system publications.

SPECIFY

For details of specify codes, refer to *3790 Communication System Configurator,* GA27-2768.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Moisture proof plug – **#9902** for 208V or **#9904** for 230V. Locking plug – **#9884** for 208V, or **#9886** for 230V.
- Color: [available at time of manufacture only] Blue (**#9043**), Red (**#9041**), Gray (**#9045**), Yellow (**#9042**).
- Up-ending Kit (in the event the 3791 must be placed on end to enter installation area): Specify **#9840**.
- Cables: Contact IBM.
- Specify **#9022** for ASCII support: ASCII support is provided for the Host Link, Diskette, 3277, 3284, 3286, 3287, 3288, 3732, 3736 and 3791 Line Printers (#4710, #4711 or #4715). Only ASCII support type B is provided for the 3287, 3732 and 3736. **Prerequisites:** **#9171** with **#9275**.
- Print Belt Character Set: Specify for 3791 Line Printer (feature codes #4710, #4711 or #4715) one of the following. These specify codes are available at time of manufacture only.)

  If additional print belts are required, see "Accessories". The 48-character and 128-character print belts can be used for ASCII or EBCDIC.

  #9071 -- 48-char set, EBCDIC
  #9072 -- 64-char set, EBCDIC
  #9073 -- 96-char set, EBCDIC

  #9071 -- 48-char set, ASCII
  #9074 -- 64-char set, ASCII
  #9075 -- 96-char set, ASCII
  #9076 -- 128-char set, DP/WP EBCDIC (1)
  #9077 -- 96-char set, WP EBCDIC - Courier (2)
  #9078 -- 96-char set, WP EBCDIC - Artisan (2)

  (1) Allows text and data to be printed in 3730-3790 system without the need to change print belts.

  (2) Cannot be installed with #4715.
- Configuration Support: Specify **#9171** for 3730 Distributed Office Communication System, including support for 3732 Text Display Station and 3736 Printer. **Field Installation:** Yes. **Limitations:** Not available with mdl 1A, 1B, 1C, 2A or 2B or with Configuration Support **#9431, #9155, #9165, #9169, #9175** or **#9195**.

Configuration: The following function and attachment specify codes must be selected to support the terminals to be attached to a 3791 mdl 11C, 12A or 12B.

3793 Attachment	**#9011**	Specify that a 3793 is to be attached by ordering quantity. **Maximum:** One. **Prerequisites:** **#9275**.
3277, 3284, 3286, 3287, 3288 Attachment	**#9200**	Specify total number of devices attached by ordering quantity. **Prerequisites:** **#9275**. **Maximum:** 29.
3732,3736 Attach	**#9016**	Specify combined total of 3732s and 3736s by ordering quantity. **Maximum:** 30 if **#9275** is specified ... 16 if **#9275** is not specified.

Support Functions

Functions	Specify	Comment
Line Printer Support	**#9561**	132 print positions.
System Activity	**#9149**	Specify to define concurrent device activity. **Minimum:** One. **Maximum:** 31. **Prerequisites:** **#9275**.
Batch Data Exchange via Diskette	**#9037**	Optional, order only if required. Required for support of user program ing when **#9285** is not specified. **Maximum:** One. **Prerequisites:** **#9275**.
RJE Function	**#9541**	Specify only if required. Cannot be installed if Magnetic Tape Attachment

3791 Controller Mdls 11, 12 (cont'd)

		(#7840) is installed. **Maximum**: One. **Prerequisites**: **#9285** with **#9011** or **#9200**.
Test Site	**#9595**	To designate a 3791 location as a test site for Mandatory Control Code Engineering Changes. **Prerequisites**: **#9285**. **Limitations**: One per network.
Alternate Mailing Address	**#9596**	To designate that an alternate mailing address is available for microcode updates.
Additional User Sessions	**#9345**	Optional, order only if required. Provides 15 additional user sessions. Basic system provides 16 user sessions. **Prerequisites**: **#9275**.
Host Communication	**#9285**	Optional. Required for applications involving host system communications. Required for support of user programming when **#9037** is not specified. **Maximum**: One. **Prerequisites**: **#9275** with #1515, #6301, #6302 or #6303.
Extended Function	**#9275**	Optional. Required for support of automated text, user application programming and 3730-3790 concurrent operations. **Maximum**: One.

SPECIAL FEATURES

Non-Communication Features

Local Channel Attachment (#1515): Provides for direct attachment to any S/370 or 4300 processor* via an integrated byte and/or block multiplexer channel or via a 2870 byte multiplexer or 2880 block multiplexer channel. Maximum distance from the channel is 200 feet. **Limitations**: Cannot be installed with SDLC Communications feature (#6301, #6302 or #6303). **Maximum**: One. **Field Installation**: Yes.

* This feature attaches to only one channel of a multiprocessing system.

Add'l Disk Heads (#3221): Provides additional disk heads to improve performance in certain configurations and for certain applications. **Prerequisites**: **#9275, #9285**. **Maximum**: One additional head on mdl 12A. Two additional heads on mdl 12B. **Limitations**: Cannot be installed on 3791 mdl 11C. **Field Installation**: Yes.

Line Printer, 80 Print Positions (#4710): [155 lpm - 6 lines per 2.54cm (inch)] Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, 80 lpm with 96-character set and 40 lpm with 128-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, 96-, or 128-character set). Capability to print on continuous fanfold paper up to 80 print positions on an 20.0cm (8.0 in.) print line with line spacing of 6 lines per 2.54cm (inch). Paper up to six parts plus carbon (maximum total thickness is 0.50mm) can be accommodated. Maximum paper width is 15.0 in. overall. Refer to *Forms Design Reference Guide For Printers* (GA24-3488) for form design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1136634 or equivalent for replacement ribbons. **Maximum**: One per 3791. **Field Installation**: Yes. **Specify**: See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96- or 128-character sets.

Line Printer, 132 Print Positions (#4711): [155 lpm - 6 lines per 2.54cm (inch)] Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, 80 lpm with 96-character set and 40 lpm with 128-character set. Included as standard is one operator interchangeable print belt (48-, 64-, 96-, 128-character set). Capability to print on continuous fanfold paper up to 132 print positions ASCII or EBCDIC character set must be specified on a 33.5cm (13.2 inch) print line with line spacing of 6 lines per 2.54cm (inch). Paper of up to six parts plus carbon (maximum total thickness is 0.50mm or 0.020 in.) can be accommodated. Refer to *Forms Design Reference Guide For Printers* (GA24-3488) for form design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1136634 or equivalent for replacement ribbons. **Maximum**: One. **Field Installation**: Yes. **Specify**: See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96- or 128-character sets.

Line Printer - 132 Print Positions (410 lpm) (#4715): Provides a higher speed line printer with maximum speeds of 410 lpm with 48-character set, 300 lpm with 64-character set, 230 lpm with 96-character set, and 160 lpm with 128-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, 96- or 128-character set), and a forms stand which is an integral part of this feature. ASCII or EBCDIC character set must be specified. Capability to print on continuous fanfold paper up to 132 print positions on a 33.5cm (13.2 in.) print line with line spacing of 6 lines per 2.54cm (inch) with **#9431**. Paper of up to six parts plus carbon (maximum total thickness is 0.50mm or 0.020 in.) can be accommodated. Refer to *Forms Design Reference Guide For Printers* (GA24-3488) for forms design considerations. Card stock is not recommended. A form-jam detection capability is provided. Order P/N 1299160 or equivalent for replacement ribbons. **Maximum**: One. **Field Installation**: Yes. **Specify**: See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96- or 128-character sets.

Security Keylock (#6350): Allows the 3791 to be "powered-on" only with key. Removing the key does not turn power off. For additional or replacement keys, see "Accessories". **Maximum**: One. **Field Installation**: Yes.

Magnetic Tape Attachment (#7840): Provides for the attachment of the 3411 Magnetic Tape and Control Unit mdl 1. Additional tape capacity is provided by attachment of the 3410 mdl 1 via the 3411 Magnetic Tape Unit. The total number of tape units (3410 and 3411) on a 3791 Controller is four. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #7003, #3211 or #3221 and **#9171** with **#9275**. **Limitations**: Only 3411 Single Density (#3211) and Dual Density (#3221) are supported by the 3791 Controller. #7840 cannot be installed with the RJE Function (**#9541**).

3793 Attachment (#7901): Allows one 3793 Keyboard-Printer to to be attached to the 3791. See M3793 pages. **Prerequisites**: **#9011**. **Maximum**: One. **Field Installation**: Yes.

Device Attachment Type II, Add'l (#7912): Each feature allows attachment of any combination of up to four additional 3277s and/or 3284s, 3286s, 3287s, 3288s, 3732s, 3736s to be attached to the 3791. (The first four devices can be attached with **#9171** only specified.) **Maximum**: Seven, but restricted to a maximum of 31 devices. **Prerequisites**: **#9016** to attach additional 3732s and 3736s, or **#9016** with **#9200** to attach additional 3277s, 3284s, 3286s, 3287s, 3288s, 3732s and 3736s. **Field Installation**: Yes. **Limitations**: All 3277s and 3732s must have a keyboard. If printer feature #4710, #4711 or #4715 is attached, maximum number of devices is restricted to 30.

Control Storage Increment, Type I-A (#1603): Provides 16,384 positions of additional control storage. **Maximum**: One. **Field Installation**: Yes.

Control Storage Increment, Type II-A (#1613): 16,384 positions of additional control storage. **Maximum**: Two. **Field Installation**: Yes.

Communication Features

EIA Interface (#3701): Provides EIA Interface for the attachment of an IBM or other external modem. **Limitations**: Cannot be installed with the 1200 bps modems (#5500 or #5501). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #6301, #6302 or #6303.

Modem, 1200 bps Integrated, Nonswitched (#5500): Provides an integrated modem for communication with the host system over nonswitched lines. No external modem is required. **Limitations**: Cannot be installed with communications features #3701 or #5501 or #6302 or #6303. **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #6301. **Specify**: **#9651** for 4-wire strapping, or **#9652** for 2-wire strapping .

Modem, 1200 bps Integrated Switched (#5501): Provides an integrated modem with an answering capability for communication from the host system over switched lines via FCC registered protective circuitry of the CBS type or equivalent) provided by the user. The coupling device determines whether the answering capability is manual or automatic. **Prerequisites**: #6301. **Maximum**: One. **Field Installation**: Yes. **Limitations**: Cannot be installed with communications features #3701, #5500, #6302 or #6303.

SDLC Communication Feature With Business Machine Clock (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500 or #5501 or, via an EIA Interface (#3701), to any external modem which does not provide its own clocking. Half-speed or 600 bps is attainable with this feature. **Limitations**: Cannot be installed with SDLC features (#6302, #6303) or Local Channel Attachment (#1515). **Maximum**: One. **Field Installation**: Yes.

SDLC Communication Feature Without Business Machine Clock (#6302): Required for attachment to communication lines via an EIA Interface (#3701) and an external modem which provides its own clocking up to 2400 bps with **#9431** or **#9165**, and up to 4800 bps with **#9155, #9175** or **#9195**. **Limitations**: Cannot be installed with SDLC features (#6301, #6303), 1200 bps Modem features (#5500), or Local Channel Attachment (#1515). **Maximum**: One. **Field Installation**: Yes.

SDLC Communication Feature Without Business Machine Clock (#6303): Required for attachment to communication lines via an EIA Interface (#3701) and an external modem which provides its own clocking of up to 9600 bps. **Limitations**: Cannot be installed with communication features #1515, #5500 or #5501 , #6301, #6302. **Maximum**: One. **Field Installation**: Yes.

3791 Controller Mdls 11, 12 (cont'd)

MODEL CONVERSIONS

The following model changes may be field installed:

From/To	11C	12A	12B
1C*	X	X	X
2A*		X	X
2B*			X
11C		X	X
12A			X

* For field conversions of purchase 3791 models 1C, 2A or 2B to models 11C, 12A or 12B, call the 3790 Marketing Center Manager for assistance in planning the model conversion.

Model upgrade requires replacement of disk storage unit. Adequate provision must be made for retaining data contained on disk storage unit and elimination of user-proprietary information.

ACCESSORIES

Forms Stand (#4450): [For 155 lpm Line Printer features #4710 and #4711 only] A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after print. A forms stand is an integral part of the 410 lpm Line Printer feature (#4715). For shipment with machine, order by feature number. . Order via MSORDER (Category = Supplies/ Accessories; Group Code = 31) on AAS.@SS@

Cables: Cables to attach 3790 units may be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of these cables. Coaxial cables, connections, and accessories for the 3277 and 3288 are applicable when these units are attached to the 3790 system. Refer to M3270 pages for part numbers.

Unit	Cable Assm No	Use	Maximum Length	Notes
3791	1832533	Keyboard Printer	48 ft	1
3792	1832533	Keyboard Printer	48 ft	1
	1454167	75 Cond. Cable Bulk		
	1836445 (P/N)	Connector Group		2
3791	2577672	Aux. Control Unit	2000 ft	3
3791	2577672	3760 mdl 1 & 3	2000 ft	3
3791	2577672	3732/3736 (indoor)	2000 ft	
3791	1833108	3732/3736 (outdoor)	2000 ft	

Notes:

1. Communication cable consisting of bulk cable #1454167 and connector group #1836445.
2. Contains connector assemblies for both ends of communication cable.
3. Indoor Cable. For coax wire and connector kit part numbers, refer to M3270 pages.

Locks and Keys: The 3791 with the Security Key Lock (#6350) is shipped with two keys. Additional keys may be purchased only from IBM. A letter of authorization must accompany order and serial number of lock must be indicated.

Print Belt, Add'l: A metal belt with engraved font that permits the customer to obtain more than one character set print belt for various applications. See "Specify" for restrictions and limitations. The belt can be used interchangeably with the one provided on the machine.

	Feature
155 lpm Max - Available in EBCDIC and ASCII character arrangements.	
48-character ASCII	**#5811****
64-character ASCII	**#5812****
94-character ASCII	**#5813****
48-character EBCDIC	**#5821**
94-character EBCDIC	**#5823**
96-char EBCDIC (word processing) Courier Typestyle	**#5831**
96-char EBCDIC (word processing) Artisan Typestyle	**#5832**
128-char EBCDIC (data & word processing) & ASCII	**#5833**
410 lpm Max - Available in EBCDIC and ASCII character arrangements.	
48-character EBCDIC/ASCII	**#5825**
64-character EBCDIC	**#5826**
94-character EBCDIC	**#5827**
128-char EBCDIC (data & word processing) & ASCII	**#5834**

** ASCII Feature **(#9022)** required.

SUPPLIES

Contact IBM.

3792 AUXILIARY CONTROL UNIT

PURPOSE

Provides for the attachment of up to four 3793 Keyboard Printers, up to two communications lines for 2741 Communication Terminals, and as a feature, a line printer ... see "Special Features". The 3792 can be attached to the 3791 at a distance up to 2,000 feet.

MODELS

Model 1: 001

Limitations: Only one 3792 Line Printer feature (#4712 or #4713) can be attached to a 3790 system. The one printer feature may be on any one of the three 3792 control units attachable to the 3791 controller. If Line Printer (#4712 or #4713) is installed, then the combined total of 2741 lines and 3793s cannot exceed four.

Prerequisites: A 3791 Controller equipped with #7900.

Maximum: Three per 3791 Controller.

HIGHLIGHTS

Up to four 3793 Keyboard Printers and up to two communications lines can be attached to the 3792 as a subcluster to the 3791. The 3792 attaches to the 3791 via Device Attachment Type I (#7900) on the 3791 at a distance of up to 2,000 feet. Buffering, controlling, and checking of input and output data are provided.

Communications Facilities: See M2700 pages.

Modems: (3792/2741 Communications)

Leased Line Adapter (#5400) on the 3792.

Publications: GC20-0370

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V ... non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Color: [Available at time of manufacture only] **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.
- Print Belt Character Set: Specify for 3792 Line Printer (#4712 or #4713). These specify codes are available at time of manufacture only. See "Accessories" if more than one print belt is required.

  48-Character Set **#9071** EBCDIC
  64-Character Set **#9072** EBCDIC
  96-Character Set **#9073** EBCDIC
- Attachment Position on the 3791: **#9110** for first 3792, **#9120** for second 3792, **#9130** for third 3792.

SPECIAL FEATURES

Non-Communication Features:

Control Storage Increment (#1622): Provides an 8,192 byte increment of control storage. Whether additional control storage is to be ordered is dependent upon specify features and the quantities and types of attachments in the 3790 system configuration. See *IBM 3790 Communication System Configuration* (GA27-2768) , for details. **Maximum:** One. **Field Installation:** Yes.

Line Printer - 80 Print Positions 155 lpm Max. (#4712): Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, and 80 lpm with 96-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, or 96-character set). Capacility to print on continuous fan fold paper up to 80 print positions on a 20cm (8 inch) print line, 6 lines per 2.54cm (inch). Paper up to six parts plus carbon can be accommodated. Maximum total thickness is 0.50mm (0.020 inches). Maximum paper width is 15 inches overall. Card stock is not recommended. A form-jam detection capability is provided. See "Supplies" for ribbon. **Limitations:** Line printers on the 3791 and 3792 must have the same number of print positions. **Maximum:** One. **Field Installation:** Yes. **Specify:** See "Print Belt Character Set" under "Specify" for ordering 48-, 64-, 96-character sets.

Line Printer - 132 Print Positions 155 lpm Max. (#4713): Provides a line printer with maximum speeds of 155 lpm with 48-character set, 120 lpm with 64-character set, and 80 lpm with 96-character set. Included as standard is one operator-interchangeable print belt (48-, 64-, 96-character set). Capability to print on continuous fan fold paper up to 132 print positions on a 38.1cm (15 inch) print line, 6 lines per 2.54cm (inch). Paper up to six parts plus carbon, can be accommodated. Maximum total thickness is 0.50mm (0.020 inches) Card stock is not recommended. A form-jam detection capability is provided. See "Supplies" for ribbon. **Limitations:** Line printers on the 3791 and 3792 must have the same number of print positions. **Maximum:** One. **Field Installation:** Yes. **Specify:** See "Print Belt Character Set" under Specify for ordering 48-, 64-, 96-character sets.

3793 Attachment (#7901): To attach one 3793 Keyboard Printer to the 3792 ... see M3793 page for details. **Limitations:** If a Line Printer (#4712, #4713) is installed, then the combined total of 2741s and 3793s cannot exceed four. **Maximum:** Four. **Field Installation:** Yes.

Communications Features

Adapter Base (#1021): Provides for the installation of up to two Asynchronous Communications Controls (#1081). **Maximum:** One. **Field Installation:** Yes.

Asynchronous Communications Control (#1081): Provides for the installation of the EIA Interface (#3701) for external modems, or an IBM Leased Line Adapter (#5400) for communications with a 2741. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #1021.

EIA Interface (#3701): Provides EIA Interface and cable for the attachment of an IBM or other external modem ... refer to M2700 pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. **Limitations:** Specify codes **#9001** (1st #5400) and **#9004** (2nd #3701) are mutually exclusive. Specify codes **#9002** (2nd #5400) and **#9003** (1st #3701) are mutually exclusive. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #1081. The 3792 Communications Support required on the 3791 should specify whether External Modem attached to the 3792 will or will not have auto-answer. See "3792 Communications Support" under "Specify" on 3791 page. **Specify:** **#9003** for first #3701 feature, **#9004** for second feature.

IBM Leased Line Adapter (#5400): Provides a modem for communications with 2741 terminals via point-to-point nonswitched communications lines. **Limitations:** Specify codes **#9001** (1st #5400) and **#9004** (2nd #3701) are mutually exclusive. Specify codes **#9002** (2nd #5400) and **#9003** (1st #3701) are mutually exclusive. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #1081. **Specify:** **#9651** for 4-wire strapping (if Receive Interrupt feature is used by the 2741, 4-wire strapping is required); or **#9652** for 2-wire strapping ... **#9001** for first #5400 feature, **#9002** for second #5400 feature.

Security Keylock (#6350): Allows the 3792 to operate only when the key is in place, removing the key causes operation to stop. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

ACCESSORIES

Forms Stand (#4450): Permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. Available on a purchase-only basis. For shipment with machine, order the feature number indicated. This accessory is a two-shelf forms stand.

Locks and Keys: The 3792 with Security Keylock (#6350) is shipped with two keys. Additional keys may be purchased only from IBM. A letter of authorization must accompany the order and serial number of keylock must be included.

Print Belts, Add'l: Permits customer to obtain more than one Character set print belt for various applications.

48-char ASCII **#5811**	48-char EBCDIC **#5821**
64-char ASCII **#5812**	64-char EBCDIC **#5822**
94-char ASCII **#5813**	94-char EBCDIC **#5823**

SUPPLIES

Ribbons: For replacement ribbons on #4712 and #4713 Printers, order P/N 1136634 (or equivalent). Contact IBM.

3793 KEYBOARD-PRINTER

PURPOSE

Provides printed hard-copy and key data-entry facilities as an attachment to the 3791 Controller or the 3792 Auxiliary Control Unit.

MODELS

Model 1 001

HIGHLIGHTS

A modified Selectric® II typewriter terminal oriented to the functions of the 3790 system. The 3793 can be located up to 48 feet from the 3791 or 3792, with the customer responsible for the connecting cable. See the *Installation Planning Manual* for details. **Prerequisites:** One 3793 attachment (#7901, #7902 or #7903) on a 3791 or 3792 per 3793.

Keyboards: Includes an EBCDIC keyboard with operator guidance lights and switches.

Printer: A 15.5 cps printer (6 lines per inch) with friction-feed platen or, optionally, pin-feed platen. A Courier 72 print element (P/N 1167043) is supplied. 3790 programs can provide vertical forms movement and automatic print element positioning.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for non-locking plug.

SPECIAL FEATURES

Power Line Keylock (#5560): A key-operated switch in the power cord. When switch is in the OFF position, no action is possible at the 3793. Two keys are supplied with the feature. See "Accessories" for additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Locks and Keys: The 3793 Powerline Keylock (#5560) is shipped with two keys. Additional or replacement keys may be purchased from IBM. **Note:** Without Key Identification Number, a new feature (#5560) must be ordered.

Platens, Pinfeed: For feeding of continuous forms that have pre-punched feed holes. On any one machine, one pinfeed platen may be ordered for plant installation in lieu of the standard solid (friction feed) platen. The platen becomes the property of the customer and cannot be returned for credit.

Specify:

1) Feature **#9509**

2) Line spacing and hole-to-hole width: One feature number, depending upon forms width and line spacing, from "Line Spacing" table below. (On the 3793, only six lines per inch is available).

Line Spacing: With **#9509**, one of the following feature numbers must be specified.

Overall Forms Width	Hole-to-Hole Width	Writing Line	Feature Number
5-3/4"	5-1/4"	4-5/8"	**#9151**
6-1/2"	6"	5-3/8"	**#9152**
8"	7-1/2"	6-7/8"	**#9153**
8-1/2"	8"	7-3/8"	**#9154**
9-1/2"	9"	8-3/8"	**#9155**
9-7/8"	9-3/8"	8-3/4"	**#9156**
10-3/8"	9-7/8"	9-1/4"	**#9157**
10-1/2"	10"	9-3/8"	**#9158**
10-5/8"	10-1/8"	9-1/2"	**#9159**
11-3/4"	11-1/4"	10-5/8"	**#9160**
12"	11-1/2"	10-7/8"	**#9161**
13"	12-1/2"	11-7/8"	**#9167**
13-5/8"	13-1/8"	12-1/2"	**#9162**

SUPPLIES

Contact IBM.

3800 PRINTING SUBSYSTEM MDL 1

PURPOSE

The 3800 model 1 is the printer output unit for S/370 models 145, 145-3, 148, 155-II, 158, 165-II, 168, 3031, 3032, 3033, 3081, 3083, 3084 and 4300 Processor. A feature allows data input from magnetic tape without printer output unit attachment to a system.

MODELS

Model 1 001

HIGHLIGHTS

Prints on single part continuous forms providing 50 discrete paper sizes . Printing is repeated for multiple copies, and every copy is of "original" quality.

PRINT SPEED RANGE:

Common Use Option

Forms Length Inches	Forms Per Min. Up to:	Lines Per Minute* 6 lpi Up to:	8 lpi Up to:	12 lpi Up to:
3-1/2	526	7,890	10,520	15,780
5-1/2	334	9,018	12,024	18,036
7	263	9,468	12,624	18,936
8-1/2	215	9,675	12,900	19,350
11	167	10,020	13,360	20,040

* Single Copy Speeds

Printer job throughput can vary depending upon form length, number of copies needed, and functions exercised.

52K-byte storage is standard for page buffering. Storage is reduced to 42K when data input is from magnetic tape in lieu of system.

Pitches: 10, 12 and 15 characters per inch (cpi) are standard.

Print Line Maximums: of 136 positions at 10 cpi, 163 positions at 12 cpi, 204 positions at 15 cpi ... pitches (10, 12 and 15 cpi) can be intermixed within a page or line ... vertical line spacings are 6, 8, and 12 lines per inch, with intermixed line spacing within a page being possible.

STANDARD CHARACTER SETS:

Character Style	Pitch (cpi) 10	12	15	Special Under-scored
Gothic	X	X	X	Yes
Gothic 15 Condensed			X	Yes
Text 1 (Upper Case)	X			Yes
Text 2 (Lower Case)	X			Yes
OCR A	X			
OCR B	X			
Format	X	X	X	
Katakana	X	X		

Note: Includes all standard World Trade National Use Graphics.

Character sets are organized into blocks of up to 64 characters and are held in subsystem read-only storage.

The 3800 Printing Subsystem has electronic character generation using Writable Character Generation Storage--128 Writable Character Generation Storage positions are standard and organized into two 64-character Writable Character Generation Modules (WCGM) ... character sets are program-selected without operator intervention and dynamically loaded into hardware WCGMs -- when operating offline under control of Tape-to-Printing Subsystem (#7810), character sets are loaded into read only storage (WCGM's) by the operator through the operator panel, or by the 3800 control file tape which is an output of the Utility Program Product, 5748-UT2. Customer designed characters require use of the Utility Program. ... an additional increment of 127 Writable Character Generation Storage positions (optional) provides dynamic storage for printing four character styles and/or pitches with one data set -- this represents up to 255 graphics online with no throughput loss ... dynamic storage allows character substitution under program control; a customer may design his/her own characters ... When operating under control of #7810, customer-designed characters require use of Utility Program Product 5748-UT2 .

By using the new maximum print size of 204 positions, Gothic 15 style reports (15 characters/inch at 8 lines/inch) can be reduced from 11 x 14-7/8 inches to the more convenient size of 8-1/2 x 11 inches thereby increasing throughput while reducing both forms costs and filing space requirements. The application of 12 lpi vertical spacing with the Gothic 15 Condensed character set can result in a further reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.

Optical Character Recognition (OCR): Printing alphameric OCR A and the less stylized OCR B fonts can be intermixed with non-OCR fonts with no reduction in printing throughput. Documents may be processed by the 1287, 1288 and 3886 Optical Character Readers. Refer to the appropriate sales manual pages for specific capabilities.

Note: The OCR characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the "United States of America Standard Character Set for Optical Character Recognition, size A, USAS X3.17-1966" for OCR-A font (also referred to as ANSCS OCR) and the "European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition 2nd Edition, October 1971" for OCR-B font.

Text Character Set: Uses upper and lower case characters, serif design, special graphics, with no reduction in throughput.

Format: Is in 10, 12 and 15 pitch, with merge format and data, and is program-controlled. Format 10, 12, and 15 pitch - merge format and data - program controlled for on-line operation, for off-line with feature #7810 format character sets require Utility Program Product 5748-UT2.

Copy Modification Function: Identifies copies with legends, phrases or names (e.g., "Customer Copy", "For Accounting Use Only", etc.), addresses each report copy to speed distribution, spots carbon or field blockout functions, is identification and deletion program controlled; has customized forms with the identification, deletion and formatting functions. When operating under control of #7810, Copy Modification Function requires use of Utility Program Product 5748-UT2.

Forms Overlay: Optical image system prints high quality document and report formats, designs or other constant data, merge format and data, and is program controlled. When operating under control of #7810, overlay is invoked from the operators panel or by the Utility Program Product 5748-UT2.

Single Part Continuous Form Output: Includes custom print forms, and features no deleaving, no carbon disposal, faster turnaround, program control of copy quantity, with up to 255 copies. Job separation is by perforation marking use Mark Form function.

Optional Burster-Trimmer-Stacker Output: Burster/trimmer bottlenecks eliminated ... offset separation between data set copies ... removal of output while running ... first-in, first-out job sequence ... trimmed edges.

Optional Channel Switching: Manual switches provide system configuration flexibility through the use of the 2914 Manual Switch mdl 1 (RPQ 880882) or the Two Channel Switch feature (#8170), automatic switching is provided by the Dynamic Two Channel Switch feature (#8171) for two processors in a tightly coupled MP configuration, and two channels on a single processor providing alternate path capability.

Laser Safety: The 3800 contains a laser assembly. In IBM's opinion, the 3800, including the laser assembly, is designed to comply with the safety standards of the U.S. Department of Health, Education and Welfare (21 CFR 1040). Separate registrations by the customer may be required by some states.

Limitation: Prints on discrete form sizes in either of two standards. Common Use Standard utilizes five forms depths (3-1/2, 5-1/2, 7, 8-1/2 and 11 inches) and ten forms widths (measured edge to edge: 6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3 and, 14-7/8 inches) which permute to 50 discrete sizes. Forms are refolded into lengths of 7 (2 x 3-1/2), 8-1/2, and 11 inches (2 x 5-1/2).

Character and forms overlay printing are restricted from the first and last half inches of forms lengths. A printed line can begin a minimum of 0.5 inches from the left page edge and must end no nearer than 0.8 inches from the right-side edge of the paper for all widths except the 14-7/8 inch width for which the printed lines must end at least 0.675 inches from the right.

Paper must be from 15 lb (56.4 g/m^2) to 24 lb (90.2 g/m^2) basic weight except for OCR for which the minimum paper weight is 20 lb (75.3 g/m^2). See GA26-1633-0 for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, and print line adjustment is made by electronically moving the line. First print positions can move to the right 5.7 inches but will cause an equivalent number of positions at the right end to be moved beyond the above-defined print line boundaries.

It is recommended that printing not occur within 0.100 inches of any binder holes or corner cuts within the form.

Prerequisites: A control unit position on a system channel and/or Tape-to-Printing Subsystem Feature (#7810).

S/370 mdl 145 (excluding 3145-3) -- byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features) ... see M3145 pages. Attachment to the byte multiplexer channel is not recommended. Selector channel attachment is not recommended unless dedicated.

S/370 mdl 145-3, 148 -- byte multiplexer channel (standard), block multiplexer channels ... see M3145-3, 3148 pages. Attachment to the byte multiplexer channel is not recommended.

S/370 mdl 155II, 158 -- byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158, 3158-3 pages.

3800 Printing Subsystem Mdl 1 (cont'd)

S/370 mdl 165II, 168 -- Selector channel of 2860, basic multiplexer channel of 2870, selector subchannel (special feature) of 2870, shared or non-shared subchannel of 2880 ... see M2860, 2870, 2880 pages. Selector channel attachment is not recommended unless dedicated.

3031 or 3032 Processor -- byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor -- byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

3081, 3083, 3084 Processor -- byte multiplexer channels, block multiplexer channels ... see M3081, 3083, 3084 pages. Attachment to a byte multiplexer mode channel is not recommended.

4300 Processor -- byte multiplexer channel, block multiplexer channel. Attachment to the byte multiplexer is not recommended.

Tape-to-Printing Subsystem (#7810) -- in lieu of or in addition to system channel attachments above ... see "Special Features".

SPECIFY

- Voltage: (AC, 3-phase, 4 wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage.
- Color (for end cover only; machine is cloud white):

  Blue **#9043** Red **#9041**
  Gray **#9045** Yellow **#9042**

- Tool Kit:

  For rental customer, select one:

  - First 3800 (mdl 1 or 3) ordered, specify **#9330** when ordering a mdl 1.
  - If unit ordered is second or higher 3800 mdl 1 or 3 to be installed, no additional tool kit is required.
  - If required for a multiple machine installation because of physical locations of machines, an additional tool kit(s) is available on a no-charge MES. (See 3800-3 pages if a mdl is at the alternate location.)

  For purchase customer, select one:

  - For each new purchase 3800 mdl 1, specify **#9330.**
  - When installed 3800 mdl 1s are purchased, a tool kit **(#9330)** is to be ordered on a no-charge MES for each machine.

  Note: A Tool Kit **(#9220)** is required with Burster-Trimmer-Stacker (#1490) ... see #1490 below.

SPECIAL FEATURES

Burster-Trimmer-Stacker (#1490): Provides an additional output stacking mode. Bursts the five forms lengths to individual sheets and stacks sheets sequentially. It also trims the left and right 12.7mm (0.5 inch) carrier strips from output sheet. **Maximum:** One. **Field Installation:** Yes. **Specify:** One tool kit.

For rental customer -- specify **#9220** for first Burster-Trimmer-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

For purchase -- specify **#9220** on each Burster-Trimmer-Stacker feature order. When installed Burster-Trimmer-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

127 Writable Character Generation Storage Positions, Add'l (#5401): Additional increment of 127 positions allows up to 255 graphics to be printed within a data set. **Maximum:** One. **Field Installation:** Yes.

Tape-To-Printing Subsystem Feature (#7810): Allows the 3800 to be operated from magnetic tape data. Either 3411/3410 or 3803/3420 tape systems may be attached. With the feature installed, the 3800 may be operated either offline under operator control or online. Up to eight tape control units may be attached provided that power sequencing and control connection for all other than one are provided by a system; and provided that all 3803 control units have at least one path, which may be switchable, to a S/360, S/370 or 4300 processor. This feature will accept the non-IBM system print tape formats described below. **Burroughs:** B7000/B6000 Print Backup Tapes. For further detail refer the customer to:

B7000/B6000 Series System Software Operational Guide Volume 1 (Form #5001563), Section 1 (Backup)

Tape files must be 7- or 9- track, EBCDIC coding, and ANSI (USASI) standard tape labels and data formats. For further detail refer the customer to *B7000/B6000 Series I/O System Reference Manual* (form #5001779).

For definition of line printer control words, refer the customer to: *Burroughs B6700 Handbook*, (form #5000276).

Honeywell: Series 60 (level 66/6000) Bulk Media Conversion program formats and Standard System formats that have the following characteristics:

- Variable length records
- Binary or BCD mode
- 7- or 9- track
- Standard labeled or non-labeled
- Low or high density
- Standard printer commands with or without edit characters

For further details refer the customer to the following Honeywell publications:

DD11 Bulk Media Conversion
DD07 File and Record Control
DB82A I/O Programming

Sperry Univac: 1100 series systems System Data Format (SDF) Symbiont print tape. For further detail refer the customer to:

Sperry Univac 1100 Series Executive System Volume 3 System Processors (form #4144.3).

Tape files may be 7- or 9- track, Field Data or ASCII

For further description of tape labels and file format and definition of line printer control functions refer the customer to:

Sperry Univac 1100 Series Executive System Volume 2 EXEC (form #4144.2).

Limitations: Selection of the non-IBM system tape format to be used must be made by the operator before printing.

Where more than one print character is represented by one 8-bit byte (data packing) on the non-IBM system print tape, applications using character densities above 8160 characters per 11 inch page may impact 3800 overall throughput and must be evaluated.

When using non-IBM system print tape formats, control tapes produced by IBM 3800 Tape-to-Printing Subsystem Feature Utility (Program Product 5748-UT2) are supported only with an IBM record format of VBM (variable length block machine language) with standard IBM labels or no labels.

Maximum: One: **Field Installation:** Yes.

Channel Attachment Features, or Tape-to-Printing Subsystem feature #7810 in lieu of or in addition to channel attachment.

Remote Switch Attachment (#6148): To attach the Two-Channel Switch (#8170) to a configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170.

Two-Channel Switch (#8170): To attach the 3800 to two S/370 or 4300 processor channels which may be on the same processor or on two different processors (both interfaces must have the same device address). The Two-Channel Switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. **Maximum:** One. **Field Installation:** Yes.

Dynamic Two Channel Switch (#8171): Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems, and to be attached to two channels from a single processor in order to provide alternate path capability. For either tightly coupled multiprocessor or single processor attachments, data transfer occurs on only one channel path at a time. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170.

MODEL CONVERSIONS

A purchased 3800 model 1 can be field converted to a 3800 model 3 by MES ... see 3800 model 3 pages.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3800 PRINTING SUBSYSTEM MDL 3

PURPOSE

Printer output unit for S/370 models 158, 168, and the 3031, 3032, 3033, 3081, 3083, 3084, 4341, 4361 and 4381 Processors.

Note: Operating System support for the mdl 3 is provided only under MVS/SP Version 1.

MODELS

Model 3 003

Prerequisites: A control unit position on a system channel is required.

Note: The mdl 3 does not provide for attachment to a byte multiplexer channel.

S/370 mdl 158: Block multiplexer channels (first two are standard). The mdl 158-1 requires EC 278240 to operate with the 3800 mdl 3. The mdl 158-3 requires EC 278249 to operate with the 3800 mdl 3. the use of short cables (under 70 feet in length) between the processor and the 3800-3 may cause overruns, contact your local Field Engineering installation planning representative ... see M3158-1, 3158-3 pages.

S/370 mdl 168: Selector channel of 2860, selector subchannel (special feature) of 2870, shared or non-shared subchannel of 2880 ... see M2860, 2870, 2880 pages. Selector channel attachment is not recommended unless dedicated to the printer ... see M3168 pages.

3031 or 3032 Processor: Block multiplexer channels (five are standard) ... the 3031 and 3032 require EC 279679 to operate with the 3800 Mdl 3 ... the use of short cables (under 70 feet in length) between the processor and the 3800-3 may cause overruns, contact your local Field Engineering installation planning representative ... see M3031 and 3032 pages.

3033 Processor: On mdls U, A, and M block multiplexer channels (ten are standard); on Mdl Group N block multiplexer channels (five are standard, five are optional); on Mdl Group S block multiplexer channel (five are standard) ... the 3033 requires EC 279679 to operate with the 3800 mdl 3 ... the use of short cables (under 70 feet in length) between the processor and the 3800-3 may cause overruns, contact your local Field Engineering installation planning representative ... see M3033 pages.

3081 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed) ... the 3081 requires system EC 213971 (including microcode EC 214788) to operate with the 3800 mdl 3 ... see M3081 pages.

3083 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed) ... see M3083 pages.

3084 Processor: Block multiplexer channels (up to 24 possible per side, 20 if 4 byte multiplexer channels are installed) ... see M3084 pages.

4300 Processor: Block multiplexer channel ... see M4341, 4361, 4381 pages.

HIGHLIGHTS

The 3800 mdl 3 offers new printing functions and improved print density with 240x240 picture elements (pels) per square inch, a 2.2 times improvement over the 3800 mdl 1. There are two modes of operation - Compatibility mode which prints 3800 mdl 1 applications with a minimum of change to the application - and "all-points-addressable" mode which prints complex pages for image, text, graphics, and system printing applications. All-points-addressable mode is also called Page mode.

The mdl 3 prints on single part continuous forms providing 50 discrete paper sizes. Printing is repeated for multiple copies and every copy is "original" quality.

Printing throughput can vary depending on form length, number of copies needed, and functions exercised. Throughput of up to 20,040 lines per minute can be achieved -- see accompanying table.

Print Speed Range: The following speeds apply to the 3800 mdl 3 in Compatibility mode. The number of characters per line depends upon the form width being used. The speeds shown for 12 lpi are applicable when a maximum of 190 characters, including blanks, are printed on each line.

Common Use Option

Forms	Forms	Lines Per Minute *			
Length (inches)	Per Min. Up To:	6 lpi Up to:	8 lpi Up to:	10 lpi Up to:	12 lpi Up to:
3-1/2	526	7,890	10,520	13,150	15,780
5-1/2	334	9,018	12,024	15,030	18,036
7	263	9,468	12,624	15,780	18,936
8-1/2	215	9,675	12,900	16,125	19,350
11	167	10,020	13,360	16,700	20,040

* Single copy speeds

Compatibility Mode: When operating in Compatibiiity mode the mdl 3 can perform the functions of the 3800 mdl 1, plus print at 10 lines per inch. This provides for easy migration of 3800 mdl 1 applications.

Note: The mdl 3 does not have a Tape-to-Printing Subsystem feature which is available for the 3800 mdl 1.

In Compatibility Mode the 3800 mdl 1 electronic character generation is emulated, providing 255 WCGM storage positions, organized in four 64-character Writeable Character Generation Modules (WCGM). Character sets are program selected without operator intervention and dynamically loaded into hardware WCGMs. Dynamic storage allows character substitution under program control. Customers may design their own characters. The following standard 3800 mdl 1 character sets are provided with Data Facility Device Support Release 1.6 for 240x240 pel printing:

Character Sets Standard

Character Style	Pitch (cpi) 10	12	15	Special Underscored
Gothic	X	X	X	Yes
Gothic 15 Condensed	X			Yes
Text 1 (Upper Case)	X			Yes
Text 2 (Lower Case)	X			Yes
OCR A	X			
OCR B	X			
Format	X	X	X	
Katakana	X	X	X	

The sixteen "fonts" provided with Document Composition Facility (5748-XX9), Release 2, are also provided in 240x240 pel form. Twenty-three fonts from the 6670 have been prepared for use with the 3800 mdl 3 in Compatibility mode. These characters were originally designed for 240x240 pel printing.

Customers can convert existing customer-created 3800 mdl 1 character sets or create new characters in the 240x240 pel density -- see Character Conversion Aid announcement letter.

All-Points-Addressable Mode: This mode is not supported by IBM software.

New printer commands provide the following functions: Characters can be positioned at any defined point on the printable area of the page. Alphameric text can be generated in three orientations (one horizontal and two vertical). Proportional-spaced and fixed-space fonts ranging in size from 4 to 36 "points" can be printed. (A "point" is 1/72 inch and is a measure of character size. This should not be confused with a printable raster point, also called a pel.)

With the base machine multiple fonts can be mixed within one data set. The number of fonts which can be present in the base machine depends upon the character size and the number of characters in the font. Fonts can be loaded from the host into the printer and stored on the internal diskette (with user provided programming) or in raster pattern storage.

Solid and dashed lines can be generated horizontally and vertically from any defined point in the printable area of the page for any specified length as long as the line remains within the printable area of the page.

Raster images of logos, signatures, drawings and photographs up to full-page size can be printed. The images are printed in raster form of 240x240 dots per square inch. Images in raster form of 120x120 dots per square inch are accepted. For these the printer generates four dots for each one indicated, producing a facsimile the same size as the original. The Accumulator feature (#1010) is required for images larger than those which can be held in the raster pattern storage where the image size depends on the raster pattern storage installed and the amount required for fonts. (Images cannot be printed in compatibility mode.)

Quality considerations in the printing of images are similar to those for printing a forms overlay, e.g., line widths and large dark areas. These guidelines and restrictions are presented in the *Forms Design Reference Guide for the IBM 3800 Printing Subsystem,* GA26-1633.

A major extension has been made to provide "electronic overlay generation". The new capabilities allow a form to be printed from a sequence of printer commands which print lines (creating boxes), constant alphameric text, shaded areas, and images for signatures, logos, etc. This information (the electronic overlay) is merged by the printer with the variable data for a given page and printed. This capability will allow many custom forms of different sizes to be printed on blank paper.

Multiple electronic overlays can be held in the base printer and used on demand within one application. The maximum addressable number is 127. The maximum for an application will depend on the complexity of the electronic overlay and the demands made by the application on the control storage. Up to eight electronic overlays can be merged onto a

3800 Printing Subsystem Mdl 3 (cont'd)

single page. (Dependent upon the complexity, throughput may be impacted.)

Storage: A control storage of 512K bytes is provided in the base printer. This provides storage for the microcode, page buffers, tables associated with character fonts, etc. ... a raster pattern storage with 256K bytes is provided in the base machine for multiple character sets and for limited storage of image data. Up to 512K bytes total is available by an incremental feature of 256K bytes. Fonts are stored in raster pattern storage and the amount of storage required is a function of the character size and the number of characters in the font. A font can have a maximum of 256 characters. ... An Accumulator feature (#1010) may be added. It allows more complex pages to be created for printing. The first increment is 768K bytes with one additional increment of 256K bytes, for a total of 1,024K bytes.

ADDITIONAL HIGHLIGHTS

(Note: Some of the following highlights apply to the mdl 3 only when operating in compatibility mode and are so indicated.)

Gothic 15: (15 characters/inch at 8 or 10 lines/inch) - 11" x 14-7/8" reports can be reduced to 8-1/2" x 11" ... convenient size ... increased throughput, reduced forms cost, reduced filing space by using the maximum print span of 204 positions. The application of 12 lpi vertical spacing with the Gothic 15 Condensed character set can result in a reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.

Optical Character Recognition (OCR) Printing: Alphameric OCR A and the less stylized OCR B fonts can be intermixed with non-OCR fonts with no reduction in printing throughput. Documents may be processed by the 1287, 1288, 3762 and 3886 Optical Character Readers. Refer to the appropriate pages for specific capabilities.

Note: The OCR-A characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the *United States of America Standard Character Set for Optical Character Recognition, Size A, USAS X3.17-1977*. The OCR-B characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the *United States of America Standard Character Set for Optical Character Recognition, Size B, USAS X3.17-1975* and the *European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition,* (EMCA 11-1975).

Text Character Set: Upper and lower case characters with serifs ... special graphics ... no reduction in throughput. **Note:** The mdl 3 has extensive text capabilities in the all-points-addressable mode plus the availability of some 6670 fonts which can be used in compatibility mode.

Format 10, 12 and 15 Pitch: Merge format and data ... program controlled for online operation (compatibility mode only).

Copy Modification Function (Compatibility mode only): Identify copies with legends, phrases, or names (e.g., Customer Copy, For Accounting Purposes Only, etc.) ... address each report copy to speed distribution ... spot carbon or field blockout functions ... identification and deletion program controlled. Provides customized forms with the identification, deletion and formatting functions.

Forms Overlay (both modes): Optical image system ... prints high quality document and report formats, designs or other constant data ... merge format and data ... program controlled.

Single Part Continuous Form Output: Including custom printed forms ... no deleaving ... no carbon disposal ... faster job separation making use of the Mark Form function.

Optional Burster-Trimmer-Stacker Output: Eliminates bursting and deleaving bottlenecks ... offset separation between data set copies ... remove output while printing ... first-in, first-out job sequence ... trimmed edges.

Optional Channel Switching: Manual switches provide system configuration flexibility through the use of the 3814 Switching Management System, or the 2914 Manual Switch mdl 1 (RPQ 880882), or the Two-Channel Switch (#8180) ... automatic switching is provided by the Dynamic Two-Channel Switch (#8181) for two processors in a tightly coupled multiprocessing configuration, and two channels on a single CPU providing alternate path capability.

Laser Safety: The 3800 contains a laser assembly. In IBM's opinion, the 3800, including the laser assembly, is designed to comply with the safety standards of the United States Department of Health, Education and Welfare (21 CFR 1040). Separate registrations by the customer may be required by some states.

Forms: Prints on discrete form sizes. Utilizes five form depths: 3-1/2", 5-1/2", 7", 8-1/2" and 11" ... ten form widths measured edge to edge: 6-1/2", 8-1/2", 9-1/2", 9-7/8", 10-5/8", 11", 12", 12-5/8", 14.3", 14-7/8" which permutes to 50 discrete sizes. Forms are refolded in 7" (2 x 3-1/2), 8-1/2" and 11" (2 x 5-1/2) in lengths.

Character and forms overlay printing are restricted from first and last 0.5 inch of forms length. A printed line can begin a minimum of 0.5 inch from the left paper edge and cannot exceed a length to position a character nearer than 0.5 inch from the right paper edge for all widths except 14-7/8" in compatibility mode where the stated dimension is 0.775 inch from the right.

Paper must be from 15 lb to 24 lb basis weight. See *Forms Design Reference Guide for the IBM 3800 Printing Subsystem,* (GA26-1633) for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, print line adjustment is by electronically moving the line. First print position can move to the right 5.7 inches (compatibility mode only) but will cause an equivalent number of positions at the right end to be moved beyond the above defined print line boundaries. It is recommended that printing not occur within 0.100 inches of any binder holes or corner cuts within the form.

Publications: GA32-0049, GA32-0050, SH35-0051, GA26-1633, GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V. Note: 240V AC is compatible with 230V AC systems.
- Color (for end cover only, machine color is cloud white): **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for gray.
- Tool Kit: For rental or Term Lease (ICC) customer, select one:
  1. First 3800 mdl 1 or 3 ordered, specify **#9330** when ordering a mdl 3.
  2. If unit ordered is second or higher 3800 mdl 3 to be installed, no additional tool kit is required.
  3. If a 3800 mdl 1 is installed and a mdl 3 is ordered to supplement or replace the mdl 1, specify **#9331** (Special Tool Group) which will bring the existing tool kit up to the level required for the mdl 3.
  4. If 3800 mdl 1 is being field converted to a mdl 3, specify **#9331** (Special Tool Group) which will bring the existing tool kit up to the level required for the mdl 3.
  5. If required for a multiple machine installation, because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

  For purchase customer, select one:

  1. For each new purchase 3800 mdl 3, specify **#9330**.
  2. When rental 3800 mdl 3s are purchased, a tool kit **(#9330)** is to be ordered on a no-charge MES for each machine.
  3. When a purchased mdl 1 is being field converted to a mdl 3, specify **#9331** (Special Tool Group) which will bring the existing tool kit up to the level required for the mdl 3.

  Note: A Tool Kit **(#9220)** is required with Burster-Trimmer-Stacker (#1490) ... see #1490 below.

SPECIAL FEATURES

Accumulator (#1010): The accumulator is used to generate complex pages that require more fonts than can be held in raster pattern storage. The page can be viewed as having been created in layers (each layer associated with a set of fonts or images). The layers are "accumulated" until the complex page is complete. Images which are too large for raster pattern storage are placed in the accumulator for printing. This feature provides 768K bytes of storage which will hold data for up to 106 square inches of image. **Maximum:** One. **Field Installation:** Yes.

Accumulator Expansion (#1021): This feature adds 256K bytes of storage to the Accumulator (#1010) for a total of 1024K bytes which will hold data for up to 142 square inches of image. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1010. .

Burster-Trimmer-Stacker (#1490): Provides an additional output stacking method. Bursts the five forms lengths to individual sheets and stacks sheets sequentially. Also trims left and right 0.5 inch carrier strip from output sheet. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #9220.** For rental customer -- specify **#9220** for first Burster-Trimmer-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES. For purchase customer -- specify **#9220** on each Burster-Trimmer-Stacker feature order. When installed Burster-Trimmer-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

Raster Pattern Storage, Add'l (#5410): Base machine comes with 256K bytes, storage maximum is 512K bytes in one additional storage increment of 256K bytes. Provides font storage for multiple character sets and can be used to hold small images. **Maximum:** One. **Field Installation:** Yes.

3800 Printing Subsystem Mdl 3 (cont'd)

Remote Switch Attachment (#6158): To attach the Two-Channel Switch (#8180) to a configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8180.

Two-Channel Switch (#8180): To attach the 3800 to two S/370, 30XX, or 4300 Processor channels which may be on the same CPU or on two different CPUs. The two interfaces can have different addresses. The two-channel switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. **Maximum:** One. **Field Installation:** Yes.

Dynamic Two-Channel Switch (#8181): Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems and to attach to two channels from a single CPU to provide alternate path capability. For either tightly coupled multiprocessors or single CPU attachments, data transfer occurs only one channel path at a time. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8180.

MODEL CONVERSION

3800 model 1s which are purchased or under an ICC Term Lease can be converted to a model 3 by MES. Conversion from a 3800 model 3 to a 3800 model 1 is not available.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3803 TAPE CONTROL MDL 1

PURPOSE

Control unit for 3420 Magnetic Tape Units models 3, 5, 7 for S/370 (except models 115 and 125) and 4300 processors.

MODELS

Model 1 001

Limitations: Attachable to all S/370 and 4300 processors except S/370 mdl 115 and 125. S/370 mdl 135, 135-3 and 138 are not supported on byte multiplexer channel for concurrent operation with Integrated File Adapter, Integrated Communications Adapter, Selector Channel on 3135-3, 3138.

Attachable to 4300 processors. For considerations, see *4331 Channel Characteristics,* GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2), GA33-1550 (Mdl Group 11) or GA33-1567 (4361). **Note:** 3803 cannot be attached to a byte multiplexer channel on the 4341 Processor.

3420 mdls 4, 6 or 8 cannot be addressed through a 3803 mdl 1.

Prerequisites: A control unit position on a S/370 or 4300 processor channel or Tape-to-printing Subsystem feature (#7810) on a 3800 Printing Subsystem. When used with a 3800 with feature #7810, at least one path, which may be switchable, must be provided to a S/370 or 4300 processor. When multiple control units (up to eight are allowable) are connected to a 3800, all other than one must have power sequencing and control connection provided by a system.

For S/360 mdl 30: If the 3803 Tape Control is attached to the 2030 Selector Channel via the 1400 Magnetic Tape Compatibility feature (#4468), the 3420/1400 Compatibility (**#9750**) is required on the 2030.

HIGHLIGHTS

Single channel control for up to eight 3420 tape units. Through special switching features, up to 16 tape drives can be addressed through any of four 3803 control units. Features are offered to provide performance at 556 and 800 bpi in the 7-track NRZI format or at 800 bpi in the 9-track NRZI format or at 1600 bpi phase encoded.

The following table indicates feature numbers for corresponding functions:

Subsystem Function	Feature Name	3420 Tape Unit	3803 Control Unit
1600 bpi PE 9-track only	Single Density	#6631	#9570
1600 bpi PE/800 bpi NRZI 9-track	Dual Density	#3550	#3551
1600 bpi PE/800 bpi NRZI 7-track	Seven-track	#6407*	#6408

* Tape unit will only read or write 7-track tape.

Publications: S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Tape Type: Either Dual Density (#3551) or Seven-track (#6408) must be ordered unless Single Density (**#9570**)is specified. Only one of the three features may be installed.
- Tape Switching: If a tape switching configuration is being ordered, the 3803 must be equipped with a Communicator 1-2, **#9071**, for a control unit with the 2-control Switch (#1792), 3-control Switch (#1793), or 4-control Switch (#1794). Communicator 3-4 (**#9073**) for a control unit included in a 3x16 or 4x16 switching configuration which does not have features #1792, #1793 or #1794. If a Communicator feature is ordered for a 3803 without a switching feature, no tape units can be attached to that control unit. See "Tape Switching".

SPECIAL FEATURES

Dual Density (#3551): Provides for attachment of tape units equipped with Dual Density (#3550) to read and write tapes at either 1600 bpi PE or 800 bpi NRZI 9-track. Tape units equipped with Single Density (#6631) can also be attached. **Limitations:** Cannot be installed in the same control unit with either Single Density (**#9570**) or Seven-track (#6408). **Field Installation:** Yes.

Remote Switch Attachment (#6148): Provides for remote operation of the Two-channel Switch (#8100) on the 3803 mdl 1 from a remote console such as the configuration control panel (3058 or 3068) for a S/370 mdl 158MP or 168MP. Operation of the switch on the remote console will result in the same function as operation of the 3803 switch. The 3803 switches will be functionally inoperative when this feature is installed. The cable to the remote console is not provided by this feature. The cable used must contain three wires for each Enable/Disable switch to be installed. Each line must have a total loop resistance of less than 75 ohms when the remote switch completes the path. For operation with the 2925 mdl 10, 3058 or 3068, cable P/N 5351178 is required and should be ordered on a separate MES. **Field Installation:** Yes.

Seven-track (#6408): Provides for attachment of tape units equipped with Seven-track (#6407) to read and write tapes at either 556 or 800 bpi in the 7-track format compatible with tapes written by 729, 7330, 7335, and 2400 series tape units equipped with 7-track read/write heads. Includes the translator function which, when used, causes 8-bit bytes from the I/O interface to be written on tape as 6-bit BCD characters and 6-bit BCD characters read from tape to be translated into their EBCDIC equivalents. The Data Conversion function, also included, allows reading and writing of 8-bit bytes on 7-track tape by converting four tape characters into three storage bytes and vice versa. Tape units equipped with Single Density (#6631) can also be attached. **Limitations:** Cannot be installed in the same control unit with either Single Density (**#9570**) or Dual Density (#3551). Tape units operating in 1600 bpi PE mode can also be attached. **Field Installation:** Yes.

Two-channel Switch (#8100): Permits connection of the 3803 Tape Control to a second channel. Alternate path switching between two channels on the same system is under program control. Partitioning of attached tape units between channels on two different systems can be done using current procedures for logical device partitioning. These procedures involve the proper use of the operator commands, VARY ON/VARY OFF (OS) or DVCDN/DVCUP (DOS). Further information concerning this type of operation is contained in the *3803/3420 Sales and Systems Guide,* ZZ20-2254. **Field Installation:** Yes.

Tape Switching: Switching configurations, via two, three or four control units, are available to provide access to:

(a) Up to eight tape units attached to a single control unit;

(b) Up to 16 tape units, with eight attached to each of two control units.

All switchable tape units must be attached to the control units equipped with the switching features (2-control Switch, 3-control Switch or 4-control Switch). Each control unit must be equipped with the appropriate Single Density, Dual Density, or Seven-track feature for any any drive in the pool to which it has access.

The table below indicates features required for the available switching options.

Switching Options	Features Required	Feature Numbers On 1st 3803	On 2nd 3803	On 3rd 3803	On 4th 3803
2 x 8	Communicator 1-2	**#9071**	**#9071**	----	----
	2-Control Switch	#1792	----	----	----
3 x 8	Communicator 1-2	**#9071**	**#9071**	**#9071**	----
	3-Control Switch	#1793	----	----	----
4 x 8	Communicator 1-2	**#9071**	**#9071**	**#9071**	**#9071**
	4-Control Switch	#1794	----	----	----
2 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	2-Control Switch	#1792	#1792	----	----
3 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	Communicator 3-4	----	----	**#9073**	----
	3-Control Switch	#1793	#1793	----	----
4 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	Communicator 3-4	----	----	**#9073**	**#9073**
	4-Control Switch	#1794	#1794	----	----

Note: For assistance in ordering, refer to subsystem description manual, GA32-0020 or GA32-0021, for graphic presentation of switching configurations.

3420/3803 Attachment Possibilities

Notes:

1) All 3803s, irrespective of feature mix, can control tape drives operating in 1600 bpi PE mode.

2) No 3803 can have the capability to control tape drives with nine-track NRZI features and tape drives with seven-track NRZI features.

3) It is not possible to have more than one of the feature numbers listed in the following table in any one unit (3803 or 3420).

3803 Tape Control Mdl 1 (cont'd)

3420 mdls 3, 5 & 7 Features	3803 with Single Density (#9570)	3803 with Dual Density (#3551)	3803 with Seven-Track (#6408)
#6631 Single Density 1600 bpi PE	Yes	Yes	Yes
#3550 Double Density operating in 1600 bpi PE mode	Yes	Yes	Yes
#3550 Double Density operating in 800 bpi NRZI mode	No	Yes	No
#6407 7-Track 556 or 800 bpi NRZI	No	No	Yes

MODEL CONVERSIONS

A 3803 model 1 may be converted to a 3803 model 2 or model 3 in the field. If the 9-track NRZI feature is installed, it will be removed when the 3803 model 1 is converted to a model 2.

ACCESSORIES (None)

SUPPLIES (None)

3803 TAPE CONTROL MDL 2

PURPOSE

Control unit for 3420 Magnetic Tape Units models 3 through 8 for S/370 (except models 115 and 125) and 4300 processors.

MODELS

Model 2 002

Prerequisites: Control unit position on S/370 or 4300 processor channel or Tape-To-Printing Subsystem feature (#7810) on a 3800 Printing Subsystem. When used with a 3800 with feature #7810, at least one path, which may be switchable, must be provided to a S/360, S/370 or 4300 processor. When multiple control units (up to 8 are allowable) are connected to a 3800, all other than one must have power sequencing and control connection provided by a system. If attached to a 2860, a 3803 Mdl 2 Attachment (#7850) is required on each channel to which 3803 mdl 2s are attached. For #7850, specify **#9181** for the first channel of a 2860 ... **#9182** for the second channel ... **#9183** for the third channel. See M2860 pages.

HIGHLIGHTS

- Standard control unit provides 6250 and 1600 bpi densities.
- 6250 Encoding/Checking Logic allows error correction without stopping or interrupting the read/write operation for any single track or combinations of two tracks simultaneously. Errors may be corrected in all nine tracks of a single data block providing they occur in combinations of no more than two tracks at a time. Long tape blocks are subdivided by resync bursts which are inserted within the block to allow error tracks to return to full operation when reading forward, thereby restoring maximum error correction capability.
- Optional features provide 9-track (800 bpi) NRZI, or 9-track (800 bpi) NRZI with 7-track (800, 556, 200 bpi) NRZI formats.
- Nine-track NRZI with Seven-Track NRZI features permit mixing 9- and 7-track tape units on the same 3803 mdl 2.

The following table indicates features for corresponding functions:

Subsystem Density	Control Unit 3803 mdl 2		Tape Unit 3420-3,5,7	Tape Unit 3420-4,6,8
	Feature Name	Feature #	Feature #	Feature #
9T-6250	--	Standard	N/A	#6420
9T-6250+1600	--	Standard	#6631	#6425
9T-6250+1600 +800	Nine-Track NRZI	#5310	#3550	N/A
9T-6250+1600 +800 with 7T-800-556-200	Seven-Track NRZI	#6320*	#6407	N/A

* Requires #5310.

- A pool of up to 16 tape units may be switched between 2, 3 or 4 control units.
- A 3803, via a two-channel switch, connects to two channels of the same system or two channels of different systems.
- Properly featured, a 3803 mdl 2 provides signal and power attachment for up to eight 3420 mdls 3, 4, 5, 6, 7. Mdl 8s may be attached as described under "Limitations".

System Attachment: The 3803 mdl 2 attaches to S/370 or 4300 processor via the indicated channels:

System	3420 mdl 4	3420 mdl 6	3420 mdl 8
135	Selector*	Selector*	Selector*
135-3,138	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr
145	Selector*	Selector*	Selector*
145-3,148	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr
155,158	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr
165,168,195	2860/2880	2860/2880	2860/2880
3031,3032, 3033	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr
3081,3083, 3084	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr
4331	Blk Mltplxr	Note 1	Note 1
4341,4361, 4381	Blk Mltplxr	Blk Mltplxr	Blk Mltplxr

* With or without Block Multiplexer Channel (#1421).
Note 1: Not attachable to Mdl Group 1

Limitations: [1] 3803 mdl 2 attachment to S/370 mdls 135, 135-3, 138, 145, 145-3 and 148 is configuration-sensitive because of potential system overrun. Consult *System/370 Model 135 Channel Characteristics* (GA33-3010) or *System/370 Model 145 Channel Characteristics* (GA24-3573) ... [2] The 3803 mdl 2 is not supported for attachment to byte multiplexer, multiplexer, or 2870 selector subchannels ... [3] The 3803 mdl 2 operating with 3420 mdl 8s is limited to a maximum channel-to-control unit (total x dimension) cable length of 119 feet to the 2880 or selector channel of a S/370 mdl 145, 119 feet to the block multiplexer channel of a S/370 mdl 145-3 or 148, 103 feet to the block multiplexer channel of a S/370 mdl 155, 3032 or 3033, and 72 feet to a 2860 ... [4] The 3803 mdl 2 provides power and signal connections for 3420 tape drives. Up to eight drives of any mdl can be signal-connected to a 3803 mdl 2. Note that 3420 mdls 4, 6 and 8 must signal-connect to a 3803 mdl 2. ... [5] For 4331 considerations see the *4331 Channel Characteristics,* GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2) or GA33-1550 (Mdl Group 11).

One 3803, either mdl 1 or mdl 2, provides power for up to eight 3420 mdls 3, 4, 5, 6 or 7. When the tape subsystem includes 3420 mdl 8s, one 3803, mdl 1 or mdl 2, may power a maximum of six 3420 mdl 8s or combinations of drives as listed in the table below.

The maximum number of drives which may be powered from one 3803 without **#9001** (Auxiliary AC Power Supply) are listed below.

Number of 3420 Mdl 8s	and	Number of 3420 Mdl 7s	and	Number of 3420 Mdls 3-6
6		0		0
5		1		0
5		0		2
4		2		1
4		1		2
4		0		3
3		4		0
3		3		1
3		2		2
3		1		4
3		0		5
2		5		0
2		4		2
2		3		3
2		2		4
2		1		5
2		0		6
1		*		*

* If only one 3420 mdl 8, then any combination of seven additional tape units is permissible.

When the subsystem includes more than one 3803 mdl 2 and the number of tape drives which must be signal-connected to a control unit exceeds the maximum number of drives which may be powered from one 3803 (see table above), obtain power from another control unit using a separate power cable (Group 144). Separate signal cable (Group 143) is also available.

A power supply feature (**#9001**) is available which allows eight 3420s of any mdl to be powered from one 3803 mdl 2 ... see "Specify". This feature is necessary only if: [1] The subsystem includes only one 3803 mdl 2 and the drives to be powered from it exceed the maximum specified in the table above, or [2] The power load still exceeds the table limitations for a 3803 when distribution by re-cabling with separate power and signal cables has been considered.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage.!47u
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Density: 6250 and 1600 bpi are standard and do not need to be specified. In addition, order Nine-Track NRZI (#5310) or Seven-Track NRZI (#6320) if required ... see "Special Features".
- Tape Switching: If a tape-switching configuration is being ordered, the 3803 must be equipped with a Communicator (**#9071** or **#9073**) ... see table under "Tape Switching" below. If a Communicator feature is ordered for a 3803 without a switching feature, no tape units can be signal-attached to that control unit.
- Auxiliary AC Power Supply: **#9001**. Required to power more than six 3420 mdl 8s from one 3803 mdl 2.

  Also may be required to power 3420 mdl 8s in combination with other drives ... see "Limitations" above. Requires 100 ampere power source.

SPECIAL FEATURES

Nine-Track NRZI (#5310): Required for the attachment of 3420 mdls 3, 5 or 7 equipped with Dual Density (#3550). Allows attached tape drives to read and write data in a 9-track 800 bpi format as well as 1600 bpi (Phase Encoded) format. **Field Installation:** Yes.

Remote Switch Attachment (#6148): Provides for remote operation of the Two-Channel Switch (#8100) on the 3803 mdl 2 from a remote console such as the configuration control panel (3058 or 3068) for a

3803 Tape Control Mdl 2 (cont'd)

S/370 mdl 158MP or 168MP. Operation of the switch on the remote console will result in the same function as operation of the 3803 switch. The 3803 switches will be functionally inoperative when this feature is installed. The cable to the remote console is not provided by this feature. The cable used must contain three wires for each Enable/Disable switch to be installed. Each line must have a total loop resistance of less than 75 ohms when the remote switch completes the path. For operation with the 2925 mdl 10, 3058 or 3068, cable P/N 5351178 is required and should be ordered on a separate MES. **Field Installation:** Yes.

Seven-Track NRZI (#6320): Required for the attachment of 3420 mdls 3, 5 or 7 equipped with Seven-Track (#6407). Allows attached tape drives to read and write data in 7-track/200, 556 or 800 bpi format. **Prerequisites:** #5310. **Field Installation:** Yes.

Two-Channel Switch (#8100): Permits connection of the 3803 to a second channel. Alternate path switching between two channels on the same system is under program control. Partitioning of attached tape units between channels on two different systems can be done using current procedures for logical device partitioning. The procedures involve the proper use of the operator commands, VARY ONLINE/VARY OFFLINE (OS) or DVCDN/DVCUP (DOS). **Field Installation:** Yes.

Tape Switching (#1792-#1794): Switching configurations, via two, three or four control units are available to provide access to:

(a) Up to eight tape units attached to a single control unit.

(b) Up to 16 tape units, with eight attached to each of two control units.

All switchable tape units must be signal-attached to the control units equipped with the switching features (2-Control Switch, 3-Control Switch or 4-Control Switch). Each control unit must be equipped with the appropriate density feature for any drive in the pool to which it has access. **Field Installation:** Yes.

The following table indicates features required for the available switching options.

Switching Options	Features Required	Feature Numbers On 1st 3803	On 2nd 3803	On 3rd 3803	On 4th 3803
2 x 8	Communicator 1-2	**#9071**	**#9071**	----	----
	2-Control Switch	#1792	----	----	----
3 x 8	Communicator 1-2	**#9071**	**#9071**	**#9071**	----
	3-Control Switch	#1793	----	----	----
4 x 8	Communicator 1-2	**#9071**	**#9071**	**#9071**	**#9071**
	4-Control Switch	#1794	----	----	----
2 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	2-Control Switch	#1792	#1792	----	----
3 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	Communicator 3-4	----	----	**#9073**	----
	3-Control Switch	#1793	#1793	----	----
4 x 16	Communicator 1-2	**#9071**	**#9071**	----	----
	Communicator 3-4	----	----	**#9073**	**#9073**
	4-Control Switch	#1794	#1794	----	----

Note: For assistance in ordering, refer to subsystem description manual, GA32-0020 or GA32-0021, for graphic presentation of switching configurations.

MODEL CONVERSIONS

A 3800 model 1 may be converted to a 3800 model 2 in the field. Customer price quotations and customer order acknowledgement letters for Purchase MESs must state: "Installation of this model change involves the removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3811 PRINTER CONTROL UNIT

PURPOSE

Control unit for the 3211 Printer in a S/360 model 22, 30, 40, 50, 65, 67 (in 65 mode), 75, 85, 195 or any S/370 processor (except 3115 or 3125), or any 4300 processor.

MODELS

Model 1 001

HIGHLIGHTS

The 3811 provides the necessary controls for attaching the 3211 Printer to the I/O channels provided by the processing system. It contains all the necessary electronic controls and buffering to adapt the mechanical printer to the channel. The control unit (3811) and the mechanical printer (3211) are physically attached to each other.

The logic, buffers and controls of the Universal Character Set and Forms Control Buffer are located in the 3811.

Prerequisites: The 3811 requires a control unit position on a system channel.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 65, 75: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/360 mdl 67: Basic multiplexer channel of 2870 ... see M2870 pages.

S/360 mdl 85, 195, S/370 mdl 165, 168, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) of 2870, the shared subchannels or non-shared subchannels (non-shared attachment is recommended) of a 2880 Block Multiplexer Channel ... see M2860, 2870, 2880 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channels (special features), block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channel (special feature) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channel (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels, block multiplexer channels (special features) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), second byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channels ... see M4321, 4331, 4341, 4361, 4381 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, 3083, 3084 pages.

Bibliography: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Print Positions, 18 Add'l (#5553): Controls for Print Positions, 18 Add'l (#5554) on the 3211 Printer. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3814 SWITCHING MANAGEMENT SYSTEM

PURPOSE

Provides channel to control unit(s) switching under single point control in combinations up to 128 nodes or a single switch matrix as large as 8x16 or 16x8. Switching can be effected at up to four locations which may be as distant as 305 meters (1,000 feet) from each other and connected via customer-supplied loop cable which begins and ends at the model A controller. Power sequencing of switched control units and single location control of control unit two-channel switches can also be managed by the 3814.

MODELS

Controller	Remote Unit	Expansion Unit --- contains
Model A1 (A01)	**B1** (B01)	**C1** (C01) one 4x4 switch
Model A2 (A02)	**B2** (B02)	**C2** (C02) one 4x8 switch
Model A3 (A03)	**B3** (B03)	**C3** (C03) one 8x4 switch
Model A4 (A04)	**B4** (B04)	**C4** (C04) two 4x4 switches

Model Bs require a model A as a prerequisite and can function as a logical expansion of a primary switching location or, if logically independent, can be up to 305 meters distant. Model Cs attach to either model As or Bs and provide up to 32 nodes which may be logically combined with their prerequisite model to provide larger switching matrixes. An alternate Model A Controller can be attached to the loop with feature #1430. Switching control to the alternate controller may be performed under operator control. This switchover is automatic in the event of some controller malfunctions or control power loss. Operator control is via 3604 Model 6 at the primary location but also may be via a second 3604 Model 6 up to 305 meters away. With feature #1420, a maximum of two 3278 Model 2s can be used for operator control. One 3278 Model 2, with the Control Unit Switch Accessory Feature (part #1743301), can be shared between two 3814 subsystems. A maximum of three 3287 Model 1s or 2s can be attached with feature #1420 providing hard copy of audit trails and configurations. These printers may be shared with other 3814 systems by using a coax selection switch. When a 3278 is installed for operator control, a 3604 Model 6 is optional.

Authorization to operate the 3814 is incorporated into the product and under control of passwords. With feature #1420 an additional authority level and 32 passwords are provided. A time stamped audit-trail of configuration changes is provided for display and/or printing. The use of installation defined names for configurations, logical channel/control unit interfaces, logical matrices and control unit identification is provided with feature #1420.

The 3814 can switch either data streaming or non-data streaming devices.

Nomenclature: The first number of the switch expression specifies the number of channels and the second number indicates the number of switchable interfaces (with one or more control units). Thus, a 4x8 designates a switch capable of connecting any of four channels to any combination of eight switchable interfaces. The intersections of the channel and switchable interfaces within the 3814 are called nodes and, taken together, comprise the switch matrix. Thus, a 4x8 switch has a switch matrix of 32 nodes.

Limitations: The 3814 is designed to function only in a raised floor machine room environment. The 1419 equipped with #7720 or #7730 (single or dual address adapter) requires external interrupt features on the associated CPUs to enable the 1419s to operate. These features are not supported by the 3814. Channel and control unit cable length restrictions must be observed.

Note: Contact Special Product Marketing for 2835/2305 attachment information.

Prerequisites: Every 3814 requires one mdl A Controller with a 3604 mdl 6. #1050 (Audible Alarm) is recommended for installation. A 1.8 meter (6 foot) power cord is supplied with the 3604 mdl 6; if a 4.3 meter (14 foot) power cord is desired, order RPQ 8P0898 for the 3604 mdl 6 (for factory install only), at no charge. The 3814 attaches to byte and block multiplexer channels of any S/370 mdl 135 and up, 3031, 3032, 3033, 3081, 3083, 3084, 4331, 4341, 4361, or 4381 Processor.

HIGHLIGHTS

Provides capability to receive, interconnect and repower both in-bound and out-bound lines of the standard IBM S/360 and S/370 I/O Interface ... implementation includes an integrated microcode driven processor ... confirmation mechanism ensures switching has been effected ... quick change of configurations via prestored configuration specifications ... storage for up to 80 configurations including current and prior configuration ... an additional 384 crosspoint configurations with feature #1420 ... standard operation permits channel switching only when channel interface is inactive ... switches channels having the Two-Byte Interface but such configurations physically use twice the nodes of other channel to control unit switching ... operator can display current configuration status without affecting on-going operations ... permits up to four physical locations per 3814 for one logical or multiple logical switches ... provides single control point for control units with the two-channel switch and remote switch attachment features ... provides storage for up to 7 two-channel switch combinations including current and prior configurations ... An additional 320 two-channel switch stored configurations with feature #1420 ... 64 multiple configurations, each one specifying a list of up to 32 crosspoint and/or two-channel switch configurations ... provides for power sequencing of attached control units ... each 3814 mdl may be placed under power sequence control of up to four processors so that it will be powered-on via the powering of the first processor and powered-off via the last processor to power down.

RAS Characteristics: The 3814 enters a diagnostic check-out procedure as part of the power-on sequence. Once in operation, operating elements are continuously monitored to detect malfunctioning hardware within the 3814. Upon detection of certain malfunctions, an audible alarm and a visual indicator alert operators to a potential problem. Error indicators are saved within the system for assisting in later diagnosis. Since on-going use of the switchable configuration may continue, the user may not have experienced impact and the net result of the detected failure may be an early alert to a pending problem.

The modularity of the 3814 power design and the ability to isolate power contribute greatly to its serviceability. Since the channel switching function remains static between changes and the CE may power-down and power-up individual frames and portions of the system, he may effect repair of failing elements of the 3814 while customer use of other elements continues. One may power-down, repair the failing element, and power-up the isolated portion of the system and return it to operational use. Major elements of the 3814s to which the above description applies are: The 3814 processor and its storage, the diskette drive, the channel interface switches, the 4x4 switch elements, some power supplies and the 3604 mdl 6. The Alternate Controller Feature allows duplication of the control function in a 3814 system.

Configuration Guidance: Refer to Tables A, B or C for the mdl/feature combinations recommended for various I/O switching requirements. If requirements are for multiple remote switches, apply the formula outlined under the heading, "Multiple Remote Switches". These tables are not intended to reflect all possible configuration options. If the Alternate Controller Adapter Feature is installed, the appropriate Model A will be substituted for a Model B.

SINGLE SWITCH CONFIGURATIONS (TABLE A)

Switch Size	Model/Feature Required
4x4	A01
4x8	A02 or A02 + B01
4x12	A02 + C01 or A02 + B01
4x16	A02 + C02 or A02 + B02
8x4	A03 + A01 + **#1531** + B01
8x8	A02 + **#9721** + C02 + #1521 or A02 + **#1531** + 1532 + B02
8x12	A03 + C03 + B03 or A03 + B03 + B03
8x16	A03 + **#9721** + C02 + #1521 + B02 + **#9721** + C02 + #1521
12x4	A03 + **#9720** + C01 + #1520 or A03 + **#1532** + B01
16x4	A03 + **#9720** + C03 + #1520 or A03 + **#1532** + B03
16x8	A02 + **#9721** + C02 + #1521 + #1531+ **#1532** + B02 + #9721 + C02 + #1521

MULTIPLE PRIMARY OR MULTIPLE REMOTE SWITCHES (TABLE B)

Switch Combinations	Primary Location Mdl/Feat. Req'd	Remote Location Mdl/Feat. Req'd
2(4x4)	A04	B04
3(4x4)	A04 + C01	B04 + C01
4(4x4)	A04 + C04	B04 + C04
(4x8) + (4x4)	A02 + C01	B02 + C01
(4x8) + 2(4x4)	A02 + C04	B02 + C04
(4x8) + (4x8)	A02 + C02	B02 + C02
(8x4) + (4x4)	A03 + C01	B03 + C01
(8x4) + 2(4x4)	A03 + C04	B03 + C04
(8x4) + (4x8)	A03 + C02	B03 + C02
(8x4) + (8x4)	A03 + C03	B03 + C03

Note that either the mdl/feature at the primary or the remote locations can easily satisfy the requirements outlined under switch combinations. Also, any mdl B requires a prerequisite mdl A.

3814 Switching Management System (cont'd)

SWITCH COMBINATIONS INCLUDING AN 8x8 OR GREATER (TABLE C)

Switch Combinations	Mdl/Feat. Required
(8x8) + any combination from Table B	Table A Build-up + Remote Build-up from Table B
(8x12) + (4x4)	Table A + C01
(8x12) + 2(4x4)	Table A + C04
(8x12) + (4x8)	Table A + C02
(8x12) + (8x4)	Table A + C03
(12x4) + (4x4)	Table A + C01 + C04
(12x4) + any combination from Table B	Table A + Remote Build-up from Table B
(12x8) + (4x4)	Table A + C01
(12x8) + 2(4x4)	Table A + C04
(12x8) + (4x8)	Table A + C02
(12x8) + (8x4)	Table A + C03
(16x4) + any combination from Table B	Table A + Remote Build-up from Table B

Multiple Remote Switches: Where the requirement is for multiple remote switches, the following formula should be used. No more than three remote locations are permitted. Using the switch definition from Table A or B, calculate the number of nodes by location by multiplying the switch expression. Substitution in the tables of an appropriate mdl B Remote Unit may be required in lieu of the equivalent size A or C mdl.

(NUMBER OF PRIMARY NODES) + (NUMBER OF REMOTE NODES, 1st LOCATION) + (NUMBER OF REMOTE NODES, 2nd LOCATION) + (NUMBER OF REMOTE NODES, 3rd LOCATION) LT/EQ 128 [cannot exceed 128].

For additional configuration guidance, refer to the *IBM 3814 Switching Management System Product Description Manual,* GA22-7075.

Stored Configurations: The number of stored configurations is determined by the following formula:

$$N = 10 \times \frac{Ch \times CU}{16}$$

Where N is the number of configurations stored per logical switch. The previous and current configurations always occupy configurations number 0 and 1, respectively.

For example, each 4x4 can have eight customer-defined configurations, plus previous and current. An 8x16 has 78 defined plus previous plus current.

Ch is the number of channel interfaces on the logical switch

CU is the number of control unit interfaces on the logical switch

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Cable for 3604 mdl 6. See "Accessories".
- Color: [A or B mdls] **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, **#9066** for pearl white.
- Unit Emergency Power Off: UEPO switches are located on mdl A Controllers and mdl B Remote Units. Depression of UEPO instantly drops power in any mdls making up the Switching Management System which are interconnected for power sequencing as well as control units which are under its power sequencing control.

  Specify **#9720** on mdl A3, A4, B3 or B4 when ordering special feature #1520 on an attached mdl C1, C3 or C4. **#9720** must be removed if mdl C1, C3 or C4 is detached. #9720 requires the appropriate C Model at installation.

  Specify **#9721** on mdl A2, A4, B2 or B4 when ordering special feature #1521 on an attached mdl C2 or C4. **#9721** must be removed if mdl C2 or C4 is detached. #9721 requires the appropriate C Model at installation.

SPECIAL FEATURES

Expanded Storage (#1410): [Mdl A] Required when #1420 or #1430 or both. **Maximum:** One per mdl A. **Field Installation:** Yes.

Display/Printer Attachment (#1420): [Mdl A] Provides attachment of up to two 3278 mdl 2s, three 3287 mdl 1s or 2s, additional stored crosspoint and two-channel switch configurations, additional 32 security passwords across 4 authority levels and the capability to assign installation defined names for configurations, and time stamped audit-trail of configuration switching activity for display on the console. **Prerequisites:** #1410. **Maximum:** One per mdl A. **Field Installation:** Yes.

Alternate Controller (#1430): [Mdl A] Provides backup to the mdl A in a system through the attachment of a second mdl A. Both A mdls must have this feature installed. The Alternate Controller takes the place of one mdl B switching unit on a 3814 configuration. **Prerequisites:** #1410. **Maximum:** One per mdl A. **Field Installation:** Yes.

Channel Expansion Internal - Four Control Unit Interfaces (#1520): [Mdls C] Required when combining a mdl C with a mdl A or B for the purpose of expanding the number of channel interfaces. This feature is required when combining a 4x4 (C1) or 8x4 (C3/C4) with an 8x4 (A3/A4/B3/B4) to create a 12x4 or 16x4 switch. **Prerequisites:** mdls A3, A4, B3 or B4 with specify **#9720**. **Limitations:** A4 or B4 mdls must be cabled as an 8x4. Cannot be installed with #1521. **Maximum:** One per mdl C1, C3 or C4. **Field Installation:** Yes.

Channel Expansion Internal - Eight Control Unit Interfaces (#1521): [C mdls] Required when combining a mdl C with a mdl A or B for the purpose of expanding the number of channel interfaces. This feature is required when combining a 4x8 (C2/C4) with a 4x8 (A2/A4/B2/B4) to create an 8x8 switch. **Prerequisites:** Mdls A2, A4, B2 or B4 with specify **#9721**. **Limitations:** A4 or B4 mdls must be cabled as a 4x8. Cannot be installed with #1520. **Maximum:** One per mdl C2 or C4. **Field Installation:** Yes.

Channel Expansion External (#1531, #1532): #1531 for first 4x4, #1532 for second 4x4. This feature provides an external cable connection for the control unit input of a 4x4 matrix for the purpose of expanding the number of channel interfaces for an A, B or C mdl. #1531 is required to allow connection through external cables to control unit inputs of the first 4x4 matrix in mdls A1, B1, C1, A2, B2, C2, A4, B4 or C4. #1532 is required to allow connection through external cables to control unit input of the second 4x4 matrix in mdls A2, B2, C2, A3, B3, C3, A4, B4 or C4. #1531 is required to create an 8x4 switch within an A4, B4 or C4. The #1531, #1532 may exist without the connection of external cables. **Prerequisites:** A, B or C mdls -- when expanding the channels on an 8-channel switch, #1531 and #1532 are required. **Limitations:** #1531 cannot be installed on A or B mdls with **#9721**. #1532 cannot be installed on A or B mdls with **#9720** or **#9721**. #1531 cannot be installed on A3, B3 or C3 mdls. #1532 cannot be installed on A1, B1 or C1 mdls. **Maximum:** One #1531 for mdl A1, B1, C1, A2, B2, C2, A4, B4 or C4. One #1532 for A2, B2, C2, A3, B3, C3, A4, B4 or C4 mdls. **Field Installation:** Yes.

Control Unit Power Sequencing (#1811, #1812, #1813, #1814): Each feature provides power sequencing control for up to four control units attached to any mdl 3814. #1811 for first group of control units, #1812 for second group of control units, #1813 for third group of control units, #1814 for fourth group of control units. **Limitations:** Features must be installed in sequence. **Maximum:** One each per mdl A, B or C. **Field Installation:** Yes.

Remote Two-Channel Switch Control - Basic (#6010): Provides single point control for the remote enable/disable function on control units having two-channel switches with remote switch attachment features. #6010 provides for control of eight pairs of interface selections. **Prerequisites:** Two-channel Switch and Remote Switch Attachment and/or Two-channel Switch, Add'l and Remote Switch Attachment, Add'l required on affected control units. **Maximum:** One per mdl A, B or C. **Field Installation:** Yes.

Remote Two-Channel Switch Control - Additional (#6011, #6012, #6013): Provides expansion of the two-channel switch control capability for controlling eight additional pairs of interface selections. #6011 for first additional, #6012 for second additional, #6013 for third additional. **Limitations:** Features must be installed in sequence. **Prerequisites:** #6010 ... Two-channel Switch and Remote Switch Attachment and/or Two-channel Switch, Add'l and Remote Switch Attachment, Add'l required on affected control units. **Maximum:** Three groups of eight per mdl A, B or C. **Field Installation:** Yes.

System Power Sequencing - Add'l (#6350): Provides power sequencing control from the 5th through 8th system. **Maximum:** One per mdl A, B or C. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model changes are field installable -- model A1 to A4, model B1 to B4, model C1 to C4. All other model changes are available at time of manufacture only.

ACCESSORIES

Cables: Cables to interconnect 3604-6 units and/or 3278 and/or 3287 units and 3814 units may be purchased from IBM or a customer selected source. See *IBM Input/Output Equipment Installation Manual - Physical Planning: System/360, System/370, 4300 Processors,* GC22-7064, for cable and connector specifications.

Assembled cables may be purchased from IBM. Specify cable assembly number. Allow a lead time of 6 weeks.

Item	Number	Description	Max Length

3814 Switching Management System (cont'd)

Assm.	1563155	Loop Cable Assm. (indoor)	304.8m (1,000 ft)

SUPPLIES (None)

3830 STORAGE CONTROL MDL 1, 2

PURPOSE

Control unit for 3330, 3333, 3340, 3344 or 3350 disk storage.

MODELS

Model 1 001 — [NO LONGER AVAILABLE] Provides for attachment of up to four 3330 modules in any combination of models 1 and/or 2. Attaches to S/360 model 195 or S/370 models 165, 168 or 195 via a 2880 Block Multiplexer Channel. Attachment to the S/370 models 135 or 145 is made via the system block multiplexer channel or selector channel and to the 135-3, 138, 145-3 and 148 via the block multiplexer channel. Attachment to S/370 models 155 or 158 is made via the system's block multiplexer channel. Attachment to a 3031, 3032 or 3033 Processor is made via a block multiplexer channel. Attaches to the 4341 or 4381 Processor via a block multiplexer channel.

Model 2 002 — Provides for the attachment of 3333s (models 1 and/or 11) and/or 3340 model A2s and/or 3350 model A2s/A2Fs ... see DASD Configuration under "Specify". Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 model Bs and/or 3344s to the 3340 model A2 or by attaching 3350 model Bs and/or a model C to the 3350 model A2/A2F ... see DASD Configuration under "Specify" and M3330, 3333, 3340, 3344, 3350 pages.

Attaches to S/360 model 195 or S/370 models 165, 168 or 195 via a 2880 Block Multiplexer Channel. Attachment to S/370 model 135 (see "Limitations") or 145 is made via the system's block multiplexer channel or selector channel and to the 135-3, 138, 145-3 and 148 via the block multiplexer channel. Attachment to S/370 model 155 or 158 is made via the system's block multiplexer channel. Attachment to a 3031, 3032, 3033, 3081, 3083 or 3084 Processor is made via a block multiplexer channel. Attaches to the 4341 or 4381 Processor via a block multiplexer channel and to the 4331 (Model Group 2) or 4361 Processor via the High-Speed Block Multiplexer Channel.

Prerequisites

[1] The 3830 mdl 1 is designed for interconnected operation with 3330 Disk Storages. Customers who wish to order a 3830 mdl 1 for stand-alone or individual use should submit an RPQ to provide the necessary safety elements (covers, cable connectors, etc.) to complete the unit for a non-standard (i.e., not interconnected as part of a 3330 facility) environment. In lieu of the RPQ, the customer may provide safety elements equivalent to the standard 3830 mdl 1/3330 configuration or that provided by the RPQ. If not provided, the unit will be offered on a purchase-only basis. See "Specify". Agreement for IBM to install and maintain the 3830 mdl 1 in any non-standard environment must be reviewed with FE Regional Management prior to making a commitment to the customer.

[2] An available control unit position on a channel. One unshared subchannel for each drive attached on a system block multiplexer channel or a 2880 Block Multiplexer Channel. For S/360 (3330 series only) mdl 195 and S/370 mdl 165, 168, 195, see M2880 pages. For S/370, mdls 135 and 145, and 4300 processors, a system block multiplexer channel is required for support of block multiplexing and rotational position sensing ... see M3333, 3330, 3340, 3344 and 3350 pages. If this support is not required, attachment to a system selector channel is permitted.

Limitations: [1] See M3333, 3330, 3340, 3344 and 3350 pages for system support limitations ... [2] in S/370 mdl 135, 135-3, 138, when a 3830 mdl 2 is attached to a block multiplexer channel, only 16 logical devices will operate in this mode even if more than 16 logical devices are attached.

HIGHLIGHTS

File organization and format are under program control ... command structure permits flexible and efficient processing of either randomly or sequentially organized files. Data integrity is provided through extensive error detection and correction capabilities.

Standard Features ... include the following:

Command Chaining: Allows sequential records within a cylinder to be read/written by a sequence of channel commands without rotational delays between records.

Record Overflow: Storage efficiency is obtained by allowing records to span track boundaries within a cylinder.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with 3330, 3333 or 3340 voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Non-standard Environment: **#9485** must be specified if the 3830 mdl 1 is not to be installed as part of a 3330 facility. Also see "Prerequisites" above.
- DASD Configuration (3830 mdl 2): The available combinations of storage devices which can be attached are shown in the tables below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s) from the appropriate table.

3830 Storage Control Mdl 1, 2 (cont'd)

3830 MDL 2 WITH OR WITHOUT TWO-CHANNEL SWITCH (#8170)

DASD Configuration		Required DASD Specify Features (2)													
		(1) 9313	(1) 9314	(1) 9314 9190	(1,3) 9315			(1,3) 9315 9190			(1,4 9317		(1,5) 9318	
3333 Only	One or two 3333s with associated 3330s	x	x											
	Up to four 3333s with associated 3330s				x	x								
	String Switch (#8150) on any 3333		x			x								
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x				
	Up to four 3340 mdl A2s with associated mdl B1/B2s						x	x			x	x		
	String Switch (#8150) on any 3340 mdl A2			x			x			x		x		
	Fixed Head feature (#4301/#4302) on any 3340				x					x	x	x		
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s												x	x
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340												x	
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives							x	x			x	x	
	String Switch (#8150) on any 3333 or 3340 mdl A2							x				x		
	Fixed Head feature (#4301/#4302) on any 3340											x	x	
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F												x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F												x	
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives													x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/ A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340													x

Notes:

(1) ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

(2) Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

(3) Control Store Extension (#2150) is prerequisite. With **#9315**, the 3830 mdl 2 requires 32 contiguous device addresses regardless of the number of drives attached.

(4) Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830 mdl 2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

(5) Expanded Control Store (#2151), Control Store Expansion (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830 mdl 2 uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

3830 MDL 2 WITH TWO-CHANNEL SWITCH, ADD'L (#8171) AND ITS PREREQUISITE TWO-CHANNEL SWITCH (#8170)

DASD Configuration		Required DASD Specify Features (2)									
		(1) 9313	(1,3 9313 9841	(1,3) 9315				(1,4 9317		(1,5) 9318	
3333 Only	One or two 3333s with associated 3330s	x	x								
	Up to four 3333s with associated 3330s			x	x						
	String Switch (#8150) on any 3333		x	x							
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s				x	x					
	Up to four 3340 mdl A2s with associated mdl B1/B2s					x	x				
	String Switch (#8150) on any 3340 mdl A2				x		x				
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s							x	x		
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/4302) on any 3340								x		
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives						x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2						x				
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F								x	x	
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F									x	
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives										x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/ A2F, C2/C2F and/ or Fixed Head feature (#4301/ #4302) on any 3340										x

Notes: For explanations, see *Notes* following the Table "3830 Mdl 2 With or Without Two-Channel Switch (#8170)".

SPECIAL FEATURES

Control Store Extension (#2150): [Mdl 2] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts above to determine which is required. **Field Installation:** Yes. **Maximum:** One.

Expanded Control Store (#2151): [Mdl 2] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** #2150. A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts to determine which is required. **Note:** Customer price quotations and customer order acknowledgement letters must state: "Installation of this feature involves removal of parts which become the property of IBM." **Maximum:** One. **Field Installation:** Yes.

Register Expansion (#6111): [Mdl 2] Provides additional registers for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts to determine which is required. **Field Installation:** Yes. **Maximum:** One.

Remote Switch Attachment (#6148): [Mdl 2] To attach the Two-Channel Switch (#8170) to a configuration control panel. **Field Installation:** Yes.

Remote Switch Attachment, Add'l (#6149): [Mdl 2] To attach the Two-Channel Switch, Add'l (#8171) to a configuration control panel. **Field Installation:** Yes.

Two-Channel Switch (#8170): To attach the 3830 to a second channel ... the two channels may be on the same processor or different processors. An available control unit position is required on each channel ... see item [2] under "Prerequisites". Switching is under program control. The 3830 can be dedicated to a single channel by means of an Enable/Disable switch. **Field Installation:** Yes. **Maximum:** One.

Two-Channel Switch, Add'l (#8171): Adds switching for two additional channels to a 3830 with Two-Channel Switch (#8170), providing four channel switch capability. **Limitations:** Only two channels of the four available can be attached to the same processor. Cannot be installed if Fixed Head feature (#4301/#4302) is installed on any 3340. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:**

3830 Storage Control Mdl 1, 2 (cont'd)

#8170. #2151 and/or #2150 are also required in certain 3830 mdl 2 configurations ... see DASD Configuration under "Specify".

MODEL CONVERSIONS

Model 1 to model 2 is field installable ... an additional 15 amp AC power outlet is required. Model 2 to model 1 is not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

3830 STORAGE CONTROL MDL 3

PURPOSE

Provides for the attachment of 3333/3330/3350 DASD in a 3850 Mass Storage System.

MODELS

Model 3 003

Prerequisites: The 3830 mdl 3 must have the Two-Channel Switch (#8170) and Control Store Extension (#2150). One channel interface attaches to the 3851 MSF and one channel interface attaches to the host processor.

Limitations

[1] A maximum of four 3830 mdl 3s may be attached to a S/370, 4341 or 4381 Processor block multiplexer channel. If 3830 mdl 1s or 2s and/or Integrated Storage Controls (#4650) are attached to the same block multiplexer channel, the maximum number of 3830 mdl 3s will be reduced. Consult *IBM 3850 Mass Storage (MSS) Installation Planning, and Table Create,* GC35-0028, for total system limitations.

[2] String Switch (#8150) may be installed on the 3333/3350 in a 3850 MSS for additional availability. Installation is not recommended in a mixed MSS/Non-MSS environment. See M3333, 3350 pages for additional limitations.

[3] 3340 DASD cannot be installed on the 3830 mdl 3.

HIGHLIGHTS

Virtual Disk Storage: Provides up to 64 unique addresses for each channel interface.

Channel Interfaces: Up to three processor channel interfaces are available, providing up to 192 unique addresses on each 3830 mdl 3.

Drives: Up to 32 DASD spindles of 3333/3330 mdls 1, 2 and 11 and 3350 mdls A2/A2F, B2/B2F and C2/C2F can be attached. A 3830 mdl 3 with **#9320** can operate any combination of up to four 3333 mdls 1 and 11 with associated 3330 mdls 1, 2 and 11 and/or native 3350 mdls A2/A2F with associated native 3350 mdls B2/B2F and C2/C2F. A 3830 mdl 3 with #6250 can operate up to four 3350 mdls A2/A2F with associated 3350 mdls B2/B2F and C2/C2F in either native or 3330 mdl 11 mode. See M3333, 3330 and 3350 pages for additional information.

Staging Drives: Up to sixteen 3333 mdl 1/3330 mdl 1 or 2 storage devices can be designated as staging drives. 3333/3330 mdl 11 or 3350 in 3330 mdl 11 mode may also be used for staging drives; however, each mdl 11 or 3350 in mdl 11 mode drive designated as a staging drive is equivalent to two mdl 1 or mdl 2 drives. These staging drives will be used by the 3850 Mass Storage System to provide virtual storage. See note on M3333 pages for feature changes required when 3333s are retained for use with a 3851.

Staging Paths: The 3830 mdl 3 contains control store for data buffering and microcode. This accomplishes data staging without using S/370, 4341 or 4381 Processor channels or memory.

Real Drives: Up to a maximum of 32 attached drives may be designated as "real". Each Real drive uses one of the 192 unique 3830 addresses. All 3350 drives attached to a 3830 mdl 3 with **#9320** must be designated as Real in 3350 native mode only. 3350 drives attached to a 3830 mdl 3 with #6250 may be designated as Real in 3350 native or 3330 mdl 11 mode.

Virtual Storage: All data stored in the 3850 Mass Storage System appears to the system as residing on a 3333/3330 storage device with all the data handling capabilities of the 3330 available.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with 3330 or 3333 voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- DASD Designation: **#9313** ‡ for 3333/3330 DASD, or **#9320** ‡ for 3333/3330/3350 DASD.

SPECIAL FEATURES

Control Store Extension (#2150): [req'd] Provides additional control store for microprogram use. **Field Installation:** Yes.

Expanded Control Store (#2151): Provides additional control store for microprogram use. Required if 3350 DASD is attached. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150.

Control Store, Add'l (#2152): Provides additional control store for microprogram use. Required if 3350 DASD is attached. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150, #6111 and #2151.

Register Expansion (#6111): Provides additional registers for microprogram use. Required if 3350 DASD is attached. **Field Installation:** Yes. **Maximum:** One.

Remote Switch Attachment (#6148): To attach the Two-Channel Switch (#8170) to a configuration panel. **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Add'l (#6149): To attach the Two-Channel Switch, Add'l (#8171) to a configuration panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6148.

3350 Staging (#6250): Provides for staging to 3350 drives in 3330 mdl 11 mode and access to Real 3350 in either native or 3330 mdl 11 mode. **Limitations:** Attachment of 3333 mdls 1/11, 3330 mdls 1, 2 or 11 is mutually exclusive with #6250. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2152 and #6111.

Two-Channel Switch (#8170): [req'd] Provides system channel attachment capability for the 3830 mdl 3. One channel interface attaches to the 3851 MSF and one channel interface attaches to the host processor. An available control unit position is required. See "Prerequisites" and "Limitations". **Field Installation:** Yes.

Two-Channel Switch, Add'l (#8171): Provides attachment for two additional channels to a 3830 mdl 3, providing three processor channel switch capability. **Limitations:** Only two of the three channel interfaces can be attached to channels on the same processor. **Maximum:** One ... see "Prerequisites" and "Limitations". **Field Installation:** Yes. **Prerequisites:** #8170.

MODEL CONVERSIONS

Model 2 can be field changed to a model 3. MES order for model change must include correct serial number and all installed and on-order features and RPQs on the 3830 model 2 to be changed. It must also include removal of any of the following which are installed: **#9190, #9314, #9315, #9317, #9318, #9841.** Prior to ordering the model change, installed and on-order RPQs should be resubmitted to IBM. Control Store Extension (#2150) and Two-Channel Switch (#8170) must be previously installed or installed concurrently with the model upgrade. For customers who wish to have an installed 3830 model 1 converted directly to a 3830 model 3, submit an RPQ. The 3830 mdl 3 to mdl 2 conversion is not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

‡ ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

3838 ARRAY PROCESSOR

PURPOSE

An auxiliary processing unit for S/370 mdl 145, 148, 158, 168, 3031, 3032, 3033, 3081, 3083, 3084, 4361, 4381, 4341 Processor and the 3042 Attached Processor model 2, which attaches on a Block Multiplexer Channel. Processes single precision floating point vector operations found in seismic trace processing and other applications.

MODELS

Model 1	001	Contains 256K bytes of bulk storage
Model 2	002	Contains 512K bytes of bulk storage
Model 3	003	Contains 1,024K bytes of bulk storage

Prerequisites:

1. A control unit position on a system block multiplexer channel.
2. For S/370 mdl 168 configuration, if feature #7850 (Two-Byte Interface) is specified the 2880 must also have the appropriate Two-Byte Interface (#7850 or #7851).
3. For S/370 mdl 145, Word Buffer (#8810) is required on the 145 to achieve maximum rated block multiplexer transfer rate.
4. For a 3032 or 3033 Processor configuration if Two-Byte Interface (#7850) is specified, the 3032 or 3033, or 3042 Attached Processor mdl 2 channel to which the 3838 is to be attached must also have the appropriate Two-Byte Interface (#7850).
5. For a 3031, 3032, or 3033 Processor, and a 3042 Attached Processor mdl 2 configuration, if Data Streaming Feature (#4850) is specified on the 3838 with its prerequisite, the channel to which the 3838 attaches must also have the appropriate Data Streaming Feature (#4850) installed.

Limitations: Multiple 3838s; and/or other I/O devices on the same channel may degrade performance. The 3838 is supported only on S/370 mdls 145, 148, 158, 168, 4341, 4361, 4381 with OS/VS1, and mdls 158, 168, 3031, 3032, 3033, 3081, 3083, 3084, 4341, 4361, 4381 with OS/VS2 MVS. Multiple 3838 Array Processors attached to a single S/370 or 4341 Processor host should each have identical algorithm sets because VPSS allocates ports based only on bulk store partition size and shared versus exclusive usage.

Minimum System Requirements:

1. S/370 mdl 145, 148, 158, 168 or 3031, 3032, 3033, 3081, 3083, 3084, 4341, 4361, 4381 with block multiplexer channel.
2. Nine track, 1600 bpi PE magnetic tape (factory order note specifying type and density, if other).
3. MVS Release 3.8 or MVS/System Product Releases 1, 2 or 3, or System Extensions with MVS/Release 3.8. Additionally, the Vector Processing Subsystem (VPSS) Independent Release must be installed.

OS/VS1 Release 6 with Selectable Unit for Subsystem Attachment Support (SU6), and EREP (SU1).

CE maintenance and service capability is affected if any of the above are not part of the system configuration.

HIGHLIGHTS

Permits systems with a high content of vector processing operations to execute the vector work in parallel with processor host processing thereby releasing the processor for other multiprogrammed system tasks. User programmable by coding available instructions to define complete processing sequences. Contains five functional components each capable of overlapped or concurrent operation to sustain processing performance.

Channel Interface: Allows data and control information to transfer in block multiplexer mode at data rates of 1.5MB/sec. in single byte transfers with the processors listed above.

When attached at 3MB/sec. on a two-byte interface, to a S/370 mdl 168, a 3032, 3033 Processor, or a 3042 Attached Processor mdl 2, with the two-byte interface feature on the 3838, the 2880 channels on the 168 must be equipped with a similar feature (#7850 or #7851), and the 3032, 3033 and 3042 Attached Processor mdl 2 channels, to which it is attached, must be equipped with (#7850).

When attached to a 3031, 3032, 3033 Processor or the 3042 Attached Processor mdl 2, with data streaming feature on the 3838, in data streaming mode, at up to 3MB/sec., the Processors must be equipped with Data Streaming Feature (#4850). (On the 3081, 3083, 3084, 4341, 4361 and 4381 data streaming is standard.)

Bulk Storage: Provides independent data storage for up to seven concurrent 3838 users. Seven is the upper limit on 3838 user partitions but is not restrictive of the number of host regions executing 3838 destined jobs. The user partitions may be shared or exclusive. Receives input data from the host and buffers for processing. During processing of algorithm sequences, provides initial, intermediate, and final result data storage. Final results are subsequently transmitted to the host under control of a pending CCW on the block multiplexer channel.

Data Transfer Controller: Provides multiplexing of the internal data busses for concurrent transfers of data between the functional elements.

Arithmetic Processor: Controls algorithm execution for processing vectors through the 100ns/stage pipelined arithmetic unit. Algorithms can be utilized in the application program of individual users to provide comprehensive processing techniques unique to each user. Algorithm control store may be expanded from the basic 16,384 bytes for all mdls with the control store additional feature (#1551) which provides an additional 16,384 bytes of control storage.

Control Processor: Manages the total 3838 subsystem functional operation, synchronizing all data transfers and arithmetic operations, performing logical decisions in algorithm chains, and sequencing multiple users problems through the array processor.

The Instruction Set includes the following vector processing algorithms and logic operations:

Algorithm/Mnemonic:

a) **Arithmetic Instructions (Standard)**
- Vector Move (VMV)
- Vector Move Convert (VMC)
- Scalar Move (SMV)
- Zero Move (ZMV)
- Vector Floating Point to Fixed Point Conversion (VFX)
- Convolving Multiply (CVM)
- Quadratic Interpolation (INT)
- Vector Element-by-Element Sum (VES)
- Scalar Element-by-Element Sum (SSUM)
- Vector Element-by-Element Multiply (VEM)
- Scalar Multiply (SMY)
- Sum of Squares (SSQ)
- Fast Fourier Transform (Forward Real) (FTFR)
- Fast Fourier Transform (Forward Complex) (FTFC)
- Fast Fourier Transform (Inverse Real) (IFTR)
- Fast Fourier Transform (Inverse Complex) (IFTC)
- Complex Multiply (CEM)
- Scalar Complex Multiply (SCEM)
- Complex Multiply (Complex Conjugate) (CMCC)
- Complex Multiply (Conjugate Output) (CMCO)
- Scalar Complex Multiply (Conjugate Output) (SCMC)
- Signed Square Array (SSA)
- Sum of Vector Elements (SVE)
- Array Scan for Maximum (MAX)
- Vector Inner Product (VIP)
- Vector Element Limit (LIM)
- Divide (DIV)
- Scalar Divide (SDIV)
- Square Root (SQRT)
- Nth Zero Crossing (NZCP/NZON)
- Wiener-Levinson (WLEV)

b) **Arithmetic Instructions (Optional)**
- Polynomial Expansion (POLY) (**#9301**)
- Logarithm (LOG) (**#9302**)
- Exponential (EXP) (**#9303**)
- Tangent (TAN) (**#9304**)
- Arctangent (ATAN/ATN2) (**#9305**)
- Recursive Filter (REC) (**#9307**)
- Vector Reverse (REV) (**#9308**)

c) **Logic/Index Instructions**
- Move Index to Index (XMV)
- Move Bulk Storage to Index (XMVS)
- Move Index to Bulk Storage (XMVX)
- Move Immediate to Index (XMVI)
- Add Index to Index (XAD)
- Add Immediate to Index (XADI)
- Subtract Index from Index (XXSE)
- Subtract Immediate from Index (XSBI)
- Multiply Index times Index (XML)
- Multiply Immediate times Index (XMLI)
- Divide Index into Index (XDV)
- Divide Immediate into Index (SDVI)
- Divide Index into Immediate (XDIR)
- Compare Index: Index (SC)
- Decrement and Compare Index: Index (XDC)
- Compare Floating Point Index: Index (XCF)
- Compare Floating Point Index: Immediate (XCFI)
- Compare Index: Immediate (XCI)
- Decrement and Compare Index: Immediate (XDCI)
- Branch on Count Loop (XBCT)
- Unconditional Branch (XGO)

d) **VPSS Instructions**
- Label Definition (XID)
- Move Data to/from S/370/4341, 4361 or 4381 Processor and 3838 Bulk Storage (VPUT/VGET)

3838 Array Processor (cont'd)

Move Data to/from S/370/4341, 4361 or 4381 Processor and 3838 Index (VPUTX/VGETX)

A brief description of the vector processing algorithm follows:

Vector Element Sum (VES): The VES operation provides a resultant vector Y, the elements of which are a sum of the corresponding elements in vector X and vector or scalar U.

Vector Element Multiply (VEM), Scalar Multiply (SMY), or Signed Square Array (SSA): The VEM operation provides a resultant vector Y, the elements of which are a product of the corresponding elements in vectors X and U. The SMY operation is a special case of VEM for which U is a scalar quantity. The SSA operation uses the VEM algorithm with two specifications of the X array as the inputs. A sign control option exercised on the first call of the X array allows the sign of the X array to be retained.

Vector Move Convert (VMC): The VMC operation has four subforms, each of which load the Y vector from the X vector. One form (VMV) moves vectors in bulk store, the second form (VMC) converts the X vector from fixed point integer to floating point, the third form (SMV) is used to load a single value (scalar) into all locations of the Y vector, and the fourth form (ZMV) is a scalar load where zero is specified as the scalar value of X.

Sum of Squares (SSQ) or Vector Inner Product (VIP): The SSQ operation takes a vector X and multiplies it on an element-by-element basis with a replica of itself. It then performs an algebraic sum of these squared elements and returns the single element result to a single element Y. Its VIP operation multiplies on an element-by-element basis, a vector U by a vector X. It then performs an algebraic sum of the resultant products and generates a single element result, Y.

Vector Floating Point to Fixed Point Conversion (VFX): The VFX operation converts a copy of the floating point vector X into a fixed point format, and stores it in Y.

Sum or Vector Elements (SVE): The SVE operation performs an algebraic sum of the elements of an X vector and places the sum in a single element, Y.

Array Scan For Maximum (MAX): The MAX operation scans the input vector X and returns in the two element Y vector the maximum value (after application or sign control) and the count of which element in X had that value.

Vector Element Limit (LIM): The LIM operation replaces the elements of the input vector X with specified minimum and/or maximum values if the input values exceed specified minimum or maximum limit values.

Convolving Multiply (CVM): Resultant vector Y with elements that are a discrete model correlation of the elements in vectors X and U or, by appropriate transposition and translation of the elements in U or X, convolution may be performed.

Divide (DIV): The DIV operation divides input vector U (or scalar (SDIV)) by a second input vector X and places the result in output vector Y.

Nth Zero Crossing (NZCP/NZCN): The NZCP/NZCN operation scans an input vector X and returns in the Y vector:

1) The count of the element X that represents the Nth time the data transitioned between positive and negative, and
2) The total number of zero crossings. The scan may be in order of increasing index (NZCP) or decreasing index (NZCN).

Quadratic Interpolation (INT): The INT operation performs a table lookup and interpolation function on a table of given data, and set of indicators into this table. The interpolation calculation is along a parabola drawn two points to the left and one point to the right of the chosen location, except where the chosen location is within the first input interval in which case the interpolation is based on one point to the left and two points to the right of the chosen point.

Complex Multiply (CEM): The CEM operation provides a resultant vector Y with complex elements from input vectors X and U each of which have complex elements. The operation may be specified to perform Complex Multiply (CEM), Scalar Complex Multiply (SCEM), Complex Multiply (Complex Conjugate) (CMCC), Complex Multiply (Conjugate Output) (CMCO) or Scalar Complex Multiply (Conjugate Output) (SCMC).

Square Root (SQRT): The SQRT operation takes the square root or the magnitude of an input vector or scalar X and places the result in output vector or scalar Y.

Wiener-Levinson Filter (WLEV): The WLEV operation accepts as its input a characterization of a signal and the type of noise encountered when reading that signal, and produces as an output the coefficients for a digital filter to remove the noise. These coefficients are chosen to minimize the RMS error in the output of a filter when the input consists of the expected signal, plus noise of the expected type.

Fast Fourier Transform (FFT): The FFT operation forms the forward or inverse Fast Fourier Transform in either of two modes: one where the time domain data is know to be complex (FFTC and IFTC) and one where it is real data (FFTR and IFTR).

Polynomial (POLY) (#9301): The POLY operation applies up to a 24th order polynomial expansion to the input vector X using coefficients provided in the U vector. **Prerequisites:** If Recursive Filter (REC) (**#9307**) or certain Algorithm Design and Development Service additions have been selected in the standard machine, then Arithmetic Element Control Storage Additional (#1551) is required.

Logarithm (LOG) (#9302): The LOG operation determines the logarithm to the base e of an input vector X. **Prerequisites:** POLY (**#9301**) and Arithmetic Element Control Storage Additional (#1551).

Exponential (EXP) (#9303): The EXP operation provides the antilog to the base e of an input vector X. **Prerequisites:** POLY (**#9301**) and Arithmetic Element Control Storage Additional (#1551).

Tangent (TAN) (#9304): The TAN operation provides the tangent Y of an input vector X. **Prerequisites:** POLY (**#9301**) and Arithmetic Element Control Storage Additional (#1551).

Arctangent (ATAN) (#9305): The ATAN operation provides the arctangent Y of an input vector X. The range of Y is 0 to pi radians. **Prerequisites:** POLY (**#9301**) and Arithmetic Element Control Storage Additional (#1551).

Arctangent 2 (ATN2) (#9305): This alternate version of Arctangent, ATN2, provides the arctangent, Y, of two input vectors, X (X axis) and U (Y axis). The range of Y is 0 to 2 pi radians. **Prerequisites:** POLY (**#9301**) and Arithmetic Element Control Storage Additional (#1551).

Recursive Filter (REC) (#9307): The REC algorithm implements a first order recursion equation where the elements of Y are a function of: previous values of Y, a Y coefficient vector U, an input vector X, and a scalar coefficient which is the first element of the U vector. **Prerequisites:** If Polynomial Expansion (POLY) (**#9301**) or certain Algorithm Design and Development Service additions have been selected in the standard machine, then Arithmetic Element Control Storage Additional (#1551) is required.

Vector Reverse (REV) (#9308): The REV operation reverses the ordering of real data for an input vector X.

Control Storage Requirements: The instruction set available on the 3838 consists of logic operations which are executed in the control processor and vector operations which are executed by the arithmetic processor. The arithmetic processor contains a 16,834 byte reloadable control store which contains the algorithms necessary to accomplish the vector operations. These are loaded when the 3838 is IPL/IMPLed from the host system. Selected arithmetic instructions from the optional arithmetic algorithms may be added to the standard arithmetic algorithms, or additional algorithms may be added to the product via the Algorithm Design and Development Service capability. When the capacity of the 16,384 bytes or control store is exceeded it is necessary to add feature #1551 Control Storage Additional (see "Special Features").

Algorithm Prerequisites: Prerequisite machine or specify features for optional algorithms are as follows:

1. Vector Reverse (REV) (**#9308**) and either POLY (**#9301**) or REC (**#9307**) can be added to the standard machine.
2. Polynomial Expansion (POLY) (**#9301**) is a prerequisite for LOG (**#9302**), EXP (**#9303**), TAN (**#9304**) and ATAN/ATN2 (**#9305**).
3. Any or all of the remaining optional algorithms (POLY) (**#9301**) or REC (**#9307**), LOG (**#9302**), EXP (**#9303**), TAN (**#9304**) and ATAN/ATN2 (**#9305**) require Arithmetic Element Control Storage Additional (#1551).
4. Algorithms provided by the Algorithm Design and Development Service may or may not require Arithmetic Element Control Storage Additional (#1551) depending upon optional algorithm selections or complexity.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage. **Field Installation:** Yes.
- Color: Specify **#9041** for Red, **#9042** for Yellow, **#9043** for Blue, **#9045** for Gray, **#9046** for White.
- Cabling: **#9080** for below floor, **#9881** for on floor. **Field Installation:** Yes.
- Configuration: **#9092** for additional 3838s in configuration (excludes first unit).
- Arithmetic Instructions

Polynomial Expansion **#9301**	Arctangent **#9305**
Logarithm **#9302**	Recursive Filter **#9307**
Exponential **#9303**	Vector Reverse **#9308**
Tangent **#9304**	

3838 Array Processor (cont'd)

SPECIAL FEATURES

Two-Byte Interface (#7850): Provides two-byte parallel transfer on the 2880 Block Multiplexer Channel to achieve data transfer rates up to 3.0MB/sec. **Maximum:** One. **Prerequisites:** #7850 or #7851 on 2880, or #7850 on a 3032, 3033, or 3042 Attached Processor mdl 2. **Field Installation:** Yes.

Data Streaming Feature (#4850): Provides attachment of the 3838 in Data Streaming Mode to channels on the 303X, 3042 Attached Processor mdl 2, 4341, 4361, 4381, 3081, 3083, and 3084. **Limitations:** The 3838 must be transferring data to and from the host processor channels in 4-byte (full word) multiples. **Maximum:** One per 3838. **Prerequisites:** On the 3838, #7850 is a prerequisite. If attached to the 303X and 3042 mdl 2, #4850 is required on the processor. **Field Installation:** Yes. Parts removed in the installation of this feature become the property of IBM.

Arithmetic Element Control Storage, Add'l (#1551): An additional 16,384 bytes of control store for additional algorithm capabilities. Custom algorithms are requested by Algorithm Design and Development Service. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field Installable.

ACCESSORIES (None)

SUPPLIES (None)

3843 LOOP CONTROL UNIT

PURPOSE

A signal converting unit used to provide loop capability at remote locations via a telecommunications link to one of the following:

- IBM 3630 Plant Communication System
- IBM 4331 Mdl Group 1 or 2 Processor
- IBM 8100 Information System.

The 3843 must be installed at the same site as the loop. The 3843 controls loop operation and provides an EIA/CCITT interface for attachment of an external synchronous modem. External non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Refer to M2700 pages.

MODELS (None)

HIGHLIGHTS

A 3843 loop may be up to 3.2 cable kilometers (2 cable miles) in length. All terminals that can attach to a 3631/3632 loop, a 3842 loop, an 8100 direct attached loop or 4331 loop via the 4331 loop adapter may be attached to the 3843 loop. The 3843 controls polling and with one poll command addressed to it, can provide responses from all loop attached terminals.

The 3843 operates at loop speeds of up to 9600 bps and will transmit/receive data over the telecommunication link at a speeds of 2400, 4800 or 9600 bps.

Communications: The 3843 functions with a synchronous modem (modem clocking) that transmits at 2400, 4800 or 9600 bps on a 2- or 4wire half-duplex nonswitched telecommunication link, with or without backup on the public switched network. The electrical characteristics of the EIA/CCITT interface comply with EIA recommendations RS232C and RS334 (for U.S.), CCITT recommendations (1976) V.24/V.28, ISO standard 2110 and other relevant CCITT recommendations. The interface supports modems functioning as recommended in CCITT V.26, V.27, V.27 and V.29. The 3843 also supports the test control line used by IBM modems. IBM modem attachment support:

IBM MODEMS	Speed (bps)	Line
3863 - 001	2400/1200	Nonswitched voice grade
3864 - 001	4800/2400	Nonswitched voice grade
3865 -001/002	9600/4800	Nonswitched voice grade
3872 - 001	2400/1200	Nonswitched voice grade

Four wire switched network backup operation with manual call and auto answer is available on 3863 mdl 1, 3864 mdl 1 and 3865 mdls 1 and 2. For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3865 and 3872 pages.

Nonswitched Lines: PTT (common carrier) provided telecommunication lines of voice grade quality. The actual line specification is dependent upon the attached modem selected to support the 3843. Duplex 4-wire required for multipoint and also recommended for point-to-point.

Privately Owned Communication Facilities: Equivalent to the above.

Public Switched Telecommunication Networks: The customer must be advised that satisfactory data transmission depends on the characteristics of the particular switched network facilities being used. Refer to M2700 pages for further details.

International Facilities: Transmission of data between the United States and Canada on nonswitched facilities is supported (US type 3002, Canada schedule 4, type 4). For Data transmission between all countries, request your country TP coordinator to contact the coordinator in the other countries involved to determine the availability of the required telecommunication facilities.

Related Equipment: The 3843 communicates with an appropriately configured 3631 or 3632 with EIA/CCITT Interface - data link (#3703) and data link adapter (#3211), a 4331 Mdl Group 1 or 2 Processor with data link adapter (#4840) or to an 8100 system with EIA interface adapter (#3701) and communications adapter without clock-SDLC (#1602). For communications capabilities, product utilization and special features, refer to M2700, 3630, 3631, 3632, 4331, 8101, 8130 and 8140 pages.

Customer Setup: The 3843 is designated for customer setup (CSU). This provides the customer with early availability. All selectable options and the address will be set at the plant from customer order information. Because none of the selectable options nor the address are accessible to the customer, a change of modem, data rate or location may require modifications to the 3843 by Field Engineering.

Problem Determination Aids: Can execute on-line diagnostic commands to perform self-tests, to assist in locating loop wiring or terminal failures at the remote site.

A Speed Select Switch is provided. This allows the 3843 to switch loop data speed to half-speed providing the externally attached modem has a half-speed capability. Modems with this capability can also be remotely switched to half-speed operation via the Speed Select Switch if they provide a "Data Rate Select" control line to the 3843.

Off-line tests are provided to perform self tests of the 3843 with or without involving loop wiring and/or loop terminals.

Physical Environments: The 3843 Loop Control Unit has been designed for operation in physical environments characteristic of office areas. See *IBM 3630 Plant Communication System, System Description*, GA24-3652 or *Introduction to the 8100 Information System*, GA27-2875.

Customer Responsibilities: The customer must be informed of his responsibilities as detailed in the M2700 pages and the pertinent section of the *IBM 3630 Installation Manual Physical Planning*, GA24-3675, and the *IBM System 3630 Plant Communications System Loop Installation - Physical Planning*, GA24-3676, or the *IBM 8100 Information System Site Planning and Preparation Guide for IBM 8101, IBM 8130, IBM 8140*, GA27-2844 or the *4331 Processor Installation Manual-Physical Planning*, GA24-3667.

The customer is responsible for the following:

- Arrangement for price quotations, installation and all costs of external modem and its associated equipment, services, and telecommunication facilities.
- Purchase, installation, testing, and maintenance of the loop cabling systems. Purchase a Loop Continuity and Relay Tester, if required. (See *IBM 8100 Information System Loop Installation Manual - Physical Planning Guide*, GA27-2878 or the *4331 Processor Installation Manual-Physical Planning*, GA24-3667.
- When installed on a 3630 Plant Communication System, The 3843 must be installed near a 3643. When installed on an 8100 System, the 3843 must be installed near a 3276 Control Unit Display Station, a 3278 Display Station, or an 8775 Display Terminal. When installed on a 4331 System, the 3843 must be installed near a 3641 or 3643 terminal when 3640 terminals are attached, when only 3287, 3775, 3276, or 3274 with their associated terminals are attached, test invocation is only possible from the Ops. Console. These devices are required for remote loop installation, problem determination procedures, and maintenance.
- Providing voice communications between the 3843 and the controller/processor locations to coordinate tests. The voice facility must be located in such a way that the operator can use it while operating the controls on the front of the 3843.
- Providing a wrap type Loop Station Connector for the 3843.
- Unpacking, physical setup, and connection of cables at setup time.
- Notifying IBM of intent to relocate the unit and following IBM instructions for relocation.
- Disconnecting, packing, and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be furnished by IBM.
- Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings and check out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where access areas are not provided.

Bibliography: *IBM 3630 Plant Communication System, System Description*, GA24-3652

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): 115V (usable on 120V): **#9880** for locking plug, or **#9881** for non-locking plug. 208V: **#9884** for locking plug, **#9885** for non-locking plug. 230V: **#9886** for locking plug, **#9887** for non-locking plug.
- **Data Rate:** **#9822** for 2400 bps; **#9823** for 4800 bps; **#9825** for 9600 bps. See Note below.
- 3843 Address: **#9587** must be specified on all orders— supplemental specs available for giving one EBCDIC byte address. Any two "Hex" characters, excluding "00" and "FF", may be used. Refer to: *IBM 3630 System Description*, GA24-3678, *IBM 3630 Programmers Guide*, GC24-5174, *IBM 3630 Plant Communication System Planning Guide*, GA24-3685, *IBM 8100 DPPX Administration Guide*, SC27-0403, *IBM 4331 Processor Summary I/O and Communication Configurator*, GA33-1523, *IBM 4331 Loop Operating Procedures and Problem Determination*, GA33-1538. On a multipoint network, each 3843 must be assigned a unique address. See Note below.
- Modem: **#9350** for connection to an IBM 3872 Modem; **#9351** for connection to an IBM 3863, 3864, 3865, or 3874 Modem; **#9352** for connection to a non-IBM modem. See Note below.
- Related Equipment: To provide applicable documentation, specify **#9560** if the 3843 will be part of a 3630 System, **#9569** if the 3843

3843 Loop Control Unit (cont'd)

will be part of an 8100 System or **#9565** if the 3843 will be part of a 4331 Processor.

- Loop Station Connector Cable: A 2.1m (7 ft) cable is provided as standard. If a 4.2m (14 ft) cable is desired, specify **#9410**.
- Interconnection Cable to Modem: A 6.0m (20 ft) interconnection cable is provided as standard for attachment to the modem. If other than a 6.0m cable is required, specify **#9021** and indicate 10 for a 3.0m (10 ft) cable, 30 for a 9.0m (30 ft) cable, or 40 for a 12.0m (40 ft) cable.

Note: "Data Rate", "3843 Address" and "Modem" type can be altered by service personnel. Instructions are contained in the maintenance manual. Do not submit an MES order to change these items.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3845 DATA ENCRYPTION DEVICE

PURPOSE

A table top or shelf mounted encryption/decryption device for data transmitted over a communication line. The 3845 is positioned between a data terminal equipment (DTE) and a data communications equipment (DCE), one at each end of a half-duplex or duplex communication line. The 3845 will operate with Start/Stop (S/S), Binary Synchronous Communications (BSC), or Synchronous Data Link Control (SDLC) protocol at speeds ranging from 110 bps to 19,200 bps. See 'Limitations' under "Communications".

Attachable Devices: The 3845 is transparent to the DCE and the DTE. Control signals used by the 3845 are redriven in compliance with the EIA-CCITT specification. All other signals are cable fed through the 3845. The 3845 will attach wherever EIA RS-232-C/CCITT V.24 interface requirements are met.

MODELS

MODELS 1-3: For use with Start/Stop or SDLC line protocol (S/S-SDLC).

Model 1 001 — A single half-duplex unit operating on a 2- or 4-wire half-duplex communication.

Model 2 002 — A dual half-duplex unit, with each half duplex device completely independent of the other, operating over 2- or 4-wire half-duplex communication lines.

Model 3 003 — A full duplex unit operating over a full duplex communication line.

MODELS 11-13: For use with BSC, BSC with Business Machine Clock (BMC), or SDLC (BSC/SDLC or BSC with BMC).

Model 11 011 — A single half-duplex unit, operating on 2- or 4-wire half-duplex communication line in BSC/SDLC or BSC with BMC ... see "Specify Features".

Model 12 012 — A dual half-duplex unit, with each half-duplex device completely independent of the other, operating over 2- or 4-wire half-duplex lines in BSC/SDLC or BSC with BMC - see "Specify". **Limitations:** A model 12 must have both outputs either BSC/SDLC or BSC with BMC.

Model 13 013 — A full duplex unit operating over a full duplex communication line in BSC/SDLC or BSC with BMC - see "Specify".

Limitations: Operation at 19,200 bps may require the user to optimize cable length and quality. For additional information, refer to the *General Information Manual,* GA27-2865.

Prerequisites: (1) A S/S, BSC or SDLC communication line ... (2) compliance with EIA RS-232-C or CCITT V.24 ... (3) external modems, IBM or non-IBM ... (4) Personalization/ Key Entry Unit (accessory) available at site location. See M10000 pages.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

A communication security device that provides encryption/decryption of digital data transmitted over a communication line. The 3845 implementation of Data Encryption Standard (DES) conforms to the U.S. National Bureau of Standards algorithm published as FIPS #46, January 15, 1977.

Two or more data encryption devices (3845 or 3846) are needed, one at each termination of a communication line (point-to-point or multipoint). **Limitations:** A 3845 or 3846 is required at each node in order to have message header information in the clear through that node.

The 3845 is cabled to the DTE via the cable that is provided by the DTE manufacturer for attachment to the DCE. Attachment from the 3845 to the DCE is by a cable provided with the 3845. One cable is provided per line function. **Limitations:** The cable provided with the 3845 is 1.5 meters (5.0 feet) long. This adds load capacitance to the DTE/DCE. See the *General Information Manual,* GA27-2865, for specific information on the additional capacitance.

An accessory, the Personalization/Key Entry Unit (P/KEU), must be available at each site location having a 3845. This accessory is used to enter the key variable, the seed, and to personalize the 3845 to the customer's communication line. The key variable is a 56 bit plus parity code, entered by the customer at a frequency consistent with his security requirements. The customer defines his own keys, selects them in a random manner, and enters them manually. The seed is 1 to 16 hexadecimal random characters used to initiate the synchronization message. The personalization consists of four hexadecimal characters of information that personalizes the 3845 to the communication facilities, such as line discipline, line speed, method of clocking, and synchronization message length.

The 3845 has a bypass switch that allows messages to be sent in the clear and is also used by the customer in fault isolation. A battery is provided that maintains power to the storage registers containing the key variable, seed, and personalization data when the 3845 AC power is removed.

Security is provided by the use of interlocks that remove power, including battery power, from the storage registers whenever the service cover is removed. The seed, key variable and personalization must be reentered when all power (battery and AC) is removed.

Communications: The 3845 mdls 1, 2 and 3 encrypt/decrypt data if the DTE/DCE: (a) conforms to interface EIA RS-232-C or CCITT V.24; (b) uses S/S or SDLC protocol; (c) operates on a half-duplex or duplex facility; (d) is within the speed of 110 to 9600 bps for asynchronous operation or the speed of up to 19,200 bps for synchronous operation; (e) uses a 7- or 8-bit code (exclusive of the required start and stop bits) for asynchronous operation or uses an 8-bit SDLC flag for SDLC operation; and (f) ensures an identical bit stream between transmit output and receive input functions of the 3845/3846 units on the same communication line.

The 3845 mdls 11, 12 and 13 encrypt/decrypt data if the DTE/DCE: (a) conforms to interface EIA RS-232-C or CCITT V.24; (b) uses BSC or SDLC protocol; (c) operates on a half-duplex or duplex facility; (d) is within the speed of up to 19,200 bps; (e) uses an EBCDIC or ASCII code (odd parity only) for BSC or uses an 8-bit SDLC flag for SDLC operation; and (f) insures an identical bit stream between transmit output and receive input functions of the 3845/3846 units on the same communication line.

Data Communications Equipment: External Data Communications Equipment must be used with the 3845. IBM external modems may be attached to the 3845:

Modem	Speed (bps)
3872	1200/2400

Problem Determination Procedure: A bypass switch is provided that allows transmission in the clear to permit determining whether a problem exists in the 3845 or in other equipment. See "Customer Responsibilities" below.

Problem determination is a customer responsibility that does not involve the customer engineer.

Customer Setup (CSU): The 3845 is designated as a customer setup device, thereby offering the customer relocation flexibility. CSU is a customer responsibility that does not involve the customer engineer.

Customer Responsibilities: The customer is responsible to: Provide an adequate site and other preparation, including Installation Planning ... receive at the customer's receiving dock, unpack and set up the 3845 ... connect cables to the 3845 and DCE ... personalize to the communication facility ... enter the seed ... enter the key variable ... use and follow the problem determination procedures and follow instructions for service of the 3845. **Note:** Appropriate procedures are provided by IBM with each unit for setup, personalization and entering the seed and key variable.

Maintenance: The customer may wish to replace a failing 3845 with a spare and must be advised to purchase spares for such use. The number of spare devices needed is dependent upon the number of devices the customer has installed, his application requirements, physical locations, and layouts.

IBM Service: Maintenance of the 3845 will normally be at a designated IBM Location . All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Location. It shall be the customer's responsibility to set up the equipment and to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing device, pack the device in the designated shipping container and ship it prepaid to the IBM Repair Center. IBM will pre-pay the transportation charges for return of the repaired device. There is no regularly scheduled preventive maintenance recommended by IBM on these devices.

The service is available under an *IBM Repair Center Service Amendment,* to the IBM Maintenance Agreement or on a Time and Material basis.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM location for repair under the *IBM Repair Center Machine Repair Authorization Form,* GX27-2981, in which case repair will be made (if the machine is repairable). Alternatively, upon request, the IBM Location will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, adjustments, testing, return shipping charges and estimating of repair charges.

The 3845 is eligible for maintenance agreement service immediately following expiration of the service and parts warranty at the monthly charge shown under MMMC in "Prices".

If maintenance agreement service is not contracted for immediately following expiration of the service and parts warranty and the customer

3845 Data Encryption Device (cont'd)

wants maintenance agreement service, the customer may ship the machine(s) to the designated IBM location for an inspection.

If, on the basis of an inspection, the Designated IBM Location concludes that a machine is not repairable, no further work will be performed. The machine will be returned to the customer with a minimum charge to cover handling, inspection, testing and a return shipping charge.

In all other cases, the IBM Location will charge a minimum fee per machine to cover handling, inspection, adjustments, testing, and return shipping. In addition, all parts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates, if so authorized by the customer. The machine will then be eligible for maintenance agreement service.

Personalization/Key Entry Unit (P/KEU): Maintenance agreements are not available. Customer engineering on-site service will not be provided. During the warranty period, warranty service is available at the Designated IBM Location.

Configuration: The HONE Configurator, CFMODEM, is available to help in configuring the 3845/3846.

Bibliography: GA27-2865, *General Information Manual* ... GA27-2866, *Principles of Operation.*

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- For 3845 mdls 11, 12 and 13: Specify one ... installation available at time of manufacture only.

  #9110 - BSC/SDLC, or
  #9115 - BSC with BMC

- Line Voltage Plug:

  #9890 Power and line cord, single phase, 60 Hz, 115/120 volt lock plug

  #9891 Power and line cord, single phase, 60 Hz, 115/120 volt non-lock plug

- Line Cord Length: If the standard 2.8 meter (9 foot) power cable is not desired, specify:

  #9511 for 1.8 meter (6 foot) line cord
  #9512 for 3.7 meter (12 foot) line cord
  #9513 for 4.5 meter (15 foot) line cord

SPECIAL FEATURES (None)

Codes: SIU = 3845 ID = L80 SYSTYPE = 3045

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

For delivery with the machine, specify the appropriate Feature number on the 3845 machine order (except battery). For delivery at any other time, specify the appropriate Part Number on MSORDER (Category = Accessories/ Supplies) on AAS (except battery).

Personalization/Key Entry Unit: On the 3845, to enter the key variable, seed, and personalization data. One must be available at each site having a 3845.

Battery: A battery is needed to replace the installed battery. The replacement schedule is defined in the *Principles of Operation Manual.* Discharged batteries should be returned to IBM.

Feature Summary	P/N	Feature No.
Personalization/Key Entry Unit	**4407908**	**#9501**
Mounting Plates	**6813128**	**#9502**
Blank Panel	**4409058**	**#9503**
Battery	**6815261**	

Warranty: Services are available for Personalization/Key Entry Unit at the designated IBM Repair Center during the 90 day warranty period which commences 30 days following date of shipment from the Plant of Manufacture (Raleigh). It shall be the customers responsibility to determine the failing unit and if the unit is still under warranty to pack it in the designated shipping container and ship it pre-paid to the designated IBM Repair Center.

IBM Maintenance Agreements are not available. Field Engineering on-site service will not be provided.

SUPPLIES

None required with machine order.

3846 DATA ENCRYPTION DEVICE

PURPOSE

A rack-mounted encryption/decryption device for data transmitted over a communication line. The 3846 is positioned between a data terminal equipment (DTE) and a data communications equipment (DCE), one at each end of a half-duplex or duplex communication line. The 3846 will operate with Start/Stop (S/S), Binary Synchronous Communications (BSC), or Synchronous Data Link Control (SDLC) protocol at speeds ranging from 110 bps to 19,200 bps. See 'Limitations' under "Communications."

Attachable Devices: The 3846 is transparent to the DCE and the DTE. Control signals used by the 3846 are redriven in compliance with the EIA RS-232-C/CCITT V.24 specification. All other signals are cable fed through the 3846. The 3846 will attach wherever EIA RS-232-C/CCITT V.24 interface requirements are met.

MODELS

Model 1 001 — A power unit capable of providing power to one to four line function units.

Models 2-3

For use with Start/Stop or SDLC line protocol meeting EIA RS-232-C or CCITT V.24 interface. Requires a 3846 Model 1 for power.

Model 2 002 — A dual half-duplex line function unit, with each half-duplex device completely independent of the other, operating over 2- or 4-wire half-duplex communication lines.

Model 3 003 — A full duplex line function unit operating over a full duplex communication lines.

Models 12-13

For use with BSC, BSC with Business Machine Clock (BMC), or SDLC (BSC/SDLC or BSC with BMC). Requires a 3846 Model 1 for power.

Model 12 012 — A dual half-duplex line function unit, with each half-duplex device completely independent of the other, operating over 2- or 4-wire half-duplex communication lines in BSC/SDLC or BSC with BMC ... see "Specify". **Limitations:** A Model 12 must have both outputs either BSC/SDLC or BSC with BMC.

Model 13 013 — A full duplex line function unit operating over a full duplex communication line in BSC/SDLC or BSC with BMC ... see "Specify".

Limitations: Operation at 19,200 bps may require the user to optimize cable length and quality. For additional information, refer to the *General Information Manual,* GA27-2865.

Prerequisites: (1) A S/S, BSC or SDLC communication line ... (2) compliance with EIA RS-232-C or CCITT V.24 ... (3) external modems, IBM or non-IBM ... (4) a 3846 mdl 1 must be available to power a 3846 mdl 2, 3, 12 or 13 ... (5) Personalization/Key Entry Unit (accessory) available at site location ... (6) accessory mounting panel ... (7) accessory blank panel may be ordered, if desired ... see M10000 pages.

HIGHLIGHTS

A communication security device that provides encryption/decryption of digital data transmitted over a communication line. The 3846 implementation of Data Encryption Standard (DES) conforms to the U.S. National Bureau of Standards DES algorithm published as FIPS #46, January 15, 1977.

Two or more data encryption devices (3845 or 3846) are needed, one at each termination of a communication line (point-to-point or multipoint). Limitations: A 3845 or 3846 is required at each node in order to have message header information in the clear through that node.

The 3846 is cabled to the DTE via the cable that is provided by the DTE manufacturer for attachment to the DCE. Attachment from the 3846 to the DCE is by a cable provided with the 3846. One cable is provided per line function. Limitations: The cable provided with the 3846 is 1.5 meters (5.0 feet) long. This adds load capacitance to the DTE/DCE. See the *General Information Manual,* GA27-2865, for specific information on the additional capacitance.

An accessory, the Personalzation/Key Entry Unit (P/KEU), must be available at each site location having a 3846. This accessory is used to enter the key variable, the seed, and to personalize the 3846 to the customer's communication line. The key variable is a 56-bit plus parity code, entered by the customer at a frequency consistent with their security requirements. The customer defines his own keys, selects them in a random manner, and enters them manually. The seed is 1 to 16 hexadecimal random characters used to initiate the synchronization message. The personalization consists of four hexadecimal characters of information that personalizes the 3846 to the specific communication line characteristics, such as line discipline, line speed, method of clocking, and synchronous message length.

The 3846 depends on the customer providing a method of switching to enable the user send messages in the clear and for fault isolation. A battery is provided that maintains power to the storage registers containing the key variable, seed, and personalization data when the 3846 AC power is turned off.

Security is provided by the use of interlocks that remove power, including battery power, from the storage registers whenever a line function is removed from the rack or a service cover of a line function unit is removed. The seed, key variable and personalization must be reentered when all (battery and AC) power is removed.

Communications: The 3846 mdls 2 and 3 encrypt/decrypt data if the DTE/DCE: (a) Conforms to interface EIA RS-232-C or CCITT V.24; (b) uses S/S or SDLC protocol; (c) operates on a half-duplex or duplex facility; (d) is within the speed of 110 to 19,200 bps; (e) uses a 7- or 8-bit code (exclusive of the required start and stop bits) for asynchronous operation or uses an 8-bit SDLC flag for SDLC operation; and (f) ensures an identical bit stream between transmit output and receive input functions of the 3845/3846 units on the same communication line.

The 3846 mdls 12 and 13 encrypt/decrypt data if the DTE/DCE: (a) Conforms to interface EIA RS-232-C or CCITT V.24; (b) uses BSC or SDLC protocol; (c) operates on a half-duplex or duplex facility; (d) is within the speed of up to 19,200 bps; (e) uses an EBCDIC or ASCII code (odd parity only) for BSC or uses an 8-bit SDLC flag for SDLC operation; and (f) ensures an identical bit stream between transmit output and receive input functions of the 3845/3846 units on the same communication line.

Data Communications Equipment: External Data Communications Equipment must be used with the 3246. IBM external modems may be attached to the 3846:

Modem	Speed (bps)
3872	1200/2400

Problem Determination Procedure: A customer installed switch panel must be used to permit determining whether a problem exists in the 3846 or in other equipment. See "Customer Responsibilities" below.

Problem determination is a customer responsibility that does not involve the customer engineer.

Customer Setup (CSU): The 3846 is designated as a customer setup device, thereby offering the customer relocation flexibility. CSU is a customer responsibility that does not involve the customer engineer.

Customer Responsibilities: The customer is responsible to: Provide an adequate site and other preparation, including installation planning ... receive at the customer's receiving dock, unpack and set up the 3846 ... make the interconnection between the 3846 mdl 1 and the 3846 line function devices ... connect cables to the 3846 and DCE ... personalize to the communication facility ... enter the seed ... enter the key variable ... use and follow the problem determination procedures and follow instructions for service of the 3846 Note: Appropriate procedures are provided by IBM with each unit for setup, personalization and entering the seed and key variable.

Maintenance: The customer may wish to replace a failing 3846 with a spare and must be advised to purchase spares for such use. The number of spare devices needed is dependent upon the number of devices the customer has installed, his application requirements, physical locations, and layouts.

IBM Repair Center Service: Maintenance of the 3846 will normally be at a designated IBM Location . All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Location. It shall be the customer's responsibility to set up the equipment and to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing device, pack the device in the designated shipping container and ship it prepaid to the IBM Repair Center. IBM will pre-pay the transportation charges for return of the repaired device. There is no regularly scheduled preventive maintenance recommended by IBM on these devices.

The service is available under an *IBM Repair Center Maintenance Supplement* , to the IBM Maintenance Agreement or on a Time and Material basis .

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM location for repair under the *IBM Repair Center Machine Repair Authorization Form,* GX27-2981 in which case repair will be made (if the machine is repairable). Alternatively, upon request, the IBM Location will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, adjustments, testing, return shipping charges and estimating of repair charges.

The 3846 is eligible for maintenance agreement service immediately following expiration of the service and parts warranty at the monthly charge shown under MMMC in "Prices" .

3846 Data Encryption Device (cont'd)

If maintenance agreement service is not contracted for immediately following expiration of the service and parts warranty and the customer wants maintenance agreement service, the customer may ship the machine(s) to the designated IBM location for an inspection.

If, on the basis of an inspection, the Designated IBM Location concludes that a machine is not repairable, no further work will be performed. The machine will be returned to the customer with a minimum charge to cover handling, inspection, testing and a return shipping charge.

In all other cases, the IBM Location will charge a minimum fee per machine to cover handling, inspection, adjustments, testing, and return shipping. In addition, all parts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates, if so authorized by the customer. The machine will then be eligible for maintenance agreement service.

Personalization/Key Entry Unit (P/KEU) maintenance agreements are not available. Customer engineering on-site service will not be provided. During the warranty period, warranty service is available at the Designated IBM Location.

Configurator: The HONE Configurator, CFMODEM, is available to help in configuring the 3845/3846.

Bibliography: GA27-2865, *General Information Manual* ... GA27-2899, *Principles of Operation.*

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- For 3846 mdls 12 and 13: Specify one ... installation available at time of manufacture only.

  #9110 - BSC/SDLC, or
  #9115 - BSC with BMC

- Line Voltage Plug (for 3846 mdl 1 only):

  #9890 Power and line cord, single phase, 60 Hz, 115/120 volt lock plug

  #9891 Power and line cord, single phase, 60 Hz, 115/120 volt non-lock plug

- Line Cord Length (for 3846 mdl 1 only): If the standard 2.8 meter (9 foot) power cable is not desired, specify:

  #9511 for 1.8 meter (6 foot) line cord
  #9512 for 3.7 meter (12 foot) line cord
  #9513 for 4.5 meter (15 foot) line cord

SPECIAL FEATURES (None)

Codes: SIU=3846 ID=L90 SYSTYPE=3046

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

For delivery with the machine, specify the appropriate Feature number on the 3846 machine order (except battery). For delivery at any other time, specify the appropriate Part Number on MSORDER (Category = Accessories/ Supplies) on AAS (except battery).

Personalization/Key Entry Unit: On the 3846, to enter the key variable, seed, and personalization data. One must be available at each site having a 3846.

Mounting Plate: One unit is needed for each four of 3846 models 1, 2, 3, 12, 13 to permit placing the 3846 in a rack.

Blank Panel: A blank panel may be ordered to cover an unused 3846 opening in the accessory mounting plate.

Battery: A battery is needed to replace the installed battery. The replacement schedule is defined in the *Principles of Operation Manual.* Discharged batteries should be returned to IBM.

Feature Summary	P/N	Feature No.
Personalization/Key Entry Unit	**4407908**	**#9501**
Mounting Plates	**6813128**	**#9502**
Blank Panel	**4409058**	**#9503**
Battery	**6815261**	

Warranty: Services are available for Personalization/Key Entry Unit at the designated IBM Repair Center during the 90 day warranty period which commences 30 days following date of shipment from the Plant of Manufacture (Raleigh). It shall be the customers responsibility to determine the failing unit and if the unit is still under warranty to pack it in the designated shipping container and ship it pre-paid to the designated IBM Repair Center.

IBM Maintenance Agreements are not available. Field Engineering on-site service will not be provided.

SUPPLIES

None required with machine order.

3848 CRYPTOGRAPHIC UNIT

PURPOSE

An auxiliary unit that enciphers and deciphers data when attached to the Virtual Storage S/370 mdls 135-3 through 168, and the 4331, 4341, 4361, 4381, 3031, 3032, 3033, 3081, 3083 and 3084 Processors.

MODELS

Model 1 001

Prerequisites: Each 3848 requires a control unit position on a block multiplexer or selector channel.

A key entry unit (accessory) must be available for use with the 3848.

For communication security, the 3848 and the Cryptographic Unit Support Program Product require terminals that include the Encrypt/Decrypt feature (#3680) and either the ACF/VTAM (Program Product #5735-RC2), Encrypt/Decrypt feature (#6010), or ACF/TCAM Version 2 (Program #5735-RC3).

HIGHLIGHTS

Provides data encryption capability for file and communications applications. The encryption process implements the Data Encryption standard (DES) published by the U. S. National Bureau of Standards as Federal Information Processing Standard (FIPS) #46 January 15, 1977.

A block chaining mode of operation is used with the DES algorithm to further disguise formatted data.

The user selected master key is maintained securely in a special storage element protected by a battery during power off periods. The master key entry process is protected by a physical key.

Master key entry is performed via a small hand-held key entry unit available as an accessory.

Attachment can be to a block multiplexer or selector channel. The maximum data rate is 1.5 megabytes per second. When attached to channels capable of 3.0 megabyte/ second data streaming and operating in data streaming mode (CE selectable) the 3848 maximum data rate is 3.0 megabytes per second.

Definition of selected key-encrypting keys as two 56-bit values provides a greater effective key length than the single 56-bit DES key.

Programming Support: Support for the 3848 is provided by the Cryptographic Unit Support program product (5740-XY6). This program provides the access method, error recovery and error recording for one or more 3848 units. Additionally, it provides generation and management control functions for cryptographic keys.

Customer Responsibilities: Primary customer responsibilities for using the 3848 Cryptographic Processor are:

- Generating Cryptographic keys. The master key must be selected by the user. The Cryptographic Unit Support program product (5740-XY6) may be used to generate key-encrypting and data-encrypting keys.
- Providing adequate physical protection measures for the computer system to which the 3848 is attached. Access to the 3848 and the support program product should be limited to authorized users.
- Maintaining secure duplicate copies of the key-encrypting keys used. A lost key precludes decrypting and results in loss of data.

Minimum Systems Requirements: The 3848 was designed to operate with the Cryptographic Unit Support program product or its equivalent. In combination, these products assist in safeguarding sensitive information. Neither product alone can provide the same function or the same degree of security as this combination.

The use of the 3848 without the error recovery and recording functions of the Cryptographic Unit Support program product will reduce the availability and maintenance characteristics of the Cryptographic Unit.

The Cryptographic Unit Support Program Product is supported in OS/VS 2 MVS (Release 3.9) and OS/VS 1 environment. Use with OS/VS 1 requires the Basic Programming Extensions Program Product (5662-257).

Operation with the S/370 mdl 145 requires Advanced Control Program Support (#1001). Attachment to any channel of a mdl 145 with four selector channels installed, or to the third selector channel of a mdl 145 with three selector channels installed requires the Word Buffer (#8810) on the mdl 145.

Bibliography: GC20-0001

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (AC, single phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V (240V is compatible with 230V.)
- Power Cable Length: (Designed for below-floor cabling). If standard 4.3 meter (14 foot) cable is not desired, specify **#9986** for 1.8 meter (6 foot) cable.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble grey, **#9066** for pearl white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Personalization/Key Entry Unit (#9501): This item is available on a purchase-only basis. Order by feature number for delivery with the 3848 or by **P/N 4407908** for delivery at any other time. To enter the master key and to facilitate certain service functions, one unit must be available at each site having one or more 3848 Cryptographic Units.

SUPPLIES (None)

3851 MASS STORAGE FACILITY (MSF)

PURPOSE

Large capacity storage and control facility for the 3850 Mass Storage System (MSS) for attaching to S/370 models 145, 145-3, 148, 155II, 158, 165II and 168, or a 3031, 3032, 3033, 3081, 3083, 3084 Processor, or a 4341 or 4381 Processor.

MODELS

A-Series	One Mass Storage Control
B-Series	Two Mass Storage Controls ... one MSC is the active control ... the second is an alternate control.

Model	Capacity Number of Cartridges	Capacity Max Bytes (Billions)	Data Recording Devices	Data Recording Control
A01/B01	706	35.3	2	1
A11/B11	2044	102.2	2	1
A21/B21	3382	169.1	2	1
A31/B31	4720	236.0	2	1
A02/B02	2044	102.2	4	2
A12/B12	3382	169.1	4	2
A22/B22	4720	236.0	4	2
A03/B03	3382	169.1	6	3
A13/B13	4720	236.0	6	3
A04/B04	4720	236.0	8	4

Maximum: Attaches to a maximum of four S/370s (any combination of UPs, MPs, APs) or 3031, 3032, 3033, 3081, 3083 or 3084 Processor Complexes (maximum two multiprocessor systems) or 4341 and 4381 Processors.

A maximum of two 3851 MSFs from the A-series of mdls or one 3851 MSF from the B-series of models can be included in the 3850 MSS.

In a 3850 MSS there is one active Mass Storage Control (MSC). It can address a total of eight 3850 MSS components: 3851 MSF control function, 3830 Storage Control mdl 3s, and Integrated Storage Controls (ISC) (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168. (Each ISC counts as two components). The number of 3850 MSS components addressed can be increased to 16 with installation of the MSC Twin Port Feature (#4901, #4902). A second MSC (either a B-series or the second A-series) may be designated as an alternate control.

Limitations: In a 3850 MSS configuration with one 3851 MSF (B-series) or two 3851 MSFs (A-series), both MSCs must be featured identically if complete backup is required. Note: On a 2880 Block Multiplexer Channel, Extended Unit Control Words (#3851, 3852) may be required to expand DASD device address capacity. The 155II Sysgen configuration is restricted by the maximum number of non-shared block multiplexer subchannels (in groups of eight). See the Channel Section of the *Guide to IBM System/370 Model 155*, GC20-1729, for description of assignment and number available. The total device addresses (real, virtual, non-existent, or non-Mass Storage System) SYSGENed may not exhaust the pool of nonshared UCWs.

HIGHLIGHTS

Included are the storage facility for data cartridges, Data Recording Devices (DRD) and their associated Data Recording Controls (DRC) for the transfer of data between the data cartridges and the 3350/3333/3330 Disk Storage devices, a Cartridge Access Station for the manual entry and removal of data cartridges, two accessors and their associated controls for the movement of data cartridges within the 3851, and a Mass Storage Control (MSC) for control of the 3850 MSS.

Prerequisites: A control unit position on a S/370 or a 4341 or 4381 Processor, byte or block multiplexer channel for each MSC -- one for each A-series MSF, two for a B-series MSF.

A minimum of one 3830 Storage Control mdl 3 on S/370 mdls 145, 145-3, 148, 155II, 158, 165II and 168, or a 3031, 3032, 3033, 3081, 3083, 3084 Processor, a 4341 or 4381 Processor or one Integrated Storage Control (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168.

A minimum of either two 3333 Disk Storage and Controls or two 3350 mdl A2/A2Fs. See "Note" on M3333 pages for feature changes required when 3333s are retained for use with a 3851.

Data Cartridges (P/N 2496971, Purchase Only) must be ordered separately ... contact IBM.

Bibliography: GC20-0001

SPECIFY

- Voltage: (AC, 3-phase, 4-wire 60 Hz): Specify **#9903** for 208V, **#9905** for 230V. Must be consistent with system voltage.
- Color: The accent panels above and below the cartridge access station are white. The two end covers on the 3851 MSF are gray. The remainder of the 3851 is available in **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white. **Field Installation:** Yes.
- In a 3850 MSS configuration with two A-series MSFs, specify **#9120** for the designated primary 3851 MSF and **#9121** for the secondary 3851 MSF.

SPECIAL FEATURES

Note: In a 3850 MSS configuration with one 3851 MSF (B-series) or two 3851 MSFs (A-series) both MSCs must be configured identically if complete backup is required.

Mass Storage Control Twin Port (#4901, #4902): [#4901 for A and B mdls ... #4902 for B mdls only] #4901 applies to the A-series MSC and the first MSC in a B-series. #4902 applies to the second MSC in a B-series, and requires #4901 as a prerequisite. Permits the MSC to address 8 additional, for a total of 16, 3850 MSS components: 3851 MSF control functions*, 3830 Storage Control mdl 3s on S/370 mdls 145, 145-3, 148, 155II, 158, 165II and 168, or 3031, 3032, 3033, 3081, 3083, 3084 Processor, or a 4341 or 4381 Processor, and ISC (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168. Each ISC has two paths and counts as two components.

*In a 3850 MSS configuration with two A-series mdls there are two 3851 MSF control function components.

Remote Switch Attachment (#6148): To control the two-channel interfaces on the basic 3851 MSF from a remote configuration control panel. Also controls the Two-Channel Switch, Add'l (#8171) if installed. For B mdls, this feature is associated with the primary MSC and must be installed in addition to #6150 below, which is associated with the alternate MSC. **Field Installation:** Yes.

Remote Switch Attachment (#6150): [B mdls] To control the two-channel interfaces on the basic 3851 (alternate MSC) from a remote configuration control panel. Also controls the Two-Channel Switch, Add'l (#8172) if installed. **Field Installation:** Yes. **Prerequisites:** #6148.

Two-Channel Switch, Add'l (#8171): Permits attachment to two additional S/370, 4341 or 4381 processor channels, providing a total of four S/370, 4341 or 4381 processor channel attachments. The channels can be on the same or different processors, to a maximum of four processors with no more than two channels to a single processor. For B mdls, the feature is associated with the active MSC and must be installed in addition to #8172 below, which is associated with the alternate MSC. **Field Installation:** Yes.

Two-Channel Switch, Add'l (#8172): [B mdls] Permits attachment to two additional S/370, 4341 or 4381 processor channels, providing a total of four S/370, 4341 or 4381 processor channel attachments. The channels may be on the same or different processors, to a maximum of four processors with no more than two channels to a single processor. **Field Installation:** Yes. **Prerequisites:** #8171.

MODEL CONVERSIONS

Field installable. Any A model can be upgraded to any larger A model or any B model. Any B model can be upgraded to any larger B model.

ACCESSORIES (None)

SUPPLIES (None)

3863 MODEM

PURPOSE

A 2400 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 1	001	Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.
Model 2	002	Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

Customer Setup: The 3863 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. **Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases..
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3863 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and "M3868" pages.

Standard Features:

- Data Rate: 2400 bps with backup of 1200 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic answering of switched network calls - mdl 2 ... SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (2400/1200 bps) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Line conditioning is not required.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the modem.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products . Under control of these programs, the modem accepts commands and initiates tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). **Note:** The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 pages for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-Wire Switched Network Backup: Provides backup for nonswitched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- LPDA Functions on Tailed Links: Allows tailed 3863 mdl 1 to respond to LPDA diagnostic commands.

Diagnostics: Built-in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report "Receive Signal Level", a 3863 mdl 1 must have serial number suffix code of **DH** or later. If the serial number suffix code is earlier, **RPQ 8Q0317** must be installed.

To respond to LPDA commands, a 3863 tailed to a 3865 with Data Multiplexer feature #3620 must have LPDA Function on Tailed Links feature #4791 installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3863 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES MDL 1

Common Carrier Facilities: Common carrier-provided voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

3863 Modem (cont'd)

COMMUNICATIONS FACILITIES MDL 2 AND MDL 1 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Network: 2-wire switched line with an exclusion key telephone. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBMto contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3863 mdl 1 to a private line (nonswitched) channel is by a cable supplied with the 3863. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters, a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description .

Attachment of a 3863 mdl 2 to the public switched network is by a cable, supplied with the 3863, which is terminated with a miniature 8-position keyed plug for connection to a data jack provided by the telecommunications service supplier. Two of these cables are supplied to attach a 3863 mdl 1 with 4-Wire Switched Network Backup (#7953) to the public switched network and two data jacks are required. The data jack must be a programmed data jack (USOC RJ45S or equivalent) or a universal data jack (USOC RJ41S or equivalent) set in the programmed mode of operation. The RJ45S data jack is recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting date through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the modem. The FCC registration numbers are:

3863 mdl 2	ANO9SA-67992-DP-N
3863 mdl 1, SNBU (#7953)	ANO9SA-67935-DP-N

For both mdls the REN (Ringer Equivalence Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-Wire Switched Network Backup (#7953). Answer only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3863 Modem operates with IBM communication products capable of 2400 bps operation. See M2700 pages. The 3863 Modem must communicate with another appropriately configured 3863 Modem or with a 3868 mdl 1 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide* (GA27-3200).

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. When ordering the telecommunications service the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3863. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3863/3864 Setup Instructions and User's Guide,* GA27-3216.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function:
NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" above for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986**.

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required).

SPECIAL FEATURES

Fan-Out (#3901): This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three multiplexers, or communications controllers, at a central site to share the same 3863 Modem for backup purposes. In this case, although all of the machines attached to the 3863 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. **Field Installation:** Yes.

LPDA Functions on Tailed Links (#4791): This feature enables the 3863 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 Modem with Data Multiplexer (#3260) and 3863 mdl 1 that are at the other end of the line to respond to LPDA commands. Required only on the 3863 attached to the 3865. **Limitations:** Mdl 1 only. Cannot be installed with Fan-Out feature (#3901). Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBDIC or ASCII or Transparent). **Field Installation:** Yes.

3863 Modem (cont'd)

Prerequisites: Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

Extended Diagnostic Card (#7930): This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature is for the mdl 1 only, and must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program products on S/370 and 4300 processors.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Available for all 3863 Modem mdl 1s (nonswitched line). Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3863 Modems. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3863 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. **Limitation:** Not available on 3863 mdl 2. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Tail Circuit Attachment (P/N 8547438): Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. **Limitations:** To have the 3863's on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3863 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900.** (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities".

SUPPLIES (None)

3864 MODEM

PURPOSE

A 4800 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 1	001	Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.
Model 2	002	Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

Customer Setup: The 3864 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. Note: Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases.
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3864 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

Standard Features:

- Data Rate: 4800 bps with backup of 2400 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic Answering of Switched Network calls - mdl 2 ... SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (4800/2400 bps) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). Note: The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Line conditioning is not required for the 3864.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the modem.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for nonswitched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- LPDA Functions on Tailed Links: Allows tailed 3864 mdl 1 to respond to LPDA diagnostic commands.

Diagnostics: Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3864 mdl 1 must have serial number suffix code of **MG** or later. If the serial number suffix code is earlier, **RPQ 8Q0318** must be installed.

To respond to LPDA commands, a 3864 tailed to a 3865 with Data Multiplexer (#3620) must have LPDA Function on Tailed Links (#4791) installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3864 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for a switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES MDL 1

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

3864 Modem (cont'd)

COMMUNICATION FACILITIES MDL 2 AND MDL 1 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Network: Two wire switched line with an exclusion key telephone. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBMto contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3864 mdl 1 to a private line (nonswitched) channel is by a cable supplied with the 3864. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters, a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description.

Attachment of a 3864 mdl 2 to the public switched network is by a cable, supplied with the 3864, which is terminated with a miniature 8-position keyed plug for connection to a data jack provided by the telecommunications service supplier. Two of these cables are supplied to attach a 3864 mdl 1 with 4-Wire Switched Network Backup (#7953) to the public switched network and two data jacks are required. The data jack must be a programmed data jack (USOC RJ45S or equivalent) or a universal data jack (USOC RJ41S or equivalent) set in the programmed mode of operation. The RJ45S data jack is recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting date through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the modem. The FCC registration numbers are:

3864 mdl 2	ANO9SA-67992-DP-N
3864 mdl 1, SNBU (#7953)	ANO9SA-67935-DP-N

For both mdls the REN (Ringer Equivalence Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-wire Switched Network Backup (#7953). Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3864 operates with IBM communication products capable of 4800 bps operation. See M2700 pages. The 3864 must communicate with another appropriately configured 3864 or with a 3868 mdl 2 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide,* GA27-3200.

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device.

When ordering the telecommunications service the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3864. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3863/3864 Setup Instructions and User's Guide,* GA27-3216.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function:

NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986**

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required).

SPECIAL FEATURES

Fan-Out (#3901): Mdl 1 only. This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3864 mdl 1 for backup purposes. In this case, although all of the machines attached to the 3864 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. **Field Installation:** Yes.

LPDA Functions on Tailed Links (#4791): This feature enables the 3864 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 modem with Data Multiplexer (#3260) and 3864 mdl 1 that are at the other end of the line to respond to LPDA commands. Required only on the 3864 attached to the 3865. **Limitations:** Mdl 1 only. Cannot be installed with Fan-Out (#3901).

3864 Modem (cont'd)

Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBDIC or ASCII or Transparent). **Field Installation:** Yes. **Prerequisites:** Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

Extended Diagnostic Card (#7930): Mdl 1 only. This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature is for the mdl 1 only, and must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program product support.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Available for all 3864 mdl 1s (nonswitched line). Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3864s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3864 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities". This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. **Limitation:** Not available on 3864 mdl 2. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Tail Circuit Attachment (P/N 8547438): Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. **Limitations:** To have the 3864's on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3864 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900.** (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities".

SUPPLIES (None)

3865 MODEM

PURPOSE

A 9600 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 001 Operatesin half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point mode.

Model 002 Operatesin half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

Limitations: The 3865 mdl 002 can be used only in a multipoint network. A multipoint network can be implemented with only one tributary. Additional stations can be added as the network expands. The 3865 mdl 002 cannot be used in a point-to-point mode, like a 3865 mdl 001. Neither can a 3865 mdl 001 be used in a multipoint network, like a 3865 mdl 002. Model conversion is not possible. See "Network Configuration" in *IBM 3863, 3864 and 3865 Modems Introduction and Site Preparation Guide*, GA27-3200.

Customer Setup: The 3865 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 002 modem may be configured for multipoint control or multipoint tributary operation with the setup switches. **Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases. See Z125-3260 and Z120-3257 for details.
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time. Refer to the Delivery Schedule and Availability Card or Advanced Administrative System (AAS) for current delivery schedules.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3865 mdl 001 and 002 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

Standard Features:

- Data Rate: 9600 bps with backup of 4800 bps.
- Auto Answer: Automatic answering of switched network calls with Switched Network Backup.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (9600/4800 bps) of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem (mdl 002) can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either Receive Signal Level Reporting or LPDA Functions on multiplexed links is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). **Note:** The functions Receive Signal Level Reporting, and LPDA Functions on multiplexed links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Fast RFS: 24 millisecond Ready for Sending (RFS) Delay available for 3865 multipoint tributary modems. Customer switch option (24ms or 60ms).
- Both point-to-point and multipoint can operate over 3002 Basic (unconditioned) channels.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the 4-wire Switched Network Backup feature (#7953).
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 pages for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for non-switched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.

Diagnostics: Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3865 must have serial number suffix code of **MG** or later. If the serial number suffix code is earlier, **RPQ 8Q0319** must be installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3865 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.

3865 Modem (cont'd)

- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Mdl 001 (point-to-point), and mdl 002 (multipoint) use basic channels.

The 3865 operates on unconditioned lines. In some unusual situations, it may be beneficial to activate a longer (60ms) RFS delay (by a switch on the back panel) on tributary modems. Mdl 002 modems can operate on links with a mix of 24ms and 60ms RFS delay.

Privately-owned Communication Facilities: Equivalent to above.

MDL 001 OR MDL 002 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Networks: 2-wire switched line with an exclusion key telephone set. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3865 to a private line (nonswitched) channel is by a cable supplied with the 3865. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered, it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters. a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description and ordering instructions.

Attachment of a 3865 with 4-wire Switched Network Backup (#7953) to the public switched network is by two cables, supplied with the feature, which are terminated with a miniature 8-position keyed plug for connection to the two data jacks provided by the telecommunications service supplier. The data jacks must be programmed data jacks (USOC RJ45S or equivalent) or universal data jacks (USOC RJ41S or equivalent) set in the programmed mode of operation. RJ45S data jacks are recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting data through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the 4-wire Switched Network Backup feature. The FCC registration number is AN09SA-67935-DP-N. The REN (Ringer Equivalent Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. (Two telephone sets are required with 4-wire Switched Network Backup (#7953).) Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3865 operates with IBM communication products capable of 9600 bps operation. See M2700 pages. The 3865 must communicate with another appropriately configured 3865 or with a 3868 mdl 003 or 004 Rack-Mounted Modem unless multiplexing is used. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide* (GA27-3200).

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. When ordering the telecommunications service, the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3865. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3865 Setup Instructions and User's Guide,* GA27-3218.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function.
NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" above for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986**.

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required)

SPECIAL FEATURES

Data Multiplexer (#3260): This feature allows selection of a 4800 bps and 2400 bps subchannel. The modem multiplexes subchannel data into a single aggregate data stream ... this feature offers four channel configurations. When the 3865 is placed in half-speed mode, the aggregate data stream is transmitted at half speed and as a result the channel configurations will be automatically altered because of lower speed. Channel configurations are:

Channels				Half-Speed Operation			
A	B	C	D	A	B	C	D
9600	–	–	–	4800	–	–	–
4800	4800	–	–	4800	–	–	–
4800	2400	2400	–	4800	–	–	–
2400	2400	2400	2400	2400	2400	–	–

3865 Modem (cont'd)

All data sources are connected to the 3865 mdl 001 by separate EIA/CCITT interfaces. Multiplexer channels will permit attachment to co-located terminals or tailed circuit extensions for network flexibility and cost savings. Tail circuit extensions allow co-located 3863 or 3864 modems equipped with the Tailed Circuit Attachment accessory to be attached to a 3865 channel. Modems so attached can extend the channel data path by its attached communications line and a second (remotely attached) modem. Each multiplexer channel is equipped with buffers to compensate for timing variations between tailed modems and the 3865 clocks. **Limitations:** Mdl 001 only. Cannot be installed with Fan-Out feature (#3901). Tailed 3863 or 3864 modems must be mdl 001 only, multipoint control mode only, set for external clocking. LPDA diagnostic commands to a Data Multiplexed Link are received only on Channel A of the 3865 with Data Multiplexer feature attached to the host DTE. In order for this 3865 to respond to LPDA commands, it must have serial number suffix code of **DG** or later. If the serial number suffix code is earlier, MES **#323406** must be installed.

Field Installation: Yes.

Fan-Out (#3901): This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used as a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. this feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3865 for backup purposes. In this case, although all of the machines attached to the 3865 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Cannot be installed with DTE external) clock, or Data Multiplexer (#3260).

Field Installation: Yes.

Extended Diagnostic Card (#7930): This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program product support.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3865s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3865 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire switched telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out; otherwise the first line is automatically dropped. **Limitations:** It may be necessary to re-dial or change to half speed to maintain acceptable performance in SNBU mode. See "Customer Responsibilities" in the M2700 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900**. (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities". Request price and order from IBM Direct, Dayton, NJ, using telephone number (800) 631-5582; in New Jersey use (800) 352-4960; in Hawaii or Alaska use (800) 526-2484. Specify P/N, quantity, ship date, bill-to name, bill-to address, ship-to name, and ship-to address.

SUPPLIES (None)

3866 MULTIMODEM ENCLOSURE

PURPOSE

The 3866 models 1 and 2 are multimodem enclosure. Model 1 can be mounted in a standard commerically available 19-inch rack cabinet and model 2 comes mounted in a mini cabinet for one enclosure only. These enclosures provide housing, cooling and power for the 3868 models 1 to 4 rack-mounted modems.

MODELS

Model 1	001	Multimodem Enclosure for installation in commercial standard 19-inch rack cabinet.
Model 2	002	Multimodem Enclosure with single enclosure cabinet.

HIGHLIGHTS

The 3866 mdl 1 and 2 are multimodem enclosures providing housing, powering and cooling for 3868 mdls 1 to 4 modem packs. Up to 12 single-width modem packs (3868 mdl 1) or up to six double-width modem packs (3868 mdl 2, 3 and 4) can be housed in an enclosure.

The 3866 mdl 1 multimodem enclosure must be installed in a standard 19-inch wide by 24-inch deep rack cabinet to be provided by the customer. Standard cabinets are available to accommodate several enclosures and mandatory fan units. Up to six enclosures and three mandatory fan units can be housed in a six foot high cabinet.

The 3866 mdl 2 multimodem enclosure is already mounted in an IBM provided mini cabinet.

For both mdls, a power unit and a fan unit must be ordered with each enclosure. In cabinet for multi enclosures only one fan unit is necessary per two enclosures (see "Special Features"). The customer may wish to replace a failing power unit with a spare and should be advised to order sufficient spare units.

Optional Features: See "Special Features" for detailed description.

Customer Set-Up (CSU): The 3866 multimodem enclosures and associated power and fan units are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, where required, site preparation and setting up. For more information, refer to the *Planning and Site Preparation Guide* (GA33-2023).
- Receipt at the customer's receiving dock, unpacking and setting up the cabinet, enclosure, power and fan units.
- Performing 3866 check-out in accordance with supplied procedures for initial set up and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3866 problem report prior to taking action to get the failing unit exchanged . (See "Maintenance" below).
- Procuring any required spares.

Warranty Service: The warranty period is three years . Warranty service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

Customer On-Site Exchange (COE): It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3866 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The service offering after warranty will be Customer On-Site Exchange (COE).

Maintenance: The level of maintenance service on a rental (MRC) machine is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

On-Site Assistance: If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms.

RPQs: RPQs will not be accepted.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for 3.0 meter (10 ft.) power cable, or **#9986** for 1.8 meter (6 ft.) power cable or **#9491** for 0.75 meter (2.5 ft.) special rack-installation power cable. If one of the above is not specified, **#9891** will be assigned.

SPECIAL FEATURES

Fan Unit (#3950): Provides cooling for modem enclosure. The Fan Unit is installed in the rack cabinet above the modem enclosures. **Minimum:** One Fan Unit is required for a single 3866 mdl 1 modem enclosure or for a 3866 mdl 2 modem enclosure. Only one Fan Unit is required for two 3866 mdl 1 modem enclosures installed one above the other. **Field Installation:** Yes.

Power Unit (#5210): Provides power for the modem packs installed in the modem enclosure. **Minimum:** One per modem enclosure 3866 mdl 1 or 3866 mdl 2. **Field Installation:** Yes.

Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3867 LINK DIAGNOSTIC UNIT

PURPOSE

The 3867 is a microprocessor-based Link Diagnostic Unit designed to complement the IBM family of microprocessor-based modems (3863, 3864 and 3865). The problem determination and diagnostic functions built into the microprocessor-based Link Diagnostic Unit provide the capability to offer the customer an integrated IBM system solution to network management for both digital and analog links.

MODELS

Model 001

Customer Setup: The 3867 is designed for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible "Setup Switches" are provided on the rear panel to allow reconfiguration of the unit where application needs change.

HIGHLIGHTS

The microprocessor-based diagnostic unit is designed to operate from 2400 to 9600 bps on nonswitched lines. It is designed to be used either with analog modems attaching to both DTE and carrier modem connections, or on digital/analog links, attaching to the DTE interface connections only, where interpositioning is prohibited.

The function of the Link Diagnostic Unit is to provide a level of the Link Problem Determination Aids (LPDA) problem determination facilities of the 3863, 3864 and 3865 for non-intelligent signal processors.

The 3867 operates in either point-to-point or multipoint mode.

Customer Responsibilities:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Completion of the site preparation requirements as stated in the *IBM 3867 Link Diagnostic Unit Site Preparation Guide,* GA27-3261. This includes modification of the attaching modem connection and the interface to the telecommunications facility for the 3867 that is installed as an interpositioned analog unit.
3. Unpacking of the 3867, placement, set up, connection of cables and operational checkout during installation.
4. Determine when remedial maintenance is required.
5. Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
6. Packing of the malfunctioning 3867 in the designated shipping container with a completed Repair Authorization form and shipping prepaid to the designated IBM Repair Center.
7. Retaining a supply of original shipping containers for use when packing for shipment to the IBM Repair Center.
8. Machines designated as "spares" should be unpacked and checked for proper operation prior to shelving.

Communication Facilities: Attachment to facilities:

Where interpositioning is permitted, attachment to a private line (nonswitched) channel is by a cable, supplied with the 3867, which is terminated with a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent), which is connected to the channel. For those situations in which the 3867 Link Diagnostic Unit will be attached to a telecommunication receptacle that does not accept the 4-prong plug, adaptors for 4-spade lugs or a 50-pin connector should be ordered. See "Telecommunication Cable" under "Specify".

Maintenance

Spares: The customer may wish to replace a failing 3867 with a spare and must be advised to purchase spares for such use. The number of spare devices needed is dependent upon the number of devices the customer has installed, his application requirements and physical locations.

When a 3867 is removed for maintenance and not replaced with a spare device, a customer must re-cable his modem connections which may be an inconvenience. Unless the customer re-sysgens his NCP, he may obtain unpredictable results from LPDA tests or misleading probable cause indications from NPDA. For these reasons, it is highly recommended that the customer be informed of the value of purchasing spares.

IBM Service: Maintenance of the 3867 will be at a designated IBM Location. All maintenance, parts replacement, adjustments, and repair shall be performed at the designated IBM Location. It shall be the customer's responsibility to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing device, pack the device in the designated shipping container and ship it prepaid to the designated IBM Location. There is no regularly scheduled preventive maintenance recommended by IBM on these devices.

Purchased Machines under Warranty: All purchased new machines are covered by three months service and parts warranty. If a malfunction occurs within this 90-day period, the machine will be repaired at the designated IBM Repair Center at no cost to the customer other than normal shipping charges.

Purchased Machines - Post Warranty: At the completion of the 90-day warranty period, service is available under a *Maintenance Agreement with the IBM Repair Center Maintenance Supplement* (Z120-2240-5).

Customers may obtain IBM maintenance agreement service after expiration of the warranty period by:

- Shipping the machine to the designated IBM repair center for inspection.
  - If, on the basis of the inspection, the center concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer without charge.
  - In all other cases, a minimum charge per machine to cover handling, inspection, cleaning, lubrication, adjustments and testing will be applied. In addition, all parts used will be billed at IBM's prevailing parts prices, and additional time required to make repairs will be billed at IBM's prevailing hourly service rates. The machine will then be qualified for maintenance agreement coverage.
- Having the machine inspected on the customer's site.
  - This inspection will be performed by a local customer engineer to verify that the machine is fully operational.
  - Machines which are not fully operational must be sent to the designated IBM repair center for an IBM inspection and repair and will be subject to the terms and conditions of repair center inspections as stated above.
  - This inspection service is available on a firm price basis under an IBM contract support service agreement or on an hourly service basis.
  - For machines with non-IBM alterations, IBM will furnish maintenance service on the unaltered portion of the IBM machine under the applicable IBM agreement and in accordance with the maintenance plan described in the IBM Multiple Supplier Systems Bulletin.

All customer inquiries regarding IBM maintenance agreement acceptability inspections for purchased repair center machines are to be handled by the branch office. Customers should be advised that if they have non-operational machines for which they desire IBM repair center maintenance agreement service, these machines should be inspected at the repair center rather than on the customer's site.

Leased Machines: The cost of Repair Center maintenance other than the customer-prepaid shipping charges is included in the lease price.

Publications: *IBM 3867 Link Diagnostic Unit Setup Instructions and Users Guide* (GA27-3260) ... *IBM 3867 Link Diagnostic Unit Site Preparation Guide* (GA27-3261)

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for non-locking plug or **#9890** for locking plug. If standard 4.5 meter (15 foot) power cable is not required, specify **#9986** for 1.8 meter (6 foot) cable.
- Telecommunication Cable (Link Diagnostic Unit to telecommunication line): Specify only when interpositioning between modem and telecommunication line is permissible. For 4.5 meters (15 feet), specify **#9711**; 18 meters (60 feet), specify **#9712**.

  Cable Termination: See "Attachment to Facilities". For 4-spade lugs, specify **#5332**; 50-pin connector, specify **#5333**.
- 3867 Link Diagnostic Unit to Modem Cable: For 4.5 meters (15 feet), specify **#9940**; 13.5 meters (45 feet), specify **#9941**.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3868 RACK-MOUNTED MODEM

PURPOSE

The 3868 modem packs are rack-mounted versions of the 3863, 3864 and 3865 modem family to be inserted in a 3866 multimodem enclosure. Offering in a minimum volume, the maximum density of modems housing facility, they enhance the user capability for easy installation, maintenance and expansion of a user telecommunication network.

MODELS

Model 1 001 — 2400 bps modem pack operating in half- or full-duplex data mode over 4-wire, nonswitched duplex telecommunication facility at speeds of 2400/1200 bps. It operates in point-to-point or multipoint mode.

Model 2 002 — 4800 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 4800/2400 bps. It operates in point-to-point or multipoint mode.

Model 3 003 — 9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in point-to-point mode.

Model 4 004 — 9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

Prerequisites: A 3866 model 1 or 2 with available modem pack slots.

HIGHLIGHTS

The 3868 modem packs have the same functional characteristics as the equivalent 3863, 3864 and 3865 stand-alone modems. The following table gives the list of modem packs and equivalent stand-alone modems:

Modem Pack	Description	Equivalent Stand-alone Modem
3868-1	2400 bps leased	3863-1 with extended diagnostic feature
3868-2	4800 bps leased	3864-1 with extended diagnostic feature
3868-3	9600 bps pt-to-pt	3865-1 with extended diagnostic feature
3868-4	9600 bps multipt	3865-2 with extended diagnostic feature

The following list of functions already available with the 3863, 3864 and 3865 stand-alone modems are included in the 3868 mdls 1 to 4 modem packs:

- Data rate:
  - 2400 bps with back-up of 1200 bps on mdl 1
  - 4800 bps with back-up of 2400 bps on mdl 2
  - 9600 bps with back-up of 4800 bps on mdls 3 and 4
- Operation on 4-wire nonswitched duplex communication facility.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic function referred to as Link Problem Determination Aid (LPDA), operates with Systems Network Architecture (SNA) and associated program products . Under control of these programs, the modem accepts commands and initiates status retrieval and tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of a network problem. These program products are:

  Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).

  Network Problem Determination Application (NPDA) Version 2 (PP 5668-983) or Version 3 (PP 5668-920 MVS/370, MVS/VA) (PP 5666-925 DOS/VSE, SSX/VSE).

  ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9). Receive Signal Level Reporting is not supported by these versions.
- Modem pack provides its own clocking or will accept DTE (external) clocking.
- Fast (RFS) Ready for sending delay available for multipoint tributary modem (customer switch option).
- Both point-to-point or multipoint can operate over 3002 Basic (unconditioned) channels.

Note: If a function is not listed herein, it is not available on the 3868 modem packs.

Diagnostics:

Built-in diagnostics: All modems will respond to diagnostic commands from the system. Test requests and responses utilize the same data path and controls that are used by the S/370, System/36, S/8100, (DPPX/SP) or 4300 processor for data transmission. Thus, diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interfaces or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results and status data including receive signal level.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a "wrap" or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance.
- Lamp test -- tests all indicator lights on the operator panel.

Customer Set Up (CSU): The 3868 Rack-Mounted modems are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, Site preparation and setting up. For more information, refer to the *Planning and Site Preparation Guide* (GA33-2023).
- Arrangements for the price quotations, installation, and all costs of common carrier equipment and service.
- Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel.
- Ensuring the availability of the interconnecting cable between the business machine and the modem because it is not supplied by the modem.
- Receipt at the customer's receiving dock, unpacking and setting up the packs.
- Performing 3868 check-out in accordance with supplied procedures for initial set up and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3868 problem report prior to taking action to get the failing unit repaired or exchanged. (See "Maintenance" below.)
- Procuring any required spare packs. The customer may wish to replace a failing 3868 with a spare and must be informed to retain sufficient spare units for such use. The number of spare units recommended is dependent upon the number units the customer has installed, the operational requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

3868 Rack-Mounted Modem (cont'd)

Number of 3868s Installed	Minimum Number of Spares Recommended
001-100	3
101-200	4
201-300	6
301-500	8
501-1000	14
1001-1500	19
1500-2000	24

- Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
- Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
- All three of the following program products must be installed for LPDA to function:
  - NCCF Version 1 Release 2 (PP 5735-XX6)
  - NPDA Version 2 (PP 5668-983) or Version 3 (PP 5668-920, PP 5666-925)
  - ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9)

Warranty Service: The warranty period is three years . Warranty Service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

Customer On-Site Exchange (COE): It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3868 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The maintenance offering will be Customer On-Site Exchange (COE).

Maintenance: The level of maintenance service on rental (MRC) machines is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

On-Site Assistance: If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms.

Communications Facilities - Mdls 1 and 2

Common Carrier Facilities: Common carrier-provided voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference,* PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

Communications Facilities - Mdls 3 and 4

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference,* PUB 41004, dated October 1973.

Mdl 3 (point-to-point), and mdl 4 (multipoint) use basic channels.

Privately-owned Communication Facilities: Equivalent to above.

Extended Diagnostic Functions: Provided with 3868 mdls 1 to 4, these functions enhance the diagnostic capabilities of non-switched modems when it is installed in both the local and remote modems. It provides and additional test that enables NPDA to differentiate between modem failure, line failure and remote modem power loss.

Related Equipment: The 3868 operates with IBM communication products capable of 2400 bps operation for mdl 1, 4800 bps operation for mdl 2 and mdl 2 and 9600 bps operation for mdls 3 and 4. See M2700 pages. The 3868 communicates with another appropriately configured 3868 or 3863/3864/3865 stand-alone modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Bibliography: See specific systems bibliography.

RPQs: RPQs will not be accepted.

SPECIFY

- Telecommunication cable (modem to telecommunications line connection):

  7.5m (25 ft.) **#9713**
  0.7m (2.5 ft.) **#9719**

  If one of the above is not specified, **#9713** will be assigned.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Telecommunications Cable Adapters (P/N 7838805, P/N 1992900): Convert the 4-prong plug (WE238B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order P/N **7838805** ... for 50-pin connectors, order P/N **1992900**. (The 50-pin connector is commonly used for telephone company modems.) See "Attachment Facilities" in the M3863, 3864 or 3865 pages.

SUPPLIES (None)

3872 MODEM

PURPOSE

A 2400 bps modem, with half-speed capability, used to provide communications products with the means for transmitting data over common carrier-provided voice band private line (nonswitched) channels, equivalent privately-owned channels or switched telecommunications networks.

MODELS

Model 1 001

Prerequisites: See "Teleprocessing Systems" in GI section.

HIGHLIGHTS

Modem operation is possible in half-duplex mode over 2- or 4-wire half-duplex facilities, half-duplex or duplex mode over 4-wire duplex facilities, or half-duplex mode over switched telecommunication networks.

Data Rates: 2400 bps with backup half-speed.

Equalization: Manually adjustable by operator on private line (nonswitched) channels and automatic on switched networks .

Operation: Switched network or multipoint control, multipoint tributary, point-to-point on a private line (nonswitched) channel. See "Special Features".

Built-In Diagnostics: Included in each modem are the following diagnostic features accessible to the operator: (1) The modem may be *wrap tested* independently of the using machine and telecommunication channel ... (2) It may be *line tested* with a remote modem and telecommunication channel, independently of the attached business machine. The test may be one-way or remotely wrapped to the local modem.

Communication Facilities

Communication common carrier-provided voice band private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference PUB 41004,* dated October, 1973. **Note:** Machines with a serial number prior to 13100 and a suffix prior to HZ with Multipoint Tributary (#5101, #5102) or Point-to-point (#6101, #6102) feature require the installation of an RPQ to operate on a basic (not conditioned) 3002 channel. Machines shipped from the plant after June 1, 1976, do not require the RPQ. Conditioned lines may be used but are not required. Contact IBM for RPQ ordering information.

Privately Owned Communications Facilities: Equivalent to above.

Public Switched Networks: The customer must be advised that satisfactory data transmission depends upon the characteristics of the particular switched network connection being used. Refer to M2700 pages for further details.

International Facilities: Transmission of data between the U.S. and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be a schedule 4, type 4.)

Attachment to Facilities: Attachment to a private line (nonswitched) channel is by a cable, supplied with the 3872, which is terminated with a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount, or equivalent) which is connected to the channel. (The receptacle is a conventional item of communications equipment and is, upon customer request, ordinarily furnished by the telecommunication service supplier.)

If the 3872 is equipped with Switched Network Backup (#7951), another cable is supplied with the feature. This cable is also terminated with a 4-prong plug and requires the aforementioned type of receptacle which is connected to the FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

If the 3872 is equipped with Switched Network (#7941, #7942) or Switched Network Backup with Automatic Answer (#7952) a cable is supplied with the feature which is terminated with spade lugs for connection to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

Related Equipment: The 3872 operates with IBM communications products capable of 2400 bps operation ... see "Related Equipment" under "Specify". Modem clocking must be used. The 3872 Modem must communicate with another appropriately equipped 3872, or with an appropriately equipped IBM 2400 bps Integrated Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine. If the 3872 is equipped with the Automatic Call Originate (#1091) feature, the interconnecting Auto-Call cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: The customer must be informed of his responsibilities as detailed in the M2700 pages and in the Installation Planning section of the *3872 User's Guide,* GA27-3058. The customer is responsible for:

1. Private line (nonswitched) channel -- arranging for the telecommunication service supplier to provide a type 3002 voice grade data channel (or equivalent) as described under "Communications Channel Specifications" in the *3872 User's Guide.* Also arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
2. Switched Telecommunication Network -- arranging for the telecommunication service supplier to install the appropriate communication service.

   Also arranging for the FCC registered protective circuitry as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the protective circuitry.

   Also inform the telecommunication service supplier that the speed of data transmission will be 2400 bps and that appropriate conditioning of the local loop is required. The customer must be made aware that the use of local loops not properly conditioned for the speed of data transmission or the use of special switched facilities may result in unsatisfactory data transmission.
3. Providing voice communication between modems to coordinate tests or re-equalization. The voice facility can be provided by the 3872 Alternate Voice feature. Information concerning the handset for the Alternate Voice feature is described in the *3872 Modem User's Guide.* The voice facility must be located such that an operator can use it while operating the controls on the front of the modem.
4. If the 3872 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.
5. If the 3872 is equipped with the Automatic Call Originate feature (#1091), the interconnecting Auto-Call cable between the business machine and the modem must be supplied by the business machine.

Publications: See *KWIC Index,* G320-1621, or specific system bibliography ... *IBM 3872 User's Guide,* GA27-3058

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V ... non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Telecommunication Cord (modem to telecommunication facility): Specify one of the following for each telecommunication channel or network connection:

  #9750 -- Telecommunication cord to connect a basic (control station) 3872 Modem or one equipped with Multipoint Tributary (#5101), or Point-to-Point (#6101) feature, to a private line (nonswitched) channel.

  #9751 -- Telecommunication cord to connect a basic (control station) 3872 Second Modem (#6302) or second modem equipped with Multipoint Tributary (#5102), or Point-to-Point (#6102) feature, to a private line (nonswitched) channel.

  #9752 -- Telecommunication cord to connect a 3872 Modem equipped with Switched Network (#7941) to a switched telecommunication network.

  #9753 -- Telecommunication cord to connect a 3872 Second Modem (#6302) equipped with Switched Network (#7942) to a switched telecommunication network.

  #9754 -- Telecommunication cord to connect a 3872 Modem equipped with Switched Network Backup (#7951) or Switched Network Backup with Automatic Answer (#7952) to a switched telecommunication network.

  A 10-foot cable will be supplied. If a longer cable is required, indicate 15, 20 or 25 feet as the quantity of the feature number specified. **Note:** MES orders to add the Switched Network Backup feature(s) (#7951 or #7952), to convert a private line (nonswitched) channel modem to Switched Network, or to convert a Switched Network modem to private line (nonswitched) channel must include the telecommunication cord specify number(s) compatible with the resultant modem configuration.
- Related Equipment: For record purposes, one 3872 Attachment Feature Code from the table below must be specified for each 3872, depending upon the unit to which it is attached.

The Following Table Has Been Revised:

3872 Modem (cont'd)

Machine	3872 Attach #	Machine	3872 Attach #
2701	**#9505**	4952	**#9573**
3115	**#9527**	4953	**#9573**
3125	**#9525**	4954	**#9573**
3135	**#9512**	4955	**#9573**
3135-3	**#9525**	4987	**#9574**
3138	**#9550**	5010	**#9531**
3232-1	**#9585**	5110	**#9564**
3271	**#9513**	5231	**#9547**
3274	**#9558**	5251	**#9565**
3275	**#9514**	5265	**#9566**
3276	**#9557**	5285	**#9604**
3601	**#9532**	5288	**#9605**
3602	**#9532**	5320	**#9545**
3614	**#9532**	5340	**#9559**
3624	**#9578**	5381	**#9570**
3631	**#9560**	5404	**#9549**
3632	**#9561**	5406	**#9518**
3651	**#9534**	5408	**#9538**
3684	**#9572**	5410	**#9519**
3694	**#9581**	5412	**#9546**
3704	**#9516**	5415	**#9533**
3705	**#9515**	5525	**#9606**
3707	**#9548**	6240	**#9562**
3725	**#9515**	6640	**#9556**
3735	**#9517**	6670	**#9563**
3741	**#9526**	8101	**#9569**
3747	**#9526**	8130	**#9567**
3767	**#9537**	8140	**#9568**
3771	**#9540**	6/420	**#9575**
3774	**#9542**	6/430	**#9552**
3775	**#9543**	6/440	**#9553**
3776	**#9544**	6/442	**#9576**
3777	**#9528**	6/450	**#9554**
3780	**#9521**	6/452	**#9577**
3791	**#9535**	MC II	**#9555**
3845	**#9579**	RPQ	**#9524**
3846	**#9579**	Non-IBM	**#9520**

SPECIAL FEATURES

The basic 3872 Modem, with no additional features required, is used at the control station in a centralized multipoint network. Additional capabilities/configurations are provided by the following features:

Alternate Voice (#1051, #1052): Provides signalling capability and a socket on the operator panel into which a customer-provided handset may be plugged, permitting voice communications with the distant 3872 Modem(s). Data cannot be simultaneously transmitted with voice. A handset is not provided. See *3872 User's Guide* for description of handset. #1051 -- for basic modem ... #1052 -- for Second Modem (#6302). **Limitations:** #1051 cannot be installed with Switched Network (#7941) ... #1052 cannot be installed with Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #1052 requires #6302.

Automatic Call Originate (#1091): Permits automatic origination of a call by the using machine equipped with an IBM autocall feature. Provides control to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user to dial telephone numbers and to provide on-hook/off-hook control. **Note:** Can only be used with Rotary Dial System. **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network Backup (#7951, #7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7941 on 3872 and an IBM Auto Call feature on the using machine.

Fan-Out (#3901): This feature allows attachment, to the 3872, of up to three IBM Teleprocessing machines at one location ... see "Related Equipment" under "Specify" for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified IBM terminals without any additional user involvement. This feature may also be used to allow up to three of the specified IBM multiplexers, communications controllers, integrated communications adapters or communications adapters on 4331, at a central site, to share the same 3872 Modem for backup purposes. In this case, although all of the machines attached to the 3872 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network (#7941) . **Maximum:** One. **Field Installation:** Yes.

Multipoint Tributary (#5101, #5102): Used on each modem attached to tributary stations in a centralized multipoint network to compensate for line distortion between the control and tributary station. Operator adjustment on front panel. #5101 -- for basic modem ... #5102 -- for Second Modem (#6302). **Limitations:** #5101 cannot be installed with Point-to-Point (#6101) or Switched Network (#7941) ... #5102 cannot be installed with Point-to-Point (#6102) or Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #5102 requires #6302. **Specify:** Telecommunication cord **#9750** for feature #5101 ... Telecommunication cord **#9751** for feature #5102.

Point-to-Point (#6101, #6102): Used on modems at each end of a point-to-point private line (nonswitched) channel to compensate for line distortion. #6101 -- for basic modem ... #6102 -- for Second Modem (#6302). **Limitations:** #6101 cannot be installed with Multipoint Tributary (#5101) or Switched Network (#7941) ... #6102 cannot be installed with Multipoint Tributary (#5102) or Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #6102 requires #6302. **Specify:** Telecommunication cord **#9750** for feature #6101 ... Telecommunication cord **#9751** for feature #6102.

Second Modem (#6302): Permits two modems, each to operate on a separate line, to be housed in the same stand-alone cabinet. The two modems share the same power supply. **Limitations:** Only the following features are allowed on either or both modems -- Alternate Voice (#1051, #1052), Point-to-Point (#6101, #6102), Multipoint Tributary (#5101, #5102), or Switched Network (#7941, #7942). **Maximum:** One. **Field Installation:** No.

Switched Network (#7941, #7942): Used for operation over the public switched network via the FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. Automatic answering of incoming calls will be performed by the modem. Automatic equalization is effected at the beginning of each call. #7941 -- for basic modem ... #7942 -- for Second Modem (#6302). Conditioning of the telecommunication service local loop for transmission of data faster than 300 bps is required. It can communicate with another 3872 equipped with Switched Network (#7941 or #7942), with Switched Network Backup (#7951) or with Switched Network Backup with Automatic Answer (#7952). **Limitations:** #7941 cannot be installed with Alternate Voice (#1051), Fan-Out (#3901), Multipoint Tributary (#5101) or Point-to-Point (#6101) ... #7942 cannot be installed with Alternate Voice (#1052), Multipoint Tributary (#5102) or Point-to-Point (#6102). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #7942 requires #6302. **Specify:** Telecommunication cord **#9752** for feature #7941 ... telecommunication cord **#9753** for feature #7942.

Switched Network Backup (#7951): Provides the capability of attaching the 3872 to the public switched network as a backup to the private line (nonswitched) channel. It can communicate with another 3872 equipped with Switched Network (#7941 or #7942), with Switched Network Backup (#7951) or with Switched Network Backup with Automatic Answer (#7952). A fixed compromise equalizer is provided for the backup operation. A front panel switch permits operator selection of either the prime or the backup facility. Both facilities cannot be used simultaneously. Attachment to the switched network is made via the FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. Calls must be established and answered manually. **Note:** To use this feature, operator intervention at the modem is required. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 and OS/VS2 in certain configurations. Programming support for the 2020, 5231, 5285, 5288, 5320, 5340, 5381, 5404, 5406, 5408, 5410, 5412, and 5415 is still applicable when these devices are used as remote terminals. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *3872 User's Guide.* Conditioning of the telecommunication service local loop for transmission of data faster than 300 bps is required. **Limitations:** Cannot be installed with Second Modem (#6302), or Switched Network features (#7941, #7942 or #7952). **Maximum:** One. **Field Installation:** Yes. **Specify:** Telecommunication cord **#9754.**

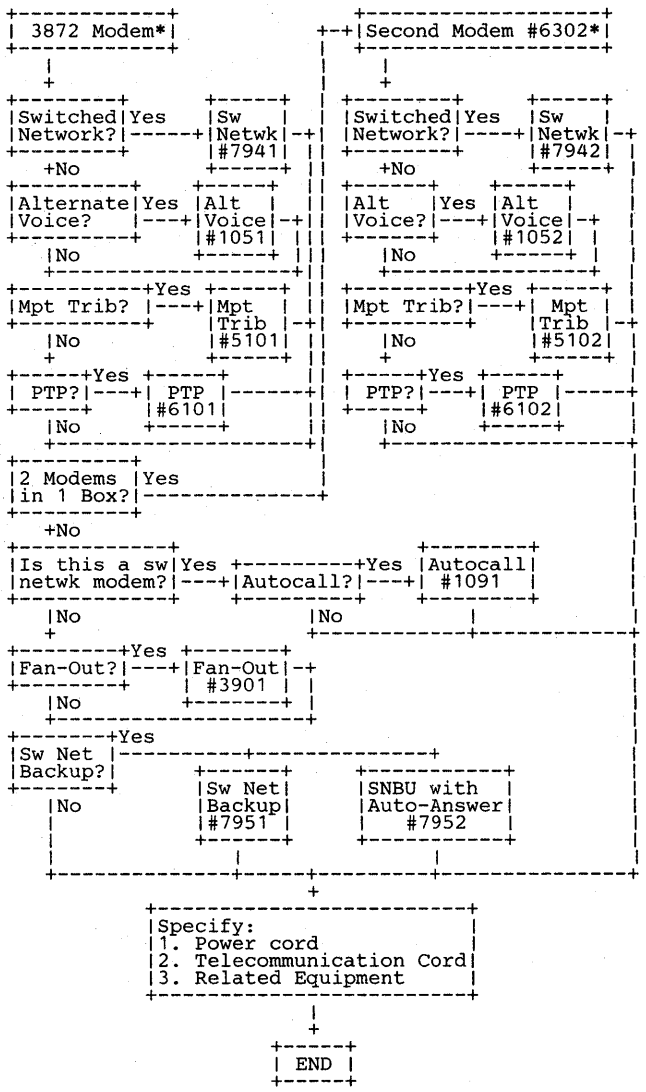
Switched Network Backup with Automatic Answer (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** To use this feature, operator intervention at the modem is required. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 and OS/VS2 in certain configurations. Programming support for the 2020, 5231, 5285, 5288, 5320, 5340, 5381, 5404, 5406, 5408, 5410, 5412, and 5415 is still applicable when these devices are used as remote terminals. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. Conditioning of the telecommunication service local loop for the transmission of data faster than 300 bps is required. For additional information, see the *3872 User's Guide.* **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network features (#7941, #7942 or #7951). **Maximum:** One. **Field Installation:** Yes. **Specify:** Telecommunication cord **#9754.**

3872 Modem (cont'd)

CONFIGURATOR

The HONE Configurator, CFMODEM, is available for assistance in configuring the 3872 Modem.

Feature Code Configuration Flowchart



* Multipoint Control Modem

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDLS 1,2,3

PURPOSE

Provides two independent control unit paths, called storage directors, for 3330/3333, 3340/3344, 3350, 3370, 3375 and 3380 direct access storage.

MODELS

Model 1 001 — Each of the two storage directors provides for attachment of either up to four 3340 model A2s, or up to four 3370 model A1s and/or A2s in any combination, or up to four 3375 model A1s and/or D1s, or up to four 3333s (any model) and 3350 A2/A2Fs and C2/C2Fs in any combination (see DASD Attachment Configuration under "Specify" and M3330, 3333, 3340, 3344, 3350, 3370, and 3375 pages).

Model 2 002 — One of the two storage directors provides for DASD attachment as described for both storage directors of the model 1 above. The other storage director provides for attachment of either up to two 3380 model A4s or two 3380 model AA4s (see M3380 pages).

Model 3 003 — Each of the two storage directors provides for attachment of either up to two 3380 model A4s or up to two 3380 model AA4s (see M3380 pages).

Limitations:

1) See M3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380 pages for system support limitations.
2) 3350 DASD attached to the 3880 must be in Native Mode format; 3330 mdls 1 and 11 Compatibility Mode are **not** supported.
3) In S/370 Mdl 135, 135-3, 138, when a 3880 is attached to a block multiplexer channel, only 16 logical devices will operate in this mode, even if more than 16 logical devices are attached.
4) Mdls of 3380 DASD with dynamic path selection (mdl AA4) may not be attached to the same storage director as mdls of 3380 without dynamic path selection (mdl A4).

Maximum: For configurations attaching 3340/3344 DASD, the storage director uses 64 contiguous addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s/B2s and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1s/B2s. The 3340 mdl A2 in the fourth string may attach one 3340 mdl B1/B2.

For a storage director attaching 3370 DASD, a maximum of four 3370 mdls A1 and A2 in any combination, each with up to three 3370 mdl B1s may be attached.

For a storage director attaching 3330/3333/3350 DASD, a maximum of four 3333 mdl 1s, 3333 mdl 11s, and/or 3350 mdls A2s/A2Fs in any combinations. Each string with a 3333 mdl 1 or 11 may attach up to three 3330 mdls 1s/2s or 11s. Each string with a 3350 mdl A2/A2F may attach up to three 3350 mdls B2s/B2Fs or up to two 3350 mdls B2s/B2Fs and a 3350 mdl C2/C2F.

For a storage director attaching 3380 DASD, a maximum of either two 3380 mdl A4s or two AA4s. Each string with a 3380 mdl A4/AA4 may attach up to three 3380 mdl B4s.

For a storage director attaching 3375 DASD, a maximum of four 3375 model A1s and/or D1s.

Prerequisites: An available control unit position for each storage director on a block multiplexer channel. One unshared subchannel for each logical address attached to a block multiplexer channel.

On 3880 mdls 2 and/or 3, storage directors attaching 3380 DASD must be attached to either a 3.0MB/sec. block multiplexer channel which can operate in data streaming mode or must have the Speed Matching Buffer for 3380 feature (#6550). On 3880 Models 1 and/or 2, storage director attaching 3375 DASD must be attached to either a block multiplexer channel which can operate at 1.859MB/sec. or more or must have the Speed Matching Buffer for 3375 feature (#6560). Attachment of either the 3380 without use of the Speed Matching Buffer for 3380 feature or the 3375 without use of the Speed Matching Buffer for 3375 feature, through the 3880 to 3031, 3032, 3033 or 3042 mdl 2 requires the Data Streaming feature (#4850) installed on the processor. Attaches to a 3081, 3083, or 3084 Processor via any block multiplexer channel.

On a 4341 Processor, storage directors on 3880 mdls 2 or 3 attaching 3380 DASD must either be attached to a 3.0MB/sec. block multiplexer channel or have the Speed Matching Buffer feature (#6550) and be attached to a 2.0 or 3.0MB/sec. block multiplexer channel. On a 4381 Processor, storage directors on a 3880 mdl 2 or 3 attaching 3380 DASD must be attached to a 3.0MB/sec. block multiplexer channel. Attachment of the 3380 to 4381 Processors in shared DASD environments via speed matching buffer (#6550) is supported only on 4381 3.0MB/sec. channels. Storage directors on 3880 Models 1 and 2 attaching 3350, 3370 or 3375 DASD must be attached to a 2.0 or 3.0MB/sec. block multiplexer channel; storage directors on 3880 Models 1 or 2 attaching 3330/3333 or 3340/3344 DASD may be attached to either a 1.0 (Mdl Group 1), 2.0 or 3.0MB/sec. block multiplexer channel.

On a 4331 Mdl Group 2, or 4361, a 3880 mdl 1 or 2 is supported only on the optional High-Speed Block Multiplexer Channel (#1431).

On a 4361, the 3880 must be attached to optional High-Speed Block Multiplexer Channels (HS BMPX) (#143X). Storage directors attaching 3380 must be attached to HS BMPX 1 or 2 (#1413, #1432).

On a S/370 mdl 165-II and 168, attachment is to the 2880 Block Multiplexer Channel. On S/370 mdl 158, 158-3, 168 and 168-3, the S/370 Extended feature (#7730) is required in order to attach 3380 or 3375 through a 3880 mdl 2 or 3 when the programming support used is one of the MVS/System Program Products.

HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files. Two independent storage directors allow orderly conversion to newer 3370, 3375 or 3380 DAS. Multiple requesting allows multiple overlapped operations on DAS drives attached to each storage director. Data Integrity is provided through extensive error detection and correction capabilities. Advanced logic and improved fault detection capability provide high availability.

System Attachments: Each storage director attaches to a processor channel. The second of the two storage directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel on a different processor. The following DASD and processor attachments are supported:

Processor(s)	DASD
4341/4361/4381	3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380
4331 mdl Group 2	3330, 3333, 3340, 3344, 3350, 3370, 3375
S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155-II, 165-II, 3330, 3333, 3344, 3340, 3350, 3375	3330, 3333, 3340, 3344, 3350
S/370 mdls 158, 158-3, 168, 168-3	3330, 3333, 3340, 3344, 3350, 3375, 3380
3031, 3032, 3033, 3081, 3083, 3084	3330, 3333, 3340, 3344, 3350, 3375, 3380

Bibliography: GA26-1661.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- DASD Attachment Configuration: Two of the following must be specified; one for each storage director. The same attachment specify code may be specified twice:

Attachment	Specify
3330/3333/3350	**#9192**
3340/3344	**#9190**
3370	**#9191**
3380 without (#6550)	**#9193**
3380 with (#6550)	**#9194**
3375 without (#6560)	**#9195**
3375 with #6560	**#9198**

Note 1: Diskette-only specify feature. A fee for purchased machines when DASD Attachment Configuration features are changed via MES.

Note 2: On MES orders where one of the two DASD Attachment Configuration specify codes is changed, you must also specify removal and addition of the other code, even though the code does not change. This will assure that the latest EC level of code is shipped for both storage directors.

3880 Storage Control Mdls 1,2,3 (cont'd)

SPECIAL FEATURES

Remote Switch Attachment (#6148): Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each storage director, or two channel connections to each storage director (using #8170). **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Add'l (#6149): Removes the four additional enable/disable switches provided by the Two Channel Switch Pair, Additional (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170, #8171, #6148.

Remote Switch Attachment For Eight-Channel Switch (#6150): Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170, #8171, #8172, #6148, #6149.

Speed Matching Buffer For 3380 (#6550): Supports attachment of 3380 DASD to 1.5MB/sec. block multiplexer channels on S/370 mdls 158, 158-3, 168 and 168-3, 3031, 3032, 3033 and 3042 mdl 2, and 2.0MB/sec. block multiplexer channels on the 4341 Processor. Also supports attachment of 3380 to 3.0MB/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 mdl 2 that have the Data Streaming feature (#4850) with data transfer at 3.0MB/sec., or a 3.0MB/sec. block multiplexer channel on a 4341 or 4381 Processor. The feature is for a storage director that attaches 3380. **Limitations:** On a 3031, 3032, 3033 or 3042 mdl 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed. When both paths of the 3380 with the dynamic path selection function are attached to a single processor, both storage directors must have the Speed Matching Buffer feature or neither may have it.

On 3031, 3032, 3033 or 3042 mdl 2 channel group without Data Streaming, first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed. See the publication *IBM 3031, 3032, 3033 Processor Complex Channel Configuration Guidelines,* GC22-9020, for more information.

On a S/370 mdl 158 or 158-3, two block multiplexer channels can attach 3880 storage directors with this feature installed. See the publication *Guide to the System/370 Model 158,* GG20-1754, for more information.

On a S/370 mdl 168 or 168-3, six block multiplexer channels can attach 3880 storage directors with this feature installed. See the publication *System/370 Model 168 Functional Characteristics,* GA22-7010, for more information. **Maximum:** One on a 3880 mdl 2; two on a 3880 mdl 3. **Field Installation:** Not available on machines with serial numbers of 10444 and below. Not recommended on machines with serial numbers between 10445 and 20119. Field installable on machines with serial numbers of 20200 and above. **Prerequisites: #9194** ... 3380 with #6550.

Speed Matching Buffer For 3775 (#6560): Supports attachment of 3375 DASD to 1.5MB/sec. block multiplexer channels on S/370 Models 145, 148, 155-II, 158, 158-3, 165-II, 168, 168-3, 3031, 3032, 3033, and 3042 Model 2 Processors. Also supports attachment of 3375 to 3.0MB/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 Model 2 that have the Data Streaming Feature (#4850) with data transfer at 3.0MB/sec. per second, or a 2.0 or 3.0MB/sec. block multiplexer channel on a 4341 or 4381 Processor, or the 3.0MB/sec. block multiplexer channel on the 3081 Processor, or the optional High-Speed Channel on the 4331 Model Group 2. If channels of speeds different from 1.859 megabytes per second are switched to a storage director with Speed Matching Buffer Feature, the 3.0 and 2.0MB/sec. block multiplexer channels are supported at the 3375 data rate (1.859MB/sec) and the 1.5MB/sec. block multiplexer channels are supported at the channel data rate (1.5MB/sec). The feature is for a storage director that attaches 3375. **Limitations:** On a 3031, 3032, 3033 or 3042 Mdl 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On 3031, 3032, 3033 or 3042 Model 2 channel group without Data Streaming, the first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On a S/370 Model 155-II, the first or second block multiplexer channel can attach 3880 Storage Directors with this feature installed. On a S/370 Model 158 or 158-3, the first two block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 165-II, four block multiplexer channels can attach 3880 Storage Directors with this feature installed. On a S/370 Model 168, 168-3, six block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 145 or 148, the first block multiplexer, only, can attach 3880 Storage Directors with this feature installed. Word Buffer Feature (#8810) is required on S/370 Model 145. **Maximum:** Two on a 3880 Model 1; one on a 3880 Model 2. **Field Installation:** Field installable on 3880 Model 1 or 2 machines with serial numbers 20200 through 29999, 30200 through 39999, and 40200 through 99999. RPQ MM2865 is required for machines with serial number 10445 through 20000 . Not available for any other machines.

Two-Channel Switch Pair (#8170): To attach each storage director to a second channel. Four unique channels may be switched, two to each storage director or the same two channels may be switched to both storage directors. The channels to be switched may be on the same or on different processors. An available control unit position is required on each channel ... see "Prerequisites". Switching is under program control. Each storage director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch Pair, Add'l (#8171): Adds switching for two additional channels per storage director on a 3880 with the Two-Channel Switch Pair (#8170) feature, providing four channel switch capability for both storage directors. Up to eight unique channels may be switched, four to each storage director. Each storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170.

Eight-Channel Switch (#8172): For 3330/3333/3350 and/or 3380 DASD, adds switching for four additional channels per storage director on a 3880 with the Two-Channel Switch Pair and Two-Channel Switch Pair, Add'l features (#8170, #8171), providing eight channel switch capability for both storage directors. The same eight channels must be switched to both storage directors. Each storage director can be dedicated to a subset of the eight attached channels by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Available at time of manufacture only. **Prerequisites:** #8170, #8171. Only supported for 3330/3333/3350 (**#9192**) and/or 3380 (**#9193** or **#9194**).

MODEL CONVERSIONS

Model upgrades are field installable. MES orders for model upgrades must include removal of old DASD Attachment Configuration specify codes and addition of new specify codes.

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDL 4

PURPOSE

Provides a single control unit path, called a Storage Director, for 3370 and 3375 Direct Access Storage. The model 4 contains one Storage Director that provides for attachment of up to four 3370 models A1 and A2 in any combination, or up to four 3375 model A1s. See DASD Attachment Configuration under "Specify" and M3370 and 3375 pages.

MODELS

Model 4 004

Prerequisites: An available control unit position on a block multiplexer channel for the storage director. One unshared subchannel is required for each logical address attached to a block multiplexer channel.

On the 4331-2 or 4361, the Storage Director must be attached to a High-Speed Block Multiplexer Channel (#143X).

On the 4341, the Storage Director must be attached to a 2.0MB/sec. Block Multiplex Channel.

On the 4381, the Storage Director must be attached to either a 3.0MB/sec. Block Multiplexer channel or to a 2.0MB/sec. Block Multiplexer Channel.

Maximum: A maximum of four 3370 mdls A1 and A2 in any combination, or four 3375 mdl A1s can be attached ... See M3370 and 3375 pages.

Limitations:

1. See M3370 and 3375 pages for system limitations.
2. 3370s & 3375s cannot both be attached to the storage director at the same time.
3. No RPQs will be accepted.

HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files; data integrity is provided through extensive error detection and correction capabilities; advanced logic and improved fault detection capability provide high availability.

Systems attachment: The single storage director attaches to a processor channel. The following DASD and processor attachment is supported:

Processor	DASD
4331-2	3370, 3375
4341	3370, 3375
4381	3370, 3375

Bibliography: GC20-0001

SPECIFY

- Voltage: (AC, 3-Phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V **Note:** 240V AC is compatible with 230V AC systems.
- DASD Attachment Configuration: Only one of the following may be specified:

Attachment	Specify
3370	**#9201**
3375	**#9202**

  Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES.

- Color: **#9060** for willow green **#9061** for garnet rose, **9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, or **#9065** for pebble gray.

SPECIAL FEATURES

Two-Channel Switch (#8160): To attach the storage director to a second channel. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel ... see "Prerequisites" above. Switching is under program control. The storage director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation** Yes. **Available:** December 30, 1983.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDL 11

PURPOSE

The 3880 Storage Control mdl 11 modifies the first Storage Director, called the Paging Storage Director, to manage dynamically an 8MB solid-state storage unit, for page and swap data. The storage unit is divided into a directory and a cache. Up to eight actuators of 3350 disk storage provide backing storage for the cache. The second Storage Director operates in a conventional manner, as a 3880 Model 1 Storage Director, for 3330/3333 and 3350 direct access storage only.

MODELS

Model 11 D11 — Provides 8,388,608 bytes of Subsystem Storage.

Prerequisites: An available control unit position on a block multiplexer channel for each Storage Director. Four unshared subchannels are required for each 3350 device attached to the Paging Storage Director. One unshared subchannel is required for each 3350 or 3333/3330 device attached to the other Storage Director. The channel must be able to provide either a 1.5 or 3.0MB/sec. capability.

Attaches to a 3081 or 3083 Processor Unit via a block multiplexer channel.

Attaches to a 303X or 3042 Attached Processor mdl 2 via either a 1.5 or 3.0MB/sec. channel. In order to operate at 3.0MB/sec., the Data Streaming Feature (#4850) is required.

On a S/370 mdl 168 or 168-3, attachment is to a 2880 Block Multiplexer Channel capable of 1.5MB/sec.

On a S/370 mdl 158 or 158-3, attachment is to any block multiplexer channel capable of 1.5MB/sec.

On a 4341 and 4381, Storage Directors attaching 3350 DASD must be attached to a 2.0 or 3.0 MB/sec. block multiplexer channel. Data rate will be up to 1.5 or 3.0 MB/sec. respectively for the Paging Storage Director. See M4341 and 4381 pages for information.

Maximum: The Paging Storage Director is limited to attaching one 3350 mdl A2/A2F and three mdl B2/B2Fs, or one 3350 mdl A2/A2F, two mdl B2/B2Fs and one C2/C2F.

The other Storage Director attaches 3330/3333/3350 DASD; a maximum of four 3333 mdl 1s, 3333 mdl 11s, and/or 3350 mdl A2s/A2Fs in any combination. Each string with a 3333 mdl 1 or 11 may attach up to three 3330 mdl 1/2s or 11s. Each string with a 3350 mdl A2/A2F may attach up to three 3350 mdl B2/B2Fs or up to two 3350 mdl B2/B2Fs and a 3350 mdl C2/C2F.

Limitations:

1. The 3350 mdl A2/A2F or C2/C2F attached to the Paging Storage Director may not be actively string switched to another Storage Director (i.e., String Switch Special Feature (#8150) on the 3350 is not supported). The switch may be installed but it is recommended that the switch should be manually positioned to the Paging Storage Director.

2. See M3330, 3333, 3350 for system support limitations.

3. 3350 DASD attached to either 3880 mdl 11 Storage Director must be in native mode format; 3330 mdls 1 and 11 Compatibility Mode are not supported.

4. All 3880 mdl 11 conversions require a 3880 mdl 1 as the converted-from machine.

US manufactured 60 Hz machines: Eligible 3880 machines that can be field model converted are 3880 models with serial numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999.

5. While the Paging Storage Director may be attached to more than one host system for backup reasons, true dynamic sharing of the paging devices is not supported.

6. The 3880 special feature Eight Channel Switch (#8172) is not supported.

HIGHLIGHTS

- Access to page and swap data in the cache at electronic speeds and transfer at channel speeds of up to 1.5 or 3.0 MB/sec. Up to 3.0MB/sec. data rates are provided on data streaming channels only.
- Attaches to 1.5, 2.0 or 3.0MB/sec. channels (Data rate on a 2.0MB/sec. channel is up to 1.5MB/sec).
- Multiple exposures for 3350s attached to the Paging Storage Director in a similar manner to that provided by the 2305 Fixed Head Storage.
- Easy migration.
- Dynamically managed cache.
- Subsystem Storage size of 8MB.
- The 3880 mdl 11 will attach to a 1.5, 2.0 or 3.0MB/sec. block multiplexer channel on S/370 mdls 158 or 168, 303X, 3042 Attached Processor mdl 2, 4341, 4381, 3081, 3083, or 3084 Processors. On a 303X or 3042 Attached Processor mdl 2, the Data Streaming Feature (#4850) is required for operation in data steaming mode at 3.0MB/sec.
- MVS/SP Release 3 and MVS DFDS Support.
- VM/SP High-Performance Option Release 3 Support.

System Attachments: Each Storage Director attaches to a processor block multiplexer channel whose speed may be 1.5, 2.0 or 3.0MB/sec. (Data rate on a 2.0MB/sec. channel is up to 1.5MB/sec.) The second of the two Storage Directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel of a different processor. These channels need not be the same speed. Only the following DASD and Processor attachments are supported (note the Paging Storage Director attaches to 3350 devices only):

Processor(s)	DASD
4341 mdl Groups 1 and 2	3330, 3333, 3350
4381	3330, 3333, 3350
S/370 mdls 158, 158-3, 168, 168-3	3330, 3333, 3350
3031, 3032, 3033, 3042 mdl 2, 3081, 3083, 3084	3330, 3333, 3350

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
  Note: 240V AC is compatible with 230V AC systems.
- DASD Attachment Configuration: Specify one each of the following;
  one for each Storage Director:

Attachment	Specify
3330/3333/3350	**#9192** *
3350/Paging	**#9196** *

* Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES. **Note:** The specify features must be changed when field model conversions of 3880 mdl 1 to mdl 11 occur. See "Model Conversions".

- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble grey.

SPECIAL FEATURES

Remote Switch Attachment (#6148): Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each Storage Director, or two channel connections to each Storage Director when using the Two-Channel Switch - Pair (#8170). **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Additional (#6149): Removes the four additional enable/disable switches provided by the Two-Channel Switch - Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Prerequisites:** #8170, #8171 and #6148. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch - Pair (#8170): To attach each Storage Director to a second channel. Four unique channels may be switched, two to each Storage Director or the same two channels may be switched to both Storage Directors. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each Storage Director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch - Pair, Additional (#8171): Adds switching for two additional channels per Storage Director on a 3880 equipped with a Two-channel Switch - Pair (#8170), providing four-channel switch capability for both Storage Directors. Up to eight unique channels may be switched, four to each Storage Director. Each Storage Director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. **Maximum:** One. **Prerequisites:** #8170. **Field Installation:** Yes.

3880 Storage Control Mdl 11 (cont'd)

MODEL CONVERSIONS

MES orders for field model conversion of the 3880 model 1 to model 11 must include removal of both the old DASD Attachment Configuration specify codes from the 3880 model 1 and the addition of the new specify codes **#9196** and **#9192** for the model 11. All 3880 model 11 field model conversions require a 3880 model 1 as the converted from machine. Field installation on purchased machines involves removal of parts that become the property of IBM. Note machine serial number restrictions outlined in point 4 of the Limitations section.

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDL 13

PURPOSE

Provides two independent control unit paths, called cache storage directors, for 3380 Direct Access Storage devices. Each cache storage director shares access to an electronic storage unit, called subsystem storage, to two cache storage directors, to the subsystem storage and attached 3380 DASD forming a caching subsystem. The two cache storage directors and subsystem storage are contained in a single caching subsystem. For improved data availability, two 3880's may be attached in a Dual Frame Configuration. In this configuration, one cache storage director from each frame is part of each subsystem. The cache retains frequently used application data for fast access by the host, and the directory contains entries to locate data in the cache.

MODELS

Model B13	4,194,304 bytes of Subsystem Storage
Model D13	8,388,608 bytes of Subsystem Storage

Prerequisites: An available control unit position on a 3.0MB/sec. data streaming channel for each cache storage director. One unshared subchannel is required for each logical address attached to a block multiplexer channel. Dynamic Path Selection (3880 mdl AA4) is required for attached DASD.

Attaches to a 3081, 3083, or 3084 Processor Unit via any block multiplexer channel.

Attachment to a 3031, 3032, 3033 or 3042 Attached Processor mdl 2 requires data streaming (#4850) on the processor's channel group.

4341 mdls manufactured before March, 1981, require an engineering change to achieve data streaming on their 3.0MB/sec. channels.

Maximum: A 3880 mdl 13 may attach one or two 3380 mdl AA4s. Each string with a 3380 mdl AA4 may attach up to three 3380 mdl B4s. Each 3380 AA4 must be attached to both cache storage directors on the same caching system.

Limitations:

1. See M3380 pages for system support limitations.

2. In a single frame configuration, 3380 units that are attached to a 3880 mdl 13 cache storage director must also attach to the other cache storage director in the *same* 3880 mdl 13. In a Dual Frame Configuration, each 3380 must attach to a cache storage director in each frame. The two cache storage directors that share the 3380's must also share a subsystem storage.

3. Speed Matching Buffer for 3380 (#6550) cannot be installed.

4. A single channel *cannot* attach to both cache storage directors in a caching subsystem.

5. All 3880 mdls with serial numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999 can be field mdl converted to mdl 13s after conversion to 3880 mdl 3.

All 3880 mdls with serial numbers between 975004 through 975999 can be field mdl converted to mdl 13s after conversion to 3880 mdl 3.

HIGHLIGHTS

Provides fast access to disk application data records in the cache storage. Helps reduce the effect of DASD skew. Cache contents are dynamically managed by a modified Lease Recently Used (LRU) algorithm. Requires no more floor space than other 3880 mdls. Data integrity is provided through extensive error detection and correction capabilities and the architecture of the cache implementation.

Systems Attachments: Each cache storage director attaches to a 3.0MB/sec. data streaming channel. The second of the two cache storage directors can attach to a different channel on the same processor, or a channel on a different processor. The following Processor attachments are supported:

Processor(s)	DASD
3081, 3083, 3084, 3033, 3032, 3031 and 3042 mdl 2	3380
4341, 4381	3380

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V. **Note:** 240V AC is compatible with 230V AC systems.
- DASD Attachment Configuration: Specify two (2); one (1) for each cache storage director - **#9197***.

  * Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES. **Note:** The specify feature for each storage director must be changed when field model converting 3880 mdls to the mdl 13. See point 5 under "Limitations" section for field mdl conversion information.
- Color: **#9060** for willow green, **#9061** for garnet rose **#9062** for sunrise yellow, **#9063** for classic blue **#9064** for charcoal brown, **#9065** for pebble gray.

SPECIAL FEATURES

Remote Switch Attachment (#6148): Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each cache storage director, or two channel connections to each cache storage director when using the Two-Channel Switch - Pair (#8170). **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Add'l (#6149): Removes the four additional enable/disable switches provided by the Two-Channel Switch - Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Prerequisites:** #8170, #8171, #6148. **Field Installation:** Yes.

Two-Channel Switch - Pair (#8170): To attach each cache storage director to a second channel. Four unique channels may be switched, two to each cache storage director. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each cache storage director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch - Pair, Add'l (#8171): Adds switching for two additional channels per cache storage director on a 3880 equipped with a Two-Channel Switch - Pair (#8170), providing four-channel switch capability for both cache storage directors. Up to eight unique channels may be switched. Each cache storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. **Maximum:** One. **Prerequisites:** #8170. **Field Installation:** Yes.

Eight-Channel Switch (#8172): The Eight-Channel Switch Feature allows up to eight host systems to access either storage director in a 3880 storage control. The same eight channels must attach to both storage directors in that storage control. The Eight-Channel Switch Feature then combines with the Dual Frame Configuration option to allow up to 16 attaching channels to access each attached DASD. **Note:** The Eight-Channel Switch Feature can be fully utilized only in the Dual Frame Configuration (see Limitation Item 4). **Maximum:** One. **Prerequisites:** #8170, #8171. **Field Installation:** No.

Remote Switch Attachment For Eight-Channel Switch (#6150): Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Prerequisites:** #8170, #8171, #6148, #6149, #8172. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable. MES orders for field model conversions must include removal of both old DASD Attachment Configuration specify codes and the addition of the new specify code (**#9197**) for each cache storage director on the model 13. All 3880 model 13 field model conversions assume a 3880 model 3 as the converted from machine. Note the machine serial number restrictions outlined in point 6 of the "Limitations" section. See M3880 pages for information about field model converting 3880 models 1 and 2 to a 3880 model 3.

Parts removed or replaced when upgrading from other 3880 models to a 3880 model 13 become the property of IBM.

ACCESSORIES (None)

SUPPLIES (None)

3881 OPTICAL MARK READER

PURPOSE

Reads machine printed and/or handmarked data online into S/370 models 115, 125, 135, 135-3, 138, 145, 145-3, 148, 155II and 158, a 3031 or 3032 processor, System/3 models 8, 10, 12, and 15, and 4300 processor, or offline to either of two magnetic media: diskette or compatible 9-track magnetic tape via a 3410 Magnetic Tape Unit model 1.

MODELS

Model 1	001	For use with a S/370 models 115, 125, 135, 135-3, 138, 145, 145-3, 148, 155II, or 158, a 3031 or 3032 Processor, System/3 models 8, 10, 12, and 15, 4321,, or 4300 processor.
Model 2	002	Magnetic tape output via a 3410 Magnetic Tape Unit model 1.
Model 3	003	Output data written on diskette.

Prerequisites:

Model 1: For S/370 mdls 115 and 125, an available control unit position on the Multiplexer Channel (#5248) ... see M3115 and 3125 pages.

For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155II, 158, or a 3031 or 3032 Processor, an available position on a byte multiplexer channel ... see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155, 3158, 3031, or 3032 pages.

For 4321, 4331, or 4341 Processor, an available position on a byte multiplexer channel ... see Machines pages.

For System/3 mdls 8, 10, 12, and 15, a Serial I/O Channel (#7081) on the5408, 5410, 5412, or 5415. **Limitations:** The IBM programming support for the 3881 requires a disk-oriented System/3 mdl 8, 10, 12, or 15 with a minimum of 12,288 bytes of storage and the Serial I/O Channel (#7081). **Maximum:** One 3881 can be attached.

Model 2: A 3410 Magnetic Tape Unit mdl 1 equipped with either Single Density (#3211) or Dual Density (#3221) ... see M3410 pages.

Model 3: None.

HIGHLIGHTS

The 3881 is a high-speed optical mark reader. Data sheets are fed from a hopper with a 600-sheet capacity, through the reading area and directed to one of two output stackers. The main stacker has a capacity of 600 sheets. Sheets with detected errors are directed to a separate stacker with a 100-sheet capacity. Documents are stacked in the same sequence as they were entered in the hopper. Data to be read can be placed on data sheets with ordinary #2 pencils, or by a 1403 Printer, a 1443 Printer mdl 1 or 2 with a 52- or 63-character type bar with arrangement A, H or K, a 1443 mdl N1 or 2203 Printer with 52- or 63-character type bar, a 3203 Printer, a 3211 Printer, or a 5203 Printer. The 1403/5203 print chains or trains, the 1443/2203 type bar, or the 3216 Interchangeable Train Cartridge must be equipped with an enlarged dash which replaces the standard dash ... see "Type Catalog".

Data Sheets: 3 inches x 3 inches to 9 inches x 12 inches. Up to 2,480 mark positions printed on a side. Preprinted mark positions are printed in rows of 40 positions on 0.2-inch centers for printer compatibility. Vertical spacing is up to six per inch for printer compatibility. Rows and columns can be grouped into various combinations to form fields for the recording of source data.

Format Control Sheet: Used to load format control information into the 3881. Format control defines:

- The area of the input data sheet which is to be read.
- The marks allowed or discrimination required within each area.
- The sequence of the marking positions which make up the marking matrices.
- The output desired (numeric, alpha, alphameric or multiple mark format).
- The timing mark count which is expected on the sheets to be processed.
- BCD Read (optional feature) requirements.

From one to six formats, each consisting of one or more Format Control Sheets, are read by the 3881 at the beginning of a job. After reading the last Format Control Sheet, the data sheets of the job to be processed are loaded in the 3881.

Processors: Documents are read under computer program control with varying speeds up to 6,000 documents/hour (4,000 pages/hour, 8-1/2 inches x 11 inches). Data is transferred to the CPU one page at a time on a fully-buffered interrupt basis.

3410 Magnetic Tape Unit: Documents are read under control of the 3881 at varying speeds up to 5,400 documents/hour (3,700 pages/hour, 8-1/2 inches x 11 inches). The 3881 reads and fully-buffers a document, after which the data from the document is written as one record on tape. Data is recorded at 1600 bits/inch, phase-encoded. An optional feature, Dual Density (#3221), permits output at either 1600 bpi PE or 800 bpi NRZI.

Diskette: Documents are read under control of the 3881 at varying speeds up to 5,700 documents/hour (3 inches x 3 inches), and 3,800 pages/hour (8-1/2 inches x 11 inches). The diskette drive and its control function are installed within the 3881 mdl 3. Each magnetic diskette has a storage capacity of up to 1,898 data records (128 characters each) with as many as 19 data sets per diskette. The contents of each document read by the 3881 are written within one data record (a maximum of up to 128 characters). The diskette media written by the 3881 is compatible with such devices as the 3741, 3742, 3747 and the 3540.

Publications: *IBM 3881 Reference Manual* (GA21-9143), *IBM 3881 Systems Design Guide* (GC20-1751).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V ... must be consistent with system or 3410 voltage. **Field Installation:** Yes.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white. **Field Installation:** Yes.
- S/370 Adapter: **#9551**. Required when a 3881 mdl 1 is to be attached to a S/370 or any 4300 Processor. **Field Installation:** Yes.
- System/3 Adapter: **#9552**. Required when a 3881 mdl 1 is to be attached to a System/3 mdl 8, 10, 12, or 15. **Field Installation:** Yes.
- Invalid Marking Condition Code: **#9301** for Hex 3F (unprintable), or **#9302** for Hex 7C (printable). **Field Installation:** Yes.
- Kickstrips: **#9431** ... if desired.

SPECIAL FEATURES

BCD Read (#1471): Provides, in addition to the basic read head, a second 12-position read head which allows the reading of high-density, preprinted binary coding. These heads will read as marks (digit "ones"), the character "I", or a vertical bar (special character). Each BCD (Binary Coded Decimal) character read will be translated into its equivalent numeric EBCDIC code and transmitted to the CPU, the magnetic tape unit, or diskette at one byte per character. Five of the 12 positions may contain BCD information which is weighted 1-2-4-8 parity from the reference (aligned) edge. The first row of BCD data following the start BCD Field Mark must indicate which 5 of the 12 positions will contain BCD data for that field. If an invalid BCD character is read or an even-parity error is detected, an invalid-marking condition code is sent to the CPU, diskette, or magnetic tape unit. **Field Installation:** Yes.

Document Counters (#3450): Provides two 5-position counters to be incremented by one for documents processed by the 3881. Counters can be manually reset to zero. Counter 1 increments by 1 for each accepted document ... Counter 2 increments by 1 for each selected document. **Field Installation:** Yes.

Dual Density (#3550): [Mdl 2] Permits the 3881 to write on the 3410 Magnetic Tape Unit in either 800 bpi NRZI or 1600 bpi phase-encoded modes. **Field Installation:** Yes. **Prerequisites:** #3221 on 3410 mdl 1.

Expanded Storage (#3801): Provides for an additional 512 bytes of memory which may be required in those situations where the number of formats, fields and characters processed exceed the maximum number of positions available within the basic data store. The formula for the determination of this condition is as follows:

$$5(F + n) + \text{BCD Bytes} + \text{Normal Bytes} + S + I = E$$

Where: F = Number of instruction fields used on all Format Control Sheets loaded.

n = Number of different formats used with the alternate format capability (from 1 to 6).

S = 7 if Serial Numbering (#6451) is installed and is being used ... otherwise, S = 0.

I = Total number of bytes required to store image format data.

E = 435 (or less) for 3881 mdls 1 and 2, or 307 (or less) for 3881 mdl 3.

Maximum: One. **Field Installation:** Yes.

Serial Numbering (#6451): A device for printing consecutive serial numbers on the form being processed. Will print a 7-digit number (2-digit batch and 5-digit serial number) which can be manually set to zero or any desired setting. A reading of the counter may be obtained

3881 Optical Mark Reader (cont'd)

and entered into the 3881 logic via a marked Serial Number Card. Various options exist for the printing of the number. A control switch provides either selective serial numbering based on stacker selection, or a 7-digit batch number without unit advancing. Concurrent with printing, the number will be transmitted to the CPU, the output tape unit or the diskette. See "Supplies". **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable. Must be serial number 20001 or above for field upgrade to model 3.

ACCESSORIES

Document Inspection Guage (P/N 2450145): One is furnished with each 3881 as a customer engineering tool. Used for checking printing alignment on data sheets. Additional gauges can be ordered from Rochester MN plant.

SUPPLIES

Diskettes: Additional diskettes can be ordered from IBM.

Format Control Sheets: 100 are provided with each 3881. Additional pads of 50 may be ordered.

Ribbons:

- For printing on the Serial Numbering (#6451) device use IBM purple ribbon P/N 1136844, or equivalent.
- For printing marks, use IBM ribbon or equivalent as follows:

  1403 - P/N 1136940 or P/N 1136430, on all mdls
  1443 - P/N 422536
  2203 - P/N 422536
  3203 - P/N 1136430
  3211 - P/N 1136964
  5203 - P/N 1136990

- For non-readable background printing, use P/N 419101, or equivalent.

Serial Numbering Card: Packets of 100 may be ordered.

3886 OPTICAL CHARACTER READER

PURPOSE

Optically reads OCR-A font and OCR-B font machine-printed numeric digits, alphabetic characters, and handprinted numeric digits from a wide variety of forms. Attaches online to any virtual storage S/370 processor or any 4300 Processor, offline to the 3410 model 1 Magnetic Tape Unit which provides compatible 9-track magnetic tape.

MODELS

Model 1	001	For use with any virtual storage S/370 or 4300 processor.
Model 2	002	For use offline with a 3410 Magnetic Tape Unit model 1

Prerequisites:

Model 1: An available control unit position on the 5248 of a S/370 mdl 115 or 125, or a byte multiplexer, block multiplexer or selector channel of a S/370 model 135, 135-3, 138, 145, 145-3, 148, 155II, 158,

165II, 168, or a byte multiplexer or block multiplexer channel on a 3031, 3032, 3033, or 4300 processor.

Model 2: A 3410 mdl 1 Magnetic Tape Unit. If Single-Density (#3211) is on the 3410, #6490 is required on the 3886 ... if Dual-Density (#3221) is on the 3410, a #6485 is required on the 3886. See "Special Features".

HIGHLIGHTS

The 3886 is a general purpose optical character recognition reader designed to meet a broad range of data entry requirements. It will read multiple lines of print from forms ranging in size from three to nine inches wide (direction of printing) and from three to 12 inches long. Allowable weights range from 16 pounds to card stock ... see "Documents and Printing". Forms enter the 3886 from the input hopper, which has a capacity of one inch of forms. The forms are advanced line by line (maximum three lines per inch) past a read station, which incorporates a total solid state scanning system to collect character images. These images are analyzed by recognition programs within the 3886 recognition and control processor. After a complete line has been recognized, certain user-specified editing and output formatting functions take place. The line output is then transmitted to the S/370, any 4300 Processor or to a 3410 mdl 1 Magnetic Tape Unit. After the complete form has been read, it is directed to one of two output stackers, each having a capacity of one inch of forms.

The recognition, machine control, and CE diagnostic microprograms for the 3886 are supplied on an internal direct access storage device. The use of these programs, singly or in combination, is dependent on the configuration of the 3886 ... see "Configurator". Input from several different sources can be read on the 3886. The tables of "Acceptable Characters and Printing Devices" below show the characters that are acceptable from typewriters, high-speed printers, lithograph, or, in the case of numeric handprinting, a pencil.

Mdl 1: The online 3886 mdl 1 provides buffered time-independent attachment to S/370 mdl 115 and 125 via an optional multiplexer channel, or to S/370 mdl 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 165II, and 168 via byte multiplexer, block multiplexer or selector channels, or to a 3031, 3032, 3033, or 4300 processor via byte multiplexer or block multiplexer channels. Forms are read and other 3886 functions are performed under S/370 or 4300 Processor program control. The basic 3886 mdl 1 contains 24K bytes of instruction storage for machine control and recognition microprogram storage.

Mdl 2: The offline 3886 mdl 2 operates independently of any processor. It produces compatible 9-track magnetic tape output via the attachment of a 3410 mdl 1 Magnetic Tape Unit. The user indicates form characteristics and processing requirements with Line/Field and Job Specification sheets. These are translated on a special 3886 run into the necessary format control information, and then stored on the internal DASD for subsequent use. Up to eight different form layouts (all one size) can be intermixed within a batch (run). Certain editing and validation functions normally performed by the host processor are also provided. These include self-check digit (Modulus 10) calculation, column or crossfoot-total verification, and field-to-field comparison. The results of these functions can be specified to control stacker selection, Serial Numbering (#6450), and Line Marking (#4720), if they are installed ... see "Special Features". The basic 3886 mdl 2 contains 32K bytes of instruction storage for machine control and recognition microprogram storage.

Speed: Document throughput depends upon the 3886 mdl, document length, number and type of characters read, the amount of output editing and formatting specified, and the user S/370 or 4300 Processor program (mdl 1).

On the mdl 1, speeds range from approximately 5,800 (3-inches long, single-line, 8-character, machine-printed) turnaround documents per hour, to approximately 300 typewritten (8-1/2 inches x 11 inches) pages with 2,262 characters (29 lines of 78 characters).

On the mdl 2, speeds for the same forms range from approximately 5,200 documents to approximately 300 pages per hour. *Input Document Design Guide and Specifications* (GA21-9148), contains formulas which should be used to determine throughput for specific forms.

Documents and Printing: The input forms and printing to be read by the 3886 must conform to the established specifications described in *Input Document Design Guide and Specifications* (GA21-9148). Only those ribbons (see "Supplies") and background inks specifically meeting the outlined spectral criteria will give satisfactory performance. Certain restrictions apply to document sizes, weights, and combinations thereof. These are discussed in *Input Document Design Guide and Specifications* (GA21-9148).

Publications:
IBM 3886 OCR Model 1 Component Reference Manual (GA21-9147),
IBM 3886 OCR Model 2 Component Reference Manual (GA21-9154),
Input Document Design Guide and Specifications (GA21-9148),
DOS/VS Supervisor and I/O Macros (GC33-5373),
DOS/VS LIOCS Volume 2, SAM (GY33-8560),
DOS/VS Error Recovery and Recording Transients Logic (SY33-8552),
OS/VS 3886 OCR Model 1 Reference (GC24-5101).

Code: [Mdl 2 only] ID = E30

SPECIFY

- Voltage (AC, 3-phase, 4 wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage. **Field Installation:** Yes.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Upending Kit: **#9840**, if required ... loan-only basis on initial machine order only, remains property of IBM. Dimensions are 29-1/2 inches wide, 60 inches long, and 76 inches high.
- 3211/5211 B-Font Compatibility: **(#9701)** if required ... only if predominately reading 3211/5211 generated documents.

SPECIAL FEATURES

Data Storage, Add'l (#3210): OCR-B Font and Numeric Handprinting recognition require this feature to handle the more complex character shapes which appear in these fonts. **Maximum:** One. **Field Installation:** Yes.

Hopper and Stacker Capacity, Add'l (#4520): The standard hopper and two stackers on the 3886 each have a capacity of one inch of forms. This feature adds the motors, sensors, etc., to increase that capacity to approximately four inches in each. **Field Installation:** Yes.

Instruction Storage, Add'l (#4610): The recognition microprograms for alphameric machine printed fonts and Numeric Handprinting require storage capacity greater than the basic models of the 3886, as do combinations of fonts. This feature provides the necessary additional storage increments of 8K bytes. Up to nine of these features may be added ... see "Configurator". **Field Installation:** Yes.

Line Marking (#4720): Provides a four-position fixed-slug printer (1, 2, 4 and 8) which prints 15 different codes to be used as an aid to error correction procedures. It is used to indicate field location or error type information in the margin of lines requiring corrective action. It will also provide page marking capability to indicate user-controlled post-processing document handling information. Line marking is under program control on the mdl 1 and is controlled by coding on the specification sheets on mdl 2. Line marking may be done with a purple ribbon if marked documents are to be re-processed through the 3886. Otherwise a black ribbon may be used. See "Supplies". **Field Installation:** Yes. **Prerequisites:** #5340.

Numbering/Marking Adapter (#5340): Provides a group of common parts necessary for the installation of Serial Numbering (#6450) and/or Line Marking (#4720). **Maximum:** One. **Field Installation:** Yes.

Numeric Handprinting (NHP) (#5360): Provides the additional machine circuits to read the handprinted numbers 0-9 and the letter X. For optimum operation, character shapes and spacing should conform to the basic rules of handprinting as outlined in *Input Document Design Guide and Specifications* (GA21-9148). Handprinting should be performed with ordinary #2 pencils or grade HB fine line lead for mechanical pencils. The NHP feature includes the ability to read supplier-preprinted Gothic (3/16-inch) font digits 0-9. Blanks are not recognized. The feature provides two modes of operation, normal and verify. The appropriate mode can be selected on a field-by-field basis depending on the critical nature of the data, the circumstances of form preparation, and the level of other available control techniques. **Field Installation:** Yes. **Prerequisites:** #3210 and sufficient #4610 ... see "Configurator".

Serial Numbering (#6450): Permits the sequential numbering of forms as they are processed. A 10-position numbering head is provided, of which five are unit-advanced and five are stationary. Selection of documents to be printed works in conjunction with stacker selection.

3886 Optical Character Reader (cont'd)

Serial Numbering may be done with a purple ribbon if numbered documents are to be re-processed through the 3886. Otherwise a black ribbon may be used. See "Supplies". **Field Installation:** Yes. **Prerequisites:** #5340.

Tape Adapter, Dual-Density (#6485): [Mdl 2] Provides the appropriate adapter, within the 3886, to attach a 3410 mdl 1 Magnetic Tape Unit for writing at 1600 bpi PE or 800 bpi NRZI (#3221 on 3410). **Field Installation:** Yes.

Tape Adapter, Single-Density (#6490): [Mdl 2] Provides the appropriate adapter, within the 3886, to attach a 3410 mdl 1 Magnetic Tape Unit for writing at 1600 bpi PE (#3211 on the 3410). **Field Installation:** Yes.

Video Collect Features (#8701, #8702, #8703):

Video Collect (#8701): [Mdl 2] Provides for direct attachment of a 3277 Display Station mdl 1 with RPQ 8K0438 to a 3886 mdl 2 (a 3272 Control Unit is not required). Entries on Line/Field and Job Specification sheets allow the 3886 to collect video image data of reject characters in specified fields and/or the collection of the video image of an entire field at either 0.006 inch or 0.012 inch resolution. Video image data will be displayed on the cable-attached 3277 (with RPQ 8K0438) for visual recognition. The display operator will key-enter the correct data. The data record will be updated with the keyed information before being written to tape.

Video Collect (#8702): [Mdl 2] Entries on Line/Field and Job Specification sheets cause collection of video image data of reject characters in specified fields and/or the collection of the video image of an entire field at either 0.006 inch or 0.012 inch resolution. Video image data is written to tape in record lengths that match the user-selected data record length. The tape can be processed on a system and have the video image displayed on a 3277 mdl 1 or 2 Display Station equipped with RPQ 8K0438 and attached to the CPU via a 3272 mdl 2 Control Unit.

Video Collect (#8703): [Mdl 1] Provides the ability to collect video image data of reject characters in specified fields and/or the collection of the video image of an entire field at either 0.006 inch or 0.012 inch resolution. The video image data can be transferred from the 3886 to the CPU by user-written routines coded with present 3886 Type 1 programming support. The display of video image data will require a 3277 mdl 1 or 2 Display Station equipped with RPQ 8K0438 and attached to the CPU via a 3272 mdl 2 Control Unit.

Limitations: The required 3277 mdl 1 or 2 (as described above) cannot be equipped with any of the following: Operator Identification Card Reader (#4600), Selector Light-Pen (#6350), ASCII Character Set (#9091 or #9092), or ASCII Keyboard (#4634 or #4635). For #8703, if a 3277 mdl 1, with the RPQ listed, is to be attached to the required 3272 mdl 2 Control Unit, at least one 3277 mdl 2 (with or without the RPQ) must also be attached to the same 3272 Control Unit for diagnostic purposes. **Field Installation:** Yes. **Prerequisites:** Each of the Video Collect Features requires (#3210) plus two increments of (#4610), in addition to the increments required to hold the font recognition programs as described in *IBM 3886 OCR Model 1 Component Reference Manual* (GA21-9147), and *IBM 3886 Model 2 Component Reference Manual* (GA21-9154), (Figure 10). See the "Configurator" below.

MODEL CONVERSIONS

Conversion from model 1 to model 2 is field installable.

CONFIGURATOR

All 3886 Optical Character Readers will be shipped containing an internal DASD. That device will contain all of the recognition microprograms for OCR-A font, OCR-B font and NHP. See "Acceptable Characters and Printing Devices". This configurator shows which features are necessary in order to utilize all valid combinations of those recognition programs.

From the following table, find the combination of fonts which will appear within any one batch (run) of input forms. The features shown on that line are required. If any other batch (run) of input forms will contain another font, a greater quantity of #4610 may be required to cover the maximum combination of fonts for all batches to be run in various applications.

					Quantity of Features Which Must be Ordered		
Num OCR-A	Num OCR-B	Alpha-meric OCR-A	Alpha-meric OCR-B	Numeric Hand-printing	Instruction Storage, Add'l * (#4610)	Numeric Hand-printing (#5360)	Data Storage, Add'l (#3210)
Single Machine Font Configurations							
X	-	-	-	-	-	-	-
-	X	-	-	-	-	-	1
-	-	X	-	-	1	-	-
-	-	-	-	X	3	1	1
X	-	-	-	X	4	1	1
-	X	-	-	X	4	1	1
-	-	-	X	-	4	-	1
-	-	X	-	X	5	1	1
-	-	-	X	X	8	1	1
Combination OCR-A and OCR-B Configurations							
X	X	-	-	-	1	-	1
-	X	X	-	-	2	-	1
X	X	-	-	X	5	1	1
X	-	-	X	-	5	-	1
-	-	X	X	-	6	-	1
-	X	X	-	X	6	1	1
X	-	-	X	X	9	1	1

* Equal or smaller size combinations of fonts will operate on machines with the required features (#5360 and #3210).

Example: User batch to be processed will contain Alphameric OCR-A font and Numeric Handprinting. This requires the following features: Quantity of 5 of #4610 plus 1 of #5360 and 1 of #3210.

Other batches this user will be able to run can include the following fonts or combinations of fonts:

Numeric-A	Numeric-A and Numeric-B
Numeric-B	Numeric-B and Alphameric-A
Numeric-A and NHP	Numeric-A and Numeric-B and NHP
Numeric-B and NHP	Numeric-A and Alphameric-B
Alphameric-B	

ACCEPTABLE CHARACTERS AND PRINTING DEVICES

OCR-A Font, Size 1: (1)

5211 mdl 2 (2)	Characters from IBM Selectric® Typewriter Only (or equivalent)
Numeric	**Additional** (3)
0	{
1	+
2	}
3	:
4	%
5	?
6	;
7	'
8	=
9	"
Y	ABC (Group Erase)
S	■ ⌶ (Char. Erase)
H	| (4)

Notes:

(1) The division of characters into sets above refers to 3886 recognition capability. The appropriate type catalog arrangements should be referenced for high-speed printer output character sets.

(2) With the 5211, use of Reread-On-Reject, and 75-90 g/sq.m (20-24 pound) single-part forms are required.

(3) All of these characters are recognized on mode 2 alphameric set except Group Erase, ■, and ⌶ which are recognized in the numeric set also. **

(4) The LVM (long vertical mark) is recognized in all OCR-A character sets. The LVL (preprinted long vertical line) is also recognized. **

1403 mdls 2, 3, 7, N1 (or equivalent), 3203 all mdls (or equivalent), 3800 (1), and IBM Selectric® Typewriter (or equivalent). Numeric set only from 3211 (2).

Numeric		**Alphameric** (3) (4)		
0	.	A	N	&
1	$	B	O	
2	*	C	P	
3	-	D	Q	
4	/	E	R	
5	¬	F	S	
6	blank	G	T	(Plus all
7		H	U	Characters
8		I	V	to left
9		J	W	except Y)
Y		K	X	
S		L	Y	
H		M	Z	

Notes:

(1) Minimum paper weight for documents produced on the 3800 is 75 g/sq.m (20 pound).

3886 Optical Character Reader (cont'd)

(2) The OCR Print Package (#5450), on the 3211 is a prerequisite for OCR applications. Use of Reread-On-Reject capability and 75-90 g/sq.m (20-24 pound) Bond is recommended for optimum performance. When other papers are used, customer testing should be performed to assure adequate reading performance.

(3) These characters are recognized in mode 1 alphameric set. **

(4) The timing mark dash (–) can be substituted for a non OCR-A font graphic (#) for the purpose of printing timing marks. See "Type Catalog" for details.

** See *IBM 3886 OCR Model 1 Component Reference Manual* (GA21-9147), and *IBM 3886 Model 2 Component Reference Manual* (GA21-9154).

OCR-B Font, Size 1: (1, 2)

5211 mdl 2 (3)	Characters from IBM Selectric® Typewriter Only (or equivalent)
Numeric	**Additional** (4)
0 7	| (LVM) (5)
1 8	ABC (Group Erase)
2 9	■ (Char. Erase)
3 <	
4 >	
5 +	
6	

Notes:
(1) The division of characters into sets above refers to 3886 recognition capability. The appropriate type catalog arrangements should be referenced for high-speed printer output character sets.

(2) This is compatible with the *European Computer Manufacturers Association Revised OCR-B Font* published in the Standard ECMA-11 for Alphameric Character Set OCR-B for Optical Recognition, 2nd Edition, dated October, 1971.

(3) With the 5211, use of Reread-On-Reject, and 75-90 g/sq.m (20-24 pound) single-part forms are required.

(4) These can be recognized in all OCR-B Font Character Sets.

(5) The LVM (long vertical mark) is recognized in both numeric and alphameric OCR-B but can only be printed or typed. The LVL (long vertical line), a special case of the LVM can also be recognized. **

1403 mdls 2, 3, 7, N1 (or equivalent), 3203 all mdls (or equivalent), 3800 (1), and IBM Selectric® Typewriter (or equivalent). Numeric set only from 3211 (2).

Numeric	**Alphameric**		
0 .	A	N	&
1 $	B	O	
2 *	C	P	
3 -	D	Q	
4 /	E	R	
5 ¬	F	S	
6 blank	G	T	(Plus all
7	H	U	Characters
8	I	V	to left)
9	J	W	
<	K	X	
> (3)	L	Y	
+	M	Z	

Notes:
(1) Minimum paper weight for documents produced on the 3800 is 75 g/sq.m (20 pound).

(2) The OCR Print Package (#5450), on the 3211 is a prerequisite for OCR applications. Use of Reread-On-Reject capability and 75-90 g/sq.m (20-24 pound) Bond is recommended for optimum performance. When other papers are used, customer testing should be performed to assure adequate reading performance.

(3) The timing mark dash (–) can be substituted for the greater-than symbol (>) for the purpose of printing timing marks. See "Type Catalog" for details.

** See *IBM 3886 OCR Model 1 Component Reference Manual* (GA21-9147), and *BM 3886 Model 2 Component Reference Manual* (GA21-9154).

ACCESSORIES

Document Inspection Gauge (P/N 2448299): One is furnished with each 3886 as a customer engineering tool. It is used for checking printing alignment on data sheets. Additional gauges can be ordered from IBM.

SUPPLIES

Ribbons:

- Input Printing: Providing maximum flexibility in background ink color and intensities requires that ribbons used for printing 3886 input be carefully selected. The following, or their equivalents, should be used:

Film Ribbon Selectric	**P/N 1136310** or **P/N 1136391**
Fabric Ribbon Selectric	**P/N 1136138**
1403 (all mdls)	**P/N 1136430**
3203 (all mdls)	**P/N 1136430**
3211	**P/N 1136627** for 75-90 g/sq.m (20-24 pound) Bond OCR forms, or **P/N 1136626** for all heavier paper.
5211 mdl 2	**P/N 1299243**.

Ribbons not having similar characteristics may result in reduced recognition performance and/or reduced ribbon life.

- Line Printing:

Purple	**P/N 414499**
Black	**P/N 414491**

- Serial Numbering:

Purple	**P/N 1136844**
Black	**P/N 1136843**

3890 DOCUMENT PROCESSOR

PURPOSE

Reads magnetically inscribed data from card and paper documents into any virtual storage S/370, except 3115 and 3125, or to a 4300 processor via the byte multiplexer or block multiplexer channel. Can be used offline for document sorting.

MODELS

The 3890 is available in 20 models as follows:

Model A1	A01	6 stackers	13,312 bytes of
Model A2	A02	12 stackers	storage (10,240 bytes
Model A3	A03	18 stackers	if image processing)
Model A4	A04	24 stackers	for stacker select
Model A5	A05	30 stackers	programs and
Model A6	A06	36 stackers	initialization data
Model B1	B01	6 stackers	29,696 bytes of
Model B2	B02	12 stackers	storage (26,624 bytes
Model B3	B03	18 stackers	of image processing)
Model B4	B04	24 stackers	for stacker select
Model B5	B05	30 stackers	program and
Model B6	B06	36 stackers	initialization data
Model E3	E03	18 stackers	13,312 bytes of
Model E4	E04	24 stackers	storage (10,240 bytes
Model E5	E05	30 stackers	if image processing)
Model E6	E06	36 stackers	for stacker select programs and initialization data.
Model F3	F03	18 stackers	29,696 bytes of
Model F4	F04	24 stackers	storage (26,624 bytes
Model F5	F05	30 stackers	if image processing)
Model F6	F06	36 stackers	for stacker select programs and initialization data.

HIGHLIGHTS

The 3890 is a buffered, modular, pocket reader-sorter which is time-independent. The 3890 mdls A and B are available with 6 to 36 stackers in increments of 6. The 3890 mdls E and F are available with a minimum of 18 stackers expandable to 36 in increments of 6. Also, the 3890 mdls E and F include as standard: Microfilming and System/370 and 4300 Attachment. These features are optional on the 3890 mdls A and B.

Documents are read at a minimum rate of 2,400 6-inch documents per minute for the 3890 mdls A1 through B6. The 3890 mdls E3 through F6 read at a minimum of 1680 6-inch documents per minute Actual throughput depends upon length of document. The formula for determining the approximate average rated throughput per minute is: The percentage of non-card stock checks x [19,200/(average document length, which is 6" or greater plus 2")] + the percentage of card stock checks x 1,907. For the 3890 mdls E and Fthe results of this calculation should be multiplied by 1.7. The primary component of the 3890 is the feed module, which contains the input hopper, recognition circuits, logic to determine stacker selection, merge feed, options when installed, and operator setup and run panels.

Input Hopper, 3890 Mdls A and B: Holds approximately 4,800 documents and permits convenient, continuous loading. A jogger is built into the hopper to eliminate joggering as a separate operation.

Input Hopper, 3890 Mdls E and F: Holds approximately 3,800 documents and permits convenient, continuous loading. Do not include a built-in jogger. Joggering must be performed as a separate operation. About 2,200 additional documents, previously joggered, may be placed in a separate staging area adjacent to the input hopper.

Merge Feed: Permits the merging of documents into the normal input stream from a separate hopper. Document capacity is 600. Document merging is controlled by the user program. For example, as part of job initialization, the user can specify the approximate number of documents to be stacked in each pocket before a document is fed from the merge hopper to that pocket. The 3890 maintains a document count for each pocket. The merge function eliminates the need for programmed pocket lights. **Limitations:** Does not permit the 3890 to function as a collator.

Logic and Control Section: Is initialized by the processor when online and by a removable disk when offline. Initialization determines the fields to be read, length of the fields, starting number for the item numbering feature, merge feed controls, whether image processing is to be performed, the stacker control instruction algorithm to be used, endorser requirements, and whether the symbol error correction option is to be used. With the symbol error correction option, the 3890 performs extensive logical analysis to determine whether unreadable symbols can be replaced by internally generated field-defining symbols. The 3890 performs all stacker select determinations independent of processor control and transfers blocked data records to the processor. Due to the logical capability, the following functions are standard "programmable": split field, self-check number verification, multiple column control, base number conversion for fine sorting.

Stackers: Each pocket holds approximately 800 to 1,000 documents. The operator can unload all but the last 200-300 documents without stopping the 3890. Pocket warning lights alert the operator when a specific pocket is becoming full. The reject stacker is the first stacker -- the stacker closest to the input hopper. Racks for output trays are above each stacker.

Documents: E13B magnetic characters, print quality and codeline arrangement on the documents must meet the specifications recommended by the American Bankers Association. Intermixed paper and card documents within the following specifications can be processed.

Length: 123 to 223mm (4.85 to 8.75 inches).
Width: 70 to 106mm (2.75 to 4.17 inches).
Thickness: .064 to .178mm (.0025 to .007 inches). Carrier documents containing mutilated documents with a total thickness up to .356mm (.014 inches) will also be transported.
Basis Weights: 60 to 165 grams per square meter, 16 to 44 pounds (basis weight is the weight of 500 sheets of 17" x 22" paper)
Grain: grain long or grain short, except for 16 pound paper, which must be grain long.

Bibliography:
IBM 3890 Document Processor, Machine and Programming Description, GA24-3612

Code: ID=E80 (applies to stand-alone machines only)

SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow **#9043** for blue, **#9046** for white.
- Upending Kit **#9840**, if required.
  Note: Loan basis; remains property of IBM.
- Cabling: **#9181** for on the floor.
- SS2 Transmission Option: **#9666**. Codeline SS2s are not treated as field-defining symbols. Requirement for this option is limited. Before specifying, refer to: *IBM 3890 Document Processor, Machine and Programming Description Manual,* GA24-3612. *IBM 3890 Document Processor Mdls E and F Machine and Programming Description Manual,* GC31-0507. **Field Installation:** Yes.
- Tool Kits: Required for CE maintenance. For Rental Customer: Specify on first 3890 order for a customer. If required for a multiple machine installation, additional Tool Kits are available via a no-charge MES. For Purchase Customers: Specify on each 3890 machine order. When installed rental 3890s are purchased, a Tool Kit is to be ordered on a no-charge MES for each machine. **Specify: #9766** for base machine, **#9767** for Microfilming (#5111), **#9768** for Item Numbering/Endorsing (#4666).

SPECIAL FEATURES

Item Numbering/Endorsing (#4666): Mdls A and B only. **Item Numbering/Endorsing (#4667):** Mdls E and F only. Provides the capability of printing an eight-digit number and/or a full endorsement on the back of each document. The starting item number and one of three print locations is determined by the user program at initialization. The number can be incremented on any document cycle based on the user-provided Stacker Control Instruction parameters for the run. The number can be configured by the user at installation to be a combination of batch and serial numbers, or serial number only. Vertical location of the item number is specified by the customer and is normally set at the plant.

During run initialization, the user specifies whether endorsing is active, and one of three horizontal print positions. Vertical location of endorsement is specified by the customer and is normally set at the plant. The design of the endorser facilitates operator changing of endorser legends for users who have a requirement to print different endorsements. The date portion of the endorser is set by the operator. **Specify: #9167** for endorsement at top or **#9168** for center; **#9379** for item number at bottom or **#9378** for center. (For the purpose of minimizing overprinting of item numbers and endorsements, 3890s ordered for Federal Reserve Banks should specify **#9167** for endorsement at top and **#9378** for item number at center. All other machines should specify **#9168** for endorsement at center and **#9378** for item number at bottom.) Color of endorser ink to be used: **#9145** for black, **#9149** for blue, **#9147** for purple, **#9148** for red. **Field Installation:** Yes.

Microfilming (#5111): Standard on mdls E and F. Optional feature on 3890 mdls A and B. Provides the capability of microfilming items, either front and back (duplex) or front only (duo), being processed on the 3890. Items are selectively filmed under program control at 3890

3890 Document Processor (cont'd)

document speeds. An 8-digit number can be exposed on the film for every other document image filmed. The 8 digit positions can be split into two number fields, which can be incremented or reset on any document cycle under stacker control instruction parameters for the run. During run initialization, the user specifies whether microfilming is active, the mode of filming, and the starting 8-digit number. A frame mark is recorded on film for each document image for image counting during retrieval. The camera provides a reduction ratio of 50 to 1 and a resolution of 120 lines per millimeter. The film is advanced by a capstan drive system based upon the document width to maximize the use of film. The film cassette, a purchase-only item (see "Accessories"), provides space for take-up of the film as well as the film supply. Capacity of the cassette is 2,000 feet of .0027" polyester thin base film. Loading and unloading of film from the cassette into the film transport are automatic under operator control. Approximately 380,000 front and back images of an average intermix of documents can be recorded on 2,000 feet of film. The film is spaced six inches every 215 feet to facilitate splicing; if a 49-inch space is required, specify **#9177**. The film to be used is 16mm unperforated thin base microfilm which must be ordered on cores. Disclosure specifications covering the film, cassette, and core on which the film must be wound, are available from: Manager, Industry Relations/Product Information, Dept. 767, IBM, Old Orchard Road, Armonk, N.Y. 10504. Film must be ordered on cores (P/N 2648096 or equivalent) with an 1/8 inch diameter hole center punched approximately seven feet from each end of the film. . **Field Installation:** Yes.

S/370 and 4300 Attachment (#6370): Standard on 3890 mdls E and F. Optional feature on 3890 mdls A and B. Permits attachment to any virtual storage S/370 processor (except 3115 and 3125) or a 4300 processor via the byte multiplexer or block multiplexer channel. This feature is required on each 3890 attached to a S/370 or a 4300 processor. **Maximum:** One per 3890. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

ACCESSORIES

MICROFILM CASSETTE (P/N 2647900): The film cassette provides space for film take-up as well as supply. Capacity is 2000 feet of 0.0027-inch polyester thin base film. The cassette must be loaded in a dark room. Disclosure specifications covering the film, cassette and core on which the film must be wound are available from Manager Industry Relations, Product Information, Dept. 767, CHQ, Old Orchard Road, Armonk, N. Y. 10504.

SUPPLIES (None)

4245 LINE PRINTER

PURPOSE

Printer Output unit for all Virtual Storage S/370's (except 155 II, and 65 II) 303X, 308X and all 4300 Processors. Print speed is 2000 lines per minute (lpm) based on a standard 48-character set.

MODELS

Model 1 001 Print speed 2000 lpm.

Limitations:

1. Only marginally punched, pinfeed, continuous forms may be used. For multiple part forms it is recommended that both sides be securely fastened. However, when only one side is fastened it must be the right side.
2. For full flexibility of column locations for margins, 451mm (17.8 inches) maximum width forms is recommended. If forms greater than 356mm (14 inches) in length are used, the rear stacker enclosure must be opened. If forms greater than 432mm (17 inches) in length are used, the front forms compartment door must be left open. For additional information, see *Forms Design Reference Guide for Printers*, GA24-3488.
3. No staples are permitted in the area exposed to the print band.
4. Both edges of the form must be engaged by the pinfeed forms tractors.
5. Use for OCR applications is not supported.
6. Print quality and printer operation (such as forms feeding and stacking) varies with paper specifications, number of copies, ribbons, and environmental conditions (temperature and humidity).

Forms of more than 4 parts or forms with a first part heavier than 13 pounds (49 grams/sq. meter) should be tested under operating conditions to verify that results are satisfactory for the user applications. The maximum forms thickness is 0.51mm (.020 inches).

Prerequisites: One operator changeable print band for each 4245 printer (see Specify section). One control unit position on a system byte multiplexor, selector, or block multiplexor channel for each printer.

HIGHLIGHTS

Print speed is 2000 lpm using a 48-character interchangeable print band. A variety of other character sets are available. Print speeds vary according to the size of the character set. The following table shows character sizes offered and expected speed ratings:

Character Set	Print Speed (lpm)
48	2000 (max.)
52	1820
50, 63	1620
94	1130
124	820

Print speed depends on frequency of use of various characters. Most 4245 print bands have been optimized to add greater frequency of commonly used characters. This enables most print jobs to run faster than if the frequency of all characters was equal.

132 print positions is standard. Horizontal spacing is 10 characters per inch. Vertical spacing is 6 or 8 lines per inch under program control. Forms skipping and spacing are controlled by a 255 byte forms control buffer. The carriage is a dual speed unit with normal skipping up to .61m (24 inches) per second and high speed skipping up to 1.4m (55 inches) per second after 6 lines have passed. The output forms stacker is power assisted.

Continuous marginally punched forms are fed by a pair of forms tractors. Maximum forms dimensions are: width - 559mm (22 inches); length - 610mm (24 inches). Minimum forms dimensions are: width - 89mm (3.5 inches); length 76mm (3.0 inches). **Note:** In the stacker, the minimum fold-to-fold length is 152mm (6.0 inches).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparations
- Replacement of the following items as necessary:
  - Ribbons
  - Print bands
  - Plastic ribbon shields
  - Vacuum bags

All of the above replacement items except vacuum bags can be purchased through SSD . Vacuum bags will be supplied at no charge by Field Engineering for IBM maintained machines. See the supplies section for further information. If the customer desires to have Field Engineering replace or install any of these items, the FE time involved will be billed to the customer.

Bibliography: S/370 - GC20-0001.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3 phase, 4 wire, 60 Hz):

  208V **#9903**
  220V **#2800**
  240V **#9915**

- Color: Machine is available in Cloud White only.
- MES: There will be no MES orders with this machine.
- Print Band Character Set: Select one band only by specifying one number from Group A, one number from Group B, and one number for character set height. When printing 8 lines per inch, 2.0mm (.079 inches) character height is recommended. One print band will be shipped at no charge with the printer. Replacement or additional print bands may be obtained by the customer for a charge. See Supplies section.

Group A

Specify	Character Set Size
#9520	48-Character EBCDIC
#9521	50-Character Scientific
#9526	52-Character FORTRAN/COBOL**
#9524	63-Character ASCII**
#9522	63-Character EBCDIC
#9525	94-Character Commercial*
#9527	124-Character Scientific*

Group B

Specify	Language
#2950	International
#2956	English US
#2961	Spanish Speaking

Specify	Character Height
#9950	2.4mm (.095 in.)
#9951	2.0mm (.079 in.)

* Available only with the 2.4mm (.095 in.) character height.

** A selection from Group B is not required.

SPECIAL FEATURES None

MODEL CONVERSIONS None.

ACCESSORIES

See "Customer Responsibilities" under "Highlights".

SUPPLIES

Ribbons: **P/N 7034437** or equivalent is required for forms up to and including four parts. **P/N 4012828** or equivalent is required for five and six part forms.

Print Bands: Replacement or additional bands are available. see the SSD Sales Manual for P/Ns.

Plastic Ribbon Shields: P/N 6092766, or equivalent is required.

For all of the above supplies, see the SSD Sales Manual .

4250 PRINTER

PURPOSE

The 4250 is a high-resolution non-impact printer. It is all-points-addressable (APA) with an addressing resolution of 600 dots per inch in both horizontal and vertical direction and can print a wide variety of text in various styles and sizes, graphics objects with various complexity. As an all-points-addressable device the 4250 can print host system-supplied dot patterns. A blackness ratio of 50% per page should not be exceeded. In case of simulated halftones customers should evaluate these against their application requirements. The 4250, together with associated software such as Document Composition Facility (DCF) Release 3 and Graphical Data Display Manager (GDDM) Release 3, provide a new level of print quality, function, and ease-of-use for a variety of customer applications such as documentation, production of manuals, brochures, reports, newsletters, presentations, etc. Based on electro-erosion technology, the 4250 produces type-set quality camera-ready master-pages directly from an IBM host computer system without photo-sensitive processes and costly darkroom facilities. Unlike traditional photo typesetters, the 4250 output is dry and immediately visible and usable. The output can be reproduced by using the conventional reproduction methods used in the reproduction industry. If the output is reproduced via copiers, the customer should evaluate the results of the copying process on the specific copier.

MODELS

Model 1 001

Prerequisites:

3274 Mdl 1A Attachment:
- **#9112** Configuration Support C at release level 46 or higher.
- Enough control storage to customize for SCS printer support (SCS), structured field and Attribute processing (SFAP) and one extended attribute terminal (EAT) for each 4250 attached.

3274 Mdl 1D Attachment:
- **#9112** Configuration Support C at release level 46 or higher.
- Enough storage to customize for SFAP and one EAT for each 4250 attached.

3274 Mdl 31A or 31D Attachment:
- **#9112** Configuration Support C level 46 or higher. Storage features are not required, but enough control storage must be available to customize for SFAP. SCS support is required for the 31A.

  or
- **#9124** Configuration Support D, and #3650 Extended Function Store Type C1, and #3101 Integrated Diskette Drive Enhancement.

3274 Mdl 41A or 41D Attachment:
- No features or special considerations required.

4321 or 4331 Mdl 1, 2, or 11 Attachment:
- Specify code **#9260** for DPA.

Customer Setup: The 4250 is a Customer Setup (CSU) machine, thereby offering the customer early availability and relocation flexibility. Setup procedures are shipped with each machine. The Customer Setup allowance is four days for each 4250 (regardless of quantity) starting from the day of the arrival at the customer's shipping dock.

HIGHLIGHTS

- Provides high-quality (typeset-level) master pages at an addressing resolution of 600 dots per inch in horizontal and vertical direction.
- Provides immediately usable dry output and requires no chemical processes with costly darkroom facilities or special environmental considerations.
- Provides the capability of printing and merging of a wide variety of text, graphics and host generated dot patterns.
- The output of the 4250 is immediately visible.
- Uses aluminum-coated paper which is inexpensive compared to conventional photographic paper.
- Provides end-user convenience, small size, and silent operation suitable for an office environment.
- The output is easily reproducible and of archival quality.

System Attachment: The 4250 attaches to the 3274 Control Unit, mdls 1A, 1D, 31A, 31D, 41A and 41D. Using these Control Units, the 4250 can be attached to any S/370 mdl 138 and up or 43XX and 30XX. In addition, the 4250 attaches directly to the 4331 mdls 1, 2 and, 11 and to the 4321 via the Integrated Display/Printer Adapter.

Human Factors: The 4250 uses electro-erosion printing technology resulting in a quiet operating unit suitable for installation in an end-user environment. In conjunction with the programming support, the user can initiate re-transmission of a page, if for example, the paper roll is empty prior to reaching the end of the page. The output of the 4250 is immediately visible and no chemicals are involved in obtaining the high quality, camera-ready master-page.

Problem Determination Procedures: The microcode checks and monitors the status of the printer and provides status information on the two-digit display in case of malfunction. The *Reference Card* (GX33-1504) in the rear of the machine provides the problem determination steps. At initial power-on, an automatic sequence of tests checks the circuitry and measures the width of paper mounted in the machine. A subset of these tests is conducted whenever the reset key is depressed. Offline tests may be initiated via the Operator Control Keys to check the function of the electrode driver circuitry.

Indicator Lights: The 4250 has six function-indicators and a 2-digit display which provide status and error code information. A power indicator light is also provided.

Operator Control Keys: The keyboard contains 16 keys. Those of prime importance to the operator such as Start, Stop, Paper Advance, and Reset, are brightly colored for positive recognition. The remaining keys, for application interface and problem determination, are used primarily by the CE.

Performance Considerations: The 4250 is an all-points-addressable printer and performance measures such as lines per minute or characters per second are not meaningful. The physical speed of the print head is one meter per second (approximately 40 inches per second). The actual time to print one page is dependent upon:

- Complexity and size of the page
- Content of a page, e.g., number of skips, line length, etc.

For planning purposes, the printing time for an average A4 size page ranges between 1.5 and 2.5 minutes provided the 4250 operates at maximum printing speed.

IBM Aids: The FIVE/3270 configurator will be enhanced to provide support for 4250 attached to the 3274 control unit.

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4250 at initial setup.
- Physical setup, connections of cables in customers access areas and check-out.
- Contacting IBM FieldEngineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Procurement, installation, and maintenance of coaxial communication cables. See "Accessories".
- Disconnection and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Shipping Materials: All shipments are from the plant of manufacture. Packaging material need not to be returned.

Programming Support:

System Support: The 4250 is supported for operation under the following operating systems:

- VM/CMS -- The 4250 is running under VM/SP Release 1 and 2 specifying the 4250 as an unsupported device. VM/SP Release 3 provides standard support as a dedicated device.
- MVS -- MVS/SP Version 1 Release 3.0 and MVS/XA with either ACF/VTAM Release 3 or ACF/VTAM Version 2.
- VSE/Advanced Functions -- VSE/Advanced Function Release 3 with either ACF/VTAM Release 3 or ACF/VTAM Version 2 or ACF/VTAME.

Application Support: The 4250 will be supported by the following strategic IBM Application Packages:

- Document Composition Facility Release 3 (5748-XX9).
- Document Library Facility Rel. 3.
- Graphical Data Display Manager Rel. 3 (5748-XXH) on MVS/TSO and VM/SP CMS only.
- Composed Document Printing Facility (CDPF).
- IBM Typographic Fonts for the IBM 4250.

Basic Configuration: The basic machine is shipped with a non-locking power cable plug and a 4.3 meter (14 foot) power cable. See "Specify".

Publications: *Planning and Site Preparation Guide* (GA33-1552), *Component Description and Programming Information Manual* (GA33-1554), *Operator's Guide* (GA33-1551), *Customer Setup Instructions* (GA33-1553), *Reference Card* (GX33-1504), *Trouble Report Form* (GX33-1503), *IBM 4250 Printer: Type Styles Portfolio* (G520-0004).

SPECIFY

- Color: Pearl White is the only available color. No specify required.

4250 Printer (cont'd)

- Communication Cable: Communication cable is not shipped with the machine. The customer is responsible for procurement, installation, and maintenance of coaxial cable. See "Accessories".

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Cables, connectors, and adapters may be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of these cables. Assembled cables may be ordered from IBM. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 4250.

Twinax Connector Kit (**P/N 7362268**): Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. Individual connectors (**P/N 7362229**) are available for replacements.

Twinax Wire (**P/N 7362211**): Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinax Cable Assembly (**P/N 7362267**): Includes a Connector Kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (**P/N 7362230**): Permits two Twinax Cable Assemblies to be joined together.

Twinax Station Protector Kit (**P/N 7361807**): Includes two protectors. One is required at each end of attachment cable installed outdoors (either above or below ground level).

SUPPLIES

Electro-erosion paper is available from IBM. The paper is on rolls and supplied in cartons (10 rolls per carton). Four widths are available:

210mm x 100m (8.26 inches x 300 feet) **P/N 7034360**
215.9mm x 100m (8.5 inches x 300 feet) **P/N 7034361**
265mm x 100m (10.43 inches x 300 feet) **P/N 7034362**
330mm x 100m (12.99 inches x 300 feet) **P/N 7034363**

The electro-erosion paper is a sensitive part of the machine. Use of paper that does not meet IBM specifications may result in unsatisfactory print quality or damage to the print head.

4321 PROCESSOR

PURPOSE

Provides the power, control, logic and memory circuitry necessary for the arithmetic, logic and processor storage functions of the 4321 Processor.

MODELS

Model J11 1,048,576 (bytes) Processor Storage

Prerequisites: Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C with keyboard and control panel is required for this purpose.

Maximum Configuration: The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to *IBM 4321, 4331 Processor Channel Characteristics,* GA33-1527, or use the HONE aid ANCHLOAD.

HIGHLIGHTS

The 4321 is a featured processor with one megabyte of processor storage and contains the following standard hardware features:

	Equivalent feature number on 4331 MG1
–128K bytes of control storage	#1901
–One DASD adapter base	#3201
–One 8809 adapter	#4910
–Display/Printer Adapter Expansion (16 ports)	#2001
–Communication Adapter Base	#1601
–ECPS:VM/370 (VM assist microcode)	#8701

These features are not ordered separately. Features and their specify codes not standard on the 4321 must be ordered individually for the 4321.

The processor contains 1,048,576 bytes of monolithic processor storage. Data flow is four bytes parallel. Storage fetch cycle is 900 nanoseconds for four bytes and the store cycle is 1,300 nanoseconds for four bytes. The processor is microcode controlled.

> **Note:** The microcode which controls system operations resides in Processor Storage and Reloadable Control Storage. 4321 includes 131,072 bytes of Control Storage. In addition to the microcode contained in this storage, a minimum of 136,000 bytes of Processor Storage are occupied by microcode, RAS workspace and system data for the featured 4321 Processor.

Standard Functions:

- Processor storage ... 1,048,576 bytes. The 4321 Processor configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 below for details.
- ECPS:VSE Mode or S/370 Mode: The 4321 operates in either S/370 Mode or in ECPS:VSE mode. The system mode is selectable at Initial Program Load (IPL) time. S/370 mode is required for operation with VM/SP, ECPS:VSE mode for operation with SSX/VSE and DOS/VSE Release 3.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3262 Line Printer mdl 1 (650 lpm system printer)
  - 3262 Line Printer mdl 11 (325 lpm system printer)
  - 3268 Printer mdl 2 and 2C (340 cps)
  - 3230 Printer mdl 2 (350/450 cps burst speed)
  - 3289 Line Printer mdl 4 (400 lpm system printer)
  - 3278 Display Station mdl 2, and keyboards
  - 3270 Personal Computer (control unit terminal mode only)
  - 3279 Color Display Station mdl 2A , S2A and 02X and keyboards
  - 3278 Display Console mdl 2A, keyboard and control panel
  - 3279 Color Display Console mdl 2C, keyboard and control panel
  - 3287 Printer mdls 1, 2, 1C and 2C.
  - 4250 Printer
  - 6580 Displaywriter System mdl A4, A6 A8, A10 (25-line display)

  > **Note:** SSX/VSE supports the 3279 Color Display Console mdl 2C as a 3278-2A with no specific color support, i.e. color is determined via the default attribute byte only.
- The System Diskette Facility is the microcode loading system for the 4321 Processor. The diskettes shipped with the 4321 Processor will supply the required microcode including diagnostics. The System Diskette Facility also allows storage of failure data from 4321 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode of the 4321 Processor. The Reloadable Control Storage is not available to the user. 4321 includes 131,072 bytes of Reloadable Control Storage.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center specialists to remotely monitor and/or perform problem diagnosis on the 4321 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization), remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML/IPL and execute manual control functions on a remote 4321 via a 3275 (real or emulated) terminal at a host location. ROCF is an extension of the Remote Support Facility (RSF) and may be ordered as a no-charge specify feature.
- One Level addressing facility for improved virtual storage control by DOS/VSE and SSX/VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 Mode)

Other Standard Functions are:

- Virtual Storage capability by Dynamic Address Translation
- Control by VSE (ECPS:VSE mode)
- S/370 Universal Instruction Set
- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- Monitoring

Programming Note: The system mode will be invoked at IPL time and supports operation of an appropriately installed Control Program. In S/370 mode operation with VM/SP is supported. Operation in a CMS-only environment is recommended. In ECPS:VSE mode, operation of SSX/VSE and DOS/VSE Release 3 is supported.

Console Function: An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer. A 3278 Display Console mdl 2A or a 3279 color Display Console mdl 2C is required for this purpose. The Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4321 Processor hardware system, and one displays messages unique to the 3278 Display Console mdl 2A or the 3279 Color Display Console mdl 2C.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IPL and execute manual control functions on a remote 4321 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

ECPS:VM/370: The 4321 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/SP corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation and Virtual Interval Time. **Limitations:** May only operate when S/370 mode has been invoked by IPL.

Byte Multiplexer Channel (Optional): Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and Table 4 below for details. The channel permits simultaneous operations of low speed devices. Operates at up to 18K bytes per second in single-byte mode. Up to 500K bytes per second in burst mode. See *IBM Channel Characteristics,* GA33-1527 for devices which may attach and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0.

Subchannels: The 4321 Byte Multiplexer Channel (#5248) provides up to 31 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 31 subchannels is reduced by 5 for the standard DASD Adapter Base (2), 8809 Magnetic Tape Unit Adapter (2) and the Communications Adapter Base (1). The remaining 26 subchannels are reduced by one for the Block Multiplexer Channel

4321 Processor (cont'd)

(#1421) and one for each telecommunication line on the Communications Adapter Base.

Block Multiplexer Channel (Optional): Provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and Table 4 below for details. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. The 231X and 33XX devices (and the 3830 or 3880 storage control units) do not attach.

- Data rate is up to 0.5 million bytes per second ... see *IBM 4321/4331 Mdl Group 1 Channel Characteristics*, GA33-1527, for details. Standard channel address is 1, a different address may be selected at installation time from the range of 1 to 6.

Subchannels: The following subchannel combinations can be configured at installation time:

– up to 128 non-shared subchannels
and
– up to 16 shared subchannels, each with devices in multiples of 8, up to a total of 128 devices

Integrated I/O Adapters: The following I/O adapters control the designated I/O devices:

DASD Adapter Base (standard)
5424 Adapter
Loop Adapter
8809 Magnetic Tape Unit Adapter (standard)
Display/Printer Adapter (16 ports, standard)
Communications Adapter Base (standard)

Note: All data passing through the system for any I/O device interfaces with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities

(2) I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunnable devices on the Byte Multiplexer Channel.
- The number and traffic on 3270 Personal Computer (control unit terminal mode only), 3278 mdl 2 or 3279 mdl 2A, S2A or 02X attached to the Display/Printer Adapter.

It is necessary to consult *IBM 4321/4331 Channel Characteristics*, GA33-1527, to properly configure a 4321 with an I/O configuration that has not previously been analyzed.

DASD Adapter Base (Standard): One DASD Adapter is standard on the 4321 and provides direct attachment of 3310 **#9202**, 3370 **#9201** and/or 3340/3344 **#7851** Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 operate in fixed block mode. The 3340/3344 operates in Count-Key-Data (CKD) mode. When using 3340/3344 exclusively system throughput can be degraded by a factor of more than two compared with use of fixed block mode devices.

Note: One of the above features must be specified at minimum.

Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The maximum number of strings of each type of device on the DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string. (3340/3344 Direct Attach feature #7851 is required.) Attachment of 3340/3344 is limited to two strings on the system.

As a transition aid and to allow the use of operating systems and programs which require Count-Key-Data (CKD) direct access storage, the 3340/3344 Direct Attachment and Direct Access Storage (DAS) Compatibility for emulation of 231X on 3310 or 3370 and 3330/3340 on 3370 are available. Operation with DAS Compatibility or the 3340/3344 Direct Attachment features in general will not achieve the same performance as the equivalent devices when attached to S/370 or 4300 processor channels. See performance notes included with the feature descriptions.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	01	02	03	04	05	06	07
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F

and

X10	11	12	13	14	15	16	17
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

With a directly-attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 mdl 12 or 15 ... this is a read-only mode and is available as a conversion aid for users converting to the 4321 Processors from a System/3.

The Direct Access Storage Compatibility feature provides emulation of 231X, 3330 (100MB/volume) or 3340 data formats on the 3370 Direct Access Storage and the emulation of 231X data formats on the 3310 Direct Access Storage. For address assignment of emulated volumes, refer to *IBM 4321/4331 Processor Compatibility Features*, GA33-1528.

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

Display/Printer Adapter (Standard): This adapter allows for attachment of the prerequisite 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up or fifteen additional devices chosen from the list below:

3178 Display Station
3230 Terminal Printer mdl 2 (350/45 cps burst mode
3262 Line Printer mdl 1 and 11 (650 and 325 lpm)
3268 Printer mdl 2 and 2C (340 cps)
3278 Display Station mdl 2
3270 Personal Computer (control unit terminal mode) *
3279 Color Display Station mdl 2A, S2A or 02X
3287 Printer mdls 1, 2, 1C and 2C (80 and 120 cps)
3289 Printer mdl 4 (400 lpm)
4250 Printer
6850 Displaywriter System mdls A4, A6, A8, A10 (25-line display)

* Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

These machines may be installed in any combination, provided that [1] only fifteen devices are installed and [2] no more than two System Printers (3262 and/or 3289) are included. A maximum of two 4250 Printer may be installed. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287/3230/3268 Printer may be used as a console hardcopy device; one or more 3287 /3230/3268 Printers may be used as hardcopy workstation devices. The 3178 Display Station 3278 Display Station mdl 2, or 3279 Color Display Station mdl 2A, S2A or 02X may be used as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278-2 Display Station, and optionally, a 3287-1/2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278-2 and 3287-1/2. Display/Printer Adapter support includes all standard functions of the 3274 mdl X1B with the 3178, 3270 Personal Computer (control unit terminal mode), 3278 mdl 2 or 3279 mdl 2A, S2A or 02X attached. In addition, the following 3278 mdl 2, 3270 Personal Computer (control unit terminal mode), or 3279 mdl 2A, S2A or 02X special features are supported: Keyboard Numeric Lock (Standard on the 3178), Audible Alarm, (standard on the 3178 or 3279) Security Keylock and Switched Control Unit. Other 3278 mdl 2 or 3279 mdl 2A, S2A or 02X special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627, #4624, or #4628 may be selected. If two different keyboards are required for a workstation, one must be #4621. Addresses for these devices are selected at installation time from the range 009 through 01F.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and Specify **#9842** 4321 must be ordered for attachment of Displaywriter.

Diskette Drive (Optional): A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4321 Processor. This diskette has a data capacity of 242,944 bytes

4321 Processor (cont'd)

organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below) or a data capacity of 246,272 bytes organized in 1,924 sectors of 128 bytes each (for use in exchanging data with another 4321 Processor). Each Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with DOS/VSE refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/ 3, 32, 34, and 38. One diskette is shipped with the feature. Device address is selected at installation time from the range 009 through 01F.

5424 Adapter (Optional): Provides native attachment of 5424 Multi-Function Card Unit mdls A1 or A2 for 96-column card operations ... Device address is 04C.

Loop Adapter (Optional): The Loop Adapter on the 4321 is a native attachment method for the 3640 Plant Data Communications Terminals ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1 and 2 ... 3232 Keyboard Printer ... 3287 Printer ... 3274 Control Unit mdl 51C and 61C ... 3276 Control Unit Display Station with their associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one IBM 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the *IBM 4321/4331 Loop Adapter Programming Guide*, SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4321 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4321 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization
- 3642 encode check handling
- Transaction selection

Communications network management problem determination support for 4321 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer mdl 11, 3276 Display Control Stations and 3274 mdl 51C and 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal mdls 1, 2 ... 3642 Encoder Printer mdls 1, 2 ... 3643 Keyboard Display mdl 2, 3, 4 including #4920 Badge and Document Encoder ... 3644 Automatic Data Unit ... 3645 Printer ... 3646 Scanner Control Unit ... 3647 Time and Attendance Terminal ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1,2 ... 3232 Keyboard Printer mdl 11 ... 3287 Printer mdls 11, 12 ... 3274 Control Unit mdl 51C and 61C ... 3276 Control Unit Display Station mdls 11-14 with their associated terminals ... 3843 Loop Control Unit. Device addresses are 040 through 07E.

8809 Magnetic Tape Unit Adapter (Standard): Provides native attachment of 8809 mdl 1A and up to five additional 8809 tape units (consisting of a mix of 8809 mdl 2s and 3s) ... allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read Backward commands are not supported, the Read Backward operation is simulated in the Logical IOCS (MTMOD) of DOS/VSE. Standard channel address is 3. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

Communications Adapter Base (Standard): The 4321 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit Terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For Communications Adapter Base details, see "Communications and Loops" below.

IBM Stand-Alone Modems

Switched

3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps

Nonswitched

The following modems are supported with the Switched Network Backup feature ... see M3863, 3864, 3865, 3872 pages for details:

3863	2400 bps
3864	4800 bps
3865	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

IBM Integrated Modem (V.23, 1200 bps): The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire.
- Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer.

Non-IBM Modems: Non-IBM modems that comply with EIA RS 232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

Digital Data Service Adapter: The Digital Data Service Adapter allows attachment to the AT&T Private Line Dataphone* Digital Service Network by way of an internal Digital Data Service (DDS*) adapter.

* Dataphone and DDS are registered trademarks of the American Telephone and Telegraph Company. Other usage of Dataphone and DDS in this text also refers to the registered trademarks of AT & T.

X.21 Adapter for Nonswitched Networks: The X.21 interface allows attachment to the X.21 facilities by way of an internal X.21 adapter.

Automatic Calling Equipment: The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- 3872 with Automatic Call Originate feature
- 3874 with Automatic Call Originate feature
- Other Automatic Calling Equipment which complies with EIA RS 366 or CCITT V.25 may be connected to the Autocall Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (1-phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- 4250 Printer Attachment: Specify **#9260** for 4250 attachment.
- 6580 Displaywriter Attachment: Specify **#9842** for 6580 attachment.
- Specify **#9841** on 4321 must be ordered for attachment of 3230 mdl 2 or 3268 to the 4321. Provides microcode and/or maintenance documentation if machine is below EC 366585 (microcode for 4321) and/or below EC 366584 (maintenance documentation) for all mdls.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4321 Processor. It provides service personnel the capability of remotely controlling the 4321 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for

4321 Processor (cont'd)

the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

RSF is available in two versions:

Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

Specify **#9511** for EIA RS 232-C Interface, 1200 bps, switched network, manual answer. An FCC registered external cable modem compatible with the WE 202S modem, interface and operation, or equivalent, is required.

- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4321 manual control functions for a remote 4321 via a real* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4321 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4321 are suppressed when ROCF is in use. **Field Installation:** Yes.

  * 3275 mdl 2 can only be obtained on an "as available" basis.

  Specify ROCF feature **#9511**. The requisite customer supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600 or 1200 bps.

- Loop-Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274 (mdl 51C or 61C) and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274 (mdl 51C or 61C) and 3276Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

- Keyboard/Character Set Language: When 3178 Display Station, 3278 Display Stations mdl 2 and/or 3287 or 3268 mdl 2 Printers are attached to the Display/Printer Adapter, specify on the 4321 Processor:

  #9441: For ASCII Keyboard/Character Set Language (#4624, #4628, on 3278 mdl 2 or 3279 mdl 2A or S2A and/or 3287 with **#9084**), when used as a workstation, or

  #9442: For EBCDIC Data Entry Keyboards (3178 mdl C1, 3278 mdl 2 or 3279 mdl 2A or S2A with #4622, #4623). In addition, specify on the 4321 Processor either **#9301** for Data Entry Keyboard or **#9302** for Data Entry Keyboard, keypunch layout.

  No specify codes on the 4321 are required for EBCDIC Typewriter Keyboards (3178 mdl C2 or #4621, #4627 on 3278 mdl 2 or 3279 mdl 2A S2A or 3270 Personal Computer in control unit terminal mode). The 6580 Displaywriter System supports the EBCDIC Typewriter Keyboard.

  Note: The keyboard/character set language selected must correspond with the mdl of 3178 or the specifications on the 3278 mdl 2 or 3279 mdl 2A or S2A and 3287s. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.

- Console Table: A console table is available ... see #1550 or the 4331-1 Accessories Section for details. Book Rack and Cable Holder ... see #1480 or the 4331-1 "Accessories".

- See 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C for console cabling.

- System Environment: For record purposes specify, one of the following codes (reference only, no parts required):

  #9701 - This processor is planned to be host/peer connected to a system within the same branch office territory (at installation or at a future time).

  #9702 - This processor is planned to be host/peer connected to a system in a different branch office territory (at installation or at a future time).

  #9703 - This processor is planned to be stand-alone (no host/peer connect).

SPECIAL FEATURES

Notes:

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. For a fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. For a fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

Adapter Power Prerequisite (#1001): Provides power and control circuitry necessary for the Communications Adapter, (when more than three line features are attached), and the Adapter Logic. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1002 or for the Loop Adapter (#4830) and/or Communication Adapter with more than three line attachments #4695 and/or #4696.

Adapter Logic Prerequisite (#1002): Provides logic and control function necessary for the 5424 Adapter (#3901). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001.

Block Multiplexer Channel (#1421): Provides means of attaching I/O devices. Up to 8 control units may attach to each channel. Disconnect during command chaining allows multiple I/O devices to operate concurrently. 231X as well as 3830 and 3880 Control Units with associated DASD do not attach. See DASD Adapter for attachment of 3340/3344/ 3310/3370 devices. Data transfer rates up to 0.5 million bytes per second. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For certain control units/devices the processor requires Power Interface (#5531, #5532). See Table 4.

Microcode Storage Requirements: The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, use the following procedure.

Note: An interactive HONE aid is available dependent on the control program or program product device support to facilitate this procedure.

1) Consulting Table 2, determine the microcode groups required to support the features and I/O to be installed.

2) On Table 3, place a checkmark in the appropriate rows. Note that each microcode group is required only once, even if it supports multiple functions of the 4321 Processor. The only exception to this is microcode group 2 where 2,048 bytes of Processor Storage are required per megabyte of virtual storage as defined in the Table 3 notes.

3) Find the sum of each of the two columns for the required microcode groups.

4) The total from Column A must pass the test: When the total from Column A exceeds 262,144 bytes, an invalid configuration has been selected. See the Note below.

5) Add the total of column A to the total from Column B, subtract control storage of 131,072 bytes and round up to the next multiple of 4,096 bytes.

The results of Step 5 determine the amount of Processor Storage occupied by microcode and should be subtracted from the Processor Storage size ordered to determine the amount available for the user. The storage for Group 7 specified in Column B (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

Note: Too many features/options have been selected. Inspect Tables 2 and 3 and determine which feature(s) of lower priority should be deleted from the configuration.

4321 Processor (cont'd)

!

TABLE 2	
Function/Feature Installed	**Microcode Group**
4321 Processor	1
Processor Storage	2
3310 attached (**#9202**)	3
3370 attached (**#9201**)	4
3340/3344 Direct Attach (#7851)	5,6
Direct Access Storage Compatibility (#7901)	5,7
BSC lines installed (**#9671-#9678**)	8
S/S lines installed (**#9681-#9688**)	9
SDLC lines installed (**#9691-#9698**)	10

Note: The Microcode Group 1 contains 4321 Processor standard hardware features. For details, see "Highlights".

TABLE 3			
	– A –	– B –	
Micro-code Group	**Control Storage – or – Processor Storage**	**Processor Storage (only)**	**Notes**
1	187392	49152	
2	–	2048	In S/370 mode or for each 1MB of virtual storage in ECPS:VSE mode, in steps of 2, 4, 8, 16MB.
3	4608	11250	
4	9316	10000	
5	5760	200	
6	22528	11600 8800 1800	Plus Per 3340 buffer. For a second string of 3340s attached to the DASD adapter.
7	27648	1300 4096 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
8	6144	–	
9	5120	–	
10	9216	1024	

DASD Adapter (Standard): Allows attachment of the 3310, 3370 and 3340/3344 DASD to the 4321 Processor. Up to four strings of devices may be attached to each adapter. The attachable device types may be intermixed on each adapter but not within a string. The maximum number of strings of each type of device on each DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string - (3340/3344 Direct Attach feature #7851 is required). Attachment of 3340/3344 is limited to two strings on the system.

String Switch Capability allows sharing of 3340 mdl A2 and/or 3370 mdl A1 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340 mdl A2 or 3370 mdl A1 must have the String Switch feature #8150 installed. String switch support for 3340/3344 is limited to the static assignment of a shared string to one processor at a time. For data rate and attachment limitations for other devices and communications lines refer to *IBM 4321/4331 Processor Channel Characteristics,* GA33-1527, which contains tables of pre-analyzed configurations.

Prerequisites: 3340/3344 requires #7851 ... see Table 2 for microcode storage requirements. **Specify: #9202**%z if 3310 and/or **#9201**%z if 3370 attaches to the DASD Adapter. **#9316** if String Switch Capability is required with 3370.

Diskette Drive (#3401): A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. **Limitations:** Not supported by VM/SP. **Maximum:** One. **Field Installation:** Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External Devices must meet the interface specifications outlined in *S/360 Direct Control Feature OEMI,* GA22-6845.

5424 Adapter (#3901%x): Allows attachment of one 5424 Multi-Function Card Unit mdl A1 or A2. **Limitations:** The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter (#4830). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001 and #1002.

Byte Multiplexer Channel (#5248): The byte multiplexer channel attaches S/370 byte multiplex devices. The data rate of the channel is up to 18K bytes per second in single byte interleaved mode and up to 500K bytes per second in burst mode. For data rates achievable for specific configurations, see *IBM 4321/4331 Channel Characteristics* GA33-1527. Up to eight control units may be attached. See Input/Output Attachments section above for details on subchannels. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For certain control units/devices, the processor requires Power Interface (#5531, #5532). See Table 4.

Power Interface (#5531), ADD'L (#5532): Provides power control to the 4321 Processor for control units attaching to the 4321 Byte Multiplexer Channel and Block Multiplexer Channel. Table 4 below lists the control units/devices for which this feature must be installed in the 4321 Processor ... Power Interface (#5531) allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. **Maximum:** One of #5531; one of #5532. **Field Installation:** Yes. **Prerequisites:** #5532 requires #5531.

TABLE 4

Control Units/Devices Requiring Power Interface Features

1 - Mandatory:
- 1255 Magnetic Character Reader
- 1287 Optical Reader
- 1288 Optical Reader
- 1419 Magnetic Character Reader
- 1442 Card Read Punch mdl N1
- 1442 Card Punch mdl N2
- 1443 Printer mdl N1
- 2415 Magnetic Tape Unit and Control
- 2501 Card Reader mdl B1 and B2
- 2520 Card Read Punch mdl B1, B2 and B3
- 2701 Data Adapter Unit
- 2702 Transmission Control*
- 2703 Transmission Control*
- 2803 Tape Control
- 2821 Control Unit mdls 1, 2, 3, 5 and 6
- 2822 Paper Tape Reader Control*
- 2840 Display Control*
- 3272 Control Unit
- 3411 Magnetic Tape Unit and Control
- 3505 Card Reader
- 3540 Diskette Input/Output Unit
- 3704 Communications Controller
- 3705 Communications Controller
- 3791 Controller
- 3800 Printing Subsystem
- 3803 Tape Control
- 3811 Printer Control Unit
- 3881 Optical Mark Reader mdl 1
- 3886 Optical Character Reader mdl 1
- 3890 Document Processor
- 3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize Power Interface features:
- 3274 Control Unit
- 3340 Direct Access Storage Facility
- 3370 Direct Access Storage
- 3203 Printer mdl 5

* No longer available

3340/3344 Direct Attachment (#7851%y): A feature allowing 3340 mdl A2s to attach to a DASD Adapter. Up to two 3340 mdl A2s per system may attach to either adapter. Up to three 3340/3344 mdl B

4321 Processor (cont'd)

units may attach to each 3340 mdl A2. **System/3 Data Import:** With the VSE/IBM System/3-3340 Data Import utility program (5746-AM3), 3348 Data Modules which have been written on a 3340 attached to a S/3 can be read on any directly-attached 3340 drive. The String Switch Capability allows sharing of 3340 mdl A2 drives (with #8150 installed) and associated drives, with another IBM processor or control unit that supports the DASD and string switching. String switch support is limited to the static assignment of a shared string to one processor at a time. **Limitations:** [1] Attachment of 3340/3344 and/or use of the DAS Compatibility is limited to two strings on the system. [2] If one string of 3340/3344s is attached to a DASD Adapter (#3201), only one string of 3310/3370s can perform DASD emulation. If two strings of 3340/3344s are attached, no 3310/3370s can perform DASD emulation. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 3340 mdl A2. See Table 2 for microcode storage requirements. **Specify: #9315** if String Switch Capability for 3340 required, **#9317** if 3344 is installed.

Note: Use of this feature introduces additional processor and channel demands, and can have a significant effect on system performance, particularly in batch environments with heavy I/O load and/or if multi-track operations are used. Performance considerations should be carefully reviewed before proposing use of the 3340/3344.

Direct Access Storage Compatibility (#7901%y): Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 mode under VM/SP, in ECPS:VSE mode under DOS/VSE. Under DOS/VSE data sets in fixed block format and in emulated format can co-reside on the same 3310/3370 volume. With DOS/VSE, a variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With VM/SP partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max Number of Emulated Full Volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4321/4331 Compatibility Features,* GA33-1528.

Performance Note: Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

Limitations: [1] Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. [2] Operation of emulation and directly-attached 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330 mdl 11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via a string switch. [6] VM/SP supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/SP or CMS. Emulated 2311 is not supported by VM/SP. **Program Order:** The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, 5745-030 or combined with VSE/Advanced Functions and VM/SP (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 3370 (**#9201**) and/or 3310 (**#9202**) specification. See Tables 1 and 2 for microcode storage requirements.

Communications And Loops

Communications Adapter Base (Standard): Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1527. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps and may operate concurrently with other lines provided the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/SP.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Up to eight line features with Digital Data Service Adapters.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half-speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (2-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High-speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Limitations: [1] SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/SP with DOS/VSE running as a guest. [2] Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. [3] The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines refer to *IBM 4321/4331 Processor Channel Characteristics,* GA33-1527, which contains tables of pre-analyzed configurations. **Prerequisites:** #1001 is required when more than three telecommunications line features are attached. See Table 2 for microcode storage requirements. **Specify:** See Table 5 "Communications Adapter Configuration Features and Position Codes", for required specify codes for each line feature attached.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

Communication Facilities: See M2700 pages for communications facility requirements with this feature.

4321 Processor (cont'd)

Terminals Supported

The Data Communications Equipment and remotely attachable Data Terminal Equipment (abbreviated "terminals") supported by the Communications Adapter are shown in the table below:

SDLC Terminals Supported:

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6	+19.2-56
Terminals:									
3271-11,-12 (3)	X	X	X	X	X	X	X	X	
3274-X1C (8)		X	X	X	X	X	X	X	X
3276-1-4 (7)	X	X	X	X	X	X	X	X	
3275-12 (3)	X	X	X	X	X	X	X	X	
3276-11-14	X	X	X	X	X	X	X	X	
3601	X	X	X	X	X	X	X	X	
3602	X	X	X	X	X	X	X	X	
3614	X	X	X	X	X				
3624	X	X	X	X	X				
3631	X	X	X	X	X	X	X	X	
3632	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661				X					
3684	X	X	X	X	X				
3694	X	X	X	X	X	X	X	X	
3767-1-3	X	X	X						
3771-1-3	X	X	X	X	X				
3773-1-3	X	X	X	X	X				
3773-P1-P3	X	X	X	X	X				
3774-1,-2	X	X	X	X	X				
3774-P1,-P2	X	X	X	X	X				
3775-1,-P1	X	X	X	X	X				
3776-1,-2		X	X	X	X				
3776-3,-4		X	X	X	X	X	X	X	X
3777-1,-3		X	X	X	X	X	X	X	X
3791	X	X	X	X	X	X	X	X	
3791/3730	X	X	X	X	X	X	X	X	
3791/3760	X	X	X	X	X	X	X	X	
4701-1	X	X	X	X	X	X	X	X	
6670		X	X	X	X	X	X	X	
4730	X	X	X	X	X	X	X	X	
7426(10)	X	X	X	X	X	X	X	X	
8775-11,-12 (10)	X	X	X	X	X	X	X	X	
Controllers:									
3705 (1)	X	X	X	X	X	X	X	X	X
Systems:									
4331 (2)	X	X	X	X	X	X	X	X	X
5285 (9)	X	X	X	X	X				
5288 (9)	X	X	X	X	X				
5320 (5)	X	X	X	X	X	X	X		
5340 (6)(9)	X	X	X	X	X	X	X	X	X
5360 (6)(9)	X	X	X	X	X	X	X	X	X
5380 (5)	X	X	X	X	X	X	X	X	
8100	X	X	X	X	X	X	X	X	X

Notes:

(1) 3705 supported as a primary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
(2) Participant as a primary or a secondary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
(3) Not supported by ACF/VTAME.
(5) Supported as a 3770.
(6) Supported as a 3770 or 3791.
(7) With SDLC/BSC Switch in SDLC mode.
(8) The maximum speed supported is 56K bps.
(9) Supported as a 3274 mdl 1C or 3770
(10) DSLU (5668-006) is required for 7426 or 8775-11, -12 with downstream loadable functions).

BSC Terminals Supported

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6 (6)	+19.2-56
Terminals:									
2715-2		X	X	X	X				
3271-1,-2	X	X	X	X	X	X	X	X	
3274-X1C		X	X	X	X	X	X	X	
3275-2 (1)	X	X	X	X	X	X	X	X	
3276-1-4	X	X	X	X	X	X	X		
3631 (7)	X	X	X	X	X	X	X	X	
3632 (7)	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661		X							
3684-1,-2	X	X	X	X	X				
3741-2,-4	X	X							
3747	X	X							
3771 (2)	X	X	X	X	X				
3773-1-3 (2)	X	X	X	X	X				
3773-P1,-P3 (2)	X	X	X	X					
3774,3775 (2)	X	X	X	X	X				
3776-1,-2 (3)		X	X	X	X				
3777-1,-2 (3)		X	X	X	X	X	X	X	X
3780	X	X	X	X	X	X	X		
4701-1	X	X	X	X	X				
5110 (12)	X	X	X	X	X	X	X		
5231-2 (9)	X	X	X	X	X				
5275 (10)	X	X	X	X	X	X	X		
5285	X	X	X	X	X				
5288 (13)	X	X	X	X	X				
5937 (11)	X	X	X	X	X	X	X		
6670	X	X	X	X	X	X	X		
Controllers:									
2701 (w 360/370)	X	X	X	X	X	X	X		
3704	X	X	X	X	X	X	X	X	
3705	X	X	X	X	X	X	X	X	X
Systems: (5)									
3115	X	X	X	X	X	X	X	X(1)	
3125	X	X	X	X	X	X	X	X(1)	
3135	X	X	X	X	X	X	X		
3138	X	X	X	X	X	X	X		
4331	X	X	X	X	X	X	X	X	X
5010 (8)	X	X	X	X	X	X	X		
5285 (14)	X	X	X	X	X				
5288 (14)	X	X	X	X	X				
5320 (8)	X	X	X	X	X	X			
5340 (8)(14)	X	X	X	X	X	X	X	X	X
5360 (8)(14)	X	X	X	X	X	X	X	X	X
5404	X	X	X	X	X	X	X	X	
5406	X	X	X	X	X	X	X	X	
5408	X	X	X	X	X	X	X	X	
5410	X	X	X	X	X	X	X	X	
5412	X	X	X	X	X	X	X	X	
5415	X	X	X	X	X	X	X	X	
8100 (4)	X	X	X	X	X	X	X	X	
Series/1 (8)	X	X	X	X	X	X	X	X	X

Notes:

(1) By RPQ.
(2) Equivalent to 2770/2772.
(3) Equivalent to 2770/3780.
(4) Supported as a 3276 mdl 1, 2, 3, 4, nonswitched connection only.
(5) With Communications Adapter.
(6) 19,200 - 56,000 bps in line position 1.
(7) See M3631 and/or 3632 pages for 3631/3632 features required and software requirements for host connection.
(8) Equivalent to 54XX (S/3).
(9) Equivalent to 3741 mdl 2, 4.
(10) Equivalent to 3275 mdl 1, 2.
(11) Equivalent to 3271 mdl 1, 2.
(12) Supported as a 2772.
(13) Supported as 3280
(14) Supported as a 3271 mdl 2.

Start/Stop Terminals Supported

Only terminals using IBM Terminal Control - Type 1 are supported.

Type	IBM I Line Control Speed in bps				
	75	134.5	300	600	1200
2740-1		X			
2740-2	X	X		X	
2741		X			
3232-51		X	X	X	
3767-1 (1)		X	X	X	X
3767-2 (1)		X	X	X	X
3767-3 (1)		X	X	X	X
5100 (2)		X	X		
5110		X	X		
CMCST (1)		X	X		

(1) Equivalent to 2740 and/or 2741: Speed 134.5 bps needs 3767 RPQ 853129.
(2) Equivalent to 2741.

4321 Processor (cont'd)

Autocall Unit Interface (#1020%x): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS 366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Limitations:** Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #3701 (in switched operation) for each Autocall Unit Interface installed. **Specify:** Line position, see Table 5 below.

EIA/CCITT Interface (#3701%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS 232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** One #4695 or #4696 is required for each feature #3701 installed. **Specify:** Start/Stop, SDLC and/or BSC operations are possible. See Table 5 for Line Position Code and Transmission Mode Codes.

Loop Adapter: Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 mdls B1, B2 and 8775 mdls 1, 2 , 3232 Keyboard Printer mdl 11 and 3287 mdls 11, 12 and/or Control Units 3274 mdl 51C and 3276 mdls 11-14 with the associated terminals to the 4321 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

Device Attachments

- 3104 Display Terminal mdls B1, B2
- 3232 Keyboard Printer mdl 11
- 3641 Reporting Terminal mdls 1, 2
- 3642 Encoder Printer mdls 1, 2
- 3643 Keyboard Display mdls 2, 3, 4
  - including #4920 Badge and Document Encoder
- 3644 Automatic Data Unit
- 3645 Printer
- 3646 Scanner Control Unit
- 3647 Time and Attendance Terminal
- 8775 Display Terminal mdls 1, 2
- 3287 Printer mdls 11, 12
- 3274 Control Unit mdls 51C, 61C with the associated terminals
- 3276 Control Unit Display Station mdl 11-14 with the associated terminals

Control Units and Associated Terminals

- 3274 Control Unit mdl 51C, 61C
  - 3178 Display Station
  - 3278 Display Station
  - 3270 Personal Computer (control unit terminal mode only)
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer mdl 2, 2C
  - 3287 Printer
  - 3289 Line Printer
- 6580 Displaywriter System, mdl A4, A6, A8, A10 (25-line display)
- 6580 Displaywriter System, mdl B4, B6, B8, B10 (66-line display)
- 3276 Control Unit Display Station mdl 11-14
  - 3178 Display Station
  - 3278 Display Station
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer mdl 2, 2C
  - 3287 Printer
  - 3289 Line Printer
- 6580 Displaywriter System, mdl A4, A6, A8, A10 (25-line display)
- 6580 Displaywriter System, mdl B4, B6, B8, B10 (66-line display)

In addition the following devices can be attached at 38,400 bps:

- 3104 Display Terminal mdls B1, B2
- 8775 Display Terminal mdls 1, 2
- 3232 Keyboard Printer mdl 11
- 3287 Printer mdls 11, 12
- 3274 Control Unit mdl 51C with the associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, *IBM Multi-use Communications Loop Planning Guide.*

Loop Installation: For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the *IBM Multi-use Communications Loop Planning Guide*, GA23-0038, and *Installation Guide*, GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to *IBM 4321/4331 Processor Loop Adapter Feature, Operating Procedures*, GA33-1538, and *Problem Determination Procedures*, GA33-1540.

Note:
(1) Loop Accessories are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See M4331-1 "Accessories" section for details and ordering information.

(2) An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320.

Communications Facilities: See M2700 pages for communications facility requirements.

Loop Adapter 1 (#4830): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274 (mdl 51C or 61C) and/or 3276 Control Units or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274 (mdl 51C or 61C) Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Adapter power prerequisite (#1001).

Loop Adapter 2 (#4831): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals, and/or 3274 (mdl 51C or 61C) and/or 3276 Control Units, or 38.4K bps for 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274 (mdl 51C or 61C) control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or

4321 Processor (cont'd)

maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4830.

Data Link Adapter (#4840): Allows connection of one or more 3843 loop control units to the 4321 processor. The feature provides for the attachment of one external modem complying with EIA/ CCITT . EIA RS 232, RS 334 support will be provided for nonswitched lines only . Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** Two. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4830.

Loop Adapter Logic Storage Requirements: The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/#4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645	2600	-
		Terminal* Control Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	Total 1	Total 2

*For additional information on buffer space refer to the *IBM 4321/4331 Loop Adapter Characteristics*, GA33-1534.

The storage requirements need to be validated by DP because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

System Diskette Space Requirements: When attaching the Loop Adapter feature with 364X terminals to the 4321 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3,876, an invalid configuration has been selected. A trade-off between features must be considered.

4321 Processor Feature/Facility	System Diskette Records
4321 Basic	2854
3310 Att. **(#9202)**	66
3370 Att. **(#9201)**	70
3340/3344 Direct Att. **(#7851)**	120
3340 Att. or DAS Compatibility **(#7851 or #7901)**	24
DAS Compatibility **(#7901)**	170
Start/Stop Transmission Mode **(#968X)**	20
BSC Transmission Mode **(#967X)**	24
SDLC Transmission Mode **(#969X)**	52
364X Terminal Att. **(#9251, #9252, #9253, #9254, #9256)**	665

The maximum number of system diskette records may not exceed 3876.

Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter: The maximum number of terminals that can be attached to the 4321 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775 , 3232 mdl 11 terminals or 3274 (mdl 51C or 61C) or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see *IBM Multi-use Communications Loop Planning Guide*, GA23-0038.

Line Attachment Base For Clocked Modems (#4695%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which provide clocking and comply with EIA RS 232-C CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network . See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4321 Communications Adapter. Each feature #4695 installed reduces by one the number of feature #4696 allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

Line Attachment Base For Nonclocked Modems (#4696%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600 or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4321 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695s allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** Feature #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

High-Speed Modem Adapter (#4720%x): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see *IBM 4321/4331 Channel Characteristics*, GA33-1527. Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps **#9831**. Cannot be installed with Digital Data Service Adapter (#5650) if the Digital Data Service Adapter operates at 56,000 bps **(#9444)**. **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** BSC and/or SDLC operations are possible ... see Table 5 for Line Position Code and Transmission Mode Codes.

1200 bps Integrated Modem, Nonswitched (#4781%X): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. **Cable Orders:** Required for attachment to external equipment. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Switched With Auto Answer (#4782%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the customer engineer for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

4321 Processor (cont'd)

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC registered equivalent for manual answer. **Maximum**: Eight. **Cable Order**: Required for one cable group which connects to nonswitched line and to the switched network. **Field Installation**: Yes. **Prerequisites**: #4696. **Specify**: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the customer engineer for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC registered equivalent for auto answer. **Maximum**: Eight. **Cable Order**: Required for one cable group which connects to the nonswitched line and to the switched network. **Field Installation**: Yes. **Prerequisites**: #4696. **Specify**: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

Local Attachment Interface (#4801%x): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the Customer Engineer at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS 232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps
400 meters at 2400 bps
200 meters at 4800 bps
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order**: Required for attachment to terminal plate. Customer-supplied cable for in-door use. **Maximum**: Eight. **Field Installation**: Yes. **Prerequisites**: #4695. **Specify**: SDLC and/or BSC operations are possible, see Table 5.

Digital Data Service Adapter (#5650%x): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to AT&T and Private Line DDS Network via the AT&T Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. The speed must be set to the speed specified in the customer's order for service to the common carrier at installation time. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations**: If feature #5650 is installed with a speed of 56,000 bps (**#9444**), then: [1] High-Speed Modem Adapter (#4720) cannot be installed. [2] For speed limitations refer to the Communications Adapter Base feature description. **Maximum**: Eight. **Cable Order**: Required for attachment to external equipment. **Field Installation**: Yes. **Prerequisites**: #4695. **Specify**: **#9444**%z for operation at 56,000 bps ... See Table 5 for Line Position Code, Transmission Mode Code, and line speed selection codes.

X.21 Adapter For Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations**: If feature #5655 operates at 48,000 bps (specify **#9831**), then the following limitations apply: [1] High-Speed Modem Adapter (#4720) cannot be installed ... [2] For speed limitations, refer to the Communications Adapter Base feature description. **Maximum**: Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. **Field Installation**: Yes. **Prerequisites**: One #4695 is required for each #5655 installed. **Specify**: SDLC operation must be specified for this feature ... see Table 5 for line position, transmission mode and transmission speed codes. **Note**: **#9831**%x is required for 48,000 bps operation. **Cable Order**: Required for attachment to external equipment.

Table 5
Communications Adapter Configuration Feature And Position Codes

	Feature Number %x	Req'd Line Att Base %x	Line Pos. with Line Pos. Codes 1 %z	2 %z	3 %z	4 %z	5 %z	6 %z	7 %z	8 %z
EIA/CCITT Interface (for Clocked Modems)	3701	4695	9531	9532	9533	9534	9535	9536	9537	9538
EIA/CCITT Interface (for Non-Clocked Modems)	3701	4696	9521	9522	9523	9524	9525	9526	9527	9528
High-Speed Modem Adapter	4720	4695	9501							
1200 bps Integrated Modems:										
Nonswitched with Switched Network Backup and Auto Answer	4788	4696	9641	9642	9643	9644	9645	9646	9647	9648
Nonswitched with Switched Network Backup and Manual Answer	4787	4696	9631	9632	9633	9634	9635	9636	9637	9638
Switched with Auto Answer	4782	4696	9651	9652	9653	9654	9655	9656	9657	9658
Nonswitched	4781	4696	9661	9662	9663	9664	9665	9666	9667	9668
Digital Data Service Adapter for 2400, 4800 and 9600 bps	5650	4695	9471	9472	9473	9474	9475	9476	9477	9478
56,000 bps (6)			9444							
X.21 Adapter for Nonswitched Networks for 2400-9600 bps	5655	4695	9711	9712	9713	9714	9715	9716	9717	9718
for 48,000 bps			9831							
Local Attachment Interface	4801	4695	9451	9452	9453	9454	9455	9456	9457	9458
Autocall Unit Interface (3)	1020									
First			9541	9542	9543	9544	9545	9546	9547	9548
Second			9551	9552	9553	9554	9555	9556	9557	9558
Transmission Mode (5)										
BSC (1)			9671	9672	9673	9674	9675	9676	9677	9678
Start/Stop (2)			9681	9682	9683	9684	9685	9686	9687	9688
SDLC (1)			9691	9692	9693	9694	9695	9696	9697	9698

Notes:

(1) BSC or SDLC transmission mode with any line attachment feature.

(2) Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696).

(3) Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.

(5) The aggregate data rate of the Communications Adapter is 64,000 bps ... Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage ... see Table 2 for microcode storage requirements.

(6) When changing **#9444** to/from **#9471**, no new hardware or diskette is required.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

4321 Processor (cont'd)

MODEL CONVERSIONS

Customer price quotations and customer order acknowledgement letters for purchase machine conversion must state: "Installation of this machine model conversion involves the removal of parts which become the property of IBM".

Field upgrade from 4321 to 4331 Mdl Group 2 is possible. After the upgrade the machine type of the 4321 is changed to 4331 Mdl Group 2 by the CE. Downgrades to 4321 from 4331 is not recommended for field installation.

For administrative instructions concerning the field upgrade from 4321 to 4331 Mdl Group 2 contact IBM.

Machine Upgrade Purchase Prices: There are no additional charges.

The 4321 type conversion to a 4331 Mdl Group 2 has a one year service and parts warranty on those components provided by IBM with the type conversion.

ACCESSORIES

See M4331-1 "Accessories" for additional information and field installation of Console Table (#1550), Book Rack and Cable Holder (#1480) and Loop Accessories and Loop Cables.

SUPPLIES (None)

4331 PROCESSOR

The 4331 Mdl Group 1 is no longer available, replaced by 4331 Mdl Group 11.

PURPOSE

Provides the power, control, logic and storage circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models.

MODELS

Group–Model		Processor Storage (bytes)	Buffer Storage (bytes)
4331-MG 1			
Model I1	I01	524,288	None
Model J1	J01	1,048,576	None
4331-MG 2			
Model J2	J02	1,048,576	8,192
Model K2	K02	2,097,152	8,192
Model KJ2	KJ2	3,145,728	8,192
Model L2	L02	4,194,304	8,192
4331-MG 11			
Model J11	J11	1,048,576	4,096
Model K11	K11	2,097,152	4,096
Model L11	L11	4,194,304	4,096

For clarity of description, separate machine pages are provided for Mdl Group 11. Tables of supported communications equipment included in this page set are common for all 4331 mdls.

Maximum Configuration: The maximum number of DASD/8809 Adapters and Byte and/or Block Multiplexer Channels which are available are shown below:

4331 Mdl Group 1	Maximum
DASD Adapter	1
8809 Adapter	1
Byte Multiplexer Channel	1
Block Multiplexer Channel	1

4331 Mdl Group 2	Options (select one column)		
DASD Adapter	1	1	1
DASD Adapter, Add'l	1	1	–
8809 Adapter	1	–	–
Byte Multiplexer Channel	1	1	1
Block Multiplexer Channel	1	1	1
Block Multiplexer Channel, Add'l	–	1	1
High-Speed Block Multiplexer Channel	–	–	1

The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to *IBM 4331 Processor Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2) which contains comprehensive tables of pre-analyzed configurations.

Prerequisites: Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C with keyboard is required for this purpose.

HIGHLIGHTS

Depending on the mdl, the processor can contain up to 4,194,304 bytes of monolithic processor storage. Storage is high density single bit cell design. Data flow is four bytes parallel. Processor storage cycles are mdl dependent. The 4331 Mdl Group 1 storage fetch cycle is 900 nanoseconds for four bytes and the store cycle is 1,300 nanoseconds for four bytes. The 4331 Mdl Group 2 fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64 byte units at a time. The 64 byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode controlled.

Note: The microcode which controls system operations resides in both Processor Storage and Reloadable Control Storage, reducing the Processor Storage available for user programming. For 4331 Mdl Group 1 without the optional Control Storage Expansion feature installed, Processor Storage available for the user is reduced from that installed by at least 53,248 bytes. For 4331 Mdl Group 1 with the optional Control Storage Expansion feature installed or 4331 Mdl Group 2, Processor Storage is reduced from that installed by at least 16,348 bytes (4331 Mdl Group 2 includes 131,072 bytes of Control Storage). Table 1 below lists the storage requirements for system microcode.

Standard Functions:

- For 4331 Mdl Group 1 -- 524,288 bytes or 1,048,576 bytes of processor storage. For 4331 Mdl Group 2 -- 1,048,576 bytes to 4,194,304 bytes of processor storage. 4331 Processor configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE mode or S/370 mode. In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 mode or in Extended Control Program Support:VSE mode. The system mode is selectable at Initial Program Load (IPL) time and determines the base operating characteristics of the machine: S/370 mode allows operation of certain releases of OS/VS1, VM/370, DOS/VSE, DOS/VS and DOS. (See Programming Note below for details.) ECPS:VSE mode supports operation of DOS/VSE and SSX/VSE, offering enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3262 Line Printer mdl 1 (650 lpm system printer)
  - 3262 Line Printer mdl 11 (325 lpm system printer)
  - 3268 Printer mdl 2 and 2C (340 cps)*
  - 3230 Terminal Printer mdl 2 (350/450 cps burst speed)*
  - 3289 Line Printer mdl 4 (400 lpm system printer)
  - 3278 Display Station mdl 2, and keyboards
  - 3279 Color Display Station mdl 2A, S2A or 02X and keyboards
  - 3278 Display Console mdl 2A, keyboard and control panel
  - 3279 Color Display Console mdl 2C, keyboard and control panel.
  - 3287 Printer mdls 1, 2, 1C and 2C.
  - 4250 Printer
  - 6580 Displaywriter System, mdl A04, A06, A08, A10 (25-line display)

  *Specify **#9841** in 4331 must be ordered for attachment of 3268 or 3230 mdl 2 to the 4331 Mdl Group 1. Provides microcode and/or maintenance documentation if machine is below EC 366585 (microcode for 4331 Mdl Group 1) or below EC 366586 (microcode for 4331 Mdl Group 2, 11) and/or below EC 366584 (maintenance document) for all mdls.
- The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and Specify **#9842** in 4331 must be ordered for attachment of Displaywriter.
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskette facility reads and writes from removable magnetic diskettes that provide all of the microcode for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, standard functions, and the special features ordered. The System Diskette Facility also allows storage of failure data from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. Tables 1 and 2 list the Reloadable Control Storage requirements for system microcode.
  - 4331 Mdl Group 1 includes 65,536 bytes of Reloadable Control Storage. An additional 65,536 bytes is available as an optional feature.
  - 4331 Mdl Group 2 includes 131,072 bytes of Reloadable Control Storage.

  In addition to Reloadable Control Storage, 4331 Mdl Group 2 contains 12,288 bytes of Read-Only Control Storage.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center

  specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization), remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a 3275 (real or emulated) terminal at a host location.
- One level addressing facility for improved virtual storage control by DOS/VSE and SSX/VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 mode)
- Data Streaming Mode can operate on the High-Speed Block Multiplexer channel (not available on mdl Group 1). The 3380 is not supported on the 4331.
- S/370 Universal Instruction Set

4331 Processor (cont'd)

- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- 8,192 bytes of high-speed buffer storage (4331 Mdl Group 2 only)

Programming Note: The ECPS: VSE mode may be invoked at IPL time and supports operation of an appropriately generated DOS/VSE Control Program with VSE/Advanced Functions Release 1 and 2, or the Small Systems Executive/VSE.

In S/370 mode, operation of DOS/VSE with VSE/Advanced Functions Release 1 and 2 (generated for use in S/370 mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2, and OS/VS1 Release 7 with or without VS1/BPE are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 mode.

Console Function: An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer ... a 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C is required for this purpose ... the display and keyboard function as an operator's I/O console to communicate with the operating system ... the Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-Keyboard Mode". In the "Printer-Keyboard Mode", the Display Console uses the keyboard for input and the display and a 3287 Printer mdl 1 or 2, 3230 Printer mdl 2 and 3268 Printer mdl 2 for output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360 console operations or as a 3210/3215 Console Printer-Keyboard and operate compatibly with S/370 Console operations. The operation of the 3287/3230/3268 printer in this mode is optional, but recommended.

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 mdls 1, 2, 1C or 2C, 3230 mdl 2 and 3268 mdl 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of DOS/VSE and SSX/VSE, the Multiple Console Support of OS/VS1, the local-attached 3286/3287/3230/3268 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

Byte Multiplexer Channel (Optional): Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (**#5531**, **#5532**) for power control must be installed on the processor. See special features and Table 3 below for details. The channel permits simultaneous operations of low speed devices. Operates at up to 18K bytes per second (Mdl Group 1) or at up to 36K bytes per second Mdl (Group 2) in single byte mode. Up to 500K bytes per second in burst mode. See *IBM 4331 Channel Characteristics* GA33-1527 for 4331 Mdl Group 1 or GA33-1535 for 4331 Mdl Group 2 for devices which may attach and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0.

Subchannels: The 4331 Mdl Group 1 Byte Multiplexer Channel (**#5248**) provides up to 31 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of subchannels is reduced from 31 with the addition of certain special features:

Feature	Subchannels Unavailable
DASD Adapter (**#3201**)	2
8809 Magnetic Tape Unit Adapter (**#4910**)	2
Block Multiplexer Channel (**#1421**)	1
Communications Adapter (**#1601**)	1
Each telecommunication line on the Communications Adapter (**#1601**)	1

The 4331 Mdl Group 2 byte Multiplexer Channel (#5248) provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one if the Communications Adapter (#1601) is installed, and one for each telecommunication line on the Communications Adapter.

Block Multiplexer Channel (Optional): Each provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (**#5531**, **#5532**) for power control must be installed on the processor. See Special Features and Table 3 below for details. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

- 4331 Mdl Group 1: One channel is optional. Data rate is up to .5 million bytes per second ... see *IBM 4331 Mdl Group 1 Channel Characteristics*, GA33-1527, for details. Standard channel address is 1, a different address may be selected at installation time from the range of 1 to 6.
- 4331 Mdl Group 2: Two channels are optional. Data rate is up to 1.25 million bytes per second ... see *IBM 4331 Mdl Group 2 Channel Characteristics*, GA33-1535, for details. If installed together with High-Speed Block Multiplexer Channel, the data rate of the Block Multiplexer Channel, Add'l (**#1422**) is up to .6 million bytes per second. Channel addresses may be selected at installation time from the range of 1 to 6.

Subchannels: The following subchannel combinations can be configured at installation time:

– up to 128 non shared subchannels
and
– up to 16 shared subchannels, each with devices in multiples of 8, up to a total of 128 devices

High-Speed Block Multiplexer Channel (Optional): One channel is optional on 4331 Mdl Group 2 only. High data rate (up to 1.86MB/sec) allows attachment of high-speed I/O devices including 2311/2314/2319, 3330/3333/3340/3344, 3350, 3370 via control units. Ability to "Block Multiplex" and facility for Multiple Requesting allows several I/O units to operate concurrently with greater channel efficiency. Can operate in Data Streaming Mode, which allows increased interface cable length and allows attachment of a control unit, e.g., a 3880, operating in Data Streaming Mode. The 3380 is not supported on the 4331. Devices attached which cannot utilize block multiplexing will function as if attached to a Selector Channel. Eight control unit positions are available. When certain control units/devices are to be connected, the optional Power Interface (**#5531**, **#5532**) for power control must be installed on the processor. See "Special Features" and Table 3 for details. The channel address is selected at installation time from the range of 1 to 6.

Subchannels: Same as the Block Multiplexer Channel.

Native I/O Adapters: The following I/O adapters control the designated I/O devices:

DASD Adapter
5424 Adapter
Loop Adapter
8809 Magnetic Tape Unit Adapter
Display/Printer Adapter
Communications Adapter

Note: All data passing through the system for any I/O device interfaces with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities listed in the sales manual.

(2) I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunnable devices on the Byte Multiplexer Channel.
- The number and traffic on 3178, 3278 mdl 2 or 3279 mdl 2A, S2A or 02X attached to the Display/Printer Adapter.

4331 Processor (cont'd)

It is necessary to consult the *IBM 4331 Channel Characteristics Manual,* GA33-1527, for 4331 Mdl Group 1 or GA33-1535, for 4331 Mdl Group 2 to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

DASD Adapter (Optional): One DASD Adapter is optional on the 4331 Mdl Group 1, one or two are available on the 4331 Mdl Group 2. Attaches 3310, 3370 A1 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 normally operate in fixed block mode where optimum DASD and system performance is achieved.

As a transition aid and to allow the use of operating systems and programs which require Count-Key-Data (CKD) direct access storage, the 3340/3344 Direct Attachment and Direct Access Storage (DAS) Compatibility for emulation of 231X on 3310 or 3370 and 3330/3340 on 3370 are available. Operation with DAS Compatibility or the 3340/3344 Direct Attachment features in general will not achieve the same performance as the equivalent devices when attached to S/370 or 4300 processor channels. See performance notes included with the feature descriptions.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	**01**	**02**	**03**	**04**	**05**	**06**	**07**
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F

and

X10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

With a directly attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 mdl 12 or 15 ... this is a read-only mode and is available as a conversion aid for users converting to the 4331 Processors from a System/3.

The Direct Access Storage Compatibility feature provides emulation of 231X, 3330 (100MB/volume) or 3340 data formats on the 3370 mdl A1 and B1 Direct Access Storage and the emulation of 231X data formats on the 3310 Direct Access Storage. For address assignment of emulated volumes refer to *IBM 4331 Processor Compatability Features,* GA33-1528.

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

Display/Printer Adapter (Standard): This adapter allows for attachment of the prerequisite 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to seven (or fifteen with optional feature, see below) additional devices chosen from the list below:

3178 Display Station
3262 Line Printer mdl 1 and 11 (650 and 325 lpm)
3268 Printer mdl 2 and 2C (340 cps)*
3230 Terminal Printer mdl 2 (350/450 cps burst speed)*
3278 Display Station mdl 2
3279 Color Display Station
mdl 2A, S2A or 02X
3287 Printer mdls 1, 2, 1C and 2C (80 and 120 cps)
3289 Printer mdl 4 (400 lpm)
4250 Printer
6580 Displaywriter System, mdl A04, A06,
A08, A10, (25-line display)

*Specify **#9841** in 4331 must be ordered for attachment of 3268 or 3230 mdl 2 to the 4331 Mdl Group 1. Provides microcode and/or the maintenance documentation if machine is below EC 366585 (microcode for 4331 Mdl Group 1) or below EC 366586 (microcode for 4331 Mdl Group 2, 11) and/or below EC 366584 (maintenance document) for all mdls.

These machines may be installed in any combination, provided that [1] only seven (or fifteen with optional feature) devices are installed and [2] no more than two system printers (3262 and/or 3289) are included. Due to the processing power of the 4250, it is not practical to attach more than two on mdl 1 or more than four on mdl 2, see Specify. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287/3230/3268 Printer may be used as a console hardcopy device; one or more 3178, 3287/3230/3268 Printers may be used as hardcopy workstation devices The 3178, 3278 Display Station mdl 2 or 3279 Color Display Station mdl 2A , S2A or 02X may be used as additional operator's consoles with the presence of OS/VS1 Multiple Console Support or equivalent, or as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278-2 Display Station, and, optionally, a 3287-1/2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278-2 and 3287-1/2. Display/Printer Adapter support includes all standard functions of the 3274 mdl X1B or 3178 with the 3278 mdl 2 or 3279 mdl 2A, S2A or 02X attached. In addition, the following 3278 mdl 2 or 3279 mdl 2A, S2A or 02X special features are supported: (standard on the 3178) Keyboard Numeric Lock, (standard on the 3178) Audible Alarm, (standard on the 3178 or 3279), Security Keylock and Switched Control Unit. Other 3278 mdl 2 or 3279 mdl 2A, S2A or 02X special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes **#4621**, **#4622**, **#4623**, **#4627** ,**#4624**, **#4628** may be selected. If two different keyboards are required for a workstation, one must be **#4621**. Addresses for these devices are selected at installation time from the range 009 through 01F.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and specify **#9842** in 4331 must be ordered for attachment of Displaywriter.

Display/Printer Adapter Expansion (Optional): Expands the capability of the standard Display/Printer Adapter to permit the 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. All other capabilities and limitations are listed under Display/Printer Adapter (Standard) above.

Diskette Drive (Optional): A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below) or a data capacity of 246,272 bytes organized in 1,924 sectors of 128 bytes each (for use in exchanging data with another 4331 Processor). Each Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with DOS/VSE or DOS/VS POWER refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/3, 32, 34, and 38. One diskette is shipped with the feature. Device address is selected at installation time from the range 009 through 01F.

5424 Adapter (Optional): Provides native attachment of 5424 Multi-Function Card Unit mdls A1 or A2 for 96-column card operations ... Device address is 04C.

Loop Adapter (Optional): The Loop Adapter on the 4331 Mdl Groups 1 and 2 is a native attachment method for the 3640 Plant Data Communications Terminals ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1 and 2 ... 3232 Keyboard Printer ... 3287 Printer ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station with their associated terminals ... 7426 Terminal Interface Unit mdl 1 with its associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the *IBM 4331 Loop Adapter Programming Guide,* SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS . This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization

4331 Processor (cont'd)

- 3642 encode check handling
- Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer mdl 11, 3276 Display Control Stations and 3274 mdl 51C, 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal mdls 1, 2 ... 3642 Encoder Printer mdls 1, 2 ... 3643 Keyboard Display mdl 2, 3, 4 including 4920 Badge and Document Encoder ... 3644 Automatic Data Unit ... 3645 Printer ... 3646 Scanner Control Unit ... 3647 Time and Attendance Terminal ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1,2 ... 3232 Keyboard Printer mdl 11 ... 3287 Printer mdls 11, 12 ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station mdls 11-14 with their associated terminals ... 3843 Loop Control Unit ... 7426 Terminal Interface Unit mdl 1 with its associated terminals. Device addresses are 040 through 07E.

8809 Magnetic Tape Unit Adapter (Optional): Provides native attachment of 8809 mdl 1A and up to five additional 8809 tape units (consisting of a mix of 8809 mdl 2s and 3s) ... allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read Backward commands are not supported, the Read Backward operation is simulated in the Logical IOCS (MTMOD) of DOS/VSE. Standard channel address is 3. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

Communications Adapter (Optional): The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit-terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For further details, refer to "Special Features".

IBM Stand-Alone Modems

Switched

3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps

Nonswitched

The following modems are supported with the Switched Network Backup feature ... see M3863, 3864, 3865, 3872, 3874, 3875 pages for details:

3863	2400 bps
3864	4800 bps
3865	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

IBM Integrated Modem (V.23, 1200 bps): The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire.
- Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer.

OEM Modems: OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

Digital Data Service Adapter: The Digital Data Service Adapter allows attachment to the AT & T Private Line Dataphone* Digital Service Network by way of an internal Digital Data Service (DDS*) adapter.

* Dataphone and DDS are registered trademarks of the American Telephone and Telegraph Company. Other usage of Dataphone and DDS in this text also refers to the registered trademarks of American Telephone and Telegraph.

X.21 Adapter for Nonswitched Networks: The X.21 interface allows attachment to the X.21 facilities by way of an internal X.21 adapter.

Automatic Calling Equipment: The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- 3872 with Automatic Call Originate feature
- 3874 with Automatic Call Originate feature
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface **(#1020)** under the provisions of the IBM Multiple Supplier Systems Bulletin.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (1-phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Specify **#9260** for 4250 attachment and **#9841** for 3268 or 3230 Mdl 2 attachment.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

  RSF is available in two versions:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

  Specify **#9511** for EIA RS-232-C Interface, 1200 bps, switched network, manual answer. An FCC registered external cable modem compatible with the WE 202S modem, interface and operation, or equivalent, is required.
- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use.

  * 3275 mdl 2 can only be obtained on an as available basis.

  Specify ROCF feature **#9511**. The requisite customer supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600 or 1200 bps.
- Loop Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 61C and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 **(#4830, #4831)** and/or Data Link Adapters **(#4840)**.

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274-51C, 61C and 3276 Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

4331 Processor (cont'd)

- Keyboard/Character Set Language: When a 3178 Display Station, 3278 Display Station mdl 2 and/or 3268 or 3287 Printers are attached to the Display/Printer Adapter, specify on the 4331 Processor:

  #9441: For ASCII Keyboard/Character Set Language (**#4624**, **#4628**, on 3278 mdl 2 or 3279 mdl 2A or S2A and/or 3287 with **#9084**), when used as a workstation, or

  #9442: For EBCDIC Data Entry Keyboards, 3178 mdl 1C, 3278 mdl 2 or 3279 mdl 2A or S2A with **#4622**, **#4623**. In addition, specify on the 4331 Processor either **#9301** for Data Entry Keyboard or **#9302** for Data Entry Keyboard, keypunch layout.

  No specify codes on the 4331 are required for EBCDIC Typewriter Keyboards 3178 mdl C2 or (**#4621**, **#4627** on 3278 mdl 2 or 3279 mdl 2A S2A). The 6580 Displaywriter System supports the EBCDIC Typewriter Keyboard.

  Note: The keyboard/character set language selected must correspond with the mdl of 3178 or the specifications on the 3278 mdl 2 or 3279 mdl 2A or S2A and 3287s. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.

- Console Table: A console table is available ... see **#1550** or Accessories section for details. Book Rack and Cable Holder ... see **#1480** or Accessories section.

- See 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C for console cabling.

  #9842 - For attachment of 6580 Displaywriter System to the Display/Printer Adapter (ordered on the 4331 only, not on the Displaywriter).

- System Environment: For record purposes specify one of the following codes (reference only, no parts required):

  #9701 - This processor is planned to be host/peer connected to a system within the same branch office territory (at installation or at a future time).

  #9702 - This processor is planned to be host/peer connected to a system in a different branch office territory (at installation or at a future time).

  #9703 - This processor is planned to be stand-alone (no host/peer connect).

SPECIAL FEATURES

Notes:

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

Adapter Power Prerequisite (#1001): Provides power and control circuitry necessary for the Communications Adapter (**#1601**), (when more than three line features are attached), and the Adapter Logic. **Maximum**: One. **Field Installation**: Yes. **Prerequisite: #1002** or for the Loop Adapter (**#4830**) and/or **#1601** with more than three line attachments **#4695** and/or **#4696**.

Adapter Logic Prerequisite (#1002): Provides logic and control function necessary for the 5424 Adapter (#3901). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: #1001.

Block Multiplexer Channel (#1421), Add'l [Mdl Group 2] (#1422): Each provides means of attaching I/O devices. Up to 8 control units may attach to each channel. Disconnect during command chaining allows multiple I/O devices to operate concurrently. The 3830 and 3880 Control Units with associated DASD do not attach. See DASD Adapter (**#3201**, **#3202**) for attachment of 3340/3344/3310/3370 devices.

4331 Mdl Group 1: Data transfer rates up to 0.5 million bytes per second.

4331 Mdl Group 2: Data transfer rates up to 1.25 million bytes per second each.

If High-Speed Block Multiplexer Channel is installed, the data rate is up to 0.6 million bytes per second for the Block Multiplexer Channel, Add'l (#1422). See Input/Output Attachment section above for details on subchannels. **Limitations**: [1] 231X can only be installed on Block Multiplexer Channel **#1421**, not on **#1422**. [2] 231X devices cannot operate with any telecommunication line feature on the Communications Adapter which operates at a speed greater than 9600 bps (**#4720**), or **#5650** with **#9444** On 4331 Mdl Group 1 only: [3] Block Multiplexer Channel, Add'l (**#1422**) is not available. [4] 231X devices may not be installed with any of the following: 3370s on the DASD Adapter (**#3201**, **#3202**), 3340/3344 Direct Attachment (#7851), 8809 Magnetic Tape Unit Adapter (**#4910**), Magnetic Tape Units attached to the Byte Multiplexer Channel (**#5248**). On 4331 Mdl Group 2: [5] Block Multiplexer Channel, Add'l (**#1422**) not be installed with 8809 Magnetic Tape Unit Adapter (**#4910**). [6] 231X devices cannot be installed on the Block Multiplexer Channel (#1421) if High-Speed Block Multiplexer Channel (**#1431**) is installed. **Maximum**: **#1421** one, **#1422** one (Mdl Group 2). **Field Installation**: Yes. **Prerequisites**: **#1422** requires **#1421**. For certain control units/devices the processor requires Power Interface feature (**#5531**, **#5532**). See Table 3 above.

High-Speed Block Multiplexer Channel (#1431): [Mdl Group 2] Provides attachment of high-speed I/O devices including 3330/3333, 3340/3344, 3350, 3370 A1 via control units including 3830 mdl 2 and 3880. The control unit can operate in Data Stream Mode. Up to eight control units may attach. Data transfer rate up to 1.86 million bytes per second. (See Input/Output Attachment section above for specifics). **Limitations**: [1] Not available on 4331 Mdl Group 1. [2] For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics,* GA33-1535 (Mdl Group 2), which contains tables of pre-analyzed configurations. [3] Cannot be installed with 8809 Magnetic Tape Unit Adapter (**#4910**). [4] 231X devices must be attached to the High-Speed Block Multiplexer Channel and cannot be used on the Block Multiplexer Channel (**#1421**). [5] Is mutually exclusive with DASD Adapter, Add'l (**#3202**). **Maximum**: One. **Field Installation**: Yes. **Prerequisites**: For certain control units/devices, the processor requires Power Interface feature (**#5531**, **#5532**). See Table 3 above.

Control Storage Expansion (#1901): [Mdl Group 1] Increases the Control Storage capacity of the Mdl Group 1 from 65,536 to 131,072 bytes, providing additional storage area for special features and the basic functions of the 4331 Processor. See Tables 1 and 2 to determine the requirement for this feature. **Limitations**: Not available on 4331 Mdl Group 2 (expanded control storage is standard). If installed on Mdl Group 1, this feature should be deleted with the order entry for conversion to Mdl Group 2. **Maximum**: One. **Field Installation**: Yes.

Note: This is for order entry only. The feature is not physically removed when upgrading to a Mdl Group 2.

Microcode Storage Requirements: The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, and to determine when Control Storage Expansion (#1901) is required, use the following procedure.

Note: An interactive HONE aid is available dependent on the control program or program product device support to facilitate this procedure.

1) Consulting Table 1, determine the microcode groups required to support the features and I/O to be installed.

2) On the Table 2, place a checkmark in the appropriate rows. Note that each microcode group is required only once, even if it supports multiple functions of the 4331 Processor. The only exception to this is microcode group 2 where 2,048 bytes of Processor Storage are required per megabyte of virtual storage defined in the notes.

3) Find the sum of each of the three columns for the required microcode groups.

4) The total from Column A and B must pass three tests.
   - When the total from Column A exceeds 65,536 bytes, Control Storage Expansion (**#1901**) is required (4331 Mdl Group 1).
   - When the total from Column A exceeds 131,072 bytes for a Mdl Group 1 or 143,360 bytes for a Mdl Group 2, an invalid configuration has been selected (see Note).
   - When the total from Column A plus the total from Column B exceeds 262,144 bytes, an invalid configuration has been selected (see Note).

5) Subtract the total from Column A from either:
   - 131,072 if **#1901** is required (4331 Mdl Group 1), or
   - 65,536 if **#1901** is not required (4331 Mdl Group 1).
   - 143,360 if 4331 Mdl Group 2 is being configured.

6) Subtract the results of Step 5 from the total of Column B.

7) Add the results of Step 6 to the total from Column C and round up to the next multiple of 4,096.

The results of Step 7 determine the amount of Processor Storage occupied by microcode and should be subtracted from the Processor Storage size ordered to determine the amount available for the user.

4331 Processor (cont'd)

The storage for Group 9 (DAS Compatibility **#7901**) is only occupied if the feature is activated at IPL time.

Note: Too many features/options have been selected. Inspect table 1 and 2 and determine which feature(s) of lower priority should be deleted from the configuration.

TABLE 1

Function/Feature Installed	Microcode Group
4331 Processor	1
Processor Storage	2
3310 attached (**#3201** and **#9202**)	3,4,5,6
3370 attached (**#3201** and **#9201**)	3,4,6,17
3340/3344 Direct Attach (**#3201** and **#7851**)	3,6,8,15
Direct Access Storage Compatibility (**#7901**)	9,15
8809 Magnetic Tape Unit attached (**#4910**)	3,4,6,7
Communications Adapter Base (**#1601**)	6,10
BSC lines installed (**#9671-#9678**)	11
S/S lines installed (**#9681-#9688**)	12
SDLC lines installed (**#9691-#9698**)	13
ECPS:VM/370 (**#8701**)	16
1401/1440/1460 Compatibility (**#3950**)	14
High-Speed BMPX Channel (**#1431**)	21

TABLE 2

Micro-code Group	– A – Control Storage (only)	– B – Control Storage – or – Processor Storage	– C – Processor Storage (only)	Notes
1	33792	66816	24576	
2	–	–	2048 or 32768	For each 1 MB of processor storage in S/370 mode or for each 1 MB of virtual storage in ECPS:VSE mode, in steps of 2, 4, 8, 16 MB. For Mdl Group 2 when High-Speed BMPX or ECPS:VM/370 is installed.
3	6144	24320	7168	
4	5120	12288	–	
5	–	4608	11250	
6	–	–	10250	
7	6144	9728	3060	Excl. with Group 14
8	9216	13312	11600 8800 1800	Plus Per 3340 buffer. For a second string of 3340s attached to the DASD adapter.
9	–	27648	1300 4096 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
10	8192	9216	2150	
11	6144	–	–	
12	5120	–	–	
13	12288	–	1024	
14	14336	–	1800	Excl. with Group 7 and 16
15	–	5760	200	
16	6656	–	–	Excl. with Group 14
17	–	9316	10000	
21	8448	2880	400	(Mdl Group 2 only)
TOTAL				

Display/Printer Adapter Expansion (#2001): Expands the capability of the standard Display/Printer Adapter to allow the 3278 mdl 2A or the 3279 mdl 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. The devices attachable are:

Up to 15 3178 Display Stations
Up to 15 3278 Display Station mdl 2s
Up to 15 3279 Color Display Station mdl 2A, S2A or 02X
Up to 15 3230 and 3268 Printers mdl 2
Up to 15 3287 Printer mdls 1, 2, 1C and 2C
Up to 2 3289 Line Printer mdl 4s
Up to 2 3262 Line Printer mdl 1s and 11s.
Up to 2 4250 Printers mdl 1 or four mdl 2.
6580 Displaywriter System mdl A04, A06, A08, A10 (25-line display). Can connect to 1 or 2 device ports (display station or display station and printer).

Other details are the same as given under the description of the Standard Function: Display/Printer Adapter, above. **Limitations:** Only the 3278 mdl 2A or the 3279 mdl 2C and 15 devices (listed above) may attach to the Display/Printer Adapter and the Display/Printer Adapter Expansion. **Maximum:** One. **Cable Order:** See Accessories section for ordering information for the required coaxial cable. **Field Installation:** Yes. **Specify:** See "Specify" for character code/keyboard combinations available. **Prerequisites:** The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and Specify **#9842** in 4331 must be ordered for attachment of Displaywriter.

4331 Processor (cont'd)

DASD Adapter (#3201%x), ADD'L (4331 Mdl Group 2) (#3202%x): Each allows attachment of the 3310, 3370 A1 and 3340/3344 DASD to the 4331 Processor. Up to four strings of devices may be attached to each adapter. The attachable device types may be intermixed on each adapter but not within a string. The maximum number of strings of each type of device on each DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string - (3340/3344 Direct Attach feature **#7851** is required). Attachment of 3340/3344 is limited to two strings on the system.

String Switch Capability allows sharing of 3340 mdl A2 and/or 3370 mdl A1 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340 mdl A2 or 3370 mdl A1 must have the String Switch feature **#8150** installed. String switch support for 3340/3344 is limited to the static assignment of a shared string to one processor at a time. **Limitations:** [1] DASD Adapter, Add'l **(#3202)** is not available for Mdl Group 1. [2] DASD Adapter, Add'l **(#3202)** is mutually exclusive with High-Speed Block Multiplexer Channel **(#1431)**. [3] 3310 and 3370 are not supported by VS1 in fixed block mode. [4] For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2), which contains tables of pre-analyzed configurations. [5] On 4331 Mdl Group 1 only: 3340 or 3370 may not be attached to the DASD Adapter if 231X DASD is attached to the Block Multiplexer Channel **(#1421)**. **Maximum:** One **#3201** and one **#3202** (on 4331 Mdl Group 2). **Field Installation:** Yes. **Prerequisites:** 3340/3344 requires #7851 ... see Table 1 for microcode storage requirements and possible requirement for **#1901** on Mdl Group 1 ... **#3202** requires **#3201**. **Specify: #9202**%z if 3310 and/or **#9201**%z if 3370 attaches to the DASD Adapter. **#9316** if String Switch Capability is required with 3370.

Diskette Drive (#3401): A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. **Limitations:** Not supported by VM/370. **Maximum:** One. **Field Installation:** Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External Devices must meet the interface specifications outlined in *S/360 Direct Control Feature OEMI,* GA22-6845.

5424 Adapter (#3901%x): Allows attachment of one 5424 Multi-Function Card Unit mdl A1 or A2. **Limitations:** The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter **(#4830)**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1001** and **#1002**.

1401/1440/1460 Compatibility (#3950%y): A feature which, in conjunction with special software, permits execution of 1401/1440/1460 instructions. Feature may be used with S/370 mode or with ECPS:VSE mode. See "Software" for details concerning prerequisites. **Limitations:** May not be installed with 8809 Magnetic Tape Unit Adapter **(#4910)**. May not be installed with ECPS:VM/370 **(#8701)** and does not operate under VM/370. Support is available under DOS/VSE/Advanced Function, DOS/VS Release 34 and DOS Release 26. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** IBM Systems 1401/1440/1460 Emulator Program Product. See Programming pages for details. See Table 1 for microcode storage requirements and possible requirement for #1901.

8809 Magnetic Tape Unit Adapter (#4910%x): Provides for attachment of the 8809 Magnetic Tape Unit. One 8809 mdl 1A may attach. Up to five 8809 mdl 2s and 3s may attach to the mdl 1A for a total of six 8809 Magnetic Tape Unit drives. **Limitations:** [1] May not be installed with 1401/1440/1460 Compatibility **(#3950)**. [2] May not be installed with Block Multiplexer Channel, Add'l **(#1422)** on 4331 Mdl Group 2. [3] May not be installed on 4331 Mdl Group 1 if 231X devices are attached to the Block Multiplexer Channel **(#1421)**. [4] May not be installed with High-Speed Block Multiplexer Channel **(#1431)** on 4331 Mdl Group 2. [5] The 8809 is not supported by VS1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See Table 1 for microcode storage requirements and possible requirement for #1901 on Mdl Group 1.

Byte Multiplexer Channel (#5248): The byte multiplexer channel attaches S/370 byte multiplex devices. The data rate of the channel is up to 18K bytes per second for Mdl Group 1 or up to 36K bytes per second for Mdl Group 2 in single byte interleaved mode and up to 500K bytes per second in burst mode. For data rates achievable for specific configurations, see *IBM 4331 Channel Characteristics,* GA33-1527 for Mdl Group 1 or GA33-1535 for Mdl Group 2. Up to eight control units may be attached. See Input/Output Attachments section above for details on subchannels. **Limitations:** [4331 Mdl Group 1] Magnetic tape devices may not be attached to the Byte Multiplexer Channel whenever 231X devices are attached to the Block Multiplexer Channel **(#1421)**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For certain control units/devices, the processor requires Power Interface **(#5531, #5532)**. See Table 3.

Power Interface (#5531), ADD'L (#5532): Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 3 below lists the control units/devices for which this feature must be installed in the 4331 Processor ... Power Interface **(#5531)** allows attachment of up to eight of these control units; Power Interface, Add'l **(#5532)** allows attachment of eight additional control units for a maximum of 16 per processor. **Maximum:** One of **#5531**; one of **#5532**. **Field Installation:** Yes. **Prerequisites: #5532** requires **#5531**.

Table 3

Control Units/Devices Requiring Power Interface Features

1 - Mandatory:
- 1255 Magnetic Character Reader
- 1287 Optical Reader
- 1288 Optical Reader
- 1419 Magnetic Character Reader
- 1442 Card Read Punch mdl N1
- 1442 Card Punch mdl N2
- 1443 Printer mdl N1
- 2314 Storage Control* mdl A1 and B1
- 2314 Direct Access Storage Facility* mdl 1
- 2415 Magnetic Tape Unit and Control
- 2501 Card Reader mdl B1 and B2
- 2520 Card Read Punch mdl B1, B2 and B3
- 2701 Data Adapter Unit
- 2702 Transmission Control*
- 2703 Transmission Control*
- 2803 Tape Control
- 2821 Control Unit mdls 1, 2, 3, 5 and 6
- 2822 Paper Tape Reader Control*
- 2840 Display Control*
- 2841 Storage Control
- 3272 Control Unit
- 3411 Magnetic Tape Unit and Control
- 3430 Magnetic Tape Unit and Control
- 3505 Card Reader
- 3540 Diskette Input/Output Unit
- 3704 Communications Controller
- 3705 Communications Controller
- 3725 Communication Controller
- 3791 Controller
- 3800 Printing Subsystem
- 3803 Tape Control
- 3811 Printer Control Unit
- 3881 Optical Mark Reader mdl 1
- 3886 Optical Character Reader mdl 1
- 3890 Document Processor
- 3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize Power Interface features:
- 3274 Control Unit
- 3340 Direct Access Storage Facility
- 3370 Direct Access Storage
- 3203 Printer mdl 5

* No longer available

3340/3344 Direct Attachment (#7851%y): A feature allowing 3340 mdl A2s to attach to a DASD Adapter **(#3201, #3202)**. Up to two 3340 mdl A2s per system may attach to either adapter. Up to three 3340/3344 mdl B units may attach to each 3340 mdl A2. **S/3 Data Import:** With the VSE/IBM System/3-3340 Data Import utility program (5746-AM3), 3348 Data Modules which have been written on a 3340 attached to a System/3 can be read on any directly attached 3340 drive. The String Switch Capability allows sharing of 3340 mdl A2 drives (with **#8150** installed) and associated drives, with another IBM processor or control unit that supports the DASD and string switching. String switch support is limited to the static assignment of a shared string to one processor at a time. **Limitations:** [1] May not be installed if 231X devices attach to the Block Multiplexer Channel **(#1421)**. [2] Attachment of 3340/3344 and/or use of the DAS Compatibility is limited to two strings on the system. [3] If one string of 3340/3344s is attached to a DASD Adapter **(#3201)**, only one string of 3310/3370s can perform DASD emulation. If two strings of 3340/3344s are attached, no 3310/3370s can perform DASD emulation. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #3201** ... 3340 mdl A2. See Table 1 for microcode storage requirements and possible requirement for **#1901**. **Specify: #9315** if String Switch Capability for 3340 required, **#9317** if 3344 is installed.

4331 Processor (cont'd)

Communications and Loops

Note: Use of this feature introduces additional processor and channel demands, and can have a significant effect on system performance, particularly in batch environments with heavy I/O load and/or if multi-track operations are used. Performance considerations should be carefully reviewed before proposing use of the 3340/3344.

Direct Access Storage Compatibility (#7901%y): Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 mode under DOS, DOS/VS, OS/VS1 or VM/370, in ECPS:VSE mode under DOS/VSE. Under DOS/VSE data sets in fixed block format and in emulated format can coreside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With OS/VS1 or VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max number of emulated full volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4331 Compatibility Features,* GA33-1528.

Performance Note: Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370 but not with OS/VS1. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

Limitations: [1] Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. [2] Operation of emulation and directly attached 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330 mdl 11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via a string switch. [6] VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. [7] OS/VS1 does not support 2311, native or emulated. **Program Order:** The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, 5745-030 or combined with VSE/Advanced Functions, 5746-XE9. OS/VS1 (5741-VS1) and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#3201** with 3370 **(#9201)** and/or 3310 **(#9202)** specification. See Tables 1 and 2 for microcode storage requirements.

ECPS:VM/370 (#8701%y): The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2. corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction Emulation and Virtual Interval Timer. **Limitations:** May only operate when S/370 mode has been invoked by IPL. May not be installed with 1401/1440/1460 Compatibility (#3950). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See Table 1 for microcode storage requirements and possible requirement for Control Storage Expansion (#1901).

Communications Adapter: Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1527 for Mdl Group 1 or GA33-1535 for Mdl Group 2. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps and may operate concurrently with other lines provided that its data rate does not exceed 50,000 bps and the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Up to eight line features with Digital Data Service Adapters.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half speed operation for synchronous lines only (for both clocked and nonclocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the customer engineer:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

Communication Facilities: See M2700 pages for communications facility requirements with this feature.

4331 Processor (cont'd)

Terminals Supported

The Data Communications Equipment and remotely attachable Data Terminal Equipment (abbreviated "terminals") supported by the Communications Adapter are shown in the table below:

SDLC Terminals Supported:

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6	+19.2-56
Terminals:									
3271-11,-12 (3)	X	X	X	X	X	X	X	X	
3274-1 X1C (8)		X	X	X	X	X	X	X	X
3276-1-4 (7)	X	X	X	X	X	X	X	X	
3275-12 (3)	X	X	X	X	X	X	X	X	
3276-11-14	X	X	X	X	X	X	X	X	
3601	X	X	X	X	X	X	X	X	
3602	X	X	X	X	X	X	X	X	
3614	X	X	X	X	X				
3624	X	X	X	X	X				
3631	X	X	X	X	X	X	X	X	
3632	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661				X					
3684	X	X	X	X	X				
3694	X	X	X	X	X	X	X	X	
3767-1-3	X	X	X						
3771-1-3	X	X	X	X	X				
3773-1-3	X	X	X	X	X				
3773-P1-P3	X	X	X	X	X				
3774-1,-2	X	X	X	X	X				
3774-P1,-P2	X	X	X	X	X				
3775-1,-P1	X	X	X	X	X				
3776-1,-2		X	X	X	X				
3776-3,-4		X	X	X	X	X	X	X	X
3777-1,-3		X	X	X	X	X	X	X	X
3791	X	X	X	X	X	X	X	X	
3791/3730	X	X	X	X	X	X	X	X	
3791/3760	X	X	X	X	X	X	X	X	
4701-1	X	X	X	X	X	X	X	X	
6670		X	X	X	X	X	X	X	
7426-1 (10)	X	X	X	X	X	X	X	X	
8775-11, -12 (10)	X	X	X	X	X	X	X	X	
8815		X	X	X	X	X	X	X	
Controllers:									
3705 (1)(3)	X	X	X	X	X	X	X	X	X
3725	X	X	X	X	X	X	X	X	X
Systems:									
4331 (2)	X	X	X	X	X	X	X	X	X
5285 (9)	X	X	X	X	X				
5288 (9)	X	X	X	X	X				
5320 (5)	X	X	X	X	X	X	X		
5340 (6)(9)	X	X	X	X	X	X	X	X	X
5360 (6)(9)	X	X	X	X	X	X	X	X	X
5380 (5)	X	X	X	X	X	X	X	X	X
8100	X	X	X	X	X	X	X	X	X

Notes:

(1) 3705 or 3725 supported as a primary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
(2) Participant as a primary or a secondary station in a network using ACF/VTAME.
(3) Not supported by ACF/VTAME.
(5) Supported as a 3770.
(6) Supported as a 3770 or 3791.
(7) With SDLC/BSC Switch in SDLC mode.
(8) The maximum speed supported is 56K bps.
(9) Supported as a 3274 mdl 1C or 3770
(10) DSLU (5668-006) is required for 7426 or 8775-11, -12 with downstream loadable functions.

BSC Terminals Supported

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6 (6)	+19.2-56
Terminals:									
2715-2		X	X	X	X				
3271-1,-2	X	X	X	X	X	X	X	X	
3274-X1C		X	X	X	X	X	X	X	
3275-2 (1)	X	X	X	X	X	X	X	X	
3276-1-4	X	X	X	X	X	X	X		
3631 (7)	X	X	X	X	X	X	X	X	
3632 (7)	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661		X							
3684-1,-2	X	X	X	X	X				
3741-2,-4	X	X							
3747	X	X							
3771 (2)	X	X	X	X	X				
3773-1-3 (2)	X	X	X	X	X				
3773-P1,-P3 (2)	X	X	X	X					
3774,3775 (2)	X	X	X	X	X				
3776-1,-2 (3)		X	X	X	X				
3777-1,-2 (3)		X	X	X	X	X	X	X	X
3780	X	X	X	X	X	X	X		
4701-1	X	X	X	X	X				
5110 (12)	X	X	X	X	X	X	X		
5231-2 (9)	X	X	X	X	X				
5275 (10)	X	X	X	X	X	X	X		
5285	X	X	X	X	X				
5288 (13)	X	X	X	X	X				
5937 (11)	X	X	X	X	X	X	X		
6670		X	X	X	X	X	X		
Controllers:									
2701 (w 360/370)	X	X	X	X	X	X	X		
3704	X	X	X	X	X	X	X	X	
3705	X	X	X	X	X	X	X	X	X
Systems: (5)									
3115	X	X	X	X	X	X	X	X(1)	
3125	X	X	X	X	X	X	X	X(1)	
3135	X	X	X	X	X	X	X		
3138	X	X	X	X	X	X	X		
4331	X	X	X	X	X	X	X	X	X
5010 (8)	X	X	X	X	X	X	X		
5285 (14)	X	X	X	X	X				
5288 (14)	X	X	X	X	X				
5320 (8)	X	X	X	X	X	X			
5340 (14)	X	X	X	X	X	X	X	X	X
5360 (14)	X	X	X	X	X	X	X	X	X
5380 (8)	X	X	X	X	X	X	X	X	
5404	X	X	X	X	X	X	X	X	
5406	X	X	X	X	X	X	X	X	
5408	X	X	X	X	X	X	X	X	
5410	X	X	X	X	X	X	X	X	
5412	X	X	X	X	X	X	X	X	
5415	X	X	X	X	X	X	X	X	
8100 (4)	X	X	X	X	X	X	X	X	
Series/1 (8)	X	X	X	X	X	X	X	X	X

Notes:

(1) By RPQ.
(2) Equivalent to 2770/2772.
(3) Equivalent to 2770/3780.
(4) Supported as a 3276 mdl 1, 2, 3, 4, nonswitched connection only.
(5) With Communications Adapter.
(6) 19,200 - 56,000 bps in line position 1.
(7) See M3631 and/or 3632 pages for 3631/3632 features required and software requirements for host connection.
(8) Equivalent to 54XX (S/3).
(9) Equivalent to 3741 mdl 2, 4.
(10) Equivalent to 3275 mdl 1, 2.
(11) Equivalent to 3271 mdl 1, 2.
(12) Supported as a 2772.
(13) Supported as 3280
(14) Supported as a 3271 mdl 2.

Start/Stop Terminals Supported

Only terminals using IBM Terminal Control - Type 1 are supported.

Type	IBM I Line Control Speed in bps				
	75	134.5	300	600	1200
2740-1		X			
2740-2	X	X		X	
2741		X			
3232-51 (3)			X	X	X
3767-1 (1)		X	X	X	X
3767-2 (1)		X	X	X	X
3767-3 (1)		X	X	X	X
5100 (2)		X	X		
5110		X	X		
6733 (3)			X		X
CMCST (1)		X	X		

(1) Equivalent to 2740 and/or 2741: Speed 134.5 bps needs 3767 RPQ 853129.

4331 Processor (cont'd)

(2) Equivalent to 2741.

(3) Supported as a CPT-TWX 33/35

Autocall Unit Interface (#1020%x): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Limitations:** Does not operate with High-Speed Modem Adapter **(#4720)**, any features with 1200 bps Integrated Modem or with any nonswitched lines. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601** and **#3701** (in switched operation) for each Autocall Unit Interface installed. **Specify:** Line position, see Table 4 below.

Communications Adapter, Base (#1601%x): Allows attachment of up to eight lines (with up to two transmission modes) plus Autocall Unit Interfaces (#1020) for up to two of the lines. The aggregate data rate capability of the Communications Adapter is 64,000 bps. **Limitations:** [1] SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. [2] Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. [3] The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 1) which contains tables of pre-analyzed configurations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1001** is required when more than three telecommunications line features are attached. See Table 1 for microcode storage requirements and possible requirement for **#1901** (4331 Mdl Group 1). **Specify:** See Table 4, "Communications Adapter Configuration Features and Position Codes", for required specify codes for each line feature attached.

EIA/CCITT Interface (#3701%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem **(#4695)**, a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems **(#4696)**, then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature **#4696** below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601.** One **#4695** or **#4696** is required for each feature **#3701** installed. **Specify:** Start/Stop, SDLC and/or BSC operations are possible. See Table 4 for Line Position Code and Transmission Mode Codes.

Loop Adapter: Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 mdls B1, B2 and 8775 mdls 1, 2 , 3232 Keyboard Printer mdl 11 and 3287 mdls 11, 12, 3230 and 3268 Printers mdl 2 and/or Control Units 3274 mdl 51C, 61C7426 Terminal Interface Unit mdl 1 with its associated terminals and 3276 mdls 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 **(#4830, #4831)** provide for direct attachment. A maximum of two Data Link Adapters **(#4840)** provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter **(#4840)** can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

Device Attachments

3104 Display Terminal mdls B1, B2
3232 Keyboard Printer mdl 11
3641 Reporting Terminal mdls 1,2
3642 Encoder Printer mdls 1,2
3643 Keyboard Display mdls 2, 3,4
including #4920 Badge and Document Encoder
3644 Automatic Data Unit
3645 Printer
3646 Scanner Control Unit
3647 Time and Attendance Terminal
8775 Display Terminal mdls 1,2
3287 Printer mdls 11,12
3274 Control Unit mdl 51C, 61C with the
associated terminals
3276 Control Unit Display Station mdl 11-14
with the associated terminals

Control Units and Associated Terminals

3274 Control Unit Mdl 51C, 61C
3178 Display Station
3278 Display Station
3279 Color Display Station
3262 Line Printer
3268 Printer mdl 2 and 2C
3287 Printer
3289 Line Printer
6580 Displaywriter System,
mdl A04, A06, A08, A10 (25-line display)
6580 Displaywriter System,
mdl B04, B06, B08, B10 (66-line display)

3276 Control Unit Display Station Mdl 11-14
3178 Display Station
3278 Display Station
3279 Color Display Station
3262 Line Printer
3268 Printer Mdl 2 and 2C
3287 Printer
3289 Line Printer
with its associated terminals
6580 Displaywriter System,
mdl A04, A06, A08, A10 (25-line display)
6580 Displaywriter System,
mdl B04, B06, B08, B10 (66-line display)
7426 Terminal Interface Unit mdl 1

In addition the following devices can be attached at 38,400 bps:

3104 Display Terminal mdls B1, B2
8775 Display Terminal mdls 1,2
3232 Keyboard Printer mdl 11
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C with the
associated terminals
7426 Terminal Interface Unit mdl 1
with its associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, *IBM Multiuse Communications Loop Planning Guide.*

Loop Installation: For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the *IBM Multiuse Communications Loop Planning Guide,* GA23-0038, and *Installation Guide,* GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to *IBM 4331 Processor Loop Adapter Feature, Operating Procedures,* GA33-1538, and *Problem Determination Procedures,* GA33-1540.

Note: (1) Loop Accessories are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See Accessories section for details and ordering information.

(2) An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N1657320.

Communications Facilities: See M2700 pages for communications facility requirements.

Loop Adapter 1 (#4830): Provides for direct attachment of a Loop with one or two Lobes (The lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 7426 Terminal Interface Unit mdl 1 with its associated terminals 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter **(#3901). Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1001.**

4331 Processor (cont'd)

Loop Adapter 2 (#4831): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 3104 and/or 8775 and/or 7426 Terminal Interface Unit mdl 1 with its associated terminals and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals, and/or 3274-51C, 61C and/or 3276 Control Units, or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter **(#3901)**. **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #4830.**

Data Link Adapter (#4840): Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. EIA RS-232, RS-334 support will be provided for nonswitched lines only . Transmission speed can be 2400, 4800, or 9600 bps, with half speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** Two. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 **(#4830)**.

Loop Adapter Logic Storage Requirements: The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 **(#4830, #4831)** or Data Link Adapters **(#4840)** has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/#4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645, 7426	2600	-
		Terminal* Control Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	Total 1	Total 2

*For additional information on buffer space refer to the *IBM 4331 Loop Adapter Characteristics*, GA33-1534.

The storage requirements need to be validated by DP because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

System Diskette Space Requirements: When attaching the Loop Adapter feature with 364X terminals to the IBM 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Processor Feature/Facility	System Diskette Records
4331 Basic	2061
DASD Adapter **(#3201, #3202)**	251
3310 or 3370 Common **(#9202, #9201)**	71
3310 Att. **(#9202)**	63
3370 Att. **(#9201)**	61
3340/3344 Direct Att. **(#7851)**	73
3340 Att. or DAS Compatibility **(#7851 or #7901)**	24
DAS Compatibility **(#7901)**	190
8809 Tape Adapter **(#4910)**	87
Communications Adapter **(#1601)**	272
Start/Stop Transmission Mode **(#968x)**	15
BSC Transmission Mode **(#967x)**	18
SDLC Transmission Mode **(#969x)**	52
Inline (System RAS Test Functions, req'd. by CE)	40
1400/1440/1460 Compatibility **(#3950)**	60
ECPS:VM/370 (#8701)	26
High-Speed BMPX Channel **(#1431)**	50
Loop Adapter Common **(#4830, #4831, #4840)**	448
3640 Terminal Att. **(#9251, #9252, #9253, #9254, #9256)**	252

The maximum number of system diskette records may not exceed 3876.

Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter: The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775 , 3232 mdl 11 terminals or 3274-51C, 61C or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see *IBM Multiuse Communications Loop Planning Guide*, GA23-0038.

Line Attachment Base For Clocked Modems (#4695%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which provide clocking and comply with EIA RS-232-C CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network . See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature **#4695** installed reduces by one the number of feature **#4696** allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites: #1601** ... **#1001** is required if more than three line attachments **#4695** and/or **#4696** are installed.

Line Attachment Base For Nonclocked Modems (#4696%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600 or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature **#4696** installed reduces by one the number of feature **#4695s** allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites: #1601.** Feature **#1001** is required if more than three line attachments **#4695** and/or **#4696** are installed.

High-Speed Modem Adapter (#4720%x): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see *IBM 4331 Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2). Cannot be installed with 231X DASD attached to the Block Multiplexer Channel **(#1421)**. Cannot be installed with X.21 Adapter for Nonswitched Networks **(#5655)** if its speed is 48,000 bps **#9831**. Cannot be installed with Digital Data Service Adapter **(#5650)** if the Digital Data Service Adapter operates at 56,000 bps **(#9444)**. **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695. **Specify:** BSC and/or SDLC operations are possible ... see Table 4 for Line Position Code and Transmission Mode Codes.

1200 bps Integrated Modem, Nonswitched (#4781%X): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. **Cable Orders:** Required for attachment to external equipment. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #1601 and #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

4331 Processor (cont'd)

1200 bps Integrated Modem, Switched With Auto Answer (#4782%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC registered equivalent for manual answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites: #1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC registered equivalent for auto answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to the nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites: #1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

Local Attachment Interface (#4801%x): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps
400 meters at 2400 bps
200 meters at 4800 bps
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order:** Required for attachment to terminal plate. Customer supplied cable for in-door use. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites: #1601** and **#4695**. **Specify:** SDLC and/or BSC operations are possible, see Table 4.

Digital Data Service Adapter (#5650%x): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to American Telephone and Private Line DDS Network via the American Telephone and Telegraph Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. The speed must be set to the speed specified in the customer's order for service to the common carrier at installation time. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations:** If feature **#5650** is installed with a speed of 56,000 bps (**#9444**), then: [1] High-Speed Modem Adapter (**#4720**) cannot be installed. [2] 231X DASD attached to the Block Multiplexer Channel (**#1421**) cannot be installed. [3] For speed limitations refer to the Communications Adapter Base feature description. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601** and **#4695**. **Specify: #9444**%z for operation at 56,000 bps ... See Table 4 for Line Position Code, Transmission Mode Code, and line speed selection codes.

X.21 Adapter For Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations:** If feature **#5655** operates at 48,000 bps (specify **#9831**), then the following limitations apply: [1] High-Speed Modem Adapter (#4720) cannot be installed ... [2] 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed ... [3] For speed limitations, refer to the Communications Adapter Base feature description. **Maximum:** Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. **Field Installation:** Yes. **Prerequisites: #1601** ... one **#4695** is required for each **#5655** installed. **Specify:** SDLC operation must be specified for this feature ... see Table 4 for line position, transmission mode and transmission speed codes. **Note: #9831**%x is required for 48,000 bps operation. **Cable Order:** Required for attachment to external equipment.

Table 4

Communications Adapter Configuration Feature And Position Codes

	Feature Number %x	Req'd Line Att Base %x	Line Pos. with Line Pos. Codes 1 %z	2 %z	3 %z	4 %z	5 %z	6 %z	7 %z	8 %z
EIA/CCITT Interface (for Clocked Modems)	3701	4695	9531	9532	9533	9534	9535	9536	9537	9538
EIA/CCITT Interface (for Non-clocked Modems)	3701	4696	9521	9522	9523	9524	9525	9526	9527	9528
High-Speed Modem Adapter (7)	4720	4695	9501							
1200 bps Integrated Modems:										
Nonswitched with Switched Network Backup and Auto Answer	4788	4696	9641	9642	9643	9644	9645	9646	9647	9648
Nonswitched with Switched Network Backup and Manual Answer	4787	4696	9631	9632	9633	9634	9635	9636	9637	9638
Switched with Auto Answer	4782	4696	9651	9652	9653	9654	9655	9656	9657	9658
Nonswitched	4781	4696	9661	9662	9663	9664	9665	9666	9667	9668
Digital Data Service Adapter for 2400, 4800 and 9600 bps	5650	4695	9471	9472	9473	9474	9475	9476	9477	9478
56,000 bps (7) (8)			9444							
X.21 Adapter for Nonswitched Networks for 2400-9600 bps	4695	5655	9711	9712	9713	9714	9715	9716	9717	9718
for 48,000 bps			9831							
Local Attachment Interface	4801	4695	9451	9452	9453	9454	9455	9456	9457	9458
Autocall Unit Interface (3)	1020									
First			9541	9542	9543	9544	9545	9546	9547	9548
Second			9551	9552	9553	9554	9555	9556	9557	9558
Transmission Mode (5)										
BSC (1)			9671	9672	9673	9674	9675	9676	9677	9678
Start/Stop (2)			9681	9682	9683	9684	9685	9686	9687	9688
SDLC (1)			9691	9692	9693	9694	9695	9696	9697	9698

Notes:

(1) BSC or SCLC transmission mode with any line attachment feature.

(2) Start/Stop transmission mode only with EIA/CCITT Interface (for nonclocked modem, **#3701** and prerequisite **#4696**) or with any other features offering 1200 bps Integrated Modems (with prerequisite **#4696**).

(3) Must be associated with EIA/CCITT Interface (**#3701** and prerequisite **#4695** or **#4696**). Maximum of two **#1020s** may be installed.

4331 Processor (cont'd)

(5) The aggregate data rate of the Communications Adapter is 64,000 bps ... Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage ... see Table 1 for microcode storage requirements and possible requirement for Control Storage Expansion (**#1901**).

(7) May not be installed when 231X DASD is attached to the Block Multiplexer Channel (**#1421**).

(8) When changing **#9444** to/from **#9471**, no new hardware or diskette is required.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

MODEL CONVERSIONS

For model upgrade from the 4331 to a 4361 processor, refer to the M4361 pages.

Model Conversions within Model Group: Can be made in the field.

Model Group Conversions: Customer price quotation and customer order acknowledgement letters for purchase model upgrades must State: "Installations of this model upgrade involves the removal of parts which become the property of IBM."

Field upgrade from 4331 Model Group 1 to 4331 Model Group 11 is possible ... refer to M4331-11 pages.

Field upgrade from 4331 Model Group 1 to 4331 Model Group 2 is possible ... see below.

Field downgrade from 4331 Model Group 2 to 4321 or 4331 Model Group 1 is not recommended. Field downgrade from 4331 Model Group 11 to 4331 Model Group 1 is not recommended.

For upgrade from 4321 to 4331 Mdl Group 2, refer to 4321 pages.

Field upgrade from 4331 Model Group 1 to Model Group 2: For upgrade of a purchase 4331 Mdl Group 1 processor to Mdl Group 2, conversion RPQ number 7B0697 is required in addition to the mdl upgrade MES if Control Storage Expansion (**#1901**) is not installed or on order for installation prior to the mdl upgrade installation.

ACCESSORIES

CONSOLE TABLE

An operator workstation with modesty skirt has capabilities for two operators with two 3278 mdl 2A/3279 mdl 2C and room for reference material. Attachable book racks may be ordered for manual storage and also serves as a cable control device for the 3278 mdl 2A/3279 mdl 2C, telephones, etc. Table dimensions are 1590mm x 815mm and is equipped with gliders. For field installation, order feature via MES specify on the 4300:

4300 Processors Console Table Accessory, **#1550**
4300 Processors Bookrack and Cable Holder, **#1480**

Console table will be supplied in the same color as the basic machine. It is available only on a purchase basis.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 X 4 Adapter Plate (2AP): The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	**1657300**
Loop Station Connector (Radial LSC)	**1657310**
Loop Station Connector (Wrap LSC)	**1657320**
Loop Station Connector Gasket	**1657260**
Loop Wiring Concentrator (LWC)	**1657330**
LWC Circuit Board Assy (order instead of LWC-1657330) *	**1657332**
Loop Surge Suppressor (LSS)	**1657350**
LSS Circuit Board Assy (order instead of LSS-1657350) *	**1657354**
Continuity and Relay Tester	**1657420**
Wrap Switch Access Cover	**1657325**
Loop Accessory Keys (10 spares) **	**1657379**
2 X 4 Adapter Plate (2AP)	**7838771**
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	**2102151**
Clamp (for cable to indoor box)	**2100264**
ElectricalBox (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	**1657280**
Clamp - small (for indoor cable to environmental box)	**2114285**
Clamp - large (for outdoor cable to environmental box)	**1657377**

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 43XX with Loop Adapter 1 (#4830), 1 key shipped with each LWC and wrap LSC.

Order via MSORDER (Order Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine type 43XX with Loop Adapter 1 (#4830). Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to

4331 Processor (cont'd)

plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

LOOP - CABLES

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265**: UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694**: UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695**: UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267**: For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268**: For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (**P/N 1657265, 7838694** and **7838695**) should be ordered in lengths of 304.8m to 609.6m (1000 to 2,000 feet). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via **P/N 1657300**. A minimum order quantity is 304.8M (1,000 feet).

Exterior cable (**P/N's 1657267** and **1657268**) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Order via MSORDER (Category = Bulk Cable). Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

SUPPLIES (None)

4331 PROCESSOR MODEL GROUP 11

PURPOSE

Provides the power, control, logic and memory circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models, including I/O channels and integrated adapters.

MODELS

Group-Model	Processor Storage (bytes)	Buffer Storage (bytes)
Model J11	1,048,576	4,096
Model K11	2,097,152	4,096
Model L11	4,194,304	4,096

Prerequisites: Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C with keyboard and control panel is required for this purpose.

Maximum Configuration: The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to *IBM 4331 Processor Channel Characteristics,* GA33-1550 or use the HONE aid ANCHLOAD.

HIGHLIGHTS

The 4331 Mdl Group 11 is a featured processor with up to four megabytes of processor storage and contains the following standard hardware features:

	Feature Number on Mdl Group 1 and 2
One block multiplexer channel	#1421
Communications Adapter Base	#1601
128K bytes of control storage	#1901*
Display/Printer Adapter Expansion (16 ports)	#2001
One DASD adapter (3310, 3370 A1 attachment)	#3201
One 8809 adapter	#4910
One byte multiplexer channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment	#7851
ECPS: VM/370 (VM assist microcode)	#8701

* Mdl Group 1

These features are not ordered separately. The processor can contain up to 4,194,304 bytes of monolithic processor storage. Data flow is four bytes parallel. Processor fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64 byte units at a time. The 64 byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode controlled.

> **Note:** The microcode which controls system operations resides in Processor Storage, Reloadable Control Storage and Read-Only Storage. 4331 Mdl Group 11 includes 131,072 bytes of Control Storage plus 12,288 bytes of Read-only Storage. In addition to the microcode contained in this storage approximately 200,000 bytes of Processor Storage are occupied by microcode, RAS workspace and system data.

Standard Functions:

- Processor storage: 1,048,576, 2,097,152 or 4,194,304 bytes for Model Group 11. Approximately 200,000 bytes of processor storage are allocated for system/microcode use. The 4331 Mdl Group11 configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE Mode or S/370 Mode: In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 Mode or in Extended Control Program Support:VSE Mode. The system mode is selectable at Initial Program Load (IPL) time: S/370 Mode allows operation of VM/370, VSE, DOS/VS and DOS. (See "Programming Note" below for details.) ECPS:VSE mode supports operation of an appropriately generated VSE system, with enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3262 Line Printer mdl 1 (650 lpm system printer)
  - 3262 Line Printer mdl 11 (325 lpm system printer)
  - 3268 Printer mdl 2 and 2C (340 cps)
  - 3230 Printer mdl 2 (350/450 cps burst speed)
  - 3289 Line Printer mdl 4 (400 lpm system printer)
  - 3278 Display Station mdl 2, and keyboards
  - 3279 Color Display Station mdl 2A and keyboards
  - 3278 Display Console mdl 2A, keyboard and control panel
  - 3279 Color Display Console mdl 2C, keyboard and control panel
  - 3287 Printer mdls 1,2, 1X and 2C.
  - 4250 Printer
  - 6580 Displaywriter System mdl A4, A6, A8, A10 (25 line display)
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, Standard Functions, and the special features ordered. The System Diskette Facility also allows storage of failure data from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable and Read-Only Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. 4331 Mdl Group 11 includes 131,072 bytes of Reloadable Control Storage plus 12,288 bytes of ROS.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization) remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML/IPL and execute manual control functions on a remote 4331 via a 3275 (real or emulated) terminal at a host location.

Other Standard Functions are:

- Virtual Storage capability by Dynamic Address Translation
- One level addressing facility for improved virtual storage control by VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 Mode)
- S/370 Universal Instruction Set
- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte-Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- 4,096 bytes of high-speed storage.

Programming Note: The ECPS:VSE mode may be invoked at IPL time and supports operation of an appropriately generated VSE Control Program with VSE/Advanced Functions and the SSX/VSE control program.

In S/370 Mode, operation of VSE with VSE/Advanced Functions (generated for use in S/370 Mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2 are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 Mode.

Console Function: An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer. A 3278 Display Console mdl 2A or a 3279 color Display Console mdl 2C is required for this purpose. The Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console mdl 2A or the 3279 Color Display Console mdl 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-Keyboard Mode". In the "Printer-Keyboard Mode", the

4331 Processor Mdl Group 11 (cont'd)

Display Console uses the keyboard for input and the display and a 3287 Printer mdl 1, 2, 1C and 2C or 3268 mdl 2 or 2C for output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360 console operations or as a 3210/3215 Console Printer-Keyboard and operate compatibly with S/370 Console operations. The operation of the 3287 or 3268 mdl 2 or 2C in this mode is optional, but recommended. The "Printer-Keyboard Mode" and the 4250 attachment are mutually exclusive.

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 mdls 1, 2, 1C or 2C or 3268 mdl 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of VSE, the local-attached 3286/3287 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IPL and execute manual control functions on a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

ECPS:VM/370: The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2 corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation and Virtual Interval Time. **Limitations:** May only operate when S/370 Mode has been invoked by IPL.

Byte Multiplexer Channel (Standard): Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. The channel permits simultaneous operations of low-speed devices. Operates at up to 36K bytes per second in single byte mode. Up to 500K bytes per second in burst mode. See *IBM 4331 Channel Characteristics,* GA33-1550, for devices which may be attached and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0. **Limitation:** Magnetic tape devices may not be attached to the byte MPX channel when 231X devices are attached to the block multiplexer channel.

Subchannels: The 4331 mdl Group 11 byte Multiplexer Channel provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one for the Communications Adapter and one for each telecommunication line on the Communications Adapter.

Block Multiplexer Channel (Standard): Provides eight control unit positions. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

Data rate is up to 1.25 million bytes per second ... see *IBM 4331 Channel Characteristics,* GA33-1550, for details. Channel addresses may be selected at installation time from the range of 1 to 6.

Subchannels: The following subchannel combinations can be configured at installation time:

- up to 256 non-shared or shared subchannels each with devices in multiples of 8, up to a total of 256 devices.

Integrated I/O Adapters: The following I/O adapters control the designated I/O devices:

DASD Adapter (Standard)
8809 Magnetic Tape Unit Adapter (Standard)
Display/Printer Adapter (16 Ports, Standard)
Communications Adapter Base (Standard)
5424 Adapter
Loop Adapter

Note: All data passing through the system for any I/O device interferes with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities listed in the feature descriptions.

(2) I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunable devices on the Byte Multiplexer Channel.

It is necessary to consult the *IBM 4331 Channel Characteristics Manual,* GA33-1550, to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

DASD Adapter (Standard): One DASD Adapter provides direct attachment of 3310, 3370 A1 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 operate in fixed block mode. The 3340/3344 operates in Count-Key-Data (CKD) mode. When using 3340/3344 exclusively system throughput can be degraded by a factor of more than two compared with use of fixed block mode devices.

Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The maximum number of strings of each type of device on the DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string. Attachment of 3340/3344 is limited to two strings on the system.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time. The 3340-A2 or the 3370-A1 must have the string switch feature #8150 installed.

With a directly attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a System/3 mdl 12 or 15. This function is available as a conversion aid for users converting to the 4331 Processors from a System/3.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	**01**	**02**	**03**	**04**	**05**	**06**	**07**
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F
				and			
X10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

Display/Printer Adapter (Standard): This adapter allows for attachment of the prerequisite 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to fifteen additional devices chosen from the list below:

3178 Display Station
3230 Printer mdl 2 (350/450 cps burst speed)
3262 Line Printer mdl 1 and 11 (650 and 325 lpm)
3268 Printer mdl 2 and 2C (340 cps)
3278 Display Station mdl 2
3279 Color Display Station mdl 2A
3287 Printer mdls 1, 2, 1C and 2C (80 and 120 cps)
3289 Printer mdl 4 (400 lpm)
4250 Printer
6580 Displaywriter System mdl A4, A6, A8, A10 (25 line display)

These machines may be installed in any combination, provided that (1) only fifteen devices are installed and (2) no more than two System Printers (3262 and/or 3289) are included. Due to the processing power requirements, it is not practical to attach more than four 4250 printers. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287 Printer may be used as a console hardcopy device; one or more 3287 Printers may be used as hardcopy workstation devices. The 3178 Display Station, 3278 Display Station mdl 2 or 3279 Color Display Station mdl 2A may be used as workstations for user-written applications.

The 6580 Displaywriter System emulates a 3278 mdl 2 Display Station, and, optionally, a 3278 mdl 1, 2 Printer. The 6580 may be used as a work station for user-written applications and for hard copy, as a 3278 mdl 2 and 3287 mdl 1, 2. Display/Printer Adapter support includes all standard functions of the 3274 mdl X1B with the 3178, 3278 mdl 2 or 3279 mdl 2A attached. In addition, the following 3278 mdl 2 or 3279 mdl 2A special features are supported: Keyboard Numeric Lock (standard on the 3178), Audible Alarm (standard on the 3178 or 3279), Security Keylock (standard on the 3178) and Switched Control Unit.

4331 Processor Mdl Group 11 (cont'd)

Other 3278 mdl 2 or 3279 mdl 2A special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627 , #4624, #4628 or 3178 mdl C1 or C2 may be selected. If two different keyboards are required for a workstation, one must be #4621. Addresses for these devices are selected at installation time from the range 009 through 01F.

The 6580 Displaywriter System prerequisities for attachment include the 3270 Attached Work Station licensed program (5608-SR9) and the 3274/3276 Attached Work Station adapter (#8332) and specify **#9842** in the 4331 must be ordered for attachment of Displaywriter.

Diskette Drive (Optional): A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below). The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with VSE, refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/3, 32, 34, and 38. One diskette is shipped with the feature. Additional diskettes are available from IBM Information Records Division (SSD). Device address is selected at installation time from the range 009 through 01F. **Limitation:** Support by VM/370 via IUP only.

8809 Magnetic Tape Unit Adapter (Standard): Provides direct attachment of 8809 mdl 1A and up to five additional 8809 tape units (consisting of a mix of 8809 mdl 2s and 3s) ... allows the 8809 Magnetic Tape Unit to operate in streaming mode (date rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rates is up to 20K bytes per second) for other data processing operations. Although physical Read-Backward commands are not supported, the Read-Backward operation is simulated in the Logical IOCS (MTMOD) of VSE. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

5424 Adapter (Optional): Provides native attachment of 5424 Multi Function Card Unit mdls A1 or A2 for 96-column card operations, device address is 04C.

Loop Adapter (Optional): The Loop Adapter on the 4331 is a native attachment method for the 3640 Plant Data Communications Terminals ... 3104 Display Terminals mdls B1, B2 ... 8775 Display Terminal mdls 1 and 2. 3232 Keyboard Printer ... 3287 Printer ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station with their associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexiblity.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one IBM 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the *IBM 4331 Loop Adapter Programming Guide*, SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS announced December 23, 1980 with P80-282. This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization
- 3642 encode check handling
- Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer mdl 11, 3276 Display Control Stations and 3274 mdl 51C, 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal mdls 1, 2 ... 3642 Encoder Printer mdls 1, 2 ... 3643 Keyboard Display mdl 2, 3, 4 including #4920 Badge and Document Encoder ... 3644 Automatic Data Unit ... 3645 Printer ... 3646 Scanner Control Unit ... 3647 Time and Attendance Terminal ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1,2 ... 3232 Keyboard Printer mdl 11 ... 3287 Printer mdls 11, 12 ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station mdls 11-14 with their associated terminals ... 3843 Loop Control Unit. Device addresses are 040 through 07E.

Communications Adapter Base (Standard): The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit Terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For Communications Adapter Base details, see section "Communications and Loops" below.

IBM Stand- Alone Modems

Switched

3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps

Nonswitched

The following modems are supported with the Switched Network Backup feature ... see M3863, 3864, 3865, 3872, 3874, 3875 pages for details:

3863	2400 bps
3864	4800 bps
3865	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

IBM Integrated Modem (V.23, 1200 bps): The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire.
- Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer.

OEM Modems: OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

Digital Data Service Adapter: The Digital Data Service Adapter allows attachment to the AT&T Private Line Dataphone* Digital Service Network by way of an internal Digital Data Service (DDS*) adapter.

* Dataphone and DDS are registered trademarks of the AT & T Company. Other usage of Dataphone and DDS in this text also refers to the registered trademarks of AT & .

X.21 Adapter for Nonswitched Networks: The X.21 interface allows attachment to the X.21 facilities by way of an internal X.21 adapter.

Automatic Calling Equipment: The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- 3872 with Automatic Call Originate feature
- 3874 with Automatic Call Originate feature
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (1-phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Specify **#9841** in 4331 must be ordered for attachment of 3230 or 3268 to 4331. Provides microcode and/or maintenance documen-

4331 Processor Mdl Group 11 (cont'd)

tation if machine is below EC 366586 (microcode for 4331) and/or below EC 366584 (maintenance document) for all mdls.

- 4250 Printer Attachment: Specify **(#9260)** for 4250 Printer attachment to display adapter.
- 6580 Displaywriter System Attachment: Specify **(#9842)** for 6580 attachment to the Display/Printer Adapter.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

  RSF is available in two versions:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

  Specify **#9511** for EIA RS-232-C Interface, 1200 bps, switched network, manual answer. An FCC registered external cable modem compatible with the WE 202S modem, interface and operation, or equivalent, is required.
- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use. **Field Installation:** Yes.

  * 3275 mdl 2 can only be obtained on an "as available" basis.

  Specify ROCF feature **#9511**. The requisite customer supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600 or 1200 bps/sec.
- Loop-Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 61C and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274-51C, 61C and 3276 Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

- Keyboard/Character Set Language: When 3178 Display Station, 3278 Display Stations mdl 2 and/or 3287 Printers and/or 3268 Printer mdl 2 are attached to the Display/Printer Adapter, specify on the 4331 Processor:

  #9441: For ASCII Keyboard/Character Set Language (#4624, #4628, on 3278 mdl 2 or 3279 mdl 2A or S2A and/or 3287 with **#9084**), when used as a workstation, or

  #9442: For EBCDIC Data Entry Keyboards (3178 mdl C1, 3278 mdl 2 or 3279 mdl 2A or S2A with #4622, #4623). In addition, specify on the 4331 Processor either **#9301** for Data Entry Keyboard or **#9302** for Data Entry Keyboard, keypunch layout.

  No specify codes on the 4331 are required for EBCDIC Typewriter Keyboards (3178 mdl C2 or #4621, #4627 on 3278 mdl 2 or 3279 mdl 2A S2A). The 6580 Displaywriter System supports the EBCDIC typewriter keyboard.

  Note: The keyboard/character set language selected must correspond with the mdl of 3178 or the specifications on the 3278 mdl 2 or 3279 mdl 2A or S2A and 3287s. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.
- Console Table: A console table is available ... see #1550 or M4331-1 "Accessories" section. Book Rack and Cable Holder ... see #1480 or M4331-1 "Accessories" section.
- See 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C for console cabling.
- System Environment: For record purposes specify one of the following codes (reference only, no parts required):

  #9701 - This processor is planned to be host/peer connected to a system within the same branch office territory (at installation or at a future time).

  #9702 - This processor is planned to be host/peer connected to a system in a different branch office territory (at installation or at a future time).

  #9703 - This processor is planned to be stand-alone (no host/peer connect).

SPECIAL FEATURES

Notes:

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

Adapter Power Prerequisite (#1001): Provides power and control circuitry necessary for the Communications Adapter, (when more than three line features are attached), and the Adapter Logic. **Maximum:** One. **Field Installation:** Yes. **Prerequisite:** #1002 or for the Loop Adapter (#4830) and/or Communications Adapter Base with more than three line attachments #4695 and/or #4696.

Adapter Logic Prerequisite (#1002): Provides logic and control function necessary for the 5424 Adapter (#3901). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001.

Microcode Storage Requirements: The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, use the following procedure.

Note: An interactive HONE aid (ANCHLOAD) is available dependent on the control program or program product device support to facilitate this procedure.

1) Consulting Table 2, determine the microcode groups required to support the features and I/O to be installed.
2) On the Table 3, place a check mark in the appropriate rows.
3) Find the sum of Table 3 for the required microcode groups.
4) Subtract the control storage of 143,360 bytes from the total of Table 3 and round up to the next multiple of 4,096.

The result of step 4 determines the amount of processor storage occupied by microcode and should be subtracted from the processor storage size ordered to determine the amount available for the user. The storage for group 3 specified in Table 2 (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

Table 2

Function/Feature Installed	Microcode Group
4331 Mdl Group 11 Processor	1
Direct Access Storage Compatibility (#7901)	2
BSC lines installed (**#9671-#9678**)	3
S/S lines installed (**#9681-#9688**)	4
SDLC lines installed (**#9691-#9698**)	5

Note: The Microcode Group 1 contains 4331 Mdl Group 11 standard hardware features, see M4331-11.1 page.

4331 Processor Mdl Group 11 (cont'd)

Table 3

Micro-code Group	Control Storage – or – Processor Storage	Notes
1	331776 8800 1800	Plus Per 3340 buffer. For a second string of 3340s attached to the DASD adapter.
2	28948 4096 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
3	6144	
4	5120	
5	10240	

Diskette Drive (#3401): A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. **Limitations:** Not supported by VM/370. **Maximum:** One. **Field Installation:** Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External Devices must meet the interface specifications outlined in *S/360 Direct Control Feature OEMI,* GA22-6845.

5424 Adapter (#3901%x): Allows attachment of one 5424 Multi-Function Card Unit mdl A1 or A2. **Limitations:** The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter (#4830). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001 and #1002.

Power Interface, Add'L (#5532): Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 4 below lists the control units/devices for which this feature must be installed in the 4331 Processor. Standard Power Interface allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. **Maximum:** One. **Field Installation:** Yes.

Table 4

Control Units/Devices Requiring Power Interface Features

1 - Mandatory:
- 1255 Magnetic Character Reader
- 1287 Optical Reader
- 1288 Optical Reader
- 1419 Magnetic Character Reader
- 1442 Card Read Punch mdl N1
- 1442 Card Punch mdl N2
- 1443 Printer mdl N1
- 2314 Storage Control* mdl A1 and B1
- 2314 Direct Access Storage Facility* mdl 1
- 2415 Magnetic Tape Unit and Control
- 2501 Card Reader mdl B1 and B2
- 2520 Card Read Punch mdl B1, B2 and B3
- 2701 Data Adapter Unit
- 2702 Transmission Control*
- 2703 Transmission Control*
- 2803 Tape Control
- 2821 Control Unit mdls 1, 2, 3, 5 and 6
- 2822 Paper Tape Reader Control*
- 2840 Display Control*
- 2841 Storage Control
- 3272 Control Unit
- 3411 Magnetic Tape Unit and Control
- 3505 Card Reader
- 3540 Diskette Input/Output Unit
- 3704 Communications Controller
- 3705 Communications Controller
- 3791 Controller
- 3800 Printing Subsystem
- 3803 Tape Control
- 3811 Printer Control Unit
- 3881 Optical Mark Reader mdl 1
- 3886 Optical Character Reader mdl 1
- 3890 Document Processor
- 3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize Power Interface features:
- 3274 Control Unit
- 3340 Direct Access Storage Facility
- 3370 Direct Access Storage
- 3203 Printer mdl 5

* No longer available

Direct Access Storage Compatibility (#7901%y): Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 Mode under DOS, DOS/VS, or VM/370, in ECPS:VSE Mode under DOS/VSE. Under DOS/VSE, data sets in fixed block format and in emulated format can coreside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max Number of Emulated Full Volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4331 Compatibility Features,* GA33-1528.

Performance Note: Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

Limitations: [1] Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. [2] Operation of emulation and directly attached 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330 mdl 11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via a string switch. [6] VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370.

Program Order: The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, (5745-030) or combined with VSE/Advanced Functions, and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. **Maximum:** One. **Field Installation:** Yes. See Tables 2 and 3 for microcode storage requirements.

Communications And Loops

Communications Adapter Base (Standard): Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1535. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps and may operate concurrently with other lines provided the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370.

4331 Processor Mdl Group 11 (cont'd)

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Up to eight line features with Digital Data Service Adapters.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High speed operation for oneline (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Limitations: (1) SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. (2) Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. (3) The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines, refer to *IBM 4331 Processor Channel Characteristics,* GA33-1535, which contains tables of pre-analyzed configurations. **Prerequisites:** #1001 is required when more than three telecommunications line features are attached. See Table 2 for microcode storage requirements.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

Communication Facilities: See M2700 pages for communications facility requirements with this feature.

Terminals Supported: For supported terminals refer to tables in the communications adapter feature description of 4331 pages for Mdl Group 1 and 2 or for more details to the M2700 pages.

Autocall Unit Interface (#1020%x): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Limitations:** Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #3701 (in switched operation) for each Autocall Unit Interface installed. **Specify:** Line position, see Table 5 below.

EIA/CCITT Interface (#3701%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** One #4695 or #4696 is required for each feature #3701 installed. **Specify:** Start/Stop, SDLC and/or BSC operations are possible. See Table 5 for Line Position Code and Transmission Mode Codes.

Loop Adapter: Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 mdls B1, B2 and 8775 mdls 1, 2 , 3232 Keyboard Printer mdl 11 and 3287 mdls 11, 12 and/or Control Units 3274 mdl 51C, , 61C and 3276 mdls 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

Device Attachments

3104 Display Terminal mdls B1, B2
3232 Keyboard Printer mdl 11
3641 Reporting Terminal mdls 1, 2
3642 Encoder Printer mdls 1, 2
3643 Keyboard Display mdls 2, 3, 4
  including #4920 Badge and Document Encoder
3644 Automatic Data Unit
3645 Printer
3646 Scanner Control Unit
3647 Time and Attendance Terminal
8775 Display Terminal mdls 1, 2
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C, 61C with the
  associated terminals
3276 Control Unit Display Station mdl 11-14
  with the associated terminals

Control Units and Associated Terminals

3274 Control Unit Mdl 51C, 61C
  3178 Display Station
  3278 Display Station
  3279 Color Display Station
  3262 Line Printer
  3268 Printer mdl 2
  3287 Printer
  3289 Line Printer
6580 Displaywriter System, mdl A4, A6, A8,
  A10 (25-line display)
6580 Displaywriter System mdl B4, B6, B8,
  B10 (66-line display)

3276 Control Unit Display Station Mdl 11-14
  3178 Display Station
  3278 Display Station
  3279 Color Display Station
  3262 Line Printer
  3268 Printer Mdl 2
  3287 Printer
  3289 Line Printer
6580 Displaywriter System, mdl A4, A6, A8,
  A10 (25-line display)
6580 Displaywriter System, mdl B4, B6, B8,
  B10 (66-line display)

In addition the following devices can be attached at 38,400 bps:

3104 Display Terminal mdls B1, B2
8775 Display Terminal mdls 1,2
3232 Keyboard Printer mdl 11
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C , 61C with the
  associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

4331 Processor Mdl Group 11 (cont'd)

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, *IBM Multiuse Communications Loop Planning Guide*.

Loop Installation: For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the *IBM Multiuse Communications Loop Planning Guide*, GA23-0038, and *Installation Guide*, GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to *IBM 4331 Processor Loop Adapter Feature, Operating Procedures*, GA33-1538, and *Problem Determination Procedures*, GA33-1540.

> **Note:** (1) Loop "Accessories" are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See 4331-1 "Accessories" section for details and ordering information.
>
> (2) An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320. **Communications Facilities:** See M2700 pages for communications facility requirements.

Loop Adapter 1 (#4830): Provides for direct attachment of a Loop with one or two Lobes (a lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Adapter power prerequisite (#1001).

Loop Adapter 2 (#4831): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals, and/or 3274-51C, 61C and/or 3276 Control Units, or 38.4K bps for 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 (#4830).

Data Link Adapter (#4840): Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. EIA RS-232, RS-334 support will be provided for nonswitched lines only . Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** Two. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 (#4830).

Loop Adapter Logic Storage Requirements: The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/#4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645	2600	-
		Terminal* Control Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	Total 1	Total 2

*For additional information on buffer space refer to the *IBM 4331 Loop Adapter Characteristics*, GA33-1534.

The storage requirements need to be validated because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

System Diskette Space Requirements: When attaching the Loop Adapter feature with 364X terminals to the 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Mdl Group 11 Processor Feature Facility	System Diskette Records
4331 Basic	3133
DAS Compatibility #7901	170
Start/Stop Transmission Mode **#968X**	20
BSC Transmission Mode **#967X**	24
SDLC Transmission Mode **#969X**	52
364X Terminal Att. **#9251, #9252, #9253, #9254, #9256**	665

The maximum number of system diskette records may not exceed 3876.

Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter: The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775 , 3232 mdl 11 terminals or 3274-51C , 61C or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see *IBM Multiuse Communications Loop Planning Guide*, GA23-0038.

Line Attachment Base For Clocked Modems (#4695%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which provide clocking and comply with EIA RS-232-C CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network . See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4695 installed reduces by one the number of feature #4696 allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

Line Attachment Base For Nonclocked Modems (#4696%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation.

4331 Processor Mdl Group 11 (cont'd)

Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600 or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695s allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

High-Speed Modem Adapter (#4720%x): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see *IBM 4331 Channel Characteristics,* GA33-1535. Cannot be installed with 231X DASD attached to the Block Multiplexer Channel. Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps **#9831**. Cannot be installed with Digital Data Service Adapter (#5650) if the Digital Data Service Adapter operates at 56,000 bps (**#9444**). **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** BSC and/or SDLC operations are possible ... see Table 5 for Line Position Code and Transmission Mode Codes.

1200 bps Integrated Modem, Nonswitched (#4781%X): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. **Cable Orders:** Required for attachment to external equipment. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Switched With Auto Answer (#4782%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC registered equivalent for manual answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC registered equivalent for auto answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to the nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

Local Attachment Interface (#4801%x): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps
400 meters at 2400 bps
200 meters at 4800 bps
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order:** Required for attachment to terminal plate. Customer supplied cable for in door use. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** SDLC and/or BSC operations are possible, see Table 5.

Digital Data Service Adapter (#5650%x): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to American Telephone and Private Line DDS Network via the AT&T Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. The speed must be set to the speed specified in the customer's order for service to the common carrier at installation time. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations:** If feature #5650 is installed with a speed of 56,000 bps (**#9444**), then: [1] High-Speed Modem Adapter (#4720) cannot be installed. [2] 231X DASD attached to the Block Multiplexer Channel cannot be installed. [3] For speed limitations refer to the Communications Adapter Base feature description. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** **#9444**%z for operation at 56,000 bps ... See Table 5 for Line Position Code, Transmission Mode Code, and line speed selection codes.

X.21 Adapter For Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations:** If feature #5655 operates at 48,000 bps (specify **#9831**), then the following limitations apply: [1] High-Speed Modem Adapter (#4720) cannot be installed ... [2] 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed ... [3] For speed limitations, refer to the Communications Adapter Base feature description. **Maximum:** Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. **Field Installation:** Yes. **Prerequisites:** One #4695 is required for each #5655 installed. **Specify:** SDLC operation must be specified for this feature ... see Table 5 for line position, transmission mode and transmission speed codes. **Note:** **#9831**%x is required for 48,000 bps operation. **Cable Order:** Required for attachment to external equipment.

Table 5

Communications Adapter Configuration Feature And Position Codes

	Feat Number %x	Req'd Line Att Base %x	Line Pos. with Line Pos. Codes 1 %z	2 %z	3 %z	4 %z	5 %z	6 %z	7 %z	8 %z
EIA/CCITT Interface (for Clocked Modems)	3701	4695	9531	9532	9533	9534	9535	9536	9537	9538
EIA/CCITT Interface (for Non-clocked Modems)	3701	4696	9521	9522	9523	9524	9525	9526	9527	9528
High-Speed Modem Adapter (7)	4720	4695	9501							
1200 bps Integrated Modems:										
Nonswitched with Switched Network Backup and Auto Answer	4788	4696	9641	9642	9643	9644	9645	9646	9647	9648
Nonswitched with Switched Network Backup and Manual Answer	4787	4696	9631	9632	9633	9634	9635	9636	9637	9638
Switched with Auto Answer	4782	4696	9651	9652	9653	9654	9655	9656	9657	9658
Nonswitched	4781	4696	9661	9662	9663	9664	9665	9666	9667	9668

4331 Processor Mdl Group 11 (cont'd)

Digital Data Service Adapter for 2400, 4800 and 9600 bps	5650 4695	9471	9472 9473	9474 9475	9476 9477	9478	
56,000 bps (7) (8)		9444					
X.21 Adapter for Nonswitched Networks for 2400-9600 bps	5655 4695	9711	9712 9713	9714 9715	9716 9717	9718	
for 48,000 bps		9831					
Local Attachment Interface	4801 4695	9451	9452 9453	9454 9455	9456 9457	9458	
Autocall Unit Interface (3)	1020						
First		9541	9542 9543	9544 9545	9546 9547	9548	
Second		9551	9552 9553	9554 9555	9556 9557	9558	
Transmission Mode (5)							
BSC (1)		9671	9672 9673	9674 9675	9676 9677	9678	
Start/Stop (2)		9681	9682 9683	9684 9685	9686 9687	9688	
SDLC (1)		9691	9692 9693	9694 9695	9696 9697	9698	

Notes:

(1) BSC or SCLC transmission mode with any line attachment feature.

(2) Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696).

(3) Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.

(5) The aggregate data rate of the Communications Adapter is 64,000 bps ... Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage ... see Table 2 for microcode storage requirements.

(7) May not be installed when 231X DASD is attached to the block multiplexer channel.

(8) When changing **#9444** to/from **#9471**, no new hardware or diskette is required.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

MODEL CONVERSIONS

Model Changes within Model Group: Can be made in the field. Customer price quotations and customer order acknowledgement letters for purchase model conversions must state, "Installation of this model upgrade involves the removal of parts which become the property of IBM".

Field upgrade from 4331 Mdl Group 1 or 4321 to 4331 Mdl Group 11 is possible. The 4331 Mdl Group 11 can be field upgraded to 4331 Mdl Group 2.

Downgrades from 4331 Mdl Group 2 to 4331 Mdl Group 11 and from 4331 Mdl Group 11 to 4331 Mdl Group 1 or to the 4321are not recommended for field installation.

Field Upgrade from 4331 Mdl Group 1 to 4331 Mdl Group 2, refer to machine pages for 4331 Mdl Group 1 and 2.

Field Upgrade from 4331 Mdl Group 1 to 4331 Mdl Group 11: When a leased 4331 Mdl Group 1 is upgraded to the 4331 Mdl Group 11, features and specifications installed on the 4331 Mdl Group 1 which are not available on the 4331 Mdl Group 11 should be deleted with the upgrade MES order. Features installed on the 4331 Mdl Group 1 which are standard on the 4331 Mdl Group 11 should be deleted, i.e, changed to standard, for record purposes. Features which are standard on 4331 Mdl Group 11, but are not installed on a leased 4331 Mdl Group 1 being upgraded, are automatically added to the configuration.

For upgrade of a purchased 4331 Mdl Group 1 to 4331 Mdl Group 11 features installed on the 4331 Mdl Group 1 which are not available on the 4331 Mdl Group 11 have to be removed. An RPQ has to be submitted listing each feature to be removed. There will be a charge for this RPQ. The features removed are the customer's property.

Standard features of the 4331 Mdl Group 11 not installed on the 4331 Mdl Group 1 are added to the configurations The 4331 Mdl Group 1 prices of these features are added to the model upgrade prices.

Standard features of the 4331 Mdl Group 11 already installed on a purchased 4331 Mdl Group 1 should be deleted, i.e., changed to standard, for record purposes.

Field Upgrade from 4331 Mdl Group 11 to 4331 Mdl Group 2: Standard features of the 4331 Mdl Group 11 which are to be retained on the 4331 Mdl Group 2 have to be included in the MES order using the individual feature and specify codes of the 4331 Mdl Group 2.

Order for the 4331 Mdl Group 2 Processor:

Block Multiplexer Channel	#1421
Communication Adapter Base	#1601
Display/Printer Add'l Expansion	#2001
DASD Adapter	#3201
8809 Adapter	#4910
Byte Multiplexer Channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment (If required)	#7851
ECPS:VM/370 (VM assist) (if required)	#8701

Other features or specifies on the 4331 Mdl Group 11 are retained unchanged on the 4331 Mdl Group 2.

ACCESSORIES

See M4331-1 "Accessories" for additional information and field installation of Console Table (#1550), Book Rack and Cable Holder (#1480) and "Loop Accessories" and "Loop Cables".

SUPPLIES (None)

4341 PROCESSOR

PURPOSE

Provides power, control, logic and memory circuitry for the arithmetic, logic and processor storage functions of the 4341 Processor.

MODELS

Mdl Grp 9	Mdl Grp 10	Mdl Grp 1	Mdl Grp 11	Mdl Grp 2	Mdl Grp 12	Bytes of Processor Storage
J9						1,048,576
K9	K10	K1	K11	K2	K12	2,097,152
L9	L10	L1	L11	L2	L12	4,194,304
			M11	M2	M12	8,388,808
				N2	N12	12,582,912
				P2	P12	16,777,216

Note: The microcode which controls system operations resides in Reloadable Control Storage and keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. See "Microcode Storage Requirements" below for details.

Prerequisites: Each 4341 Processor requires one 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel.

HIGHLIGHTS

From 2,097,152 to 16,777,216 bytes of monolithic processor storage depending upon the mdl ... see "Models" above.

Processor base cycle time in nanoseconds:

Mdl Groups					
Grp 9	Grp 10	Grp 1	Grp 11	Grp 2	Grp 12
150-300	150-300	150-300	120-240	120-240	115-230

8-byte parallel data flow within the processor as well as an 8-byte wide data flow between the processor, storage and channels.

Processor High-Speed Buffer storage in bytes:

Mdl Groups					
Grp 9	Grp 10	Grp 1	Grp 11	Grp 2	Grp 12
2,048	4,096	8,192	8,192	16,384	16,384

Buffer storage is transparent to the program and significantly reduces the effective access time of storage. Buffer storage does not increase the amount of addressable storage. Extensive data checking, error recording by the hardware itself and remote maintenance are coupled with increased availability and serviceability.

Standard Features Include: Virtual Storage Capability by Dynamic Address Translation ... Byte and Block Multiplexer Channels ... Data Streaming Mode ... One-Level Addressing Facility for Improved Virtual Storage Control by DOS/VSE (ECPS:VSE Mode) ... Channels with Virtual Storage Addressing (ECPS:VSE Mode) ... 128-1024 UCWs ... Channel Indirect Addressing in S/370 Mode ... Channel Command Retry ... EC and BC Modes ... Byte Oriented Operands ... Clock Comparator and CPU Timer ... Control Registers ... Error Checking and Correction in Processor Storage ... Extended Control-Program Support for DOS/VSE, VS1, VM/370 and MVS ... Extended Precision Floating Point ... Interval Timer ... Machine Check Handling ... Support Processor ... Instruction Retry ... Program Event Recording ... Reloadable Control Storage ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... System Diskette Drive ... Time-of-Day Clock ... PSW Key Handling ... Compare and Swap and Compare Double and Swap ... Clear I/O ... External Signal ... Unit Power Off ... Move Inverse Instruction (not software supported) ... Engineering Scientific Assist (Multiply Add facility) on Mdl Group 9, Mdl Group 10, Mdl Group 11, Mdl Group 2 and Mdl Group 12 Processors ... Fast Release for the Start I/O Fast Release Instruction for the Mdl Group 12.

Modes of Operation: Two modes of operation are available. The mode is selected from a common diskette at Initial Microcode Load (IML) time.

- ECPS:VSE Mode – allows operation of an appropriately generated DOS/VSE system, offering potential for enhanced systems performance.
- S/370 Mode – allows operation of any program written for S/370 and S/360 that does not violate the exceptions noted under "Compatibility" below. **Note:** DOS/VSE in S/370 Mode will not operate on 12MB and 16MB models, except under VM/370. See the Programming Support Section for those SCPs which contain 4341 support. In this mode, two performance options and an MVS support option are available. These options are selected at IML time and are mutually exclusive on Mdl Group 9, Mdl Group 10, Mdl Group 1 and Mdl Group 11 processors. On Mdl Group 2 and Mdl Group 12 processors with ECPS Expansion Feature (#1601), ECPS:VM/370 and ECPS:MVS can operate concurrently.
  - ECPS:VS1 – hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in OS/VS1, Release 7. The functional areas include:

    IOS
    SVC FLIH
    System Trace
    Page Management

    Note: OS/VS1 Release 7 with or without OS/VS1 Basic Programming Extension will operate on 12MB and 16MB mdls, but the SCP will only access up to 8MB. However, when OS/VS1 runs as a guest SCP under VM/370 and the VM Handshaking feature is specified, an OS/VS1 system can utilize up to 16MB.
  - ECPS:MVS – hardware facility that provides 14 privileged instructions necessary to allow the 4341 processor to be supported by the MVS System Product – JES2, 5740-XYS, and MVS/System Product – JES3, 5740-XYN. The instructions involve the following MVS functional areas:

    SVC Interrupt Handling
    Integrity
    Tracing
    Lock Management
    Real Storage Management

    On Mdl Group 2 and Mdl Group 12 processors, the ECPS:MVS hardware facility is extended to include the dual address space facility a function supported by MVS/System Product-JES2 Release 3 and MVS/System Product-JES3 Release 3 and defined in *IBM System/370 Principles of Operation,* GA22-7000-7. This extension facilitates communication among address spaces in an MVS/SP environment. In addition, the extensions include the ADD FRR instruction and the Page Fault Assist function, defined in *IBM System/370 Assists for MVS,* GA22-7079-1.
  - ECPS:VM/370 – hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in VM/370 Release 6. The functional areas include:

    Virtual Machine I/O
    Storage Management
    SVC Handler
    Privileged Instruction Emulation
    Dispatching
    Virtual Interval Timer

    On Mdl Group 2 and Mdl Group 12 processors, whenever ECPS:VM/370 and ECPS:MVS are both selected at IML time, ECPS:VM/370 is enhanced to include the functions of the Shadow-Table Bypass Assist defined in *Virtual Machine Assist and Shadow-Table-Bypass Assist,* GA22-7074. These functions are defined to enhance the performance of MVS running under VM/370 in a V=R environment with VM System Extensions Release 2 or VM/System Product. (#1601, ECPS Expansion Feature is required.)

The Engineering/Scientific Assist can be used in both modes of operation.

Control Storage Requirements: [Mdl Group 2 and 12] ECPS Expansion Feature (#1601) is required to support concurrent operation of ECPS:VM/370 and ECPS:MVS.

System Diskette Drive: This is the basic microcode loading device for the system. The several removable diskettes that will be supplied with the system will contain all of the required microcode for CE diagnostics, basic systems features, plus the optional features ordered for the system. The System Diskette File also allows recording of system failure data for later CE diagnostics.

In addition, the system diskette file provides automated Problem Analysis for use by console operators and system programmers. Basic data are collected and analyzed. Messages are displayed which describe system problems or status and suggest corrective actions. Options are included for sending service information to IBM via RSF and for running an additional processing unit analysis test when required.

4341 Processor (cont'd)

Console Function: A 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel is required. It is the principal device provided for the operator to communicate with the system. The operator may use the keyboard and the display to control the system operation as well as to display the status of the system. The primary Operator Console Keyboard includes the operator control panel. The 3278 mdl 2A and 3279 mdl 2C has a screen size of 1,920 characters, 24 lines at 80 characters per line. The bottom four lines (lines 21-24) are reserved for system status information and are not accessible to the user. 3278/3279 features other than those basic to the primary console display/keyboard are not supported. Up to three optional (for a total of four) 3278 Operator Display Consoles mdl 2A or 3279 Color Operator Display Console mdl 2C or 3268 Printer mdsl 2 and 2C or 3287 Printers mdl 1, 2, 1C or 2C for hard copy output are also available in any combination.

Two console modes are available -- "Display Mode" and "Printer-Keyboard Mode". In "Display Mode", the keyboard is used for input, the display with 20 lines of 80 characters/line for output, and DOS/VSE, OS/VS1 Release 7 to VM/370 Release 6 or MVS Release 3.8 with the MVS/System Product-JES2 or MVS/System Product-JES3 support is required. The optional 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 has a separate address. In "Printer-Keyboard Mode", the 3278 mdl 2A Display Console or 3279 mdl 2C Color Display Console uses the keyboard for input and the display and a recommended 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C for output. The display/keyboard and 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C appear to the system as a Console Printer-Keyboard. This allows the 4341 Processor user to run an operating system which has been generated for use on a S/360 with a 1052 typewriter keyboard console or a S/370 with a 3210 or 3215 console.

Channels Mdl Group 9, Mdl Group 10 and Mdl Group 1: Six channels in two groups are available. Group 1 (standard) consists of 1 byte multiplexer channel and 2 block multiplexer channels. Group 2 (optional) consists of 3 block multiplexer channels. One of the 2.0 million byte per second block multiplexer channels in the second group (channel 4) can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexer speed in million bytes per second for the following Mdl Groups:

Mdl Group 1, 9, 10

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	-	-	-	6
Option 2	byte	3	3	2	2	1	11
Option 3	byte	3	3	2	byte	1	9

Channels Mdl Group 11, Mdl Group 2 and Mdl Group 12: Six channels are standard, consisting of one byte multiplexer channel and five block multiplexer channels. One of the block multiplexer channels can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexor speed in million bytes per second for the following Mdl Groups:

Mdl Group 2, 11

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	2	2	12
Option 2	byte	3	3	2	byte	2	10

Mdl Group 12

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	3	2	13
Option 2	byte	3	3	2	3	byte	11
Option 3	byte	3	3	2	byte	2	10

Data Streaming Mode can operate on any 4341 block multiplexer channel up to the maximum data rates specified above.

The capability for the attachment and automatic I/O power sequencing of up to 24 separate control units is standard. Optionally, 48 control units can be attached. An optional Channel to Channel Adapter is also available.

Compatibility: Any program written for S/370 will operate on the 4341 Processor in S/370 Mode, provided that it (1) is not time-dependent, (2) does not depend on system facilities (storage size, I/O equipment, optional features, etc.) being present when the facilities are not included in the configuration, (3) does not depend on system facilities (such as operation codes) being absent when the facilities are included in the 4341 Processor, and (4) does not depend on results or functions which are defined in the *Principles of Operation* to be unpredictable or model-dependent.

Any program written for S/360 will operate on the 4341 Processor in S/370 Mode, provided that it follows the above rules and does not depend on functions that differ between S/360 and S/370.

Any program written for the 4331 Processor in ECPS:VSE Mode or S/370 Mode will operate on the 4341 Processor, provided it follows the above rules. **Note:** DOS/VSE and prior DOS releases in S/370 Mode will not operate on the 4341 12MB and 16MB models, except under VM/370.

For more details, see *S/370 Principles of Operation,* GA22-7000, or *4300 Processors Principles of Operations for ECPS:VSE Mode,* GA22-7070.

Microcode Storage Requirements: The microcode which controls system operations resides in Reloadable Control Storage and keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. The amount required is the sum of Processor Storage required by two user selectable options: [1] the number of Unit Control Words (UCWs) selected, and [2] the mode of operation.

1. Number of UCWs:

   128 UCWs are basic on the 4341 and require 8,192 bytes of Processor Storage. Additional UCWs are allocated as required in groups of 32, each group requiring an additional 2,048 bytes of Processor Storage. The maximum number of UCWs on 4341 is 1,024.

   UCW assignment is user-dependent. It is the customer's responsibility to designate desired I/O addresses and configurations to service personnel. Channel configurations should be reviewed during pre-installation planning for new systems and when additional I/O devices are attached or existing equipment is reconfigured.

   For specific device requirements, see the appropriate machine pages.

2. Depending on which mode of operation is selected at IML time, processor storage will be required as follows:

	.... Mode of Operation	
	ECPS:VSE Mode	S/370 Mode
4341 J9 K1 K2 K9 K10 K11 K12	49,152 bytes	10,240 bytes
4341 L1 L2 L9 L10 L11 L12	51,200 bytes	10,240 bytes
4341 M2 M11 M12	55,296 bytes	10,240 bytes
4341 N2 N12	59,392 bytes	10,240 bytes
4341 P2 P12	63,488 bytes	10,240 bytes

Bibliography: GC20-0001

4341 Processor (cont'd)

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Cabling: For the primary console with Operator Control Panel (OCP) signal and control cables are shipped with the processor. 7.6m (25 feet) is standard. Cables longer than 7.6m (25 feet), up to a maximum length of 45.6m (150 feet) may be obtained by RPQ. Each additional console device (without OCP) requires a cable order. For cable order information, refer to the *4300 Processor Installation Manual - Physical Planning*, #GA24-3667.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray. **Note: #9061, #9062, #9063** are slightly different colors from those available on previous machines.
- Dimensions: The normal dimensions of the larger of two 4341 Processor frames are 62-3/4" x 32" x 39-1/2". Dimensions can be reduced to 60" x 29-1/2" x 38-1/2", if required, by local field engineering. No materials need to be ordered.
- Remote Support Facility: The Remote Support Facility utilization (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4341 Processor. It provides service personnel the capability of remotely controlling the 4341 from any RETAIN terminal and allows the IBM CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF Modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *4300 Processors Installation Manual - Physical Planning*, GA24-3667.

  RSF is available in two versions for Mdl Group 1 and three versions for the other mdls:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone set with exclusion Key and with FCC registered Data Access Arrangement (DAA), compatible with CDT Type Coupler Series 1000A interface and operation is required.

  Specify **#9511** for EIA-Interface, 1200 bps, switched network, manual answer. An FCC registered external modem compatible with the WE202S modem, interface and operation, or equivalent is required.

  For Mdl Group 2, Mdl Group 9, Mdl Group 10, Mdl Group 11 and Mdl Group 12, specify **#9512** for integrated modem with integrated protective circuits, 1200 bps, switched network, manual answer. (An external protective coupler is not required.) A telephone set with exclusion key and an RJ41S or RJ45S type data jack are required. Protective couplers are FCC registered. The FCC Registration number is AN09SA-67992-DP-N and Ringer Equivalence Number (REN) 0.8B.

  If Remote Support Facility is not desired, no specify code is required.
- Remote Operator Console Facility: The Remote Operator Console Facility (ROCF) is an extension of RSF. It gives personnel at a host site the ability to dial-up and control a remote 4341 by means of a 3275 mdl 2 Display Station or by means of host site programming support.

  Specify RSF feature **#9511**. The customer-supplied external modem attached to feature **#9511** must include auto answer.

SPECIAL FEATURES

ECPS Expansion (#1601): [Mdl Group 2 or 12] Adds 16,384 bytes of control storage. See "Control Storage Requirements" under "Highlights" for details. **Maximum:** One. **Field Installation:** Yes. Field installation of #1601 involves the removal of parts which become the property of IBM. **Prerequisites:** A 4341 Mdl Group 2 or Mdl Group 12 Processor.

Channel-To-Channel Adapter (#1850): One channel to channel feature is optionally available to interconnect two channels (4341 Processor, S/360, S/370) ... one of the processors requires this feature ... requires one control unit position on each of the connected channels. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] #4631 must be specified on the primary 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C. [2] One control unit position on a block multiplexer channel.

Block Multiplexer Channels Add'l (#1870): [Mdl Group 9, 10, 1] An optional group of three block multiplexer channels permits simultaneous operation of high speed devices at a data rate of 2.0MB/second for two channels and 1.0MB/second for one channel. One of the 2.0 million byte per second block multiplexer channels in the second group (Channel 4) can be optionally selected as an additional byte multiplexer channel at installation time. **Limitations:** Not available on 4341 Mdl Group 2, 11, or 12 since five block multiplexer channels are standard. If installed on a 4341 Mdl Group 1, 9, or 10, this feature designation should be deleted with the order entry for conversion to a 4341 Mdl Group 2, 11, or 12. This is for order entry purposes only. The channels are not physically removed when upgrading. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A 4341 Mdl Group 1, 9, or 10 Processor.

Channel Control Unit Positions, Add'l (#1890): This feature is required for the automatic I/O power sequencing of more than 24 control units from the 4341 Processor. Standard on the 4341 is the capability to attach up to 24 control units, not to exceed eight per channel. With this feature, 25 to 48 Control Units may be attached and automatically powered up, not to exceed eight per channel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1870 on Mdl Group 9, Mdl Group 10 or Group 1 Processor.

MODEL CONVERSIONS

There are no additional installation charges for allowable upgrades of a purchased 4341 processor. Select the appropriate upgrade MES from the table below. Since six channels are standard on the Model Group 11 and Model Group 2, MES upgrade prices for upgrades to these two models from Model Group 10 or Model Group 1 without Add'l Block Multiplexer Channels #1870 installed will include the price for (#1870). Customer price quotations and customer order acknowledgment letters for purchase MESs must state: "Installation of a model upgrade and special feature additions involves the removal of parts which become the property of IBM." Other mdl changes and storage downgrades are not recommended for field installation.

4341 Model Group 9

From Model	To Model				
	J9	K9	L9	K10	L10
J9	-	MES	MES	MES	MES
K9	**	-	MES	MES	MES
L9	**	**	-	MES	MES

4341 Model Group 10

From Model w #1870	To Model via MES				
	K10	L10	K11	L11	M11
K10	-	MES	MES	MES	MES
L10	**	-	**	MES	MES
	K12	L12	M12	N12	P12
K10	MES	MES	MES	MES	MES
L10	**	MES	MES	MES	MES
w/o #1870					
	K10	L10	K11	L11	M11
K10	-	MES	MES	MES	MES
L10	**	-	**	MES	MES
	K12	L12	M12	N12	P12
K10	MES	MES	MES	MES	MES
L10	**	MES	MES	MES	MES

4341 Processor (cont'd)

4341 Model Group 1

From Model w #1870	To Model via MES				
	K1	L1	K11	L11	M11
K1	-	MES	MES	MES	MES
L1	**	-	**	MES	MES
	K2	L2	M2	N2	P2
K1	MES	MES	MES	MES	MES
L1	**	MES	**	MES	MES
	K12	L12	M12	N12	P12
K1	MES	MES	MES	MES	MES
L1	**	MES	MES	MES	MES
w/o #1870					
	K1	L1	K11	L11	M11
K1	-	MES	MES	MES	MES
L1	**	-	**	MES	MES
	K2	L2	M2	N2	P2
K1	MES	MES	MES	MES	MES
L1	**	MES	**	MES	MES
	K12	L12	M12	N12	P12
K1	MES	MES	MES	MES	MES
L1	**	MES	MES	MES	MES

4341 Model Group 11

From Model	To Model via MES							
	K11	L11	M11	K12	L12	M12	N12	P12
K11	-	MES	MES	MES	MES	MES	MES	MES
L11	**	-	MES	**	MES	MES	MES	MES
M11	**	**	-	**	**	MES	MES	MES

4341 Model Group 2

From Model	To Model via MES				
	K2	L2	M2	N2	P2
K2	-	MES	MES	MES	MES
L2	**	-	MES	MES	MES
M2	**	**	-	MES	MES
N2	**	**	**	-	MES
	K12	L12	M12	N12	P12
K2	MES	MES	MES	MES	MES
L2	**	MES	MES	MES	MES
M2	**	**	MES	MES	MES
N2	**	**	**	MES	MES
P2	**	**	**	**	MES

4341 Model Group 12

From Model	To Model via MES				
	K12	L12	M12	N12	P12
K12	-	MES	MES	MES	MES
L12	**	-	MES	MES	MES
M12	**	**	-	MES	MES
N12	**	**	**	-	MES

**Not recommended for field installation.

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the P/N indicated below.

Bookrack and Cable Holder (#1480): Provides a storage rack for use with Console Table (#1550) only. Up to four racks can be mounted on one table.

Console Table, 4300 Processors (#1550): Provides a convenient workstation table to support one or two 3278 mdl 2As/3279 mdl 2Cs.

SUPPLIES (None)

4361 PROCESSOR MDL GROUPS 4, 5

PURPOSE

Provides the power, control, logic and memory circuitry necessary for the Processor Central Electronic Complex including I/O channels and integrated device adapters.

MODELS

Model Group 4	Model Group 5	Processor Storage (bytes)
Model K04	Model K05	2,097,152
Model L04	Model L05	4,194,304
Model LK4	Model LK5	6,291,456
Model M04	Model M05	8,388,608
Model ML4	Model ML5	12,582,912

HIGHLIGHTS

The 4361 Processors incorporate several design and technology advances to achieve substantial performance gains relative to the 4331 Processors. They are designed as one physical unit including all CEC functions and the service processor. Each is comprised of the following:

- Instruction processing unit with:
  - A High-Accuracy Arithmetic Facility that allows computational procedures with maximum accuracy and automatic verification of results.
  - Floating-point multiply hardware accelerator using high-speed array multiplier logic. It improves floating-point multiply instruction execution times by a factor of 3 to 8 over microcode implementation.
  - Implementation of frequently used instructions in hardware rather than in microcode.
- Channel processor which controls integrated I/O attachments and the I/O interface channels. It operates concurrently with the instruction processing unit for maximum throughput.
- Service processor which controls the operator console, the maintenance and service functions and the locally attached displays, printers, and diskette drive.
- Processor storage from 2 to 12 megabytes.
- High-speed cache buffer storage with 100 nanosecond cycle speed; (8K bytes on Mdl Group 4, 16K bytes on Mdl Group 5).
- High-speed reloadable control storage of 150K bytes.

Data flow is four bytes parallel within the processors and eight bytes parallel between the processors and main storage. Processor fetch cycles from the cache are 100 nanoseconds each for four bytes. The cache is automatically replenished from main storage in 64-byte blocks. The 64-byte fetch cycle requires 1.9 microseconds. The store cycle requires 2.2 microseconds.

Microcode: The microcode which controls systems operations resides in processor storage and reloadable control storage. The 4361 includes 150K bytes of Reloadable Control Storage, which is not available to the user. In addition, approximately 350,000 bytes of processor storage are occupied by microcode, RAS workspace and system data. The approximate processor storage available to the user is obtained by subtracting 350,000 bytes from the nominal storage size of a given mdl. When directly attached 3340 or DAS Compatibility is used, approximately 100K of additional storage is required for I/O buffers.

The system diskette facility is the microcode loading system for the 4361 Processors. The facility includes two diskette drives, and the second is available to the user after initial microcode loading.

The diskettes shipped with the processor supply the microcode for diagnostics, standard functions, and all optional features. The facility is also used for the storage of processor failure data for analysis by IBM customer engineers.

Operational Modes: The 4361 Processor operates in either S/370 mode or in Extended Control Program Support (ECPS):VSE mode. The mode is selectable at Initial Program Load (IPL) time.

ECPS:VSE supports operation of an appropriately generated VSE or SSX/VSE system.

S/370 mode allows operation of VM/370, VSE, OS/VS1, MVS/370 (on Mdl Group 5).

Performance: The 4361 Processors incorporate several design and technology advances to achieve substantial performance gains relative to the 4331 Processors:

- New instruction processing unit and cache buffer storage each with 100 nanosecond cycle speeds.
- A separate channel processor which operates concurrently with the instruction processing unit.
- Additional, frequently used instructions implemented in hardware rather than in microcode.
- Floating-point multiply hardware accelerator using high-speed array multiplier logic.
- Larger storage, higher internal data rates, and additional data paths.
- Support of the Start I/O Fast Release instruction with queuing of I/O requests on the Mdl Group 5.

Instruction execution rates, relative to the 4331-2, are approximately as follows:

	Mdl Group 4	Mdl Group 5
For commercial workloads	2	3
Workloads For Engineering/Scientific		
Single Precision	3	4
Double Precision	6	6

STANDARD FUNCTIONS

High-Accuracy Arithmetic Facility: A high-accuracy arithmetic facility is included. New floating-point instructions in addition to the S/370 floating-point instruction set are implemented in the 4361. They compute the basic arithmetic operations (+, -, x, /) and the scalar (dot) product with maximum accuracy, providing directed rounding (up, down, to nearest, to zero) for the short and long floating-point hexadecimal formats. Maximum accuracy is defined as between the computed floating-point result and the exact result (infinite precision) there is no other floating point number.

A set of subroutines using these instructions have been developed, which allow computations where the existence, uniqueness and validity of the solution and the accuracy of the results are algorithmically verified. If no solution can be achieved in the case of extremely ill-conditioned problems, the user is notified. A new program product, High-Accuracy Arithmetic Subroutine Library, 5664-185, provides these subroutines for use in programs compiled with VS/FORTRAN under VM/SP.

The application areas which should benefit from this facility include: professional personal computing, education in numerical mathematics, research in numerical methods, and mathematical problem solving in such areas as structural analysis, optimization, nuclear energy, power net distribution, forecasting, robotics, and others.

Direct Attachment Capability for Intelligent Workstation: The 3270 Personal Computer - control unit terminal mode only (see Note), and the 6580 Displaywriter System can be attached to the 4361 processors via the Display/Printer Adapter or remotely connected via the Communication Adapter. These attachments provide additional capability for Office applications. Several emulation features on the Displaywriter enable access to S/370 host networks.

The 5150 Personal Computer can be direct-attached to the 4361 via the Communication Adapter. Through the use of 3270 or 3101 emulation features, customers can access host applications. When the Personal Computer is not used for that purpose, it is available for use in native mode.

The IBM 3270 Personal Computer Attachment (PC attached via a 3278) to the Display/Printer Adapter supports concurrent operation of host and Personal Computer programs. The file transfer function from Personal Computer to host and the screen capture function to the PC printer or diskette are not supported. No specify is required on the 4361. For prerequisites on the Personal Computer and the 3278, see the "Machine" pages for these devices.

On the 6580 Displaywriter System and the 3270 Personal Computer Attachment when attached to the DPA, a 'Hot Key' function provides the capability to switch between the native mode and 3270 emulation mode, that is, switching between local operation and network connection.

Console Function: An operator's display console, keyboard, and control panel is a prerequisite for use of the system. The display console can be a 3278 mdl 2A or a 3279 mdl 2C (color), with keyboard feature **#4634**.

The Operator Control Panel allows additional communication with the system. A maximum of 20 of the 25 lines on the display may be used for system communication; four lines are reserved for messages from the 4361 Processor, and one line displays messages unique to the 3278 mdl 2A or the 3279 mdl 2C. The console address is selected at system installation time.

Note: Certain MVS components, such as DCCF, require output to a 24-line display. In these cases, an alternate console must be assigned to a terminal other than the operator console.

The console can operate in "Display Mode" or in "Printer/Keyboard Mode".

4361 Processor Mdl Groups 4, 5 (cont'd)

- In Display Mode, the keyboard is used for input and the CRT, with 20 80-character lines, is used for output. The 3287 or the 3268 Printers, if attached, has its own address and are supported as an independent device.
- In Printer/Keyboard Mode, the console and an optional printer have a single address, and operation is in single-line mode compatible with the 1052/3210/3215 devices of the older S/360 and S/370.

Printer/Keyboard Mode is selected at IPL time and is exclusive with the 4250 Image Printer operation. Remote Operator Console Facility (ROCF) is an extension of the Remote Support Facility (RSF) and provides an operator at a host location the ability to IML, IPL, and execute other manual control functions for a remote 4361 via a 3275 display station, or via a 3275 emulated on a host-attached 3278.

Maintenance Facilities: Remote Support Facility (RSF) is an IBM Customer Engineering tool provided by the Service Processor. Installation of the corequisite IBM modem is a no-charge customer option. RSF permits IBM Field Technical Support Center specialists after customer authorization to remotely monitor and/or perform problem diagnosis from any RETAIN terminal. This includes remotely-initiated execution of diagnostic programs, remote examination of logout records from the system diskette facility, and remote exercise of the Customer Manual Operations. RSF also allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site.

Problem Finder Facility: This is a function of the service processor. It provides the customer with detailed information on machine failures. It also contains procedures which enable the customer's operator to diagnose and solve certain problems before calling for service. When CE service is necessary, the customer reported error data allows the CE to identify suspected FRU remotely. This eliminates on-site verification and wait time for required parts, resulting in reduced system outage time.

Other Standard Functions are:

- Multiple Virtual Storage capability by 2-level Dynamic Address Translation in S/370 mode
- Single Virtual Storage by one-level addressing in ECPS:VSE mode
- Channel Indirect Data Addressing in S/370 mode
- Channel Virtual Storage addressing in ECPS:VSE mode
- S/370 Universal Instruction Set
- Extended Precision floating-point arithmetic
- Multiply-and-Add instruction set
- Floating-Point multiply hardware accelerator
- Support of the Start I/O Fast Release instruction with queuing
- Conditional Swapping
- Customer Engineering maintenance support functions
- Storage Protection (Store and Fetch)
- Byte-Oriented Operands
- Clock Comparator and CPU Timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling including Recovery Extension Feature
- Command retry on block multiplexer channels
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- High-Speed buffer storage (Cache)

  Mdl Group 4 8KB
  Mdl Group 5 16KB

STANDARD PROCESSOR FEATURES

The 4361 includes many generally required features as standard. Configuring, ordering, and administration are simplified. (In the tables below, 4331 feature numbers are provided for reference.)

Standard Features on Mdl Groups 4 and 5	4331 Feature
Adapter Power Prerequisite	#1001
Block Multiplexer Channel, 1st	#1421
Control Storage Expansion	#1901
Display/Printer Adapter Expansion	#2001
Diskette Drive	#3401
External Signals	#3898
Power Interface	#5531
3340/44 Attachment	#7851
DAS Compatibility	#7901
ECPS: VM/370	#8701
ECPS: VSE	standard

Additional Standard Features on Mdl Group 5	4331 Feature
Block Multiplexer channel, Add'l	#1422
Byte Multiplexer channel	#5248
Power Interface, Add'l	#5532
ECPS: MVS	–

The block multiplexer channel operates at up to 1.25MB/second for the attachment of tape units, system printers, displays and other non-DASD I/O via their control units. The ASCII Device Control Unit 4994 attaches to a block multiplexer channel.

The byte multiplexer channel (standard on MG5, optional on MG4) operates at up to 36K Bytes/second in single byte-mode and 500K Bytes/second in burst mode. It is primarily for the attachment of unbuffered card readers and MICR and OCR devices.

Power Interface provides power on/off control from the 4361 Processor for control units/devices attached to 4361 channel and I/O adapters. The Mdl Group 4 has control for up to eight control units/devices, and the Mdl Group 5 for up to 16.

External Signals provides six external interrupt lines.

The Diskette Drive is compatible with the 3540 as a reader/recorder for Diskettes Type 1. It is required during system start-up for microcode loading and when the Problem Finder Facility is used.

The Display/Printer Adapter attaches the 3278-2A or 3279-2C operator console, and the following displays, printers and other devices:

3178-C1,C2	Display Station
3278-2, 3279-2A,S2A,0SX	Display Station
3270 Personal Computer	Control unit terminal mode only
5150 Attached to a 3278	3270 Personal Computer Attachment
6580-A4,A6,A8,A10	Displaywriter System
3262-1,11	System Line Printer
3289-4	System Line Printer
3268-2,2C	Printer
3287-1,2,1C,2C	Printer
4250-1	Printer
5210-G1,G2	Printer

OPTIONAL FEATURES

Byte Multiplexer Channel: Optional on Mdl Group 4.

DASD/8809 Adapters and High-Speed Channels: The 4361 Processors have integrated DASD/8809 adapters and High-Speed BMPX Channels to attach high-performance DASD, Tape, and other I/O devices.

These adapters and channels are available in several combinations to provide the configurations required to support a range of programming systems' and customers' environments.

4361 Processor	DASD/8809 Adapters (max)		High-Speed BMPX Channels (max)
Mdl Group 4	2	and	1
	1	and	2
Mdl Group 5	4		none
	2	and	1
	1	and	2
	none		3

The DASD/8809 Adapters operate at up to 1.86MB/second for the attachment and control of 3310, 3370 mdls A1/A2, B1/B2 and 3340/44 DASD or the 8809 Magnetic Tape Unit. The 3310 and 3370 operate in fixed-block data format and provide emulation of Count-Key-Data (CKD) data formats. The 3340 operates in CKD data format.

The High-Speed BMPX Channels include two which operate at up to 3MB/second for the attachment of the 3880/3380 DASD, a third operates at up to 1.86MB/second. Any of the three channels support 231X, 333X, 334X, 3350, and 337X DASD, and other higher data rate I/O devices via control units.

The Communications Adapter attaches up to eight communication lines with an aggregate data rate of 64K bps. BSC, SDLC, and Start/Stop transmission modes are supported and can be intermixed. In Start/Stop mode, Type 1 and TWX/TTC2 devices are supported, with connection via the EIA RS-232-C interface.

4361 Processor Mdl Groups 4, 5 (cont'd)

Additional optional features on the 4361 Processors include most of those available on the 4331 Processors. Exceptions are those with low usage, which are the 5424 Adapter, 1400 Compatibility, and integrated modems for the communications adapter.

The Loop Adapter features of the 4331 Processors are available on the 4361 Processors via RPQ.

PROGRAMMING SUPPORT

The 4361 Processors implement new machine and channel checking techniques which significantly increase recovery capabilities, reduce downtime and allow increased deferred maintenance.

The 4361 Mdl Group 5 supports the Start I/O Fast Release instruction with queuing of I/O requests. This can improve performance by up to 20 percent in commercial workloads with high input/output activity.

These new capabilities are supported by the following IBM programming releases:

- VSE/SIPO/E 1.4.0, including VSE/System Package 1.1.0, in ECPS:VSE or S/370 modes, and as a guest under VM.
- VSE/Advanced Functions 1.3.5, in ECPS:VSE or S/370 modes, and as a guest under VM.
- SSX/VSE 1.3.0, in ECPS:VSE mode, and as a guest under VM.
- VM/System Product Release 2 and 3.
- MVS Release 3.8 with MVS/System Product Release 1.3.0 and above installed. JES2 (5740-XYS) and JES3 (5740-XYN) are supported. ECPS:MVS must be activated. Operation as a guest under VM is supported and assisted. **Note:** MVS supports only the 4361 Mdl Group 5. MVS does not support the integrated communication adapter or the DASD/8809 adapter.

OS/VS1 Release 7, with OS/VS1/Basic Programming Extensions Release 4 supports the 4361 Processor. The Start I/O Fast Release instruction and the enhanced recovery capabilities of the 4361 are not supported in OS/VS1.

At start-up of the system (at IPL time), the 4361 Processors can be conditioned to be viewed by the operating system as a 4331-2. Previous releases of VSE, SSX/VSE, and VM, as well as OS/VS1, which do not recognize the 4361 Processors, can then be used.

This additional programming support will ease migration to the 4361 Processors for customers upgrading from a 4331 with a following release installed:

- VSE/SIPO/E 1.2.1 or 1.3.1, and releases with VSE/Advanced Functions 1.2.0 or 1.3.0 as a base, in ECPS:VSE or S/370 mode, including as a guest under VM.
- VSE/Advanced Functions 1.2.0 or 1.3.0, in ECPS:VSE or S/370 mode.
- SSX/VSE Release 1.2.0, in ECPS:VSE mode, including as a guest under VM.
- VM/System Product Release 2 and 3.
- OS/VS1 Release 7, with or without OS/VS1/Basic Programming Extensions, including as a guest SCP under VM.

Customers who install the 4361 processor with a VSE, SSX/VSE, or VM release supporting the 4361 as a 4331 should plan to subsequently migrate to the latest release in order to gain the benefits of improved performance and enhanced recovery. Customers who install with OS/VS1 Release 7 can achieve full benefit from a 4361 Mdl Group 5 by migrating to MVS/SP.

Additional Comments:

- VSE releases in S/370 mode will not operate on the 12MB mdls unless VSE is a guest under VM. When the VM linkage enhancements are generated in the VSE system, it can then fully utilize a 12MB configuration.
- Under VSE basic support for attachment of X.21 switched lines to the Communications Adapter will be available in ACF/VTAM 2.1 during the second half of 1984.
- OS/VS1 will operate on the 12MB mdls, but the SCP will only access up to 8MB. When OS/VS1 is a guest SCP under VM, and the VM handshaking feature is generated, an OS/VS1 system can fully utilize the 12MB storage.
- Support for the 4361 in VM/SP Release 2 and 3 can be installed with an SPE via PUT tape 8308, available December, 1983.
- Support for the 4361 in MVS/SP 1.3.X can be installed with PTF 90274 via SMP.

ECPS: VM/370: The 4361 Processor provides ECPS: VM/370 support at Level 20, compatible with VM/SP Release 2. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation, and Virtual Interval Timer.

Whenever ECPS:VM/370 and ECPS:MVS are both selected at IPL time, ECPS:VM/370 is enhanced to include the functions of the Shadow-Table Bypass Assist defined in *Virtual Machine Assist and Shadow-Table-Bypass Assist*, GA22-7074. These functions enhance the performance of MVS running under VM/370 in a V=R environment with VM/System Product.

ECPS:MVS: The 4361 Processor Mdl Group 5 provides the privileged instructions required by MVS/System Product - JES2 (5740-XYS) and MVS/System Product - JES3 (5740-XYN). These instructions involve the following MVS functional areas:

- SVC Interrupt Handling
- Integrity
- Tracing
- Lock Management
- Real Storage Management

INPUT/OUTPUT ATTACHMENTS - ADD'L INFORMATION

External Signals: External devices must meet the interface specifications outlined in *S/360 Direct-Control Feature OEMI*, GA22-6845.

Byte Multiplexer Channel: Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. The channel permits simultaneous operations of low-speed devices. See *IBM 4361 Channel Characteristics*, GA33-1567, for devices which may be attached and the data rates achievable for certain configurations.

Channel Address and Subchannels: The Byte Multiplexer Channel, the Display/Printer Adapter, the Loop Adapter (RPQ) and the Communications Adapter are addressed via channel 0. From the 256 subchannel addresses of channel 0, up to 32 are assigned to the Display/Printer Adapter, up to 64 to the Loop Adapter and one, or two in case of a X.25 line, are required for each communication line installed. The subchannels remaining for the Byte Multiplexer Channel can be configured at installation time as non-shared or shared subchannels, the latter each with devices in multiples of 8, up to a maximum of 224 devices.

Block Multiplexer Channel 1 and 2: Each provides eight control unit positions. The block multiplexer channels permit simultaneous operation of high-speed devices. The ability to "Block Multiplex" and the facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. See Table 2 and *IBM 4361 Channel Characteristics*, GA33-1567, for details, or use HONE aid ANCHLOAD.

Channel Address and Subchannels: Channel addresses may be selected at installation time from the range of 1 to 6. Subchannels can be configured at installation time with up to 256 non-shared or shared subchannels, the latter each with devices in multiples of eight, up to a total of 256 devices.

DASD/8809 Adapter: DASD/8809 Adapters provide attachment of 3310, 3370 (including mdls A02/B02), 3340/3344 Direct Access Storage Devices or 8809 Magnetic Tape Units without the necessity of a control unit. Attachment of DASD and of 8809 units on one adapter is mutually exclusive. The configuration is selected at system installation time.

DASD Attachment: Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string.

The channel address may be from 1 to 6. Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	**01**	**02**	**03**	**04**	**05**	**06**	**07**
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F
and							
X10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

String Switch Capability allows sharing of 3340-A2 and/or 3370-A1/A2 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340-A2 or 3370-A1/A2 must have the String Switch feature **#8150** installed. String switch support of 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

4361 Processor Mdl Groups 4, 5 (cont'd)

System/3 Data Import: With the VSE/3340 Data Import utility program product (5746-AM3), 3348 Data modules which have been written on a System/3-3340 can be read on any directly attached 3340 drive.

Direct Access Storage Compatibility: (Standard when a DASD/8809 adapter is installed) Designed primarily as a conversion aid, this feature provides emulation of 231X data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB volume) or 3340 (70MB volume) formats on 3370 Direct Access Storage. This allows programs written for use with 231X, 3330 or 3340/3344 DASD to be executed with only Job Control modifications.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. Any one compatibility type can be activated at IPL time. Operates under DOS/VSE, OS/VS1 or VM/370, is not supported by MVS.

Data sets in fixed-block format and in emulated format can reside on the same 3310/3370 volume, however, access to one format only can be selected at IPL time. A variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device, in case of 3370 mdls A02 and B02 up to the capacity of 3370 mdls A01/B01. Residual space can be used in fixed-block format. Each full or partial emulated volume begins on a predefined full-volume boundary. With OS/VS1 or VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Maximum number of emulated full volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4361 Direct Access Storage Compatibility,* GA33-1569.

Performance Note: Use of DAS Compatibility or 3340 direct attachment introduces additional channel demands and can have an effect on system performance, particularly in environments with high I/O load on emulated DASD. Batch job execution elapsed times may increase. Exclusive use of DASD emulation is not recommended in any SCP environment. **Limitations:** [1] Operates on up to two consecutively addressed strings of 3310 or 3370 attached to the DASD adapter. [2] Direct attachment of 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330-11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via string switch. [6] VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. [7] OS/VS1 does not support 2311, native or emulated. [8] MVS does not support DAS compatibility.

Program Order: The required utility programs for initialization and surface analysis of the 3310/3370 DASD as well as the formatting of the emulator extent are included in the VSE SCP, 5745-030, or VSE/AF or combined with VSE/SIPO/E products. OS/VS1 (5741-VS1), VM/370 (5749-010) and VM/SP contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1.

8809 Magnetic Tape Unit Attachment: 8809-1A and up to five additional 8809 tape units (consisting of a mix of 8809-2s and 3s) may be attached. Allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for dedicated loading or offloading DASD devices, since streaming mode may not be sustained, the 3340/3344 should not be used with the 8809 in that mode. Can operate in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read-Backward commands are not supported, the Read-Backward operation is simulated in the Logical IOCS (MTMOD) of VSE. Channel and device addresses may be assigned at system installation time from the range of X00 to X05, where X is 1 to 6.

Display/Printer Adapter: Up to 15 of the devices attachable may be installed in any combination. No more than two 3262 and/or 3289 printers can be included. The 3262 or the 3289 may be used as system printers depending on control program or program product support. One 3287 or 3268 Printer may be used as a console hardcopy device. The remaining ports may be used for attachment of displays, printers and workstations for user-written applications. Display/Printer Adapter support includes all standard functions of the 3274-1B with the respective terminal devices attached. In addition, the following 3278/3279 special features are supported: Keyboard Numeric Lock, Audible Alarm (standard on the 3279), Security Keylock and Switched Control Unit. Other 3278/3279 special features are not supported. 3278 or 3279 Display Station keyboard feature codes **#4621, #4622, #4623, #4627, #4624, #4628,** and the mdl C1 and C2 keyboards of the 3178 are supported. If two different keyboards are required for 3278/3279s, one must be **#4621.**

The 3268 and the 5210 printer are supported as 3287.

The 6580 Displaywriter may be used with its native functions or emulating a 3278-2 and the 3287-1 or 2. The 6580 requires the 3274/3276 Attachment Workstation Adapter (**#8332**) and the 3270 Attached Workstation Licensed Program (5608-SR9) to support normal 3270 screen functions, screen save, deferred print, compressed print, keystroke save and playback alternate task, and document transfer.

The IBM 3270 Personal Computer Attachment (PC attached via a 3278) to the Display/Printer Adapter supports concurrent operation of host and Personal Computer programs. The file transfer function from Personal Computer to host and the screen capture function to the PC printer or diskette are not supported. No specifies are required on the 4361. For prerequisites on the Personal Computer and the 3278, see the "Machine" pages for these devices.

Channel 0 addresses for these devices are assigned at installation time.

Cable Order: See machine pages of the device for ordering information for the required coax cable. **Specify:** See "Specify" for character code /keyboard combinations available.

Diskette Drive: This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (Diskette Type 1). When used with VSE refer to VSE/POWER documentation. Recorded Data can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5280 and 8100 and Series/1 and System/3, 32, 34, and 38. The diskette drive is temporarily used as input device for Initial Microcode Load (IML) and when the Problem Finder Facility is used. **Limitations:** Support by VM/370 via IUP only. Device address on channel 0 is selected at installation time.

COMMUNICATIONS ADAPTER

Provides the basic control and common circuits for the direct attachment of up to eight communication lines in any combination, operating in the following transmission modes: Synchronous (BSC), asynchronous (Start/Stop), Synchronous Data Link Control (SDLC).

Connection via 2- or 4-wire line is possible. Simultaneous bidirectional (full-duplex) data transmission over one line is not supported . Maximum aggregate data rate is 64,000 bps. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps. For number and speed of lines allowable, refer to Table 3 above or see *IBM 4361 Channel Characteristics,* GA33-1567.

The Communications Adapter has the following structure: The Communications Adapter Base contains common circuits and control. Each of the telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface. The following optional line interface features are available:

- Up to eight line features without internal clock for attachment to external modems (Data Circuit terminating Equipment, DCE) with clocking (EIA RS-232-C/CCITT V.24/V.28 or X.21bis).
- Up to eight line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock (EIA RS-232-C/CCITT V.24/V.28 or X.21bis).
- Autocall Unit interfaces (EIA RS-366/CCITT V.25) for up to two of the installed lines with EIA RS-232-C/CCITT V.24/V.28 interface.
- One synchronous high-speed line feature (V.35 interface).
- One synchronous high-speed line feature (WE303 modem interface).
- Up to eight line features without business machine clock for attachment to X.21 Nonswitched Data Network.
- Up to eight line features for synchronous transmission with local attachment without modems.
- Up to eight line features with Digital Data Service Adapters.

Note: IBM Integrated Modems are not available on the 4361 processor.

CONFIGURATIONS

Maximum Configuration: The maximum number of channels and integrated adapters which can be installed are shown below with associated features numbers. Your configuration should correspond to one column or be a subset of it. Either High-Speed BMPX Channel (#1431) or DASD/8809 Adapter (#3201) must be installed.

4361 Processor Mdl Groups 4, 5 (cont'd)

Table 1 - Maximum Configurations

Channel/Adpt Configuration Option	Mdl Group 4 C2D1	C1D2	C	Mdl Group 5 C2D1	C1D2	D
Byte Mpx channel	0	0	S	S	S	S
Block Mpx channel 1st	S	S	S	S	S	S
Block Mpx channel 2nd	–	–	S	S	S	S
High-Speed Block Mpx channel 1	#1431	#1431	#1431	#1431	#1431	–
High-Speed Block Mpx channel 2	#1432	–	#1432	#1432	–	–
High-Speed Block Mpx channel 3	–	–	#1433	–	–	–
DASD/8809 Adpt 1	#3201	#3201	–	#3201	#3201	#3201
DASD/8809 Adpt 2	–	#3202	–	–	#3202	#3202
DASD/8809 Adpt 3	–	–	–	–	–	#3203
DASD/8809 Adpt 4	–	–	–	–	–	#3204

Legend:

S	Standard
O	Optional
-	Not available
C	Channel configuration
D	DASD/8809 adapter configuration
C1D2	One channel, two DASD adapters
C2D1	Two channels, one DASD adapter

Channel/Adapter Load Evaluation: All data passing through the system for any I/O device interferes with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities listed in the feature descriptions.

(2) I/O attachments which individually or in combination can produce frequent data overruns. Considerations in this category are:

- The number of and the aggregate data rate of the Block Multiplexer Channels and the DASD/8809 Adapters.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunnable devices on the Byte Multiplexer Channel.

Refer to Tables 2, 3 and 4 below to properly configure a 4361. If your configuration is within the limits of the examples shown no further validation is required. Valid configurations of the 4331-2 including channels, adapters and communications lines, are valid for a 4361. If additional channels/adapters/lines are to be installed, the limitations below should be observed.

Table 2 - Allowable Data Rates

Configuration	Maximum Data Rate (MByte/sec) Block Mpx 1	2	High-Speed BMpx 1	2	3	DASD/8809 Adapter 1	2	3	4
D1	1.25	1.25	–	–	–	1.86	–	–	–
D2	1.25	1.25	–	–	–	1.86	1.86	–	–
D3 (4)	0.50	1.25	–	–	–	1.86	1.86	1.86	–
D4 (4)	0.50	0.50	–	–	–	1.86	1.86	1.86	1.86
C1D2a	Class 3	1.25	3.00	–	–	1.86	1.86	–	–
C1D2b	0.50	1.25	1.86	–	–	1.86	1.86	–	–
C2D1a	Class 3	1.25	3.00	3.00	–	1.86	–	–	–
C2D1b	0.50	1.25	1.86	3.00	–	1.86	–	–	–
C2	1.25	1.25	3.00	3.00	–	–	–	–	–
C3a (4)	Class 3	1.25	3.00	3.00	1.50	–	–	–	–
C3b (4)	0.50	1.25	1.86	3.00	1.86	–	–	–	–

Notes:

(1) See Table 3 below for number and speed of lines concurrently operable on the communications adapter together with devices (example 2501) attached to the Byte Multiplexer Channel.

(2) If multiple Class 1 devices are to be operated concurrently on the byte multiplexer channel, consult *IBM 4361 Channel Characteristics,* GA33-1567, or use HONE aid ANCHLOAD.

(3) For data rates and recommended attachment of commonly used devices, refer to Table 4 below.

(4) Configuration is not applicable to Mdl Group 4.

(5) Second BMPX channel not available on Mdl Group 4.

Table 3 - Medium Speed Communication Lines

Allowable number of medium speed communication lines. Maximum line speed, 9600 bps.

Configuration	Single DeviceVon Byte Mpx channel None	2501	1442	1419
D1	8	8	8	8
D2, D3, C1D1	8	8	8	7
D4, C1D2	8	8	8	6
C2, C2D1	8	8	6	3
C3	8	5	4	1

Note: Lines of different speed may be mixed. Maximum number of lines is 8. Aggregate data rate of 64K bps may not be exceeded. For configurations with line speed higher than 9600 bps refer to, *IBM 4361 Channel Characteristic, GA33-1567,* or use HONE aid ANCHLOAD. Line configurations which exceed the load maximum may be installed, however, should only be operated concurrently within an allowable configuration.

Table 4 - Data Rates and I/O Attachment

Data rates and recommended attachment of selected I/O devices:

Device	Data Rate (MB/sec)	Recommended attachment in sequence of preference		
3310	1.030	da		
3370	1.860	da	hb	
3375	1.860	hb		
3380	3.000	hb12		
3330	0.805	hb		
3340/3344	0.885	hb	da	
3350	1.200	hb		
3411	0.080	b2	Bu	
3420-7	0.320	b2	b	Bu
3420-4	0.470	b2	b	
3420-8	1.250	b2	b	
3430	0.312	b2	b	Bu
3272/3274	Class 3	b1	b	Bu
3203-5,2821	Class 3	b1	b	Bu
3262-5	Class 3	b1	b	Bu
4245	Class 3	b1	b	
3705 NCP	Class 3	b1	b	Bu
3705 EP,2701	Class 2	By		
2501,1442	Class 1	By	b2(s)	
1419	Class 1	By		

Legend:

Class 1	unbuffered device, manual recovery from overrun
Class 2	unbuffered device, programmed recovery
Class 3	buffered device, operates at channel speed
da	attach to a DASD/8809 adapter
b	attach to any Block MPX channel
b1	attach to Block MPX channel 1
b2(s)	attach to BMPX channel 2 as single device
hb	attach to any High-Speed BMPX channel
hb12	attach to HS BMPX channel 1 or 2
Bu	attach to Byte MPX channel in burst mode, may not operate concurrent with Class 1 or Class 2 devices
By	attach to Byte MPX channel in byte mode

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage: No specify is required. 1-phase, 3-wire, 60 Hz, 208V, **(#9902)** is standard. 240V **(#9914)** can be wired at installation time (paper MES required).
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- **Remote Support Facility:** The Remote Support Facility (RSF) is a customer engineering tool provided by the Service Processor. Its use is recommended. It requires installation of a communications interface in the 4361 which is a no-charge customer option. It can be installed in the field. RSF permits IBM Field Technical Support Center specialists, after customer authorization, to manually establish a connection to a remote IBM support location and monitor and/or perform problem diagnosis from any RETAIN terminal.

  When RSF is selected, the customer must provide the telephone line and arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

4361 Processor Mdl Groups 4, 5 (cont'd)

RSF is available in three versions:

For a 4361 upgraded from an installed 4331, retain specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

Specify **#9512** on new 4361 orders for integrated modem, 1200 bps, switched network, manual answer. An telephone set with exclusion key and a RJ41S or RJ45S type data jack is required. An FCC registered protective coupler is included. Ringer Equivalence Number (REN) is 0.8B.

Specify **#9511** for EIA RS-232-C Interface, 1200 bps, switched network manual answer. An FCC registered external cable modem compatible with the WE202S modem, interface and operation, or equivalent, is required.

- Remote Operator Console Facility (ROCF) is field installable and is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other manual control functions for a remote 4361 via a 3275 display station, or via a 3275 emulated on a host attached 3278 (Remote Console). After IML and IPL is complete the remote operator console can be disconnected and the remote 4361 can be operated in stand-alone mode, or control can be turned over to existing networking facilities.

  Note: The 3275 Display Terminal can only be obtained on an "as available" basis. The 3275 emulation can be used instead, which is available via microcode on a 4361, or as a facility of the host operating system. In latter case, either program product MVS/OCCF, 5665-288, or VM/Pass-Thru Facility, 5748-RC1, is required. **Prerequisites:** Specify ROCF feature **#9511**. The customer-supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600/1200 bps.

- Keyboard/Character Set Language: No specification is required on the 4361. The keyboard/character set for devices attached to the Display/Printer Adapter is selected at installation of the machine or the device via a Manual Operation. It must correspond to the keyboard/character set ordered for the device. Support is provided for:

  EBCDIC Typewriter Keyboards **#4621, #4627** on 3278-2 or 3279-2A. The 3178 mdl C2 is compatible with 3278 with **#4621**.

  EBCDIC Data Entry Keyboards: For 3278-2 or 3279-2A either Data Entry (**#4623**) or Data Entry/keypunch-layout (**#4622**). 3178 mdl C1 is compatible with 3278 with **#4623**.

  Support for Data Entry/keypunch-layout keyboard (**#4623**) will be withdrawn in the future because of diminishing usage. Do not plan its use in future applications.

  ASCII Keyboard/Character Set: **#4624, #4628** on 3278-2 or 3279-2A and/or **#9084** on 3287, when used as a workstation. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

High-Speed Block Multiplexer Channel 1, 2 and 3 (#1431, #1432, #1433): [HS-BMPX 3 is not available on Mdl Group 4] provides attachment of high-speed I/O devices including 3330/3333, 3340/3344, 3350, 3370, 3375, 3380 via control units including 3830 mdl 2 and 3880. The ability to "Block Multiplex" and the facility for Multiple Requesting allows several I/O units to operate concurrently with greater channel efficiency. Can operate in Data Streaming Mode. Devices attached which cannot utilize block multiplexing will function as if attached to a selector channel. Up to eight control units may attach. Data transfer rate is up to 3.0 million bytes per second. Channel address and subchannels, same as on the block multiplexer channels. **Limitations:** [1] is mutually exclusive with certain DASD/8809 Adapters: Adapter 1 (#3201) is mutually exclusive with HS BMPX 3 (#1433,) Adapter 2 (#3202) is mutually exclusive with HS BMPX 2 and 3 (#1432, #1433), Adapters 3 and 4 (#3203, #3204) are exclusive with any HS BMPX (#1431, #1432, #1433). [2] For data rate and attachment limitations for other devices and communications lines refer to "Maximum Configuration" section above or to *IBM 4361 Processor Channel Characteristics,* GA33-1567, or use HONE aid ANCHLOAD. [3] 231X devices must be attached to a High-Speed Block Multiplexer Channel and cannot be used on a Block Multiplexer Channel. [4] HS BMPX3 is not available on Mdl Group 4. **Maximum:** One each. **Field Installation:** Yes. **Prerequisites:** #1431 for #1432 ... #1431 and #1432 for #1433.

DASD/8809 Adapter 1, 2, 3 and 4 (#3201, #3202, #3203, #3204): [Adapters 3 and 4 are not available on Mdl Group 4] Each allows attachment of the 3310, 3370 and 3340/3344 DASD or of 8809 Magnetic Tape Units to the 4361 Processor.

DASD Attachment: Up to four strings of devices may be attached to each adapter. A string consists of one A-unit and one or several B-units. The attachable device types may be intermixed on each adapter but not within a string. Device strings may be configured on each adapter as follows:

(a) Up to four strings of 3310-A1s or A2s with 3310-B units attached, up to a maximum of 4 drives per string.

(b) Up to four strings of 3370-A1/A2 with 3370-B1/B2 units attached, up to a maximum of four drives (eight actuators/addresses) per string.

(c) Up to two strings of 3340-A2s with 3340/3344-B units attached, up to a maximum of eight drives per string can be attached to one or two DASD/8809 Adapters.

8809 Magnetic Tape Unit Attachment: Provides for attachment of the 8809 Magnetic Tape Unit. One 8809-1A may attach. Up to five 8809-2s and 3s may attach to the mdl 1A for a total of six 8809 Magnetic Tape Unit drives. The 8809 is not supported by VS1 and MVS.

Limitations: [1] Adapters 3 and 4 (#3203, #3204) are not available on Mdl Group 4. [2] DASD and 8809 are mutually exclusive on the same adapter. [3] DASD/8809 Adapters are mutually exclusive with certain High-Speed Block Multiplexer channels. Adapter 1 (#3201) is mutually exclusive with HS BMPX 3 (#1433,) Adapter 2 (#3202) is mutually exclusive with HS BMPX 2 and 3 (#1432, #1433), Adapters 3 and 4 (#3203, #3204) are exclusive with any HS BMPX (#1431, #1432, #1433). [4] 3310 and 3370 are not supported by VS1 or by MVS in fixed block mode. MVS does not support direct-attached 3340/3344. [5] For data rate and attachment limitations for other devices and communications lines, refer to "Maximum Configuration" above or to *IBM 4361 Processor Channel Characteristics,* GA33-1567. [6] Use of direct- attached 3340/3344 introduces additional channel demands, and can have an effect on system performance, particularly in batch environment with heavy I/O load. Performance considerations should be carefully reviewed before proposing use of the 3340/3344. **Maximum:** One #3201, #3202, #3203 or #3204. **Field Installation:** Yes. **Prerequisites:** #3204 requires #3203 ... #3203 requires #3202 ... #3202 requires #3201.

Byte Multiplexer Channel (#5248): Optional on Mdl Group 4, standard on Mdl Group 5. **Limitations:** [1] Available only on Mdl Group 4, is standard on Mdl Group 5. [2] For data rate and attachment limitations for other devices and communications lines, refer to Maximum Configuration section above or to *IBM 4361 Processor Channel Characteristics,* GA33-1567, or use HONE aid ANCHLOAD. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communication facilities and services. For supported terminals and communications facilities, refer to the M2700 pages.

Autocall Unit Interface (#1020): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366/CCITT V.25 interface may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #1601 and #3701 (in switched operation) for each Autocall Unit Interface installed.

Communications Adapter Base (#1601): Allows attachment of up to eight lines plus Autocall Unit Interface (#1020) for up to two of the lines. **Limitations:** Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "Subchannels" above for details. **Maximum:** One. **Field Installation:** Yes. **Specify:** See Table 6 for required specify codes for each line feature attached.

EIA/CCITT Interface (#3701): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line. When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC, or an SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Non-Clocked Modems (#4696), then a BSC, a Start/Stop (including ASCII/TTC2 line protocol), or an SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #1601. One #4695 or #4696 is required for each feature #3701 installed. **Specify:** See Table 6 for line position codes.

4361 Processor Mdl Groups 4, 5 (cont'd)

Line Attachment Base For Clocked Modems (#4695): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which provide clocking and comply with EIA RS-232-C CCITT V.35, X.21, X.21bis or X.25 recommendations. See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases #4695 and/or #4696 can be installed. **Field Installation:** Yes. **Prerequisites:** #1601.

Line Attachment Base For Non-Clocked Modems (#4696): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which do not provide clocking and comply with EIA RS-232-C CCITT recommendation. See the various features below to determine when it is required.

The clock speed can be wired at installation to one of the following:

- Start/Stop (IBM Type I) - 75, 300, 600, 1200 and 2400 bps.
- Start/Stop (ASCII/TTC2) - 75, 300, 600, 1200 and 2400 bps.
- BSC - 600 or 1200 bps.
- SDLC - 600 or 1200 bps.

Limitations: A maximum of eight Line Attachment Bases #4695 and/or #4696 may be installed. **Field Installation:** Yes. **Prerequisites:** #1601.

High-Speed Digital Interface (#4717): Provides for the attachment of an wideband external modem (WE303 interface). One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** Is always installed in line position 1. No other line with speed higher than 9600 bps can be installed. **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695.

High-Speed Modem Adapter (#4720): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** Is always installed in line position 1. No other line with speed higher than 9600 bps can be installed. **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695.

Local Attachment Interface (#4801): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps	200 meters at 4800 bps
400 meters at 2400 bps	100 meters at 9600 bps

For distances beyond 120 meters, to protect against damage by lightning, shielded cables should be used. For installation details, see *IBM 4300 Installation Manual/Physical Planning,* GA24-3667, Appendix D. The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order:** Required for attachment of communications adapter and DTE to customer-supplied terminal blocks. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695. **Specify:** See Table 6 for line position codes.

Digital Data Service Adapter (#5650): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to American Telephone and Private Line DDS Network via the AT&T Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations:** If feature #5650 operates with a speed of 56,000 bps it must be installed in line position 1 (specify **#9471**). No other line with speed higher than 9600 bps can then be installed. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695. **Specify:** See Table 6 for line position codes. **#9471** is required for operation at 56,000 bps.

X.21 Adapter for Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21 or X25. In X.21 networks transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations:** If feature #5655 operates with a speed of 48,000 bps, it must be installed in line position 1 (specify **#9711**). No other line with speed higher than 9600 bps can then be installed. **Maximum:** Eight. **Field installation:** Yes. **Prerequisites:** #1601 and #4695. **Specify:** See Table 6 for line position codes. **#9711** is required for operation at 56,000 bps. **Cable Order:** Required for attachment to external equipment.

Table 6 - Comm. Adapter and Line Position Features

Communications Adapter Configuration Special Features and Line Position Specify Codes:

Feature	Line	Inter Att face Base		Line Position 1	2	3	4	5	6	7	8
EIA/CCITT interface (for Clocked Modems)		#3701	#4695	#9531	#9532	#9533	#9534	#9535	#9536	#9537	#9538
EIA/CCITT interface (for Non-Clocked Modems)		#3701	#4696	#9521	#9522	#9523	#9524	#9525	#9526	#9527	#9528
Transmission Mode(1)											
Start/Stop(2) incl. ASCII/TTC2				#9681	#9682	#9683	#9684	#9685	#9686	#9687	#9688
Digital Data Service Adapter		#5650	#4695	#9471	#9472	#9473	#9474	#9475	#9476	#9477	#9478
High-Speed Modem Adapter		#4720	#4695	No position code required. Is always installed in line position one.							
High-Speed Digital Interface		#4717	#4695	No position code required. Is always installed in line position one.							
X.21 Adapter for Nonswitched Networks		#5655	#4695	#9711	#9712	#9713	#9714	#9715	#9716	#9717	#9718
X.21 Adapter for Switched Networks		#5656	#4695	#9721	#9722	#9723	#9724	#9725	#9726	#9727	#9728
Local Attachm. Interface		#4801	#4695	#9451	#9452	#9453	#9454	#9455	#9456	#9457	#9458
Autocall Unit Interface (3)		#1020		No position code required. Association with the desired line via manual operation in the field.							

Notes: The aggregate data rate of the Communications Adapter is 64,000 bps. Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc.

(1) BSC or SDLC transmission mode is possible with any line attachment feature. Selection of BSC or SDLC at installation time using configuration tool.

(2) Start/Stop transmission mode requires EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696). IBM Start/Stop Line Control Type 1 or TWX/TTC Type 2 is selected at installation time.

(3) Is linked to the desired EIA/CCITT Interface (#3701) and prerequisite (#4695 or #4696) by the CE. Maximum of two #1020s may be installed.

MODEL CONVERSIONS

Field installation Downgrades from 4361 to 4331 or from 4361 Model Group 5 to Model Group 4, as well as memory downgrades, are not recommended for field installation.

Customer price quotations and customer order acknowledgment letters for machine/model conversions must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM."

Depending on whether an installed 4331 feature is standard, optional, or not available on the 4361, different ordering actions will be required when an installed 4331 is upgraded to a 4361.

Standard features of the 4361, not installed on the 4331 to be upgraded, are automatically included in the upgrade by the plant. The 4331 prices of these features are added to the model upgrade price. If the 4331 to be upgraded has features installed which are standard on the 4361, those feature codes must be shown as 'chargeable to standard' on the upgrade MES order.

Optional features of the 4361 which are not currently installed on the upgrading 4331 may be ordered with the upgrade MES without restriction. However, conversion time may be extended.

4361 Processor Mdl Groups 4, 5 (cont'd)

Those 4331 feature codes and specify codes which are not available on the 4361 must be deleted with the MES upgrade order. Features installed on the upgrading 4331 which are not available on the 4361 will be removed. The customer has two options: [1] If the parts to be removed are returned to IBM with the gate exchange, the removal is free of charge. [2] If the customer elects to keep removed parts, an RPQ must be submitted listing each feature to be removed from the 4331. There will be a charge for these RPQs. The removal of features must be scheduled prior to the machine conversion. Specify codes on the upgrading 4331 which are not available on the 4361 must be deleted.

Depending on whether a feature is standard, optional, or not available on the 4361, the following actions are required when a 4331-1, 2, or 11 is upgraded to a 4361.

4331 Upgrading to 4361

Feature	Number	Available On 4331 1	2	11	4361 4	5	Action if Feature Is Installed	Action if Feature Is Not Installed
Adapter Power Prerequisite	#1001				S	S	1	2 (7B0758)
Adapter Logic Prerequisite	#1002				N	N	4,5	–
Autocall Unit Interface	#1020						3	–
Block Mpx Channel	#1421			S	S	S	1	2 (7B0811)
Block Multiplexer Channel Add'l	#1422	N		N	N	S	1	2 (7B0759)
High-Speed Block Mpx Channel								
1	#1431	N		N			3	–
2	#1432	N	N	N			–	–
3	#1433	N	N	N	N		–	–
Book Rack (acc'y)	#1480						–	–
Console Table (acc'y)	#1550						–	–
Communications Adapter Base	#1601			S			7	–
Control Storage Expansion (MG1)	#1901		S	S	S	S	1	2 (7B0697)
Display/Printer Adapter Expansion	#2001			S	S	S	1	2 (7B0813)
DASD/8809 Adapter								
1	#3201			S			3,7	–
2	#3202	N		N			3	–
3	#3203	N	N	N	N		–	–
4	#3204	N	N	N	N		–	–
Diskette Drive	#3401				S	S	1	2 (7B0760)
EIA/CCITT Int.	#3701						3	–
External Signals	#3898				S	S	1	2 (7B0761)
5424 Attachment	#3901				N	N	4,5	–
1401/1440/1460 Compatibility	#3950				N	N	4	–
Line Attach Base for Clocked Modems	#4695						3	–
Line Attach Base for Non-Clocked Modems	#4696						3	–
High-Speed Digital Interface	#4717	R	R	R		10	11	–
High-Speed Modem Adapter	#4720						3	–
1200 bps Integrated Modem								
Nonswitched	#4781				N	N	4,5	–
Switched with Auto Answer	#4782				N	N	4,5	–
Nonswitched with SNBU and Manual Answer	#4787				N	N	4,5	–
Nonswitched with SNBU and Auto Answer	#4788				N	N	4,5	–
Local Attachment Interface	#4801						3	–
Loop Adapter 1	#4830				7B0795		9	–
Loop Adapter 2	#4831				7B0796		9	–
Data Link Adapter	#4840				7B0797		9	–
8809 Magnetic Tape Unit Adapter	#4910			S	S	S	6	–
Byte Mpx Channel	#5248			S		S	1	2 (7B0810)
Power Interface	#5531			S	S	S	1	2 (7B0812)
Power Interface Add'l	#5532				N	S	1	2 (7B0762)
DDS Adapter	#5650						3	–
X.21 Adapter, Nonswitched	#5655						3	–
3340/3344 Direct Attachment	#7851			S	S	S	1	–
Direct Access Storage Compatibility	#7901				S	S	1	–
ECPS:VM/370	#8701			S	S	S	1	–
ECPS:MVS	–	N	N	R	N	S	–	–

Legend:

No entry in Column	Feature is optional
N	Feature is not available
S	Feature is standard
R	Feature available via RPQ
–	No action

Notes:

1. Delete feature code (chargeable to standard).
2. No action, feature price is added to upgrade purchase price by IBM.
3. No action, feature is carried to 4361.
4. Feature must be cancelled/removed.
5. Feature must be removed from the 4331. Feature can be returned to IBM without charge or feature can be removed from the 4331 via removal RPQ (charge). In latter case, removed parts are the customer's property.
6. For attachment of the 8809, order DASD/8809 Adapter (#3201, #3202, #3203 or #3204). See DASD/8809 feature description for limitations and prerequisites. On a 4331-1 or 2, delete #4910. On the 4331-11, feature #4910 is standard and need not be deleted. If #320X is ordered, this involves hardware swapping of the adapter hardware without charge in the case of a purchased machine.
7. On the 4331-11, feature is standard. To retain the feature on the 4361, add the feature on the MES order. If not ordered, the feature will be removed.
8. 8809 attachment to the 4361 is via any DASD/8809 adapter (#3201, #3202, #3203 or #3204).
9. For installation of these features, the specified RPQ is required. Availability is June, 1984.
10. Feature is equivalent to RPQ ML4707 for 4331 Mdl Grps 1, 2, 11.
11. Cancel the RPQ and add the feature (chargeable to standard).

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with the 4361, order the feature number indicated below:

Console Table (#1550): Provides a convenient table for the operator console and one 3278/3279 Display Station. Color is the same as the machine.

Book Rack and Cable Holder (#1480): Provides a book rack and cable holder.

SUPPLIES (None)

4381 PROCESSOR

PURPOSE

Provides power, control, logic, memory and channels circuitry for the associated functions in a Data Processing System where a model of the 4381 is the Central Electronic Complex.

MODELS

Six models of the 4381 are available, offering two computing power options and three sizes of processor storage.

Model		Processor Storage
L01	L02	4,194,304 Bytes
M01	M02	8,388,608 Bytes
P01	P02	16,777,216 Bytes

Prerequisites: Each 4381 Processor requires one 3278 Display Console Mdl 2A or 3279 Color Display Console Mdl 2C equipped with an operator console keyboard and an operator control panel. A second 3278 or 3279 Console, although not required, will enhance system operations for most customers and help increase system availability.

HIGHLIGHTS

Depending on the 4381 mdl selected, 4,194,304 to 16,777,216 bytes of monolithic processor storage are available. Internal processor cycle time of 68 nanoseconds for both Mdl Groups ... 8,192 bytes of high-speed buffer are available on the Mdl Group 1 when the operating system supports 4K pages ... 4,096 bytes of high-speed buffer on the Mdl Group 1 when the operating system supports 2K pages ... 32,768 bytes of high-speed buffer on the Mdl Group 2 when the operating system supports 4K pages ... 16,384 bytes of high-speed buffer on the Mdl Group 2 when the operating system supports 2K pages ... 8-byte parallel data flow within the processor as well as an 8-byte wide data flow between the processor, high-speed buffer and channels ... 16-byte wide data flow between the high-speed buffer and main storage ... Upright design for optimum floor space utilization.

Standard Features Include: Virtual Storage Capability by Dynamic Address Translation ... 1 byte and 5 block multiplexer channels ... Data Streaming Mode ... 128 to 2,048 UCWs in S/370 Mode ... Channel Indirect Addressing in S/370 Mode ... Channel Command Retry on Block Multiplex Channels ... EC and BC Modes ... Byte-Oriented Operands ... Clock Comparator and CPU Timer ... Control Registers ... Error Checking and Correction in Processor Storage ... Extended Control-Program Support for VM/370 and MVS/370 ... Extended Precision Floating Point ... Interval Timer ... Machine Check Handling ... Support Processor ... Instruction Retry ... Program Event Recording ... Reloadable Control Storage ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... Two System Diskette Drives ... Time of Day Clock ... PSW Key Handling ... Compare and Swap and Compare Double and Swap ... Clear I/O ... Clear Channel... Recovery Extension Facility ... External Signals ... Unit Power Off ... Move Inverse Instruction (not software supported) ... Fast Release for the Start I/O Fast Release Instruction ... Hardware Reconfiguration in High-Speed Buffer (Cache), Control Storage, Channel Data Buffer and Processor Storage ... Remote Operator Console Facility (ROCF), when a no-charge Remote Support Facility (RSF) Feature is installed .

Modes of Operation: Two modes of operation are available. The mode is selected from a common diskette at Initial Microcode Load (IML) time.

S/370 Mode allows operation of any program written for S/370 and S/360 that does not violate the exceptions noted under "Compatibility" below. When the 4381 Processor is operating in S/370 mode, support is provided by:

- MVS/System Product Version 1 Release 3.
- VM/System Product Release 2 with or without VM/SP High Performance Option Release 3 and VM/SP Release 3 with or without High-Performance Option Release 3.2.
- DOS/VSE with VSE/Advanced Functions Release 3.5 and by VSE/SP Release 1.1.0.
- ACP/TPF1 or ACP/TPF2.
- OS/VS1 Release 7 with OS/VS1 Basic Programming Extensions Release 4 supports 4381 Mdl Groups 1 and 2; with Basic Programming Extensions Release 3 and appropriate PTF, only 4381 Mdl Group 2 is supported.

To improve the performance of the 4381 Processors running in S/370 Mode, the following assists and facilities are standard:

- Extended Control Program Support (ECPS) for MVS/370, and VM/370.
- Elementary Math Library Assist (4381 Mdl Group 2 only).
- Engineering/Scientific Assist.
- Enhancements to ECPS:MVS for MVS/System Product Version 1 Release 3 (MVS/SP) which include cross memory services, the page fault assist function, and the ADDFRR instruction.
- Preferred Machine Assist to improve performance of MVS/370 running as a guest under VM/SP High-Performance Option.

When the 4381 processor is operating in S/370 Extended Architecture (370-XA) Mode, support is provided by:

- MVS/XA Version 2 Release 1.
- VM/XA Migration Aid, Release 1.

To improve the performance of the 4381 Processors running in 370-XA Mode, the Engineering/Scientific Assist and the Elementary Math Library Assist (Mdl Group 2 only) are available.

Compatibility: Any program written for S/370 will operate on the 4381 Processors in S/370 or 370-XA Mode, provided that it (1) is not time-dependent, (2) does not depend on system facilities (storage size, I/O equipment, optional features, etc.) being present when the facilities are not included in the configuration, (3) does not depend on system facilities (such as operation codes) being absent when the facilities are included in the 4381 Processor, and (4) does not depend on results or functions which are defined in the *Principles of Operation* to be unpredictable or model-dependent.

Any program written for S/360 will operate on the 4381 Processor in S/370 Mode, provided that it follows the above rules and does not depend on functions that differ between S/360 and S/370.

For more details, see *System/370 Extended Architecture Principles,* GA22-7000 or the *IBM System/370 Extended Architecture Principles of Operations,* SA22-7085.

Problem Determination Procedures: The Problem Analysis facility will be available on each 4381 Processor. Every user should be encouraged to take advantage of the benefits offered by Problem Analysis by invoking the procedure each time a machine failure occurs. Doing so will cause a set of routines to be executed by the system which will store failure data for later analysis and which will assist in isolating failing components. The benefit for the customer is that in many machine failure situations, it will not be necessary to await arrival of an CE to begin isolation of system problems, with the result of higher system availability for the customer. Use of Problem Analysis is a customer option. The capabilities of Problem Analysis are enhanced with the installation of one of the RSF features listed under "Specify", below.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Power Cord Length: For all machines to be installed in Chicago, Ill., specify **#9986** is required to order 1.83m (6 feet) power cord.
- Cabling: See 3278 mdl 2A Display Console or 3279 Color Display Console mdl 2C for console cabling.
- Color: If no specify is selected, then the color of the 4381 Processor will be classic blue. If another color is required, specify: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9064** for charcoal brown, **#9065** for pebble gray.
- Remote Support Facility (RSF): The RSF utilization is a customer option. It is recommended to enhance the hardware availability of the 4381 Processor. It provides service personnel the capability of remotely controlling the 4381 from any RETAIN terminal and allows the CE to access the RETAIN data bank for the latest service aids and information from the customer site. When RSF is used, the customer must provide the telephone lines required for the RSF modem.

  To provide RSF, specify one. Customers are urged to select **#9514** to eliminate the need for either external modems or protective couplers. This specify code is the preferred choice of all the RSF features, allowing both RSF and Remote Operator Console Facility (ROCF) capabilities.

  Specify **#9514** for integrated modem with integrated protective circuits, 1200 bps, switched network, auto answer. (An external protective coupler is not required.) A telephone set with exclusion key and an RJ41S or RJ45S type data jack are required. Protective couplers are FCC registered. The FCC Registration number is AN09SA-67992-DP-N and Ringer Equivalence Number (REN) 0.8B. FCC approval is pending.

  Specify **#9511** for EIA Interface, 1200 bps, switched network, manual answer. An FCC registered external modem compatible with the WE 202S modem, interface and operation, or equivalent is required.

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. (This feature should only be selected when the 4381 is directly replacing a 4341 processor which had used **#9510**, and the customer is unwilling to upgrade his installation to accommodate **#9514** on the 4381.) A telephone set

4381 Processor (cont'd)

with exclusion key and with FCC registered Data Access Arrangement (DAA), compatible with CDT Type Coupler Series 1000A interface and operation is required.

If RSF is not desired, no specify code is required.

- Remote Operator Console Facility (ROCF): The ROCF is an extension of RSF. It gives personnel at a host site the ability to dial-up and control a remote 4381 by means of host site programming support.

  The preferred ROCF feature is **#9514**, since it avoids the necessity of external modems or external protective couplers. Details of **#9514** are shown under RSF, above. RSF feature **#9511** may also be specified. The customer-supplied external modem attached to feature **#9511** must include auto answer.

SPECIAL FEATURES

Channel-To-Channel Adapter (#1850): One channel to channel feature is optionally available to interconnect two channels (4381 Processor, 4300 Processor, S/360, S/370, 30XX). One of the processors requires this feature. Requires three control unit positions on each of the connected channels. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** **#4631** must be specified on the primary 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C. Three control unit positions on a block multiplexer channel.

Block Multiplexer Channels, Add'l (#1870): An optional group of six Block Multiplexer Channels. Permits simultaneous operation of high-speed devices at a data rate of 2.0 MB/second for two channels and 1.0MB/second for four channels. **Maximum:** One.

MODEL CONVERSIONS

4381 Model Group 1 Processors may be upgraded in the field to Model Group 2 Processors, provided that the same or larger Processor Storage is selected. Changes from the 4 Megabyte Models (L01 and L02) to the 8 Megabyte Models (M01 and M02) or to the 16 Megabyte Models (P01 and P02) may be made in the field. In addition, changes from the 8 Megabyte Models (M01 and M02) may be made in the field to the 16 Megabyte Models (P01 and P02). Memory model changes from a larger to a smaller size are not recommended. Installation of a change from one model to another may involve the removal of parts which become the property of IBM.

ACCESSORIES

An operator work station with modesty skirt has capabilities for two operators with two 3278 mdl 2A/3279 mdl 2C and room for reference material. Attachable book racks may be ordered for manual storage and also serves as a cable control device for the 3278 mdl 2A/3279 mdl 2C, telephones, etc. Table dimensions are 1590mm x 815mm and is equipped with gliders. The following items are available on a purchase-only basis. For field installation, order feature via MES. For shipment with machine, order the feature number indicated below.

Bookrack and Cable Holder (#1480): Up to four racks can be mounted on one table.

Console Table (#1550).

SUPPLIES (None)

4701 FINANCE COMMUNICATION CONTROLLER

PURPOSE

A programmable controller for attachment of 4700 Finance Communication System terminals and 3600 Finance Communication System terminals to System/370, 303X, 308X or 4300 Processors, System/34, System/36 or 8100 System.

MODELS

Model 1 001 — A programmable controller with a base configuration of 192K bytes of machine storage, two loops, SDLC communication adapter, and one diskette drive which accommodates 1- or 2- sided removable diskettes (type 1 or 2) to provide up to 0.5 megabytes of diskette storage. May be upgraded to provide a maximum of four loops, 512K bytes of machine storage and one auxiliary diskette storage feature (0.5 or 1.0 megabyte).

Model 2 002 — A programmable controller with a base configuration of 256K bytes of machine storage, two loops, SDLC communication adapter, and one diskette drive which accommodates 1- or 2-sided removable diskettes (type 1, 2, or 2D) to provide up to 1.0 megabytes of diskette storage. May be upgraded to provide a maximum of four loops, 896K bytes of machine storage and one auxiliary diskette storage feature (1.0 megabyte only). May also be upgraded to provide a maximum capacity of 60MB of Disk Storage.

Customer-Setup (CSU): Machine and selected specify features.

Machine Storage: For the mdl 1 controller the base 192K bytes of machine storage and the additional storage increments, when present, are contiguous and are available to provide the storage as required for system control, selected device/feature/function support and user-programmable storage.

For the mdl 2 controller, the base 256K bytes of machine storage and storage increments up to 512K bytes, when present, are contiguous. When total storage capacity exceeds 512K bytes, storage is divided into a user/microcode storage area and a microcode storage area, and addressing is no longer contiguous. The minimum microcode storage area is 256K bytes. Refer to the *IBM 4700 System Configurator*, GC31-2017, for a comprehensive list of storage requirements and details on determining the amount of additional storage, if any, required.

HIGHLIGHTS

Controls all the functions of 4700 Finance Communication System and/or 3600 Finance Communication System terminals. The 4700 Online Terminal Support for System/34 PRPQ (5799-BGB) supports the 4704 mdl 1, 5210 mdls G01, G02 Printers, 4710, 3603, 3610, 3611, 3616 and 3624 (multiline display only).

Controls data transmission between terminals and the central processing site. Host data transmission via SDLC can be at speeds up to 9600 bps or via BSC at speeds up to 4800 bps dependent on the other elements of the host connection facility. The base controller provides a controller maximum aggregate bps rate of 16,800 (mdl 1) or 19,200 (mdl 2) for the loops independent of host SDLC link. When using BSC, the maximum aggregate bps rate is 14,400 (mdl 1) or 16,800 (mdl 2) including the host BSC link. The base controller also offers integrated encryption to provide security of personal identification numbers (PINs), messages and software.

All 4700 system terminals (except 4704-2 and 4704-3) and 4730 are attached by loops which may be selected to operate at speeds of 1200, 2400 or 4800 bps.

The mdl 1 controller contains 192K bytes of machine storage for use as system control, device/ feature/ function support and user-programmable storage. One additional 64K byte storage increment and two 128K byte storage increments are available for a total of 512K bytes. For a 192K, 320K or 448K byte mdl 1 controller already installed, a maximum of one additional 64K byte storage increment and, respectively, two 128K, one 128K or zero 128K byte storage increments are allowed. The mdl 2 controller contains 256K bytes of machine storage. A maximum of five additional 128K byte storage increments are available for a total of 896K bytes. For a 192K, 320K or 448K byte mdl 2 controller already installed, a maximum of one additional 64K byte storage increment and, respectively, five 128K, four 128K, or three 128K byte storage increments are allowed. Refer to the *IBM 4700 System Configurator*, GC31-2017, for detailed storage use information.

Two loops are provided. An optional feature providing two loops (for a total of four) is available. Houses a direct access diskette drive for 1- or 2-sided removable diskettes which provide up to .5 megabytes (mdl 1) or 1 megabytes (mdl 2) of diskette storage for controller data and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). One additional diskette drive may be attached. Alternatively, a maximum capacity of 60MB of disk storage may be attached for temporary and permanent storage of user data (mdl 2).

The 4701 mdl 2 controller with storage sizes of 192K, 320K, or 448K bytes have been designated as 4701 mdl A2 controllers for administrative purposes only. Additional storage increments to the mdl A2 require a mdl conversion via MES. This mdl conversion includes 64K bytes of additional machine storage.

An optional Device Cluster Adapter (DCA) feature is available to provide high-speed workstation attachment locally for 3178 mdl C1, C2, 3278 mdl 2 3279 mdl 2A, S2A, 2B, S2B, 02X, 4704 mdl 2 and 4704 mdl 3 Displays, 5210 mdl G01, G02 Printwheel Printers, 3287 mdl 1, 2 Character Printers, 3262 mdl 3, 13 Line Printers, 6580 Displaywriter System and 5150 or 5160 XT Personal Computer. Optional SDLC Communications Adapter with either EIA/CCITT Interface or Fanout Communications Adapter are available to attach 4730 Personal Banking Machines.

System Attachment:

Note: See Program Product pages for host support programming information.

S/370, 303X, 308X or 4300 Processors: Remote attachment using SDLC or BSC-3 via a 3704, 3705 or 3725 Communications Controller. BSC-3 requires optional BSC Communications feature **(#1422)**.

4321, 4331 Processors: Remote attachment using SDLC or BSC-3 via the Communication Adapter on the 4321 or 4331 BSC-3 requires optional BSC Communications feature (#1422). Local attachment using SDLC or BSC-3 via 4321 or 4331 Local Attachment feature. BSC-3 requires optional BSC Communications feature (#1422).

8100 Units (8101, 8130, 8140): Remote attachment or Direct connection using SDLC via 8100 unit Data Link features.

These attachments are supported by the DPPX/DSC capability.

System/34 or System/36 Processors: Remote attachment or local attachment using SDLC via System/34 or System/36 Communication Adapter feature.

Note: See IBM for a list of applicable PRPQs.

Each 4701 operates in half-duplex mode. When operating in an SNA environment, duplex communication line operations are possible (except System/34 or System/36) with multiple 4701s attached to the line, one 4701 transmitting, while another receives. The 4701 contains a communication adapter without business machine clocking and EIA RS-232-C interface for direct connections or for attaching external modems operating via SDLC at speeds up to 9600 bps or BSC-3 with optional BSC Communications feature at speeds up to 4800 bps. The Data Circuit-terminating Equipment (DCE) must provide its own clocking. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

Note: SNA and BSC Communications are mutually exclusive. Conversion in the field from one to the other requires an RPQ.

When using SDLC, the X.21 adapter for nonswitched or switched networks (#1424) is available in place of the standard EIA/CCITT interface.

The 4701 can be programmed to operate independently when the host processor is unavailable. It also is capable of controlling all terminal functions, executing arithmetic and capturing data from the terminals for later transmission to the host processor.

When used either with a non-S/370 compatible host system or without a host system, the Local Configuration Facility (LCF) specify **#9490** may be ordered, see "Controller Data Support".

Transmission: The 4701 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

Modems: External modems operating at speeds up to 9600 bps for SDLC links, or 4800 bps for BSC-3 links, may be used.

Modem	Speed (bps)	Facility
3863	2400	Switched or nonswitched voice grade lines
3864	4800	Switched or nonswitched voice grade lines
3865	9600	Nonswitched voice grade lines
3868 Mdl 1	2400	Nonswitched voice grade lines
3868 Mdl 2	4800	Nonswitched voice grade lines
3868 Mdl 3/4	9600	Nonswitched voice grade lines
3872	2400	Switched or nonswitched voice grade lines
3874	4800	Switched or nonswitched voice grade lines

Customer-Setup (CSU): The 4701 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, see IBM. One copy of the CSU Instructions and diagnostic diskette are shipped with each 4701. The CSU allowance is four days.

4701 Finance Communication Controller (cont'd)

Customer Responsibilities: All customers must be advised that their responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
- Receipt at the customer's receiving dock, unpacking and placement of the 4701.
- Performing 4701 checkout in accordance with supplied procedures for initial installation or relocation, and updating of controller diskettes (at customer option).
- Physical setup, connection of cables in protected customer access areas including loop cables, cable to host communication lines/modems, and cables for Disk Storage features and Auxiliary Diskette feature.
- Installation of the controller data support and generation of the operational diskettes, at initial controller installation and for any subsequent release distribution.
- Checking communications to the host processor.
- Security for erasure of data from a failing Disk Storage feature being returned to IBM. It is IBM's practice to erase any remaining data on a returned disk before reusing it.
- Using the problem determination procedures provided with the 4701 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM designated location or requesting On-Site Service (see "Maintenance" below).
- Determining the need for any required spares.
- Notifying IBM of intent to relocate the 4701 and following IBM instructions regarding relocation.

Maintenance: Maintenance of 4701s is available under IBM Maintenance agreement for either On-Site Service or IBM Service/Exchange Center Service Service/Exchange Center Service is under the Repair option only. The Service/Exchange Center Service is not available for rental machines. Replacement option is not available for the 4701. It is the customer's responsibility to setup the equipment and to determine when maintenance is required. If the customer has selected Service/Exchange Center Service, it is the customer's responsibility to disconnect the unit(s), transport them to the designated IBM location, pick them up when repair is completed and re-setup the unit(s). The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such a practice is planned. On-Site Service is provided during the warranty period. When the 4701 mdl 2 is configured with a Disk Storage feature, only On-Site Service is offered.

Customers with 4701s not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) on-site or at the designated IBM location for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined. Qualification inspection will be done at the customer's site. There is no charge for this inspection.

If the unit requires repair, and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Bibliography: For information on 4701 publications, refer to the *4700 System Summary*, GC31-2016.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, **#9891** for non-locking plug. A line cord of 1.8 meters (6 feet) will be provided at time of shipment.
- Controller Storage Size: Controller storage size must be specified on all orders and MESs as follows:

  #9616 for 256K, **#9617** for 384K, **#9618** for 512K, **#9619** for 640K, **#9620** for 384K user storage and 384K microcode storage, **#9621** for 512K user storage and 256K microcode storage, and **#9622** for 512K user storage and 384K microcode storage.

  No specify code is required for ordering a base 192K byte mdl 1 controller. Specify codes **#9619**, **#9620**, **#9621**, and **#9622** are for mdl 2 only. Controllers with greater than 192K bytes of machine storage have one specify code **#9612** (320K bytes), **#9614** (448K bytes) or **#9616** to **#9622** to identify the current storage configuration. When a storage increment is ordered via MES or via a mdl A2 to mdl 2 conversion, the old specify code must be deleted and the proper new specify code must be added.
- X.21 Adapter: **#9750** for switched network or **#9751** for non-switched network.

Controller data support is *not* supplied with the shipment of the controller. Subscription order form *GX31-4501* is to be filled out, by the customer, and sent to

IBM Corporation
Department 05Y
Building 101
1001 W. T. Harris Boulevard
Charlotte, NC 28257.

Any 4701 RPQ information with corresponding controller data support requirements should be supplied to the customer for inclusion on form *GX31-4501*.

Receipt of this form by IBM will assure prompt shipment of the required controller data support and notification of any subsequent enhancements.

This subscription form provides capability for the customer to indicate their requirements for:

- Distribution Tape Reel (DTR)
- Installation Diskette
- Local Configuration Facility (LCF)
- Pre-operational Diskette for LCF

A Distribution Tape Reel (DTR) is required for controllers that are used with a S/370, 43XX, or 30XX host system. The user will receive a DTR tape delivered to the address provided with the subscription form.

An installation diskette is required at a controller location where an operational diskette will be created by an image transmission from a host S/370.

A Local Configuration Facility (LCF) diskette is required where the customer requires the capability to create operational diskettes at the controller using the Local Configuration Facility (LCF).

A Pre-operational Diskette for LCF is required where the output of an LCF CPGEN is written upon a diskette for subsequent use as an operational diskette. LCF output will only write upon a diskette formatted as a pre-operational diskette.

Normally, a S/370 customer will enter a subscription for a Distribution Tape Reel (DTR) and an Installation Diskette. A non-S/370 customer who would generate operational systems without the use of a S/370 would typically order the Local Configuration Facility (LCF) diskette and a Pre-operational Diskette.

Normally, only one subscription form need be entered for each host location. Periodically, an availability notice will be sent to the address provided by the subscription. Upon receipt of this notice the customer will acknowledge to IBM by return mail their requirement for that enhancement update.

User of the Local Configuration Facility (LCF), who may have no host or a non-S/370 host, similarly will require only one subscription.

Form GX31-4501 replaces:

- The use of the 9xxx specify codes.
-

- **Cables:** See "Accessories" for additional information. See also *4700 Finance Communication System, Installation Planning Manual*, GC31-2018.

SPECIAL FEATURES

Note: Unless otherwise stated, all features available for field installation require service personnel.

NON-COMMUNICATIONS FEATURES

For specify codes **#9618** and **#9622** the last 8,192 bytes of machine storage are not addressable by the user.

Add'l Storage (#1007): Provides an additional 64K (65,536) bytes of machine storage to increase a 192K mdl 1 to 256K bytes. **Limitations:** Can only be ordered as the first increment on already installed 192K byte mdl 1 via MES, or as the first increment of an order for a mdl 1 greater than 192K bytes. **Maximum:** One, see "Limitations". **Field Installation:** Yes. **Specify:** See table below and "Controller Storage Size" in Specify section.

4701 Finance Communication Controller (cont'd)

Add'l Storage (#1008): Provides an additional 64K (65,536) bytes of machine storage. **Limitations:** Can only be ordered as an additional increment on already installed mdl 1 320K, or 448K byte machines via MES. **Maximum:** One, see "Limitations". **Field Installation:** Yes, field only. **Specify:** See table below.

Add'l Storage (#1009): Provides an additional 128K (131,072) bytes of machine storage. **Limitations:** Mdl 1 is restricted to specify codes **#9617** and **#9618**. **Maximum:** The maximum number of #1009 for mdl 1 is two. The maximum number of #1009 for the mdl 2 is five. **Field Installation:** Yes. For specify codes **#9619, #9620, #9621** and **#9622** parts removed becomes the property of IBM. **Prerequisites:** For mdl 1, one #1007. **Specify:** See table below and controller storage size in the specify section.

Feature and specify codes required for storage upgrades.

To Storage Size (K Bytes)

Storage Size		256	384	512	640	768	768	896
Specify Code		#9616	#9617	#9618	#9619	#9620	#9621	#9622
From Storage Size (K Bytes)	192	#1007	#1007 and #1009	#1007 and 2 #1009	X	X	X	X
	256	X	#1009	2 #1009	3 #1009	4 #1009	4 #1009	5 #1009
	320	X	#1008	#1008 and #1009	X	X	X	X
	384	X	X	#1009	2 #1009	3 #1009	3 #1009	4 #1009
	448	X	X	#1008	X	X	X	X
	512	X	X	X	#1009	2 #1009	2 #1009	3 #1009
	640	X	X	X	X	#1009	#1009	2 #1009
	768	X	X	X	X	X	X	#1009

Feature codes #1007 and #1008 are for mdl 1 only. For 192K, 320K, and 448K byte mdl 2 see mdl Conversion section. See Specify section for instructions on changing specify codes for storage upgrades.

Note:
Specify **#9619** = 384K user storage and 256K microcode storage
Specify **#9620** = 384K user storage and 384K microcode storage
Specify **#9621** = 512K user storage and 256K microcode storage
The minimum microcode storage is 256K bytes.
Specify **#9619** to **#9622** are for mdl 2 only.

Customer Order Acknowledgement Letters for purchase MESs for specify codes **#9619, #9620, #9621,** and **#9622** will involve the removal of parts which become the property of IBM.

Auxiliary Diskette Storage .5 Megabyte (#1035): [Mdl 1] Provides approximately 560,000 bytes of additional diskette storage via a second diskette drive for 1- or 2-sided diskettes. No storage area offered by the auxiliary (or secondary) diskette will be reserved for the control program. **Limitations:** May not be installed with #1045. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3651.

Auxiliary Diskette Storage 1.0 Megabyte (#1045): Provides approximately 985,088 bytes of additional diskette storage via a second diskette drive for 1- or 2-sided diskettes (type 1, 2 or 2D). No storage area offered by the auxiliary (or second) diskette will be reserved for the control program. **Limitations:** May not be installed with #1035. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3651, or #3652 and #1065 , or #3652 and #1055.

Disk Storage 15.4 Megabyte (#1055): Provides 15,423,488 bytes of disk storage when ordered with Expansion Frame (#3652). **Limitations:** Can only be installed with #3652, or #3652 and #1045. Cannot be installed with #1065 or #1075. **Maximum:** One. **Field Installation:** Only when ordered for delivery with expansion frame #3652. **Prerequisites:** #3652.

Disk Storage 30.8 Megabyte (#1065): Provides 30,846,976 bytes of disk storage when ordered with Expansion Frame (#3652). **Limitations:** Can only be installed with #3652, or #3652 and #1045, or #3652 and #1075. Cannot be installed with #1055. **Maximum:** One. **Field Installation:** Only when ordered for delivery with expansion frame #3652. **Prerequisites:** #3652.

Second Disk Storage 30.8 Megabyte (#1075): Provides an additional increment of 30,846,976 bytes of Disk Storage. **Limitations:** Can only be installed with #3652 and #1065. Cannot be installed with #1045 or #1055. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3652 and #1065.

Device Cluster Adapter (#3101): Provides for the local attachment of up to a maximum of eight devices with a mix of 3262 mdl 3, 13 Line Printers, 3178 mdls C1, C2 3278 mdl 2 Display Stations, 3279 mdl 2A, S2A, 2B, S2B, 02X, 4704 mdl 2 Display Stations, 4704 mdl 3 Display Stations, 5210 mdls G01, G02 Printwheel Printers and 3287 mdl 1, 2 Printers, 6580 Displaywriter System and 5150 or 5160 XT Personal Computer. When attaching the 3278 mdl 2 Display Station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. When attaching Displaywriter or Personal Computer via their 3278 emulation adapter, file transfer is not supported on the 4701. See M6580, 5150 or 5160 pages for additional prerequisites and/or limitations. **Limitations:** Maximum distance from controller to terminal is 1.5Km (4,920 feet). The 5210 printer is supported in SCS mode only. **Maximum:** One. **Field Installation:** Yes.

Diskette Expansion Unit (#3651): Provides a matching unit for housing an auxiliary diskette drive. The unit is cable attached to the main unit. **Limitations:** Cannot be installed with #3652. If #1035 is installed, conversion to #1045 is via RPQ 8V0099. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1035 or #1045.

Disk Expansion Unit (#3652): Provides a matching unit for housing up to 60MB of disk storage capacity. No storage area offered by the Disk Storage features will be reserved for the control program. **Limitations:** Cannot be configured with #3651. Can only attach to 4701 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1055, or #1045 and #1055, or #1065, or #1065 and #1075 or #1045 and #1065.

Add'l Loops (#4745): Provides two additional loops for attachment of additional 4700 Finance Communications System or 3600 Finance Communications System terminals. **Maximum:** One feature providing two loops. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

BSC Communications Without Business Machine Clocking (#1422): Required for attachment to communications lines through an external modem which does have internal clocking at speeds up to 4800 bps when operating with Binary Synchronous Communications BSC-3. **Limitations:** Cannot be installed with #1424. **Maximum:** One. **Field Installation:** Not recommended.

Note: SNA and BSC communications are mutually exclusive. Conversion in the field from one to the other requires an RPQ.

X.21 Adapter for Nonswitched or Switched Networks (#1424): This feature provides an interface and 6 meter cable for attachment to an X.21 native nonswitched network with no changes to existing SNA/SDLC procedures for controlling nonswitched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for nonswitched point-to-point and multipoint communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. Also provides an interface adapter and 6 meter cable for attachment to the X.21 Switched Network. SDLC Communications at speeds of 2400, 4800 and 9600 bps are supported. **Limitations:** Cannot be installed with #1422. **Maximum:** One. **Field Installation:** Not recommended. **Specify: #9750** for switched network or **#9751** for nonswitched network.

Fan Out Communications Adapter (#1551): Permits local attachment of up to four 4730 Personal Banking Machines communicating via SDLC. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4502. **Specify:** One of the following line speeds:

Specify	Speed	Maximum Cable Length
#9181	9600 bps	30.48m (100 ft.)
#9182	4800 bps	60.96m (200 ft.)
#9183	2400 bps	121.92m (400 ft.)

Note: All attached 4730s will run at the selected speed.

EIA/CCITT Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external modem for communications attachment to remote 4730 Personal Banking Machines via SDLC at speed up to 9600 bps. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with #1551. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4502.

SDLC Communications Adapter Without Business Machine Clocking (#4502): Required to communicate with local or remote 4730 Personal Banking Machines using SDLC at speeds from 1200 bps to 9600 bps. **Limitations:** Can only be used to attach the 4730 Personal Banking Machine. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model 1 may be converted to a model 2 having 256K, 384K or 512K bytes of machine storage. Model 1s with 192K, 320K or 448K bytes of machine storage will be converted to model 2s with 256K, 384K, or 512K bytes respectively. The price of this model conversion includes the price of an additional 64K bytes of machine storage.

4701 Finance Communication Controller (cont'd)

Model 1s with 256K, 384K, or 512K bytes of storage will be converted to model 2s of the same machine storage size. To upgrade to larger machine storage sizes see the table for the features that must be added to the model 2 to reach the desired storage size. Parts removed become the property of IBM.

If #1007 is currently installed then #1007 must be changed from chargeable to standard. If #1008 is installed add #1009, and #1008 must be changed from chargeable to standard. Model 2s installed with 192K , 320K, or 448K bytes of machine storage have been designated as model A2 for administrative purposes only. Adding storage increments to model A2 requires conversion from a model A2 to a model 2. This conversion includes 64K bytes of machine storage. Parts removed become the property of IBM.

If #1008 is currently installed add #1009, and #1008 must be changed from chargeable to standard. If Expansion Frame (#3651) is installed, it must have a Auxiliary Diskette Storage 1.0 Megabytes (#1045) installed. See "Limitations" under Expansion Frame (#3651).

ACCESSORIES

Keylock Cable Assembly: Replacement keylock cable assembly (used to load Master key) may be purchased from IBM. Order **P/N 6018769.**

Cables: Cables to attach 4700 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GC31-2018 for cable and connector specifications. The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM.

Cable Assem No	Use	Length
8249921	Cable Assy, (Inch) - EIA/CCITT	6m (20 ft.)

The following are "X" length cables with maximum length shown.

1563155	Loop Cable Assembly	610m (200 ft.)

For attachment of 3262, 3287, 3278 to a 4701:

2577672	Cable Assembly - indoor	1,500m (4920 ft.)
or		
323921	Coax Wire	1,500m (4920 ft.)
and		
1836418	Connector Kit	

Loop Repeater (P/N 4400002): Plugs into the Loop cable and redrives all signals being transmitted in a 3600 or 4700 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. **Prerequisite:** An operating 3600 System Local Loop or Remote Subloop.

Bibliography: GC22-0005

Customer Responsibilities: The customer must be advised that: [1] The customer is responsible for making certain that the use of the equipment compiles with all Federal, State, and Local Laws, Regulations and Ordinances. [2] The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service. [3] The customer is responsible for the set-up of the unit. [4] The customer will determine the failing unit (see Maintenance below). [5] The customer is responsible for determining the required number of spares.

Physical Planning and Set-up: Physical planning and set-up is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly **(P/N 1745372),** or equivalent. See *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766, or *IBM 4700 Finance Communication System, Installation Planning Manual,* GC31-2018.

Spares: The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of Loop Repeaters Installed	Minimum Number Spares Recommended
100	2
200	2
300	3
500	4
1000	6
1500	9
2000	10
2500	12
3000	14
3500	16
4000	18
4500	19
5000	21

Warranty: Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units.

Maintenance agreements are not available. FE on-site service will not be provided.

Ordering: See IBM.

	Machine	P/N
Loop Repeater	3601	**4400002**
Loop Repeater	3602	**4400002**
Loop Repeater	4701	**4400002**

GENERAL ACCESSORIES

For delivery with the machine (if offered), specify the appropriate Feature Number on 4700 machine order. For delivery at any other time, specify the appropriate Part Number on MSORDER (Category = Accessories/ Supplies) on AAS.

Filters: Anti-glare filters protect against light reflection and provide either a yellow character display on a brown background (amber) or bright green characters on a dark green background (green). One filter is provided with each 4700 display terminal.

Cradle: The display monitor may be mounted in a cradle to provide a vertical tilt capability which allows the display operator to adjust for the best viewing angle within plus or minus 30 degrees. The cradle may be set on a counter top or be mounted to the under side of a horizontal surface. A bracket supplied for hanging the cradle provides a swivel capability.

Magnetic Stripe Reader: Has read capability only. The MSR is capable of reading the contents of ANSI Track 2 (75 bpi) on a credit or other plastic card.

Magnetic Stripe Reader/Encoder: Has read and encode capability. The device is capable of reading the contents of Track 2 on a credit card (encoded at 75 bpi according to the ANSI Standard X4.16) or an ID card or passbook encoded at 210 bpi on a 4704 or 3604, or equivalent. The device encodes at a density of 210 bpi in the IBM Passbook Format. The slot in the unit is designed to accept documents ranging in thickness from 0.25mm (0.010") (excluding magnetic stripe), to 0.84mm (0.033") (including magnetic stripe). It will accept plastic credit cards and ID cards or one cover of a magnetically encoded passbook.

Cleaning Card: A card which is used for cleaning the magnetic head on a Magnetic Stripe Reader.

Encrypting PIN Keypad: A twelve key numeric keypad that has the data encryption algorithm (DEA) implemented in hardware for personal identification number (PIN) encryption within the keypad prior to transmission to a 4704 display terminal.

Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the numeric "0" , or an alphameric arrangement in the American Banking Association Standard format with the Q and Z over the numeric "1". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the encrypting PIN keypad is ready to accept entry. Data entered from the encrypting PIN keypad is not displayed on the 4704 to which it is attached. **Prerequisites:** A 4704.

Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

Non-Encrypting PIN Keypad: A twelve key numeric keypad for entry of a Personal Identification Number (PIN) to a 4704. Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the

4701 Finance Communication Controller (cont'd)

numeric "0" , or an alphameric arrangement in the American Banking Association Standard format with the Q and Z over the numeric "1". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the PIN keypad is ready to accept entry. Data entered from the PIN keypad is not displayed on the 4704 to which it is attached. **Prerequisites:** A 4704. **Note:** 4700 non-encrypting PIN keypad and 3600 PIN keypad not interchangeable.

Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

Encrypting PIN Keypad Privacy Shield: Attaches to the encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

Non-Encrypting PIN Keypad Privacy Shield: Attaches to the non-encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the non-encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the non-encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

Keytop Protective Caps: Clear plastic caps which cover each non-engraved keytop to protect the label from normal wear and tear. These may be ordered to replace, if required, the ones shipped with the 4704 keyboards.

Keytop Label Sheets: Sheets of 30 labels each for use on the 4704 keytops. The blank sheet contains 30 blank labels. The preprinted sheet contains sixteen blank labels and the following preprinted labels: digits 0 through 9, 00, 000, (.) period, and (,) comma).

ACCESSORY SUMMARY

	Feature No.	P/N	Description
Filters	**#9181**	**6019525**	Green (5.5")
	#9182	**6019527**	Green (9.0")
	#9191	**6019526**	Green (5.5")
	#9192	**6019528**	Amber (9.0")
Cradles		**6019529**	For (5.5") Monitor
		6019530	For (9.0") Monitor
MSR	**#4904**	**6019474**	Magnetic Stripe Reader
MSR/E	**#4905**	**6019470**	Magnetic Stripe Reader/Encoder
Cleaning Card		**6019483**	MSR Cleaning Card
Encrypting PIN Keypad			
		5667650	English "QZ" over zero
		5680917	English "QZ" over one

Note: When ordering, select only one of the two possible "QZ" formats to avoid mixed format input data.

Non-Encrypting PIN keypad	**5680905**	English QZ over zero
	5680908	English QZ over one

Note: When ordering, select only one of the two possible "QZ" formats to avoid mixed format input data.

Encrypting PIN Privacy Shield	**4707195**	Shield
Non-Encrypting Privacy Shield	**4402169**	PIN keypad Privacy Shield
Keytop Caps	**4585103**	Keytop Protective Cap (one)
Keytop Labels	**6019424**	Keytop Label Sheet (blank)
	6019425	Keytop Label Sheet (preprinted)
Fuses	**512137**	(5A Slow Blow) -(100-120V, 50/60Hz)
	5718367	(3A Slow Blow) -(200-240V, 50Hz)

SUPPLIES

The 4701 uses a standard IBM Diskette type 1, 2 or 2D or equivalent.

4704 FINANCE COMMUNICATION DISPLAY STATION

PURPOSE

A modular user-configurable 480 or 1,920 character CRT display and keyboard station for input and output in interactive banking applications.

Three display models with a variety of keyboards provide flexibility to offer a wide range of display functions and keyboard configurations.

MODELS

Model 1	001	A loop-attached keyboard display for use in interactive banking applications.
Model 2	002	A DCA attached keyboard display with 9" CRT for use in interactive banking or administrative applications.
Model 3	003	A DCA attached keyboard display with 12" CRT for use in interactive banking or administrative applications.

Prerequisites:

Model 1: An available position on a loop of a 4700 Finance Communication System or 3600 Finance Communication System. One Display Monitor and filter, and one keyboard type must be selected to complete the order (see Special Features), unless the unit is being ordered for use as a spare and then the specify for the Display Control Module only, must be indicated (See Specify).

Model 2 or 3: An available position on the 4700 DCA feature. One filter and one keyboard type must be selected to complete the order (see Special Features), unless the unit is being ordered as a spare and then the specify for the Display Module must be indicated (See Specify).

Customer Setup (CSU): Machine and selected features.

HIGHLIGHTS

Model 1: A basic display station consists of a Display Control Module, a Display Monitor (5.5" or 9") with filter and a Keyboard. The Display Control Module provides capability to attach to the 4700 or 3600 System Controller via a loop connection.

Model 2 or 3: A basic display station consists of a Display Module with filter and a keyboard. The Display Module provides capability to attach to the 4700 System Controller via a DCA connection and offers improved performance for administrative applications. (Additional information under Special Features).

Model 1, 2 and 3: A magnetics device and a PIN keypad (see Accessories) may be optionally attached to the Display Control Module (mdl 1) or the Display Module (mdl 2 and 3).

The characters are well defined. Brightness and contrast are adjustable.

Automatic initiation of diagnostics begins when station is powered on.

Four different keyboards are available to meet various user and application requirements (see Special Features).

Additional standard display station functions include:

- Upper and lower case characters
- Normal and high intensity
- MSR, MSR/E and PIN Keypad attachment capability
- Audible alarm
- 3604 Compatibility
- Banking Loop communication (mdl 1)
- Address sharing with printers (mdl 1)
- 3278-2 Compatibility (except magnetics) (mdl 2 and 3 only)
- DCA Communication (mdl 2 and 3 only)

Risers on the mdl 1 and 2 displays, and a pedestal on the mdl 3 that attach to the bottom of the Displays and keyboard, tilt the front of the display, or the rear of the keyboard, upward approximately 15 degrees. An optional cradle (mdl 1 and 2 only) enables the operator to adjust the viewing angle of the display from (-5 degrees to +20 degrees). A choice of anti-glare filters protect against light reflection. The anti-glare filters provide either yellow characters displayed on a brown background or bright green characters on a dark green background (see Accessories). One filter is provided with (and must be specified) for each display station.

Customer Setup (CSU): The 4704 is designated customer setup, thereby offering the customer early availability and station relocation flexibility. One copy of the CSU Instructions is shipped with each 4704.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4704.
- Performing 4704 checkout in accordance with IBM supplied procedures for initial installation or relocation.
- Physical setup, connection of cables in protected customer access areas including loop cables (mdl 1), DCA cables (mdl 2 and 3), cables that attach the Display Control Module to the Display Monitor (mdl 1), and cables that attach keyboards, magnetics and PIN keypads to the Display Control Module (mdl 1) or Display Module (mdl 2 and 3).
- Using problem determination procedures provided with the 4704 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM designated location (see Maintenance below).
- Determining any required spares.

Maintenance: The 4704 utilize IBM Service/Exchange Centers under either Maintenance or Replacement options. Replacement option is not available for rental machines. It is the customer's responsibility to setup the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service Center Maintenance it is the customer's responsibility to disconnect the unit(s), transport them to the designated IBM location, pick them up when repair is completed and reinstall them.

Maintenance is provided during the warranty period as described in the Maintenance option of the IBM Service Center Maintenance plan.

Customers with 4704s not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) at a designated IBM location for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement Coverage, he may have the machine(s) inspected. This inspection will be done at the designated IBM location for a fixed charge.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Bibliography: For information on 4704 publications, refer to the *IBM 4700 Finance Communication System: Introduction to the IBM 4704 Model 2 and 3 Display Station,* (GC31-2049).

SPECIFY

Unless indicated otherwise, these specify features are not recommended for field installation.

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, **#9891** for non-lock plug. A line cord of 1.8 meters (6 feet) is provided at time of shipment.
- Cables: For DCA attachment, refer to Accessories for ordering information. The following cables are provided:

  Model 1 - Attached to the Display Control Module are the cables for the Display Monitor attachment and the loop attachment.

  Model 1 and 2 - The keyboards, magnetics, and PIN keypads provide a cable for attachment to the Display Control Module or Display Module. All cables are 2.0m (6.5 feet) long. For more information, see *IBM 4700 Finance Communication System: Installation Planning Manual,* GC31-2018.
- Display Control Module or Display Module: Specify **#9480** when ordering mdl 1 without Display Monitor or Keyboard, or mdl 2 or 3 without Keyboard.

SPECIAL FEATURES

Display Monitors (mdl 1 only)

The Display Monitors are free-standing units which are cable attached to the Display Control Module. One Display Monitor must be selected for each Display Control Module. Only one Display Monitor may be attached to a 4704 Display Control Module. For spares, any number of Display Monitors may be ordered depending on user requirements.

Display Monitor (5.5 in.) (#3255)Mdl 1 only: Displays up to 480 characters in 12 lines of 40 characters each on a 5.5-inch (diagonal) CRT. **Limitations:** Cannot be installed with #3290. **Field Installation:** Yes (CSU). **Specify:** One of the following must be selected for each #3255 Display Monitor, **#9181** Antiglare filter (green), or **#9191** Antiglare filter (amber).

4704 Finance Communication Display Station (cont'd)

Display Monitor (9 in.) (#3290)Mdl 1 only: Displays, under program control, either 1,920 characters (24 lines of 80 each) or 480 characters (12 lines of 40 each) on a 9-inch (diagonal) CRT. In the 480-character mode (default mode), the characters are larger than in the 1920-character mode. **Limitations:** Cannot be installed with #3255. **Field Installation:** Yes (CSU). **Specify:** One of the following must be selected for each #3290 Display Monitor: **#9182** Antiglare (green), or **#9192** Antiglare filter (amber).

Display Modules (Mdl 2 and 3 only)

The Display Module is an integrated unit which contains a CRT plus the logic and power necessary to drive the CRT, keyboard and the optional magnetics and/or PIN keypad devices. One keyboard or keyboard combination must be selected for each Display Module.

The Display Module will display, under program control, either 1,920 characters (24 lines of 80 characters each) or 480 characters (12 lines of 40 each). In the 480-character mode, the characters are larger than in the 1920-character mode. **Limitations:** Not attachable to a 3600 System Controller. **Field Installation:** Yes (CSU). **Specify:** One of the following must be selected for each Display Module: **#9183** Antiglare Filter (Green) or **#9193** Antiglare Filter (Amber).

Keyboards

The keyboards are packaged separately from the display, with a cable for attachment to the Display Control Module or Display Module. The Function, Expanded Alphameric and Administrative keyboards have a combination of pre-engraved and non-engraved keytops. These keyboards are provided with a set of keytop labels, some of which contain pre-printed numbers and the remainder blank. The clear plastic cap which covers each non-engraved keytop protects the label from wear. One keyboard must be selected for each Display. Only one keyboard or keyboard combination may be attached to a 4704 Display Station. For spares, any number of keyboards may be ordered depending on user requirements.

Function Keyboard (#4650): A 50-key keyboard containing two clusters of 15 keys (a matrix of five rows, with three keys in each row) plus one cluster of 20 keys (a matrix of five rows, with four keys in each row) to the right side of the keyboard. Forty-five of these keys are non-engraved and may be personalized by the user according to requirements. The remaining 5 keys are pre-engraved. This keyboard may be combined with Alphameric Keyboard (#4662) for additional function. **Limitations:** May not be combined with an Expanded Alphameric Keyboard (#4677) or Administrative Keyboard (#4607). **Field Installation:** CSU.

Alphameric Keyboard (#4662): A 62-key alphameric keyboard. It provides a typewriter layout with permanently labeled keys. This keyboard may be combined with Function Keyboard (#4650) for additional function. **Limitations:** May not be combined with an Expanded Alphameric Keyboard (#4677) or Administrative Keyboard (#4607). **Field Installation:** CSU.

Expanded Alphameric Keyboard (#4677): A 77-key Keyboard with a permanently labeled typewriter layout of 62 keys plus a cluster of 15 non-engraved function keys to the right of the alphameric block. The 15 function keys are programmable and can be labeled according to the application requirements. **Limitations:** May not be combined with a Function Keyboard (#4650), Alphameric Keyboard (#4662) or Administrative Keyboard (#4607). **Field Installation:** CSU.

Administrative Keyboard (#4607): A 107-Key keyboard with a permanently labeled typewriter layout of 62 keys plus a cluster of 10 control keys to the left of the alphanumeric block, a cluster of fifteen keys to the right of the alphanumeric block and a cluster of twenty keys to the right of the fifteen-key cluster. Two of the keys in the ten-key cluster are permanently labeled; the remaining 8keys plus the entire fifteen and twenty-key clusters are programmable and may be labeled according to the application requirements. **Limitations:** (1) May not be combined with a Function Keyboard (#4650), an Alphameric Keyboard (#4662) or an Expanded Alphameric Keyboard (#4677) (2) Attaches to 4704 mdls 2 and 3 only (3) This keyboard is not supported on 3600 System Controllers. **Field Installation:** CSU.

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES

The following items are available on a purchase-only basis. Order by feature number with original machine order for delivery of the item with the 4704. Order the item by part number for delivery at any other time.

Filters: Anti-glare filters will protect against light reflection and provide either a yellow character display on a brown background (amber) or bright green characters on a dark green background (green). (One filter is provided with each display station.) One filter must be selected for each display monitor feature (see Special Features).

Feature No	Part Number	Description
#9181	6019525	Filter, Green (5.5 in.) Mdl 1
#9182	6019527	Filter, Green (9.0 in.) Mdl 1
#9191	6019526	Filter, Amber (5.5 in.) Mdl 1
#9192	6019528	Filter, Amber (9.0 in.) Mdl 1
#9183	8583464	Filter, Green (9.0 in.) Mdl 2
#9193	8583465	Filter, Amber (9.0 in.) Mdl 2
#9184	8583443	Filter, Green (12.0 in.) Mdl 3
#9194	8583443	Filter, Amber (12.0 in.) Mdl 3

Cradle: A vertical tilt capability allows the display operator to adjust the display monitor from -5 to plus 20 degrees, (mdls 1 and 2 only). The cradle may be set on a counter top or for mdl 1 only may be mounted to the underside of a horizontal surface. A bracket supplied for hanging the cradle provides a swivel capability.

Part Number	Description
6019529	Cradle (5.5 in.)
6019530	Cradle (9.0 in.)

Magnetic Stripe Reader: Specify **#4904** for delivery of the unit with the 4704. Order P/N 6019474 for delivery of the unit any other time. Has read capability only. The MSR is capable of reading the contents of ANSI Track 2 (75 bpi) on a credit or other plastic card. **Limitations:** Cannot be installed with Magnetic Stripe Reader/Encoder. **Maximum:** One.

Magnetic Stripe Reader: Specify **#4901** for delivery of the unit with the 4704. Order P/N 6019489 for delivery of the unit at any other time. The MSR is capable of reading both the contents of ANSI or ISO Track 2 (75 bpi) on a credit or other plastic card and the contents of a track encoded on a magnetic striped savings book by a 4704 or 3604 magnetic stripe encoder (210 bpi). The slot in the device is designed to accept documents ranging in thickness from 0.10" (0.25mm) to 0.096" (2.44mm). **Limitations:** Can not be installed with Magnetic Stripe/Reader/Encoder. **Maximum:** One.

Magnetic Stripe Reader/Encoder: Specify **#4905** for delivery of the unit with the 4704 ... P/N 6019470 for delivery of the unit any other time. Has read and encode capability. The device is capable of reading the contents of Track 2 on a credit card (encoded at 75 bpi according to the ANSI Standard X4.16) or an ID card or passbook encoded at 210 bpi on another magnetic stripe encoder attached to a 4704 or 3604, or equivalent. The device encodes at 210 bpi in the IBM 3604 Passbook Format. The slot in the device is designed to accept documents ranging in thickness from .010" (0,25mm) (excluding magnetic stripe), to .038" (0,96mm) (including magnetic stripe). It will accept plastic credit cards and ID cards or one cover of a magnetically encoded passbook. **Limitations:** Cannot be installed with Magnetic Stripe Reader. **Maximum:** One.

Cleaning Card: A card which is used for cleaning the magnetic head on a Magnetic Stripe Reader.

Part Number	Description
6019483	Cleaning Card

Encrypting PIN Keypad: A cable attached encrypting PIN keypad device enabling the customer to enter a personal identification number that becomes encrypted during a transaction. **Limitation:** Cannot be installed with a Non-Encrypting PIN Keypad. **Maximum:** One.

Part Number	Description
5667650	English "QZ" over zero
5680917	English "QZ" over one

Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

Non-Encrypting PIN Keypad: A cable attached non-encrypting PIN keypad device enabling the customer to enter a personal identification number during a transaction.

Part Number	Description
5680905	English QZ over "0"
5680908	English QZ over "1"

Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

Encrypting PIN Keypad Privacy Shield: Provides a degree of visual shielding while allowing easy manipulation of the encrypting PIN keypad keys.

Part Number	Description
4707195	Shield

Non-Encrypting PIN Keypad Privacy Shield: Provides a degree of visual shielding while allowing easy manipulation of the PIN keypad keys.

Part Number	Description
4402169	Shield

Keytop Protective Caps: Clear plastic caps which cover non-engraved keytops to protect the label from wear.

4704 Finance Communication Display Station (cont'd)

Part Number	Description
4585103	Keytop Cap

Keytop Label Sheets: Labels which provide the user with some pre-printed numbers and/or blanks for users requirements.

Part Number	Description
6019424	Blank Labels
6019425	Labels Blank, Pre-printed

Fuses	512137	(5ASlow Blow) -(100-120V, 50/60Hz)
	5718367	(3ASlow Blow) -(200-240V, 50Hz)

SUPPLIES

See IBM.

4710 FINANCE COMMUNICATION SYSTEM RECEIPT/VALIDATION PRINTER

PURPOSE

The 4710 receipt/validation printer is a table top printer designed to fit into a teller workstation along with other teller operated keyboards and displays. The 4710 attaches to both the 4700 and 3600 controllers via a loop.

MODELS

Model 1 001 — Provides for banking receipt, validation and journal functions. Has a 96-character set, and prints at 10 or 12 characters per inch.

Prerequisites: An available position on a loop of a 4700 or 3600 Finance Communication System.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 4710 printer prints on a variety of forms and paper stock to provide for banking receipt, validation and journal functions. It prints on single, double or triple part forms such as checks, receipts and validation documents. Documents are inserted vertically and do not require edge justification. Forms can easily be inserted/positioned with one hand to a fixed bottom registration point.

Printing operations are initiated manually via either of two separate keys if shared, or automatically upon sensing an inserted document. Either option can be selected under application program control.

Ribbon replacement is a "clean hands" operation.

Printing is bidirectional with a maximum of 120 characters per second at 12 cpi, and a maximum of 100 characters per second at 10 cpi, selectable by Application program. The 4710 printer can print from one to four lines per document. **BOLD** printing (2 x normal character width) is standard, selectable by application program.

Sixteen customer-designable characters can be added to the character set.

Shared Workstations is included. (Station A/B Start Keys.)

Address sharing is supported. Like and Unlike devices. (Printer with Printer and Printer with Display.)

A Locked Journal Roll function is standard. One- or two-part paper rolls may be used.

Single part rolls may be 25.4m (100 feet) in length.
Two part rolls may be 12.7m (50 feet) in length.
A tear bar is provided for the exiting paper.
A slot is provided to permit manually writing on the journal.

The Journal Print Station is located directly behind the Document Print Station, thus allowing the same lines which print on the cut form document to print on the journal roll.

The 4710 is attached to controllers by loops, which operate at speeds of 1200, 2400 or 4800 bps.

Indicator Lights: Six indicator lights are provided.
- **Ready:** Indicates status of loop communications.
- **Check:** Indicates a machine check.
- **Insert Form:** Signals operator to insert form; when extinguished, verifies form accepted. Controlled by application program.
- **Programmable Indicators 1 and 2:** Controlled by application program.
- **Journal Paper Out:** Paper nearing end.

Operator Control Keys: Four control keys are provided.
- **Start Keys (2)**
- **Stop Key**
- **Journal Advance Key**

Forms Specifications: Refer to *Forms Design Reference Guide for Printers,* GA24-3488.

Customer Setup (CSU): The 4710 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, refer to the GI section. One copy of the CSU Instructions is shipped with each 4710. The CSU allowance is four days.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State, and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4710.
- Replacement of ribbon and paper. (See "Supplies" below.)
- Performing 4710 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical setup, connection of cables in protected customer access areas including loop cables.
- Using the problem determination procedures provided with the 4710 to determine the failing unit and filling out the appropriate Report prior to forwarding the failing unit to an IBM designated location. (See "Maintenance" below.)
- Determining any required spares.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.

Maintenance: The 4710s utilize IBM Service/Exchange Centers under either Maintenance or Replacement options. Replacement option is not available for rental machines. See GI, FE Services sub-section 71) for description and procedures associated with Service/Exchange Centers. It is the customer's responsibility to install the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service/Exchange Center Maintenance it is the customer's responsibility to disconnect the unit(s), transport them to the designated IBM location, pick them up when repair is completed and reinstall them.

Maintenance is provided during the warranty period as described in the Maintenance option of the IBM Service Center Maintenance plan. (See GI pages).

Customers with 4710s not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) at a designated IBM location for a time and material charge. (See GI pages).

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement Coverage, he may have the machine(s) inspected. This inspection will be done at the service center for a fixed charge.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Bibliography: For information on Publications about the 4710, refer to the *IBM 4700 Finance Communication System: Summary,* GC31-2016.

SPECIFY

Unless indicated otherwise, specify features are not recommended for field installation.

- Voltage (120V AC, 1-phase, 60 Hz): **9890** for locking plug, **#9891** for non-locking plug. A line cord of 1.8 meters (6 feet) is provided at time of shipment.

SPECIAL FEATURES (None)

Volume Purchase: Volume purchase quantity 100 or more, price reduction percentage, 15%.

MODEL CONVERSIONS (None)

ACCESSORIES

Locks and Keys: The 4710 is shipped with two identical keys for the cover lock. Additional keys may be purchased from IBM. Order via MSORDER (Category = Supplies/Accessories; Group Code = Supply Order, on AAS. Indicate serial number of lock.

SUPPLIES

The following items, available from the System Supplies Division (SSD), or their equivalents, are required.

Paper: 100-foot single journal roll paper:

Carton of 48 rolls 4.5 inches wide	P/N 7032894
One roll 4.5 inches wide	P/N 7032895
50-foot two-part journal roll paper:	
Carton of 48 rolls 4.5 inches wide	P/N 7032919
One roll 4.5 inches wide	P/N 7032920

Ribbon:

Black Ribbon, one box	P/N 7037985
Purple Ribbon, one box	P/N 7033537

4710 Fin. Comm. System Receipt/Validation Printer (cont'd)

Starter Kits: Two starter kits are available, one containing two-ply roll paper and the other containing single-ply paper. Each contains black ribbons and provides approximately a six month supply of ribbons and paper for every four 4710s being installed. Both kits are available as purchase-only items.

#6320	1 carton two-ply roll paper 10 black printer ribbons
#6321	1 carton single-ply roll paper 10 black printer ribbons

4720 FINANCE COMMUNICATION SYSTEM FORMS/PASSBOOK PRINTER

PURPOSE

The IBM 4720 forms/passbook printer is a family of table top printers designed to fit into a teller or administrative workstation along with other 4700 devices. The 4720 printer is available in a series of Models intended to provide appropriate printing capabilities for a variety of financial applications. The 4720 printers attach to 4701 controllers via a loop. Attachment to 3600 controllers is supported by PRPQ 5799-BJE.

MODELS

Model 1	001	Provides cutform printing capability.
Model 2	002	Provides cutform and journal printing capability.
Model 3	003	Provides cutform and passbook printing capability.
Model 4	004	Provides cutform, passbook, and journal printing capability.

Prerequisites: An available position on a loop of a 4701 Finance Communication System Controller.

HIGHLIGHTS

The 4720 printer provides the capability to print on a range of sizes of cutforms or passbooks. Journal printing function is also available, depending on model.

Printing is bi-directional at a maximum of 120 characters per second. Printing takes place at 10 or 12 cpi, selectable by Application program.

Forms advance can be specified at 5 or 6 lines per inch, or in 1/90 inch steps, selectable by Application program.

Shared Workstations is included, implemented by two Start Keys. In a non-shared environment, printing operations can be initiated manually via either of the two separate start keys, or automatically upon sensing an inserted document. Either option can be selected under application program control.

Ribbon replacement is a "clean hands" operation.

The basic machine provides a set of 212 characters. From this set, character sets of up to 192 characters may be selected. In addition to standard alphabetics and numerics, this set includes diacritic characters used in most countries, and special characters used in both data processing and word processing applications. Non-Latin Languages (Arabic, Hebrew, and Greek), and Katakana are supported via Specify Features. Sixteen customer-designable characters can be added to the character set. The above set is available in both standard and quality print. BOLD printing (2 x normal character width) is standard.

A Quality Print function is provided. When performing quality print, the 4720 makes two printing passes over each line. Both printing passes begin at the same margin, and each pass is made at one half of the normal print head speed. The quality print characters have a more formal, typewriter-like appearance suitable for applications requiring a higher print quality than the standard matrix character.

Address sharing is supported. Like and Unlike devices. (Printer with Printer and Printer with Display.)

A Locked Journal Roll function is standard on the Models 2 and 4. One or two partrolls of 8.5" width can be used. Single part rolls may be 90 feet (27.4 m) in length. Two part rolls may be 45 feet (13.7 m) in length. A tear bar is provided for the exiting paper.

The Journal Print Station is located directly behind the Document Print Station, thus allowing the same lines which print on a cut form document to print on the journal roll.

The 4720 attaches to a 4701 controller via a loop, which operates at speeds of 1200, 2400, or 4800 BPS.

Customer Setup (CSU): The 4720 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. One copy of the CSU Instructions is shipped with each 4720. The CSU allowance is four days.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4720.
- Replacement of ribbon and paper. (See Supplies below).
- Performing 4720 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical set-up, connection of cables in protected customer access areas including loop cables.
- Using the problem determination procedures provided with the 4720 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM Service/Exchange Center. See "Maintenance" below.
- Determining any required spares.
- Replacing worn or defective print heads and maintaining a supply of spare printheads.

Maintenance: The 4720's utilize IBM Service/Exchange Centers under either Maintenance or Replacement options. Replacement option is not available for rental machines. It is the customer's responsibility to install the equipment and to determine when maintenance is required. The customer may wish to replace a failing unit with a spare and should be advised to purchase sufficient spare units if such use is planned. Under Service/Exchange Center Maintenance it is the Customer's responsibility to disconnect the units, remove his ribbon and journal roll (if applicable), and transport the unit (s) to the Service/Exchange Center, pick them up when repair is completed, and reinstall them. If the Replacement option is used, the customer should also remove his printhead prior to transporting the unit (s) to the Service/Exchange Center.

Maintenance is provided during the warranty period as described in the Maintenance option of the IBM Service/Exchange Center Maintenance plan.

Customers with 4720's not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) at a Service/Exchange Center for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement Coverage, he may have the machine(s) inspected. This inspection will be done at the designated IBM location for a fixed charge.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Forms Specifications: Refer to *Forms Design Reference Guide For Printers,* GA24-3488.

Publications: *IBM 4700 Forms/Passbook Printer Introduction and Installation Planning,* GC31-2050.

The Introduction includes a product description, configuration data, forms specifications, and physical planning information for the 4720 printer.

SPECIFY

Unless indicated otherwise, the following specify and order codes are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60Hz): **#9890** for locking plug, or **#9891** for non-lock plug. A line cord of 1.8 meters (6 ft.) is provided at time of shipment.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Available at time of manufacture only.

ACCESSORIES (None)

SUPPLIES

Paper: 90 feet single part journal roll action paper. Carton of 24 rolls 8.5 inches wide P/N 457363.

45 feet two part journal roll action paper. Carton of 24 rolls 8.5 inches wide P/N 457365.

Ribbon: Black Ribbon, one box P/N 7032757.

The above Supplies may be ordered through your IBM SSD Sales Representative .

Print Head, Customer Replaceable P/N 7034533: One print head is supplied with the printer. The print head is a consumable item, and to assure maximum availability, it is recommended that the customer have one spare print head per location on hand.

All the above supplies may be ordered via IBM Direct Sales.

4730 PERSONAL BANKING MACHINE

PURPOSE

A self-service financial terminal for use in bank lobbies, supermarkets, and other shopping and work locations.

MODELS

Model F01 A self-service financial terminal with a basic configuration containing a 480-character 9-inch diagonal display with selection keys, a keyboard consisting of a numeric keypad and function keys with optional overlays and masks, an identification card reader with Track 2, and a statement printer all located in a single console unit which may be positioned to the left or the right of a currency unit. Five currency cartridges plus one for CE service are provided with each machine. (Additional cartridges are available.) In addition, the model F01 is supplied with SNA/SDLC LU0 communications support and security keylocks. Servicing doors are on the front. Customizable panels for the upper rear and upper side of the currency unit are shipped with the machine. They can be removed and repainted. They are also available as accessories from National Distribution Division (NDD) for replacement or for early customization before the machine is installed. Special features which may be ordered for the Model F01 include a check depository, an envelope depository, and a coin dispenser. Two keylock access to the check and envelope depositories is provided with the basic machine.

Model F02 A self-service financial terminal with a basic configuration containing two displays with selection keys, two keyboards with optional overlays and masks, two identification card readers with Track 2, and two statement printers located in two console units, one on either side of a single currency unit. Five currency cartridges plus one for CE service are provided with each machine. (Additional cartridges are available.) In addition, the model F02 is supplied with SNA/SDLC LU0 communications support, and security keylocks. Servicing doors are on the front. A customizable panel for the upper rear of the currency unit is shipped with the machine. It can be removed and repainted. It is also available as an accessory from NDD for replacement or for early customization before the machine is installed. Special features which may be ordered for the Model F02 include two check depositories, two envelope depositories, and two coin dispensers. Two keylock access to the check and envelope depositories is provided with the basic machine.

Model R01 Same as the model F01 except that the servicing doors are on the rear and the currency unit customizable panels for the upper front and upper side are shipped with the machine.

Model R02 Same as the model F02 except that the servicing doors are on the rear and the currency unit customizable panel for the upper front is shipped with the machine.

Prerequisites: Attaches to an available position on the Fan-out Communications Adapter of the 4701 Finance Communication Controller or communicates with the IBM 4701 controller via the EIA/CCITT Interface. If Host Connected -- a communications controller with appropriate features ... see M3704, 3705, 3725, 3727 or 4321/4331/4361 (for Communications Adapter, #1601, on the 4321, 4331 and 4361) pages.

Customer Setup (CSU): Yes.

HIGHLIGHTS

The 4730's modular design and configuring flexibility allow it to be ordered as a low-cost cash issuer, with selected features, or fully featured with its unique new functions. All mdls of the 4730 can be configured to issue currency in up to five denominations plus four denominations of coin; cash checks in the exact amount; validate checks for acceptance by a cashier; stack checks individually for deposit; sequentially stack enveloped deposits in the order they were deposited; and perform other financial transactions including transfers and bill payment ...other documents, such as Traveler's checks, may be dispensed if (via RPQ) they complete a document issue qualification test successfully.

- New 4730 capabilities:
  - Check deposits without envelope.
  - Envelope deposits sequentially stacked in a spill-proof sealable container.
  - Cashing of non-maker checks in the exact amount.
  - Uneven amount cash back or cash withdrawal transactions.
  - Check authorization (cashier function).
  - Check verification through MICR reader.
  - Audit trail through check printer.
  - Multiple transactions on transaction statement.
  - Dynamic currency/coin cartridge reconfiguration when a cartridge is out of currency/coin.
  - Customer pre-determined automatic reconfiguration if a component fails.
  - Consumer display and statement printer used for settlement and operator tasks.
  - Locally stored image and microcode eliminate need to download after power loss or machine reset.
- New features:
  - 480-character 9-inch diagonal CRT display.
  - Selection keys ... can be used in conjunction with or in place of function keys.
  - 4-denomination coin dispenser.
  - Check depository - check MICR reader, check printer, and stacker.
  - Sequential stacking envelope and check depositories.
  - Continuous form statement printer ... multiple transactions per statement ... automatically cut to proper length when statement is issued.
  - 5-denomination currency unit.
  - Modular packaging, horizontal configuration, customizable appearance.
  - Installation flexibility ... free standing or in-counter installation.
  - Single or dual consoles ... dual consoles share common logic and currency unit providing cost savings.
  - Front or rear service ... front service for a free-standing installation near a wall, rear service for other free-standing installations or for in-counter installations.
  - Menu-driven service interface.
  - Customer servicing activities such as replacing ribbons, replacing paper rolls, emptying depository containers, etc., can be performed on one console of a dual console 4730 while the other console remains operational.
  - Customizable panels ... lower panels for all sides but service doors are provided as accessories by NDD. . The customer can leave the accessory lower panels pearl white, repaint them, or install his own lower panels (wood, veneers, etc.) in place of the accessory panels. Lower panels may not be required for in-counter installation. Upper panels are always shipped with the machine. Certain upper panels can be removed and repainted (mdl F01 -- upper rear and upper side; mdl F02 -- upper rear; mdl R01 -- upper front and upper side; mdl R02 -- upper front). If the customer wishes to have custom-finished upper panels available at the time of installation, accessory upper panels can be ordered from NDD in advance of machine shipment.
  - Dynamic reconfiguration without machine closing ... at customer option. **Documents:** Automatic recovery with documents of same or lower denomination (including substitution of coins for dollars to complete a transaction). **Coin:** Automatic recovery with coin of lower denomination. **Check Depository:** Automatic recovery using envelope depository. **Envelope Depository:** Automatically configured out when out of service. **Statement Printer:** Automatically configured out when out of service. (Consumer option to complete transaction without receipt.)
- Other characteristics:
  - Full function keyboard with optional overlays and masks.
  - Identification card reader with Track 2.
  - Optional dual-custody keylocks for currency unit.
  - Customer setup.
  - UL291 certification for "business hour" service.
  - Multiple language display capability ... based on identifier code recorded on magnetic stripe card.
  - Multiple installation usage capability ... can accept magnetic stripe cards of many different card issuers.

Capacities:

Document cartridge: 2,000 new documents, approximately 1,500 used documents.

Coin cartridges (average per console): 1 - 410; 5 - 325; 10 - 480; 25 - 350.

Check depository: Approximately 300.

4730 Personal Banking Machine (cont'd)

Envelope depository: 325 sealed envelopes each containing an average of three documents.

Statement printer: 1,000 3-inch statements using a 3.75 inch o.d. roll of 16-pound paper.

Currencies and coins tested and supported for the U.S. include:

Bills	Coins
$ 1	1
5	5
10	10
20	25
50	

An RPQ should be submitted for a document issue qualification test for note denominations not specified above, for traveler's checks, or for other documents. Specify currency denomination or note and issue to be tested.

System attachment: The 4730 was designed to communicate with any host CPU or subhost capable of communications via an SDLC line discipline using an SNA LU TYPE 0 protocol. The electrical interface presented by the 4730 complies with EIA Standard RS-232-C.

Local Attachment: For local attachment to a 4701 Finance Communication Controller via SNA/SDLC LU0, the customer must order cable assembly P/N 6125820 from Poughkeepsie, specifying the length required (connectors provided). The customer must also specify for the 4701 the SDLC Communications Adapter Without Business Machine Clocking, feature #4502, the Fan-out Communication Adapter, feature #1551, and one of the following line speeds (Refer to *IBM 4700 Finance Communication System Installation Planning,* GC31-2018):

Specify	Speed	Maximum Cable Length Supported
#9181	9600 bps	30.48m (100 ft.)
#9182	4800 bps	60.96m (200 ft.)
#9183	2400 bps	121.92m (400 ft.)

Remote Attachment: A 20-foot cable assembly will be provided for attachment of a 4730 to an external modem with clocking for remote attachment to a 4701 Finance Communication Controller, or to a 4321/4331/4361 Communications Adapter, or through a 3704, 3705, 3725 or 3726 Communication Controller to a S/370, 303X, 308X, 4341 or 4381 ... specified length cable assembly P/N 6093901 up to 40 feet may be ordered from Poughkeepsie for attachment to an external modem with clocking. **Prerequisites:** (1) External modems (such as 3863 or equivalent) capable of supplying data clocking are required. Supported transmission rates are 1200 through 9600 bps. (2) For remote attachment to a 4701 Finance Communication Controller, the EIA/CCITT Interface (#3701) and the SDLC Communications Adapter Without Business Machine Clocking (#4502) are required on the 4701.

Cabling: Refer to *IBM 4730 Personal Banking Machine Planning and Site Preparation Guide,* GC31-2075, for information regarding the specified length (up to 40 feet) cable assembly and bulk cable. See "Accessories" for ordering instructions.

Customer Responsibilities: The customer is responsible for:

- Assuring that use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate site, system, and other vendor preparation.
- Price quotations, installation, and cost (initial and recurring) of common carrier equipment and service.
- Receipt at the customer's receiving dock, unpacking, and placing of the 4730.
- Physical setup, connection of cables in protected customer-access areas.
- Performing 4730 checkout in accordance with supplied procedures for initial installation or relocation.
- Creating the customization image and loading it onto the operational diskette.
- Checking communications with the 4701 controller or with the host processor.
- Developing and/or obtaining and installing application programs to communicate with the 4730.
- Using the problem determination procedures provided with the IBM 4730 to determine the failing component and filling out the appropriate 4730 Trouble Report prior to requesting on-site maintenance service (see "Maintenance" below).
- Notifying IBM of machine relocation for CE coverage.
- Procuring and replacing replacement ink ribbons for the statement printer and the check printer, and replacement paper rolls for the statement printer. Ink ribbons and paper rolls are available from NDD.
- Procuring any spare or replacement accessories.

Maintenance: Maintenance of the 4730 is available under the IBM Maintenance Agreement.

IBM will not provide warranty or maintenance service on a 4730 containing money. The customer will be responsible for removing, controlling, and reloading all money in the 4730 so that IBM can fulfill its warranty and maintenance obligations. A service document cartridge is supplied with the basic machine, and a service coin cartridge is supplied with the coin feature. These cartridges are intended for use in customer problem determination and by the CE for servicing the 4730.

Customers with 4730s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if repairable, on-site for a time-and-material charge.

If maintenance coverage is not contracted for immediately following expiration of any warranty and the customer subsequently wants IBM Maintenance Agreement coverage, the customer must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined. This qualification will be done at the customer's site. If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Accessories are not maintained by IBM.

CUSTOMIZATION

The 4730 is supplied by IBM in pearl white only.

Customizable Panels: All 4730 panels and service doors shipped by IBM are finished in pearl white. Lower panels for all sides but service doors are not shipped with the 4730 but must be ordered and are billed separately by NDD. The customer can leave the accessory lower panels pearl white, repaint them, or install his own lower panels (wood, veneers, etc.) in place of the accessory panels. Lower panels may not be required for in-counter installation. Upper panels are always shipped with the machine. Certain upper panels can be removed and repainted (mdl F01 -- upper rear and upper side; mdl F02 -- upper rear; mdl R01 -- upper front and upper side; mdl R02 -- upper front). If the customer wishes to have custom-finished upper panels available at the time of installation, accessory upper panels can be ordered from NDD in advance of machine shipment.

Mounting hardware to be used to mount panels the customer provides is also available from and will be billed separately by NDD.

Orders for customizable panels and mounting hardware should be submitted to NDD sufficiently early to allow the customer to obtain customized panels before installation of the 4730.

When a standard panel is ordered early (as an accessory), the customer will have to replace the standard panel that is always shipped on the 4730 with the one he has customized.

Customizable Bezels: The 4730 is shipped with bezels and graphics for the identification card reader, envelope depository, and check depository slots. These bezels are also available from NDD without graphics as accessories. This allows the customer to customize his graphics on the bezels through silk screening or decals.

Kick Strips: Kick strips around the base of the 4730 may not be required for in-counter installations. Kick strips are recommended for free-standing installations and are available as an accessory.

Currency Unit Security Bracket: A currency unit security bracket is available as an accessory. It allows the currency unit to be bolted to the floor. The currency unit security bracket and 4730 replacement accessories and supplies may be ordered from NDD.

CURRENCY UNIT OPERATION

Document Cartridges: Five document cartridges are provided with the basic 4730 for customer use. An additional service document cartridge is provided for use by CE personnel. Additional cartridges for use as spares or replacements may be ordered from NDD. Spare cartridges permit the customer to fill some with currency while other cartridges are in use. The customer is responsible for determining if the cartridge is the failing unit within a 4730. The customer is responsible for determining if the cartridge is the failing unit within a 4730. Failing document cartridges should be replaced; the document cartridge was not designed to be repaired. Service for the document cartridge under the IBM Maintenance Agreement is not offered. The service document cartridge must be made available by the customer to the CE for normal 4730 maintenance.

Use new or used currency in good condition: The general condition of used currency may vary. Used currency must be inspected to remove excessively worn, damaged, or torn bills. The *4730 Personal Banking Machine Operator's Guide for Front-Serviced 4730s,*

4730 Personal Banking Machine (cont'd)

GC31-2518, and the *4730 Personal Banking Machine Operator's Guide for Rear-Serviced 4730s*, GC31-2520, contain procedures for preparation of new currency and inspection of used currency for operation in the 4730.

Coin Cartridges: Each 4730 coin cartridge is used to hold one denomination of coins. Four coin cartridges are provided with the feature for customer use. An additional service coin cartridge capable of holding multiple denominations is provided for use by CE personnel. Additional cartridges for use as spares or replacements may be ordered from NDD. Spare cartridges permit the customer to fill some with coins while others are in use. The customer is responsible for determining if the cartridge is the failing unit within a 4730. Failing coin cartridges should be replaced; the coin cartridge was not designed to be repaired. Service under the IBM Maintenance Agreement is not offered. The service coin cartridge must be made available by the customer to the CE for normal 4730 maintenance.

Use new or used coins in good condition: The general condition of used coins may vary. Used coins must be inspected to remove excessively worn or damaged coins. The *4730 Personal Banking Machine Operator's Guide for Front-Serviced 4730s*, GC31-2518, and the *4730 Personal Banking Machine Operator's Guide for Rear-Serviced 4730s*, GC31-2520, contain procedures for inspection of used coins for operation in the 4730.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9911** for 120V (usable on 115V). Specify **#9891** for line cord with non-locking plug.
- Console unit position (Consumer facing front of machine): [mdls F01, R01] Specify **#9120** for console unit to the left of the currency unit. Specify **#9121** for console unit to the right of the currency unit.
- Dual-Custody Keylock: Specify **#9550** for a second keylock provided for the currency unit. **Maximum:** One. **Field Installation:** Not recommended.
- Keyboard Overlays (Numeric or Alphameric Key Arrangement): Specify **#9301** for numeric-only keypad. Specify **#9302** for alphameric keypad ... alphameric arrangement is the basic touch-pad telephone format with the Q and Z added over the numeric "0" and no alpha over the numeric "1" or specify **#9303** for alphameric keypad ... alphameric arrangement is the American Banking Association Standard format with the Q and Z over the numeric "1" and no alpha over the numeric "0".
- Function Key Arrangement: Specify one of the following function key arrangements. All keyboards can be customer installed.

	1	2	3	4	5	6	7	8
1	Withdraw Cash	Deposit	From Checking	To Checking	1	2	3	Cancel
2	Fixed Amount	Cash Check	From Savings	To Savings	4	5	6	(Reserved)
3	Account Balance	Payment	From Credit Card	To Credit Card	7	8	9	Change
4	Transfer	Other Service	From Other Account	To Other Account	Correc-tion	0	Decimal Point	OK

As shown (numeric only): Specify **#9301**
Alphameric with QZ/0: Specify **#9302**
Alphameric with QZ/1: Specify **#9303**

	1	2	3	4	5	6	7	8
1	Withdraw Cash	Deposit	From Checking	To Checking	1	2	3	Cancel
2	Special	Payment Enclosed	From Savings	To Savings	4	5	6	(Reserved)
3	Account Balance	Payment From Account	From Credit Card	To Credit Card	7	8	9	Change
4	Transfer	Other Service	From Other Account	To Other Account	Correc-tion	0	Decimal Point	OK

As shown (numeric only): Specify **#9305** and **#9301**
Alphameric with QZ/0: Specify **#9305** and **#9302**
Alphameric with QZ/1: Specify **#9305** and **#9303**

	1	2	3	4	5	6	7	8
1	Withdraw Cash	Deposit	From Checking	To Checking	1	2	3	Cancel
2	Check Approval	Cash Check	From Savings	To Savings	4	5	6	(Reserved)
3	Account Balance	Payment	From Credit Card	To Credit Card	7	8	9	Change
4	Transfer	Other Service	From Other Account	To Other Account	Correc-tion	0	Decimal Point	OK

As shown (numeric only): Specify **#9306** and **#9301**
Alphameric with QZ/0: Specify **#9306** and **#9302**
Alphameric with QZ/1: Specify **#9306** and **#9303**

- Keyboard Masks: Specify one of the following keyboard masks: All keyboard masks can be customer installed.

```
   12 34 567 8        12 34 567 8        12 34 567 8        12 34 567 8
1     000 0           1     000 0        0  0 000 0        0  0 000 0
2     000             2     000          0  0 000          0  0 000
3     000             3     000 0           0 000             0 000 0
4     000 0           4     000 0           0 000 0           0 000 0
      #9351                #9451              #9354              #9454

   12 34 567 8        12 34 567 8        12 34 567 8        12 34 567 8
1  0  0 000 0        0  0 000 0        0  0 000 0        0  0 000 0
2  0  0 000          0  0 000          0  0 000          0  0 000
3  0  0 000          0  0 000 0        0  0 000          0  0 000 0
4     000 0           4     000 0           0 000 0           0 000 0
      #9355                #9455              #9356              #9456

   12 34 567 8        12 34 567 8        12 34 567 8        12 34 567 8
1  00 00 000 0        00 00 000 0        00 00 000 0        00 00 000 0
2  00 00 000          00 00 000          0  00 000          0  00 000
3  00 00 000          00 00 000 0        0  00 000          0  00 000 0
4  0  00 000 0        0  00 000 0           00 000 0           00 000 0
      #9357                #9457              #9358              #9458

   12 34 567 8        12 34 567 8        12 34 567 8        12 34 567 8
1  0  00 000 0        0  00 000 0        00 00 000 0        00 00 000 0
2  0  00 000          0  00 000          00 00 000          00 00 000
3  0  00 000          0  00 000 0        00 00 000          00 00 000 0
4  0  00 000 0        0  00 000 0        00 00 000 0        00 00 000 0
      #9359                #9459              #9362              #9462

   12 34 567 8        12 34 567 8        12 34 567 8        12 34 567 8
1  00 00 000 0        00 00 000 0        00    000 0        00 00 000 0
2  0  00 000          0  00 000          0     000          00 00 000
3  0  00 000          0  00 000          0     000          00 00 000
4  0  00 000 0        0  00 000 0        0     000 0        0     000 0
      #9363                #9463              #9364              #9367

   12 34 567 8        12 34 567 8
1  00 00 000 0        00    000 0
2  00 00 000             00 000
3  00 00 000 0        0     000 0
4     000 0           4     000 0
      #9469                #9470

   12 34 567 8        12 34 567 8
1  00 00 000 0        00 00 000 0
2  0  00 000          0  00 000
3  00 00 000          00 00 000 0
4  00 00 000 0        00 00 000 0
      #9365                #9466

   12 34 567 8        12 34 567 8
1  0  0  000 0        0  0  000 0
2  0  0  000          0  0  000
3  0  0  000          0  0  000 0
4  0  0  000 0        0  0  000 0
      #9366                #9467
```

SPECIAL FEATURES

Note: All field installable special features require service personnel for field installation.

Check Depository (#1550): Provides a check transport mechanism leading from a check slot to a MICR check reader, a check printer, and a container with a capacity of approximately 300 checks. One container per Check Depository is supplied with the feature. Additional containers are available through NDD as an accessory. Handles checks between 66.7mm (2.63 in.) and 108.0mm (4.25 in.) wide and between 146.1mm 5.75 in.) and 225.4mm (8.9 in.) long and between 0.09mm (0.0035 in.) and 0.18mm (0.007 in.) thick with a base weight of between 20 and 32 pounds (75 and 120 grams per square meter). The check printer will print up to 55 characters (45 characters when check authorization is implemented) of customer selected information on the check to aid reconciliation and return item processing, or to provide

4730 Personal Banking Machine (cont'd)

data for check authorization. This information will be printed in a multiple field single line across the face of the check. The check will be printed after the check has been accepted for stacking or authorization and returned to the customer. The checks will be stacked in sequence in a container which is transportable and spill-proof. **Limitations:** One per mdl F01 or R01; two per mdl F02 or R02. **Field Installation:** Yes.

Coin Dispenser (#1650): Transports coins from four denomination-specific coin cartridges to a coin cup located in the currency unit ... four coin cartridges per Coin Dispenser are provided with the feature for customer use. An additional service coin cartridge capable of being installed in any position in the coin dispenser is provided for use by CE personnel. Additional coin cartridges are available through NDD as an accessory. The approximate coin capacities for the 4730 Mdls F01 and R01 and each station of a Mdl F02 and R02 are: 1 - 410; 5 - 325; 10 - 480; 25 - 350. **Limitations:** One per mdl F01 or R01; two per mdl F02 or R02. **Field Installation:** Yes.

Envelope Depository (#3650): Provides an envelope transport leading from a controlled access slot to a deposit receptacle inside the 4730. The depository transport is designed to discourage tampering with previously inserted deposits. The deposited envelopes are stacked in a portable container in sequence. The depository will accept sealed envelopes up to 12.7mm (0.5 in.) thick. It will accept the normal (maximum) size envelope for the U.S. and Canada which is 107mm (4.2 in.) by 241mm (9.5 in.). The envelope depository will accept 325 sealed envelopes each containing an average of three documents. One container per Envelope Depository is supplied with the feature. Additional containers are available through NDD as an accessory. **Limitations:** One per mdl F01 or R01; two per mdl F02 or R02. **Field Installation:** Yes.

MODEL CONVERSIONS

Model F01 can be field upgraded to model F02. Model R01 can be field upgraded to model R02. Model changes between F01 and R01 or between F02 and R02 are available at time of manufacture only. Field changes between left and right console unit attachment to the currency unit for a model F01 or R01 are not recommended.

ACCESSORIES

The 4730 is shipped without lower panels (since these panels may not be required for in-counter installation). Panels may be ordered as an accessory from NDD. Other accessories, such as the privacy filter, kick strips, the currency unit security brackets, and customizable bezels, also can be ordered. Cartridges and containers for documents, coins, check and envelope depositories and all items required to make the 4730 operative and for Customer Setup (CSU) and customer maintenance will be provided with each machine in accordance with its configuration. Contact IBM for replacement accessories and supplies, such as document separators, ink ribbons, and statement printer paper.

All 4730 Accessories and Supplies are available from NDD.

Cables to attach 4730 units may be purchased from IBM ... The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk cable number, cable assembly number or P/N as appropriate. Allow lead time of 90 days.

The following are "X" length cables with maximum length shown.

Cable Assy No.	Use	Length
6093901	Cable Assy, EIA/CCITT (to ext modem)	12m (40 ft)
5680977	Cable Assy, EIA/CCITT (to 4701)	122m (400 ft)

SUPPLIES

The following 4730 accessories and supplies are available from NDD. Customers planning to order large volumes of additional or replacement cartridges/containers should contact their NDD Marketing Representative at least one month prior to installation.

Document Cartridge	Service Document Cartridge
Envelope Container	Check Container
Coin Cartridges	Coin Cartridge Stand
Service Coin Cartridge	Customizable Bezels
Customizable Panels	Mounting Hardware
Privacy Display Filter	Currency Unit Security Brackets
Kick Strips	Check Printer Ribbon
Statement Printer Ribbon	Statement Printer Paper
Document Separators	Magnetic Head Cleaning Card

To order one or more complete sets of replacement cartridges/containers for your 4730, use the feature codes listed below:

Full Function		
Mdl F01, R01	**#6301**	**#2950**
Mdl F02, R02	**#6302**	**#2951**
Document Only		
Mdl F01, R01	**#6303**	**#2952**
Mdl F02, R02	**#6303**	**#2952**
Document and Check		
Mdl F01, R01	**#6304**	**#2953**
Mdl F02, R02	**#6305**	**#2954**
Document and Coin		
Mdl F01, R01	**#6306**	**#2955**
Mdl F02, R02	**#6307**	**#2956**
Document and Envelope		
Mdl F01, R01	**#6308**	**#2957**
Mdl F02, R02	**#6309**	**#2958**
Document, Check and Coin		
Mdl F01, R01	**#6310**	**#2959**
Mdl F02, R02	**#6311**	**#2960**
Document, Check and Envelope		
Mdl F01, R01	**#6312**	**#2961**
Mdl F02, R02	**#6313**	**#2962**
Document, Coin and Envelope		
Mdl F01, R01	**#6314**	**#2963**
Mdl F02, R02	**#6315**	**#2964**

4860 PCjr

PURPOSE

The 4860 PCjr is a small, low-cost system which is compatible with other members of the IBM Personal Computer family. PCjr is designed for use in home and educational environments and for personal productivity applications.

MODELS

Model 004 System Unit/Keyboard, 64KB Memory, two cartridge slots, transformer.

Model 067 System Unit/Keyboard, 128KB Memory (including 64KB memory and display expansion), two cartridge slots, transformer, one 360KB Diskette Drive.

Prerequisites: One of the following display options is required: A) an Adapter Cable for IBM Color Display (#0021) and a 5153 mdl 001 Color Display or equivalent, or B) a Connector for TV (#0020) and a user-supplied color television set, or C) a user-supplied color video monitor and cable. Four user-supplied AA-size batteries are required to operate the cordless keyboard. The optional Keyboard Cord (#0012) is required to operate the keyboard without batteries. The use of the 360KB Diskette Drive requires IBM Personal Computer Disk Operating System (DOS) 2.1 (6024120).

Customer Setup (CSU): All mdls and special features of the 4860 PCjr are customer setup.

HIGHLIGHTS

- The 4860 PCjr base system consists of three separate units: The system unit, a cordless keyboard, and a small power transformer. The optional keyboard cord and the transformer plug into rear-mounted jacks on the system unit. The system unit includes 64KB of Read-Only Memory (ROM), which contains the power-on self-test, Cassette BASIC interpreter, and cassette operating system.
- The Cassette BASIC interpreter provides the necessary cassette input/output instructions and a high level of support for display, keyboard, printer, light-pen, and joy sticks, as well as a full complement of editing, logic, math, and string functions. It is operational as soon as the system is turned on.
- The cordless keyboard, with a technology that is unique to the PCjr, is a low-profile, 62-key, detached keyboard that allows low cost and high quality. The keys are arranged in standard typewriter layout with the addition of a function key and cursor control keys. The keytops themselves are not labeled. The standard keyboard layout is permanently affixed above each key. This allows customization of the entire keyboard. There are two tilt positions for operator comfort: The normal position has 5-degree slope; with legs extended it has a 12-degree slope.
- The cordless keyboard is battery-powered and interfaces with the system unit by an infrared (IR) optical link. Mounted in the keyboard are two infrared emitting diodes that transmit coded information to the system unit. The receiver card, located in the system unit, has an infrared sensing device that receives the signal transmitted from the keyboard. The keyboard is powered by four customer-supplied AA-size batteries during cordless operation. It will function in cordless mode when located within 20 feet of, and in front of, the PCjr.
- An optional keyboard cord connection to the system unit is available power the keyboard and to send data to the system unit. The cord option must be used when multiple systems are being operated in the same immediate area to eliminate cross communication.
- The following items are supplied as standard with the 4860 PCjr system unit:
  - 62-key cordless keyboard
    battery-powered infrared optical link
    operation within 20 feet of and in front of system unit
  - 64KB of read-only memory (ROM)
    250ns access time; 375ns cycle time
    Cassette BASIC interpreter
    Power-on self-test
    Cassette operating system
  - 64KB (mdl 004) random access memory
    28KB (mdl 067) random access memory (16KB reserved for video buffer)
  - 360KB Diskette Drive (mdl 067 only)
  - Intel 8088 microprocessor
    4.77 MHz clock (210ns clock-cycle time)
  - Two cartridge slots
  - 60-volt-ampere step-down power transformer
    Separately housed
    Weight: 2 lb 13 oz.
    Power cord: 6 feet from power source to transformer; 4 feet from transformer to system unit
  - 33-watt, 3-voltage-level, 2-stage power supply
  - Audible alarm
  - Sound subsystem that uses the speaker(s) in TV or display
  - I/O connectors, keyed to prevent improper installation, for the following devices and options:
    - Serial Devices
    - Cassette recorder for loading or saving programs or data
    - Joy sticks
    - Modem
    - Diskette
    - Video/graphics subsystem
    - Direct-drive video, composite video, and television
    - Light-pen
    - I/O expansion bus
    - External audio

    Options for the 4860 PCjr that attach to the I/O connectors are:
  - 360KB diskette drive for mdl 004 (standard on mdl 067)
  - 64KB memory and display expansion for mdl 4 (standard on mdl 067)
  - Internal modem
  - Parallel printer attachment
  - Keyboard cord
  - Adapter cable for IBM Color Display
  - Adapter cable for cassette
  - Adapter cable for serial devices
  - Connector for TV (RF modulator)
  - Joy sticks

  In addition, a carrying case and cordless keyboard overlays are available.

Physical Specifications (system unit):
Width - 354mm (13.9 inches)
Depth - 290mm (11.4 inches)
Height - 97mm (3.8 inches)
Weight - less than 9 pounds with diskette drive;
less than 6 pounds without diskette drive

Physical Specifications (keyboard):
Width - 342mm (13.5 inches)
Depth - 168mm (6.6 inches)
Height - 26mm (1.02 inches)
Weight - 616 grams (22 oz.) without batteries;
700 grams (25 oz.) with batteries

Operating Environment:
Temperature (system on): 16 to 32 degrees C (60 to 90 deg. F)
Temperature (system off): 10 to 43 degrees C (50 to 110 deg. F)
Temperature (storage): 0.6 to 60 degrees C (33 to 140 deg. F)
Temperature (shipment): -40 to 60 degrees C (-40 to 140 deg. F)
Relative Humidity (system on): 8% to 80% RH
Relative Humidity (system off): - 8% to 80% RH
Transformer operating: Altitude to 7,000 feet.

Publications: *Logo: Programming with Turtle Graphics* (#2229): A spiral-bound manual that explains how to construct programs using Logo and includes a step-by-step introduction to Logo turtle graphics. The manual is intended for use with IBM Logo (6024076), and is identical to the manual that is shipped with the software.

Hands-on BASIC for the IBM PCjr (#2290): This manual is provided as standard with all mdls of the 4860 system unit. The manual is a primer for learning BASIC language programming. The manual may be purchased separately by ordering feature #2290.

IBM PCjr Guide to Operations (#2292): Provides information on operations for users of the 4860 PCjr. This manual is shipped as standard with all mdls of the 4860 system unit. The manual may be purchased separately by ordering feature #2292.

IBM PCjr Technical Reference Manual (#2293): This manual is designed to provide hardware design and interface information. The manual is intended for programmers, engineers involved in hardware and software design, designers, and interested persons who have a need-to-know how the 4860 PCjr is designed and works.

IBM PCjr Hardware, Maintenance, and Service Manual (#2294): Provides step-by-step instructions that aid the user in identifying the failure of a 4860 PCjr Field Replaceable Unit (FRU). When the FRU has been identified, the manual provides the necessary information to complete the repair activity (i.e., adjustments, replacements, etc.).

BASIC Made Easy for the IBM PCjr (#4116): An introduction to the BASIC programming language on the 4860 PCjr. It takes inexperienced users of the 4860 PCjr and the BASIC programming language through the more commonly used commands, statements, and functions of BASIC. The student learns by doing, and sets his or her own pace. The book is written in a friendly, conversational tone with heavy emphasis on the use of color, sound, and examples. Once the student has

4860 PCjr (cont'd)

completed *BASIC Made Easy*, it can be used as a reference book, since it contains a list of common BASIC error messages, as well as an index of BASIC programming terms. **Prerequisites:** Before beginning *BASIC Made Easy*, the user should read the *IBM PCjr Guide to Operations* to become familiar with the keyboard. To enter examples shown in the text requires a 4860 PCjr with the BASIC Interpreter cartridge (#4101), and one of the following: A) a color TV set with the connector for TV (#0020); or, B) a color video monitor with cable.

IBM Personal Computer Disk Operating System (DOS) 2.1 Technical Reference (#4125): Intended for the more experienced DOS users, system programmers, and those who will be developing their own applications. It contains detailed technical information not contained in the manuals available with DOS 2.1 (6024120).

IBM PCjr BASIC Reference Manual (#4702): This manual (which is provided as standard with the BASIC Interpreter cartridge #4101) describes the full capabilities of cassette and cartridge BASIC. The manual may be purchased separately without a cartridge by ordering feature #4072.

SPECIFY

- Voltage (110V AC, 60 Hz): No specify required.

MODEL CONVERSIONS (None)

SPECIAL FEATURES

Diskette Drive (#0005): The Diskette Drive is a standard feature on the 4860 mdl 067. It provides for the 4860 to read and write data on both sides of a double-sided, soft-sectored 5-1/4 inch diskette. Each side of a diskette can be formatted for 40 tracks with 9 sectors per track. Formatted storage capacity is approximately 360KB. Space and power have been provided for one drive in the system unit. Included with the Diskette Drive is the diskette drive adapter which connects to the diskette drive through an internal, flat cable attached to one end of the adapter. The diskette drive parameters are programmable. In addition, the attachment supports the diskette drive's write-protect feature. The adapter is buffered on the I/O bus and uses the system read-only memory BIOS (basic input/output system). Diskettes created on any member of the IBM Personal Computer family may be read on any other member of the family. Technical Information: 512 bytes/sector ... 9 sectors/track ... 48 tracks/in. track density ... 2 sides ... 40 tracks per side (80 total) ... 300 RPM ... 6ms track to track access time ... 250K bits/sec data transfer rate ... maximum operating altitude 7,000 feet above sea level ... dimensions -- height, 41.6mm (1.6 in.); width, 146mm (5.8 in.); depth, 208mm (8.3 in.); weight, 1.1kg (2.2 lbs). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 4860 mdl 004. IBM Personal Computer DOS 2.1 (6024120) is required. It is recommended that the 64KB Memory and Display Expansion (#0007) be installed on diskette-based systems. **Customer Setup:** Yes.

64KB Memory and Display Expansion (#0007): The 64KB Memory and Display Expansion is a standard feature on the 4860 mdl 067. This option permits the use of higher density video modes and 80-column text support while increasing the system memory size by 64KB for a total of 128KB (including 16KB video buffer). The option is a shielded adapter card containing eight 64K-by-1, 150ns, dynamic memory modules which plugs into a 44-pin connector on the system board. Parity checking is not supported. The memory and display expansion does not require the user to reconfigure the system to recognize the additional memory. **Maximum:** One. **Field Installation** : Yes. **Prerequisites:** 4860 mdl 004. **Customer Setup:** Yes.

Internal Modem (#0008): Provides for full-duplex asynchronous communication over 2-wire, switched network channels (normal household telephone installation). The Internal Modem plugs into the modem connector on the system board and does not require the use of the system unit serial port. Auto/manual answer ... auto/manual originate ... direct connection to telephone line uses modular phone jack (USOC RJ11) - modem cable is included ... auto dial Touch-tone* (* Touch-tone is a trademark of AT&T) or pulse by software command ... compatible with Bell 103 series modems ... call progress reporting ... dial tone, ring-back tone, and busy-tone detection ... fully programmable serial-interface characteristics: 7- or 8-bit characters; even-, odd-, or no-parity bit generation and detection; one stop-bit generation; baud rate generation (110 bps or 300 bps); false start-bit detection ... complete status reporting capabilities ... line-break detection ... internal diagnostic capabilities: loopback controls for communications link fault isolation; break, parity, overrun, framing error simulation ... fully-prioritized interrupt system controls. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Customer-provided modular telephone jack connected to the telephone system. **Customer Setup:** Yes.

Parallel Printer Attachment (#0009): Supports attachment of the 5152 mdl 002 Graphics Printer or equivalent. Attaches to the I/O bus on the right side of the system unit and presents the I/O bus at its right side for additional attachments. Dimensions: Height 76mm (3 in.); length 244mm (9.6 in.); weight 12 oz. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Printer cable (#5612) is required for attachment of a printer. **Limitations:** When the Parallel Printer Attachment is present, the 4860 PCjr directs print output only to this attachment. **Customer Setup:** Yes.

Attachable Joy Stick (#0010): This option is an input device which provides the user with 2-dimensional positioning control. Two momentary contact pushbutton switches on the joy stick give the user additional input capability. Two modes of operation are available. In the "spring return" mode, the stick will return to the center position when released. The "free floating" mode allows smooth, force-free operation with the stick remaining in position when released. Selection of these modes can be made for each axis independently. Two controls are provided for individual adjustment to the electrical center of each axis. **Maximum:** Two. **Field Installation:** Yes. **Customer Setup:** Yes.

Keyboard Cord (#0012): Connects the cordless keyboard to the system unit, giving power to the keyboard and serially encoded data to the system unit. When connected, it disengages the battery power, disables the infrared circuit in the keyboard, and disables the infrared receiver in the system unit. System performance with or without the cord is the same. Length: 1.8m (6 ft.) straight cord. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Cordless Keyboard Overlays (#0013): Provided for those users who may want to customize their 4860 PCjr keyboard. This option includes five overlays in one package. An overlay fits between the keyboard keys and covers the preprinted symbols. Overlays may be customized by writing on them, by typing on them, or by having them printed commercially. The overlays are made of blank heavy stock paper and are scored so that they may be easily folded for storage and distribution.

Connector for TV (#0020): Allows the 4860 PCjr to use a standard home television set as an output device. This option connects to the VHF terminals of the television set and has a selection switch that allows the TV to be used in either a "computer" or "TV" mode. The Connector for TV plugs in to the system unit. Supports TV sets made for operation in U.S. or Canada. Includes sealed RF modulator certified within the limits for an FCC class-B computing device for operation on TV channel 3 or 4. Weight: 12.5 oz. **Prerequisites:** A user-supplied television set is required. For connection to cable TV and in "TV" mode, a user-supplied 75-ohm to 300-ohm converter may be required. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Adapter Cable for IBM Color Display (#0021): Allows for attachment of the 5153 mdl 001 Color Display. Provides one connector to match the 5153 mdl 001 Color Display cable connector, and another to match the 4860 PCjr system unit display attachment connector. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Adapter Cable for Cassette (#0022): Allows for attachment of a user-supplied cassette recorder/player to the cassette connector on the rear of the system unit for storage of programs and data. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A user-supplied cassette recorder/player is required. Cassette recorder/player to be connected requires all of the following type connectors (or equivalent): Belden Style-51 miniature phone-plug (auxiliary); Belden Style-51 miniature phone-plug (earphone); Belden Style-56 subminiature phone-plug (remote). **Customer Setup:** Yes.

Carrying Case (#0023): The Carrying Case has been made especially for the owner who occasionally wishes to safely, securely, and conveniently move or store the PCjr. The case is black with a lightly textured surface. A 3-digit combination lock aids in protecting the system. The lock combination can easily be changed by the owner. The carrying case will fit under many airline seats. The case has the capacity for: PCjr system unit; parallel printer attachment; connector for TV; cordless keyboard; keyboard cord; transformer and power cord; up to five diskettes; up to four program cartridges. **Limitations:** The Carrying Case should not be used as a shipping container. It is intended only to provide hand transportation or storage of the 4860 PCjr. The original packing material should be retained for shipping the system.

Adapter Cable for Serial Devices (#0026): Allows connection of PCjr system unit to serial devices such as printers and modems. A male RS-232C connector on one end of this short cable matches standard D-type 25-pin serial device cable connectors, and a connector on the other end matches the PCjr system unit serial device attachment connector. Connection is provided for the following typical RS-232C signal pins: transmit data, receive data, request-to-send, clear-to-send, data set ready, signal ground, carrier detect, data terminal ready. The cable length is 72mm (3 in.). **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Mouser Cartridge (#4087): A fast-paced, arcade-type cartridge game for the PCjr system in which the player is cast in the role of a farmer whose 9-room farmhouse has been overrun by mice. The object of the game is to trap, within the allotted time, all of the mice in the rooms by building traps with movable walls. To clear all of the rooms requires skill, strategy, and dexterity. Some of the rooms are not lit, and the player must locate a flashlight that can be used to illuminate a portion of the room. On the higher levels, the mice reproduce themselves as the player is attempting to trap them. The farmer loses by running out of time or by touching a mouse. Points are awarded for each mouse trapped. The total score depends on how fast the player traps the mice. 1- or 2-player mode ... player movement with either joy stick or

4860 PCjr (cont'd)

keyboard ... full 16-color graphics ... three-voice music and sound effects ... pause game feature ... displays high score ... nine screens ... multiple levels of difficulty. **Prerequisites:** Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

Scubaventure Cartridge (#4088): An action-packed, arcade-type game cartridge designed to run on the PCjr system. Here, each player is in control of a 3-diver expedition team that is searching the dangerous recesses of an undersea cavern for sunken treasure. Each expedition sends one diver at a time to brave the treacherous waters to collect rare fish, to avoid poisonous fish and electric eels, and to find keys to open the treasure chests. Unlike many other arcade games, two players may play simultaneously, competing for the same rare fish and for survival. Played in 1-player mode, a ghostly white diver with a strange knack for being in the wrong place at the right time accompanies you. Points are awarded for each chest opened and for each rare fish collected. 1- or 2-player mode ... simultaneous play in two-player mode ... player movement with either joy sticks or keyboard ... pause game feature ... full 16-color graphics ... 3-voice sound. **Prerequisites:** Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

Crossfire Cartridge (#4091): An exciting, arcade-type game cartridge in which the player must defend the grid-like streets of a city from the onslaught of a swarm of insects. Fortunately, the player has a fleet of three ships containing insecticide missiles to clear the streets. A bonus ship is awarded every 5,000 points. The object is to clear the town of these enemies, but, with a limited supply of ammunition and invaders coming from all directions, this is not an easy task. Points are awarded for each invader hit and for bonus targets that occasionally appear in the streets. Player movement with either keyboard or joy stick ... pause game feature ... sound on/off feature ... game restart control... full 3-voice sound ... current high score maintained ... three difficulty settings ... full-color graphics. **Prerequisites:** Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

Mine Shaft Cartridge (#4092): A fast-paced, action-packed game cartridge in which the player maneuvers a mining car around dangerous mine shafts looking for a fortune in diamonds. In addition to the twisty, treacherous shafts, there are a number of runaway robot miners that seem bent on destruction of the mining car. Disabling the robots and collecting diamonds earn the player points. Clearing either all of the diamonds or all of the robots out of one mine shaft will allow the player to explore the next level. Player movement with either keyboard or joy stick ... pause game feature ... sound on/off feature ... game restart control ... full three-voice sound ... current high score maintained ... full-color graphics. **Prerequisites:** Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

BASIC Interpreter Cartridge (#4101): Provides extensions to the PCjr built-in Cassette BASIC interpreter. Extensions to the language provide a full set of instructions, commands, and functions. Most of these can be used with or without DOS present. The *IBM PCjr BASIC Reference Manual* is provided with cartridge BASIC and describes the full capabilities of cassette and cartridge BASIC. Superset of advanced BASIC on the 5150 Personal Computer and the 5160 Personal Computer XT ... improves programmer productivity by reducing the need for special machine-language subroutines ... compatible with IBM Personal Computer DOS 2.1 ... current date and time of day (DOS must be present for these functions) ... path name support for tree-structured directories (DOS must be present for these functions) ... event trapping of communications, function key, joy stick, light-pen, music, and timer activity ... stores and plays musical notes ... advanced graphics: Paint, circle, get/put display contents, store and draw line segments, line styling, tiling, viewports, windows, and palette control ... supports one parallel printer ... provides a terminal emulator for asynchronous communications ... ability to load and run a BASIC program in a second cartridge slot. **Prerequisites:** Minimum configuration required is 4860 mdl 004 with attachment of a supported display type. IBM Personal Computer DOS 2.1 (6024120) is required for diskette input/output operations.

Printer Cable (#5612): Provides for the attachment of a 5152 mdl 002 Graphic Printer or equivalent to the Parallel Printer Attachment (#0009). **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

ACCESSORIES (None)

SUPPLIES (None)

4952 PROCESSOR

PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

MODELS

Model A	A00	128KB maximum, five I/O feature locations, half-width unit. 32KB basic storage provided.
Model B	B00	128KB maximum, 14 I/O feature locations, full-width unit. 32KB basic storage provided.
Model C	C00	128KB maximum, four I/O feature locations, full-width unit. 32KB basic storage and one built-in diskette drive provided. Second diskette drive optional.
Model 30D	30D	128KB maximum, seven I/O feature locations, full-width unit. 32KB basic storage, with a 30MB disk, optional cache and optional 1.2MB diskette.

All models are designed for mounting on support rails in a 4997 Rack Enclosure (see M4997 pages) or in an EIA standard 19-inch enclosure. Models C and 30D can also be mounted in the Stand-Alone Enclosure (#4520).

Limitations: 4999 Battery Backup Unit may not be used with mdl A prior to mdl A serial number 50,000 (EC 375810). Mdl B is not supported by 4999 when primary power consumption exceeds 800VA (corrected for power factor). Contact IBM for further information. 4999 may not be used with mdl C or 30D.

Prerequisites: For mdl A, a space in Rack Mounting Fixture (**#4540**). See "Accessories" in the M4959 pages.

HIGHLIGHTS

The 4952 is a processor unit in the Series/1 family. It provides CPU, 32,768 bytes of main storage, enclosure, and power. It includes storage address translation function (two 64KB address spaces), clock/comparator, and communications power. Three additional storage increments of 32KB each are pluggable on the processor card. The number of feature locations is model-dependent. See "Specification Table". Standard features include rich instruction set, four interrupt levels, and power failure detect/auto-restart. There are eight general purpose registers per level and byte-addressable storage. The 4952 includes a clock/comparator with a single 32-bit register, which is incremented at one millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

Mdl C provides one or two diskette drives and four I/O feature positions. The diskettes, one standard and the second an optional feature, provide the multiple functions of diskette writing and reading including input of data and programs generated offline, output of programs and data for personal or offline storage, journaling, recording of an audit trail, checkpoints, system errors, etc. Data exchange media is compatible with other systems.

Diskette Types: Either the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D may be used.

Diskette Formats: Diskettes 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette 2D may be initialized for 256-, 512-, or 1,024-byte sectors.

Diskette Capacity: Capacity of diskette is dependent upon type and format. **Note:** Actual useful capacity depends on the system software used and may be less than capacities shown here.

Bytes/ Sector	Sectors/ Track *	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

* 74 data tracks per surface; Diskettes 2 and 2D have two surfaces.

Diskette Drive: Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds.

The use of flexible diskette storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the diskette, causing wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life. See guidelines in the *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading.

Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the diskette should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

Disk Drive Mdl 30D: Provides a capacity of 30 megabytes per disk drive. This mdl has an average access time of 40 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

Cache Mdl 30D: The 64 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

Environmental Restrictions: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See *Customer Site Preparation Manual* (GA34-0050) for details.

Publications: *IBM Series/1 4952 Processor and Processor Features Description* (GA34-0084), *IBM Series/1 4952 Model C Processor and Processor Features Description* (GA34-0159), and *IBM Series/1 4952 Model 30D Processor and Processor Feature Description* (GA34-0251).

SPECIFY

Unless otherwise indicated these specify features are only available at time of manufacture. Specify codes **#2XXX**, **#8XXX**, and **#9XXX** apply to plant orders only ... do not use on MES orders.

- Voltage (AC, 60 Hz, 1-phase,): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.
- Type of Distribution Channel (specify one):

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketer, systems integrators, programming houses, and other equipment manufacturers (OEMs) who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application (specify one):

  Industry Terminal Systems:

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  Industrial Automation:

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

4952 Processor (cont'd)

#9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management (FC/PM) licensed program.

#9024 Power Management - Non-FC/PM: Power management systems which will not use the FC/PM licensed program.

#9025 Facilities Management and Security: All other facilities management and security systems except Controlled Access System (CAS).

#9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numerical tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

Communications:

#9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

#9031 Front End Processors - Large Systems.

#9032 Front End Processors - Small and Medium-Sized Systems.

#9033 Message Switching: Message routing and dispatching in a data communications network.

#9034 Telephone Switching: Switching (PABX Control), call routing, and central offices switching.

#9035 Audio Store and Forward.

#9039 Other Communications Applications: All other communications applications.

Scientific Computation:

#9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

#9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

Business Data Processing:

#9070 Remote Job Entry: RJE or remote batch terminal.

#9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote job entry/batch functions.

#9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 Distributed Business Processing: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

#9074 Business System: Same as **#9073** but in new accounts or in enterprises with small or medium-sized systems only.

#9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

#9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

#9079 Other Business Applications: All other business data processing applications.

Other Applications:

#9090 Applications not classified in any category above: For example, graphic arts (e.g., typesetting), design and drafting, undefined government, and any other.

Application Unknown:

#9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

  #92AA Number of processors
  #93BB Sequence number

  For multiple processor configurations, specify **#92AA** where AA is the number of processors in the configuration, and **#93BB** where BB is the sequence number of this processor.

  Note: Use the multiple processor specify codes given above to define the number of processors and the sequence numbers for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For more than 16 processors in system, contact IBM.

- Diskette IPL:

  Mdl C:

  #9138 1st diskette primary IPL, 2nd diskette not used
  #9139 1st diskette alternate IPL, 2nd diskette not used
  #9140 2nd diskette primary IPL, 1st diskette not used
  #9141 2nd diskette alternate IPL, 1st diskette not used
  #9142 1st diskette primary IPL, 2nd diskette alternate IPL
  #9143 2nd diskette primary IPL, 1st diskette alternate IPL
  #9144 No IPL

  Mdl 30D:

  #9148 Disk primary IPL, Optional diskette not IPL device
  #9149 Disk alternate IPL, Optional diskette not IPL device
  #9150 Diskette primary IPL, Disk not IPL device
  #9151 Diskette alternate IPL, Disk not IPL device
  #9152 Disk primary IPL, Diskette alternate
  #9153 Diskette primary IPL, Disk alternate
  #9144 No IPL

- Diskette Functions: When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the "Specification Table" below. To simplify, shorten, and improve the usability of these pages, descriptions of all those features which are available on all processors, the 4959, and the 4965 are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

Channel Repower (#1565): Provides channel repower for the 4959 Input/Output Expansion Unit, and 4965 Storage and I/O Expansion Unit required in the processor for a 4959 or 4965 connected to 4952 mdls A, B, C, and 30D. **Field Installation:** Yes.

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed to show status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B or 30D Processor only. Does not require a feature position. **Limitations:** Cannot be installed on a mdl A or C Processor. **Field Installation:** Yes.

Diskette Drive (#4100): Provides for a second diskette on mdl C and a single diskette drive on the mdl 30D. Does not require a feature position. **Field Installation:** Yes.

Stand-Alone Enclosure (#4520): For the 4952 mdls C and 30D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C or 30D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). **Limitations:** Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 1 at the end of the "Specification Table". **Field Installation:** Yes.

Stand-Alone Enclosure Cable (#4525): Provides a 3.1 meter (10 foot) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4952 also in a #4520. **Field Installation:** Yes. **Prerequisites:** #1565.

Programmer Console (#5650): Provides data entry/data display console. Includes hexadecimal key pad, display lights, and ability to stop on error or on address. In addition to basic console provided with base processor. #5650 does not require a feature position. **Field Installation:** Yes.

Storage Addition Module - 32,768 Bytes (#6306): Provides additional processor main storage in 32,768-byte increments. Mounts on processor card. **Maximum:** Three. **Field Installation:** Yes.

Cache (#6400): Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance

4952 Processor (cont'd)

improvement (mdl 30D). The cache option does not require a feature position. **Field Installation:** No.

Specification Table: The table below is provided to determine if 4959s or 4965s are required to mount the desired features. Available feature positions within the processor unit are model-dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero. **Note:** Storage Addition Modules mount on processor card and do not occupy any feature positions.

Machine/ Feature Number		Feature Positions	Notes
4952 mdl A Processor		-5	
4952 mdl B Processor		-14	
4952 mdl C Processor		-4	
4952 mdl 30D Processor		-7	
#1200	Series/1 - S/370 Channel Attach	+1	(1)
#1205	4966 Diskette Magazine Unit Attach	+1	(1)
#1210	5250 Info Display System Attach	+2	(2)
#1215	4969 Magnetic Tape Subsystem Attach	+1	(1)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(1)
#1250	Multidrop Workstation Attach	+1	
#1300	Programmable Communications Subsystem Controller	+2	(1,2)
#1310	Multifunction Attach	+1	
#1400	Series/1 Local Comm Controller	+1	(3)
#1560	Intgrtd Digital I/O Non-Isolated	+1	(4)
#1565	Channel Repower	+1	(4,7)
#1595	Channel Socket Adapter	+1	
#1610	Async Comm Single Line Control	+1	
#2074	Binary Sync Comm Single Line Control	+1	
#2075	Binary Sync Comm Single Line Control, High-Speed	+1	
#2080	Sync Comm Single Line Control, High-Speed	+1	(8)
#2090	Sync Data Link Control	+1	
#2091	Async Comm 8-Line Control	+1	
#2092	Async Comm 4-Line Adapter	+1	(5)
#2093	Binary Sync Comm 8-Line Control	+1	
#2094	Binary Sync Comm 4-Line Adapter	+1	(5)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(5)
#3580	4962 Disk Storage Unit Attach	+1	(1)
#3581	4964 Diskette Unit Attach	+1	(1)
#3585	4979 Display Station Attach	+1	
#3590	4963 Disk Subsystem Attach	+1	(1)
#3595	4967 High Performance Disk Subsystem Attachment	+1	(1)
#5430	Customer Direct Program Control Adapter	+1	(4)
#5620	4974 Printer Attach	+1	
#5630	4973 Line Printer Attach	+1	
#5640	Printer Attachment 5200 Series	+1	
#6305	4982 Sensor I/O Unit Attach	+1	(1,4)
#7840	Timers	+1	(4)
#7850	Teletypewriter Adapter	+1	(6)
#7880	Telephone Comm Controller	+1	
#7881	Telephone Comm Adapter	+1	(5)
RPQ	D02038 4978 Display Station Attach	+1	
RPQ	D02118 GPIB Adapter	+1	

Notes:

(1) Not supported on the Stand-Alone Enclosure due to flat or internal cabling.

(2) Must be contiguous I/O feature positions.

(3) Contact IBM when considering the use of this feature.

(4) This feature may be placed in mdl B feature position A (leftmost). Other features may not be located in this position. Does not apply to mdls A, C, and 30D.

(5) Must be contiguous I/O feature position with its associated controller.

(6) This feature may be placed in mdl B feature position A (leftmost) if no system + and - 12 V DC power is required.

(7) Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure Cable (#4525).

(8) Requires #2010 if the CCITT V.35 interface is used.

MODEL CONVERSIONS (None)

ACCESSORIES

Customer Access Panel (#1590): Assembly and cables to provide interface at surface of rack with quick disconnect type connection for Integrated Digital Input/Output (#1560) or Customer Direct Program Control Adapter (#5430) features (up to four in any mix), plus one Timer (#7840) with external sources and one Teletypewriter Adapter (#7850). Connecting cables from panel for Timer and Teletypewriter Adapter are included. Cables for connected Integrated Digital Input/Output and Customer Direct Program Control Adapter are obtained separately. See **#1593** and **#1594** below. **Field Installation:** Yes. **Restrictions:** May not be mounted behind the following units: 4952A without EC375810, any mdl 30D or any unit in a Stand-Alone Enclosure (#4520).

Customer Access Panel - Integrated DI/DO Cable (#1593): Internal cable which connects Integrated Digital Input/Output (#1560) with Customer Access Panel (**#1590**). Provides both plug and receptacle at Customer Access Panel and connectors at Integrated Digital Input/Output feature. Up to a total of six **#1593**s and **#1594**s may be accommodated in each full-width machine. (Half-width machines are limited by available feature positions.)

Customer Access Panel - Customer DPC Adapter Cable (#1594): Internal cable which connects Customer Direct Program Control Adapter (#5430) with Customer Access Panel (**#1590**). Provides both plug and receptacle at Customer Access Panel and connectors at Customer Direct Program Control Adapter. Up to a total of six **#1593**s and **#1594**s may be accommodated in each full-width machine. (Half-width machines are limited by available feature positions.) **Field Installation:** Yes.

Frame Stand (P/N 6841365): Provides a steel stand capable of supporting a 4952 mdl C or 30D and a 4975 Printer. The stand rests on glides, and comes in a pebble gray color only.

Auxiliary Features/Cables/Connector Kits: Certain devices, cables, etc., involved in system installation are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

SUPPLIES

Diskettes: The 4952 mdls C and 30D use the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D. The 4952 mdl C or 30D may be used to reformat the diskettes. Single diskettes are packaged 10 per box. Minimum order is one box.

4953 PROCESSOR

[The 4953 is no longer available ... certain features, RPQs, and Accessories still available.]

PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

MODELS

Mdl A	A00	64KB maximum, 4 I/O feature or storage locations, half-width unit. 16KB basic storage provided.
Mdl B	B00	64KB maximum, 13 I/O feature or storage locations, full-width unit. 16KB basic storage provided.
Mdl C	C00	64KB maximum, 4 I/O feature or storage locations, half-width unit. 32KB basic storage provided.
Mdl D	D00	64KB maximum, 13 I/O feature or storage locations, full-width unit. 32KB basic storage provided.

All models are designed for mounting in a 4997 or an EIA standard 19-inch rack enclosure.

Prerequisites: For mdl A or C space in Rack Mounting Fixture (#4540). See "Auxiliary Features" in M4959 pages.

HIGHLIGHTS

Processor Unit in Series/1 family. Internal performance approximately 1.25 times that of 4952. Provides CPU, 16,384 bytes or 32,768 bytes of main storage, enclosure, and power. Includes storage address translation function (eight 64KB address spaces), and communications power. Three additional storage increments of 64KB each are pluggable on the storage card. Number of I/O feature locations is mdl-dependent. See "Specifications Table" at end of section. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart. Eight general purpose registers per level. Byte-addressable storage.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See *Customer Site Preparation Manual* (GA34-0050) for details.

Publications: *IBM Series/1 4953 Processor and Processor Features Description* (GA34-0022).

SPECIFY

- Voltage (AC, 1-phase 60 Hz): With a 1.8 meter (6 foot) cord.

  115V **#9901** 230V **#9904**
  208V **#9902**

- Type of Distribution Channel: Specify only one.

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketer, systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: Specify only one.

  – *Industry Terminal Systems*

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  – *Industrial Automation*

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

  #9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

  #9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management Program Product (FC/PM).

  #9024 Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM Program Product.

  #9025 Facilities Management and Security: All other facilities management and security systems [except Controlled Access System (CAS)].

  #9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numerical control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

  – *Communications*

  #9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high speed lines to a remote computer.

  #9031 Front-End Processors - Large Systems: Front end processors for large systems.

  #9032 Front-End Processors - Small Systems: Front end processors for small systems.

  #9033 Message Switching: Message routing and dispatching in a data communications network.

  #9034 Telephone Switching: Switching (PABX control), call routing, and central office switching.

  #9035 Audio Store and Forward.

  #9039 Other Communications Applications: All other communications applications.

  – *Scientific Computation*

  #9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

  #9051 Instructional: Stand-alone or time-shared systems for computer-assisted instruction and related functions.

  – *Business Data Processing*

  #9070 Remote Job Entry: RJE or Remote Batch Terminal.

  #9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote Job Entry/Batch functions.

  #9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

  #9073 Distributed Business Processing - Stand-alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

  #9074 Business System - Small account: Same as **#9073** but in enterprises with small systems as the largest system or in new accounts.

  #9079 Other Business Applications: All other business data processing applications.

  – *Other Applications*

  #9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

  – *Application Unknown*

  #9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

  #92AA Number of Processors
  #93BB Sequence Number

  For multiple processor configurations, specify **#92AA** where AA is the number of processors in the configuration, and **#93BB** where BB is the sequence number of this processor.

Note: In ordering, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the three-digit AAS mdl code. For example, in a 2-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each proc-

4953 Processor (cont'd)

essor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For more than 16 processor systems, contact IBM.

- Attachment of 3101:

  #2787 Designates that a 3101 Display Terminal is on order for this system and that its delivery is to be synchronized with that of the system.

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the Specification Table below. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 Diskette Drive and I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

Channel Repower (#1565): Provides channel repower for 4959 Input/Output Expansion Unit. Required for 4959 or 4965 connected to 4953. **Field Installation:** Yes.

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B or D Processor only. Does not require a feature position. **Limitations:** Cannot be installed on a mdl A or C processor. **Field Installation:** Yes.

Communications Power(#2010): Provides + and - 12 volts regulated power. Required for mdl B or D containing one or more intergrated communications features #1310, #1610, #2074, #2075, #2090, #2091, #2092, #2093, #2094, #2095, #2096 and #7881. Also required for Teletypewriter Adapter (#7850) configured for EIA voltage interface or for current loop where Series/1 supplies the powerand for #2080 when V.35 interface is used. Not required for a 4953 Processor mdl A or C. This feature is installed in the power supply section and does not occupy a feature position. **Field Installation:** Yes.

Programmer Console (#5650): Provides data entry/data display console. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position.

Field Installation: Yes.

Storage Addition - 16,384 Bytes (#6315): Provides additional processor main storage in 16,384 byte increments. Requires one feature position. **Maximum:** Three in mdls A and B, two in mdls C and D. **Field Installation:** Yes.

Specification Table: The table below is provided to determine if 4965 Diskette drive and I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero.

Machine/ Feature Number		Feature Positions	Notes
4953-A Processor		-4	
4953-B Processor		-13	
4953-C Processor		-4	
4953-D Processor		-13	
#1200	Series/1 - /370 Channel Attachment Feature	+1	
#1205	4966 Diskette Magazine Unit Attachment	+1	
#1210	5250 Information Display System Attachment	+2	(6)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	
#1300	Programmable Communications Subsystem Controller	+2	(6)
#1310	Multifunction Attachment	+1	(2)
#1400	Series/1 Local Communications Controller	+1	(1)
#1560	Integrated Digital Input/Output Non-Isolated	+1	(1)
#1565	Channel Repower	+1	(1)
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	(2)
#2074	Binary Synchronous Comm Single Line Control	+1	(2)
#2075	Binary Sync Comm Single Line Control/HS	+1	(2)
#2080	Sync Comm Single Line Control/HS	+1	(9)
#2090	Sync Data Link Control	+1	(2)
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2, 7)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2, 7)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2, 7)
#3580	4962 Disk Storage Unit Attachment	+1	
#3581	4964 Diskette Unit Attachment	+1	
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	
#5430	Customer Direct Program Control Adapter	+1	(1)
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(1)
#6315	Storage Addition - 16,384 Bytes	+1	
#6316	Storage Addition - 32,768 Bytes	+1	(5)
#7840	Timers	+1	(1)
#7850	Teletypewriter Adapter	+1	(3, 4)
#7880	Telephone Communications Controller	+1	
#7881	Telephone Communications Adapter	+1	(2, 7)
RPQ	D02038 4978 Display Station Attachment	+1	
RPQ	D02118 GPIB Adapter	+1	

Notes:

(1) This feature may be placed in 4953-B or 4953-D feature position A (leftmost). Other features may not be located in this position. Does not apply to 4953-A or 4953-C.

(2) Requires #2010 to provide + and - 12 volts used in mdls B or D.

(3) Requires #2010 (except in mdls A and C) to provide + and - 12 volts if the system is to provide power for the current loop or if the EIA voltage level compatibility option is selected.

(4) This feature may be placed in 4953-B or 4953-D feature position A (leftmost) when the feature does not require + and - 12V DC.

(5) Mdls C and D only.

(6) Must be contiguous I/O feature positions.

(7) Must be in contiguous I/O feature position with its associated controller.

(8) Branch level systems assurance is required before ordering this feature.

(9) Requires feature #2010 if the CCITT V.35 interface is used.

MODEL CONVERSIONS (None)

ACCESSORIES

Frame Stand (P/N 6841365): Provides an attractive, steel stand capable of supporting a 4954 C and a 4975 Printer. The stand rests on glides and comes in a pebble gray color only.

Auxiliary Features/Cables/Connector Kits: Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

SUPPLIES

Diskette: The 4954 mdl C uses the 2-sided Diskette 2 or Diskette 2D or the 1-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. The Diskette 2 is prepared in 128, or 256 bytes per sector and must be re-initialized for other formats. The Diskette 2D is prepared in 256, 512, or 1,024 bytes per sector. The 4954 mdl C may be used to reformat the diskette. Single diskettes are packaged ten in a box. Minimum order is one box.

4954 PROCESSOR

PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

MODELS

Model A	A00	256KB maximum, 4 I/O feature locations, half-width unit. 64KB basic storage provided.
Model B	B00	256KB maximum, 13 I/O feature locations, full-width unit. 64KB basic storage provided.
Model C	C00	256KB maximum, 3 I/O feature locations, full-width unit. 64KB basic storage and one built-in diskette drive provided. Second diskette drive optional.
Model 30D	30D	256KB maximum, six I/O feature locations, full-width unit. 32KB basic storage, with a 30MB disk, optional cache and optional 1.2MB diskette.

All models are designed for mounting on support rails in a 4997 Rack Enclosure (see M4997 pages) or in an EIA standard 19-inch enclosure. Models C and 30D can also be mounted in the Stand-Alone Enclosure (#4520).

Prerequisites: For mdl A, a space in Rack Mounting Fixture (#4540). See "Auxiliary Features" in M4959 pages.

Limitations: 4999 Battery Backup Unit may not be used with mdl C or 30D. Mdl B is not supported by 4999 when primary power consumption exceeds 800 VA (corrected for power factor).

HIGHLIGHTS

Processor Unit in Series/1 family. Internal performance approximately twice that of 4952. Provides CPU, 65,536 bytes of main storage, enclosure, and power. Includes storage address translation function (eight 64KB address spaces), and communications power. Three additional storage increments of 64KB each are pluggable on the storage card. Number of I/O feature locations is model-dependent. See "Specifications Table" at end of section. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart. Eight general purpose registers per level. Byte-addressable storage. Includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

Mdl C provides one or two diskette drives and three I/O feature positions. The diskettes, one standard and the second an optional feature, provide the multiple functions of diskette media including input of data and programs generated offline, as well as output of programs and data for personal or offline storage, journaling, recording of audit trail, checkpoints, system errors, etc. Data exchange media is compatible with other systems using the diskette types and formats shown below.

Diskette Types: Either the 2-sided IBM Diskette 2, IBM Diskette 2D, or the 1-sided IBM Diskette 1 may be used.

Diskette Formats: Diskette Type 1 or 2 may be initialized for 128, 256, or 512 byte sectors. Diskette Type 2D may be initialized for 256, 512, or 1024 byte sectors.

Diskette Capacity: Capacity of diskette is dependent upon type and format.

Note: Actual useful capacity depends on the system software used and may be less than capacities shown here.

Bytes/ Sector	Sectors/ Track*	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1024	8	2D	1,212,416

* 74 Data tracks per surface, Diskette-2 and 2D have two surfaces.

Diskette Drive: Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds. The use of Flexible Diskette Storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the media causing diskette wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life (see guidelines in the *IBM Diskette General Information Manual,* GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the media should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

Disk Drive Mdl 30D: Provides a capacity of 30 megabytes per disk drive. This mdl has an average access time of 40 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

Cache Mdl 30D: The 64 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. (See *Customer Site Preparation Manual,* GA34-0050, for details.)

Publications: *IBM Series/1 4954 Model A and B Processor and Processor Features Description* (GA34-0099), *IBM Series/1 4954 Model C Processor and Processor Features Description* (GA34-0154), and *IBM Series/1 4954 Model 30D Processor and Processor Feature Description* (GA34-0252).

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes **#2XXX**, **#8XXX**, and **#9XXX** apply to plant orders only ... do not use on MES orders.

- Voltage: All options are 60 Hz, single phase, AC with a 1.8 meter (6 foot) cord.

  115V **#9901** 230V **#9904**
  120V **#9911** 240V **#9914**
  208V **#9902**

- Type of Distribution Channel: (Specify Only One)

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketer, systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-user Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: (Specify Only One)

  - Industry Terminal Systems

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  - Industrial Automation

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

4954 Processor (cont'd)

#9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management Program Product (FC/PM).

#9024 Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM Program Product.

#9025 Facilities Management and Security: All other facilities management and security systems (except Controlled Access System [CAS]).

#9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, N. C. tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

- Communications

#9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high speed lines to a remote computer.

#9031 Front End Processors: Large systems.

#9032 Front End Processors: Small and medium sized systems.

#9033 Message Switching: Message routing and dispatching in a data communications network.

#9034 Telephone Switching: Switching (PABX Control), call routing, and central office switching.

#9035 Audio Store and Forward.

#9039 Other Communications Applications: All other communications applications.

- Scientific Computation

#9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

#9051 Instructional: Standalone or timeshared systems for computer-assisted instruction and related functions.

- Business Data Processing

#9070 Remote Job Entry: RJE or Remote Batch Terminal.

#9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote Job Entry/Batch functions.

#9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 Distributed Business Processing - Standalone, Large Account: Standalone batch or interactive system for business applications in an enterprise with DP Systems. Offline communications to a host system is optional.

#9074 Business System: Same as **#9073** but in new accounts or in enterprises with small or medium sized systems only.

#9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

#9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

#9079 Other Business Applications: All other business data processing applications.

- Other Applications

#9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

- Application Unknown

#9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

  #92AA Number of Processors
  #93BB Sequence Number

  For multiple processor configurations, specify **#92AA** where AA is the number of processors in the configuration, and **#93BB** where BB is the sequence number of this processor.

  Note: In AAS, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the three-digit AAS mdl code. For example, in a two-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl.

- Diskette IPL:

  Mdl C:

  #9138 First Diskette Primary IPL, Second Diskette not used.
  #9139 First Diskette Alternate IPL, Second Diskette not used.
  #9140 Second Diskette Primary IPL, First Diskette not used.
  #9141 Second Diskette Alternate IPL, First Diskette not used.
  #9142 First Diskette Primary IPL, Second Diskette Alternate IPL.
  #9143 Second Diskette Primary IPL, First Diskette Alternate IPL.
  #9144 No IPL.

  Mdl 30D:

  #9148 Disk primary IPL, Optional diskette not IPL device
  #9149 Disk alternate IPL, Optional diskette not IPL device
  #9150 Diskette primary IPL, Disk not IPL device
  #9151 Diskette alternate IPL, Disk not IPL device
  #9152 Disk primary IPL, Diskette alternate
  #9153 Diskette primary IPL, Disk alternate
  #9144 No IPL

- When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

Code: SIU = 4954 ID = P80

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the "Specification Table" below. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are mdl-dependent considerations are presented below.

Channel Repower (#1565): Provides channel repower for 4959 Input/Output Expansion Unit, and 4965 I/O Expansion Unit. Required for 4959 and 4965 connected to 4954 mdls A, B, C, and 30D. **Field Installation:** Yes.

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B or 30D Processor only. Does not require a feature position. **Limitation:** Cannot be installed on a mdl A or C Processor. **Field Installation:** Yes.

Floating Point (#3925): Provides floating point instruction set. Includes single (32 bit) and double (64 bit) precision arithmetic olus conversion between binary and floating point data. Does not require a feature position. **Maximum:** One. **Field Installation:** Yes.

Diskette Drive (#4100): Provides for a second diskette drive on the mdl C and a single diskette drive on the mdl 30D. Does not require a feature position. **Field Installation:** Yes.

Stand-Alone Enclosure (#4520): For the 4952 mdls C and 30D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C or 30D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). **Limitations:** Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 3 at the end of the "Specification Table". **Field Installation:** Yes.

Stand-Alone Enclosure Cable (#4525): Provides a 3.1 meter (10 foot) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4952 also in a (#4520). **Field Installation:** Yes. **Prerequisites:** #1565.

Programmer Console (#5655): Provides data entry/data display console. New function includes segmentation register display/store and

4954 Processor (cont'd)

console lock. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. **Field Installation:** Yes.

Storage Addition Increment - 65,536 Bytes (#6307): Provides additional processor main storage in 65,536 byte increments. Mounts on storage card. **Maximum:** Three. **Field Installation:** Yes.

Cache (#6400): Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance improvement (mdl 30D). The cache option does not require a feature position. **Field Installation:** No.

Specification Table: The table below is provided to determine if 4965 I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero. All features (#1XXX through #7XXX) may be field installed. *Note:* Storage Addition Increments mount on storage card and do not occupy any feature positions.

Machine/ Feature Number		Feature Positions	Notes
4954-A Processor		-4	
4954-B Processor		-13	
4954-C Processor		-3	
4954-30D Processor		-6	
#1200	Series/1 - System 370 Channel Attachment Feature	+1	(3)
#1205	4966 Diskette Magazine Unit Attachment	+1	(3)
#1210	5250 Information Display System Attachment	+2	(1)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	(3)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1250	Multidrop Workstation Attach	+1	
#1300	Programmable Communications Subsystem Controller	+2	(1,3)
#1310	Multifunction Attachment	+1	
#1400	Series/1 Local Communications Controller	+1	(4)
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	(5)
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	
#2074	Binary Synchronous Comm Single Line Control	+1	
#2075	Binary Sync Comm Single Line Control/HS	+1	
#2080	Sync Comm Single Line Control/HS	+1	
#2090	Sync Data Link Control	+1	
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2)
#3580	4962 Disk Storage Unit Attachment	+1	(3)
#3581	4964 Diskette Unit Attachment	+1	(3)
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	(3)
#3595	4967 High Performance Disk Subsystem Attachment	+1	(3)
#5430	Customer Direct Program Control Adapter	+1	
#5620	4974 Printer Attachment	+1	
#5640	Printer Attachment-5200 Series	+1	
#5630	4973 Line Printer Attachment	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(3)
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	
#7880	Telephone Communications Controller	+1	
#7881	Telephone Communications Adapter	+1	(2)
RPQ D02038	4978 Display Station Attachment	+1	
RPQ D02118	GPIB Adapter	+1	

Notes:

(1) Must be contiguous I/O feature positions.

(2) Must be in contiguous I/O feature position with its associated controller.

(3) Not supported in the Standalone Enclosure due to flat or internal cabling.

(4) Branch level systems assurance is required before ordering this feature.

(5) Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure Cable (#4525).

Auxiliary Features/Cables/Connector Kits: Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

AAS Ordering Instructions: The 4954 is a Computer System.

MODEL CONVERSIONS (None)

ACCESSORIES

Frame Stand (P/N 6841365): Provides an attractive, steel stand capable of supporting a 4954 mdl C or 30D (within a Stand-Alone Enclosure #4520) and a 4975 Printer. The stand rests on glides and comes in a pebble gray color only.

SUPPLIES

Diskette: The 4954 mdls C and 30D use the 2-sided Diskette 2 or Diskette 2D or the 1-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. The Diskette 2 is prepared in 128, or 256 bytes per sector and must be re-initialized for other formats. The Diskette 2D is prepared in 256, 512, or 1,024 bytes per sector. The 4954 mdl C or 30D may be used to reformat the diskette. Single diskettes are packaged ten to a box. Minimum order is one box.

4955 PROCESSOR

PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

MODELS

Mdl A	**A00**	[NO LONGER AVAILABLE] 64KB maximum, eight I/O feature locations, full width unit. 16KB basic storage provided.
Mdl B	**B00**	[NO LONGER AVAILABLE] 128KB maximum, three I/O feature locations, full width unit. 16KB basic storage provided.
Mdl C	**C00**	64KB maximum, ten I/O feature locations, full width unit. 32KB basic storage provided.
Mdl D	**D00**	128KB maximum, seven I/O feature locations, full width unit. 32KB basic storage provided.
Mdl E	**E00**	256KB maximum, seven I/O feature locations, full width unit. Includes communications power (function similar to #2010) and storage address translation function (eight 64KB address spaces).
Mdl F	**F00**	512KB maximum, seven I/O feature locations, full width unit. Includes communications power (function similar to #2010) and storage address translation function (eight 64KB address spaces).

All models are designed for mounting on support rails in a 4997 (see M4997 pages) or in an EIA standard 19-inch enclosure.

Limitations: Mdl E and mdl F are not supported by the 4999 Battery Backup Unit where primary power consumption exceeds 800VA (corrected for power factor). Contact IBM for further information.

HIGHLIGHTS

Processor Unit in Series/1 family. Internal performance approximately 3.0 to 3.5 times that of 4952. Provides CPU, up to 524,288 bytes of main storage, enclosure, and power. Number of feature locations is mdl dependent. See Specifications Table at end of section. Standard features include rich instruction set, four interrupt levels, storage protect, power failure detect/auto restart. Eight general purpose registers per level. Byte addressable storage.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These contaminants may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See *Customer Site Preparation Manual* (GA34-0050) for details.

Publications: *IBM Series/1 4955 Processor and Processor Features Description* (GA34-0021).

SPECIFY

Unless otherwise indicated these specify features are available only at time of manufacture. Specify codes, **#2XXX**, **8XXX**, and **9XXX**, apply to plant orders only ... do not use on MES orders.

- Voltage: All options are 60 Hz, 1-phase, AC with a 1.8m (6 foot) cord.

  115V **#9901** 230V **#9904**
  208V **#9902**

- Type of Distribution Channel: (Specify only one)

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketers,systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-user Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: (Specify only one)

  – Industry Terminal Systems

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  – Industrial Automation

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

  #9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

  #9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management (FC/PM) licensed program.

  #9024 Power Management - Non-FC/PM: Power Management Systems which will not; use the FC/PM licensed program.

  #9025 Facilities Management and Security: All other facilities management and security systems [except Controlled Access System (CAS)].

  #9029 Other Industrial Automation: Controlled Access System (CAS) production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numerical control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators.

  – Communications

  #9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

  #9031 Front End Processors - Large systems.

  #9032 Front End Processors - Small and medium-sized systems.

  #9033 Message Switching: Message routing and dispatching in a data communications network.

  #9034 Telephone Switching: Switching (PABX Control), call routing, and central office switching.

  #9035 Audio Store and Forward.

  #9039 Other Communications Applications: All other communications applications.

  – Scientific Computation

  #9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

  #9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

  – Business Data Processing

  #9070 Remote Job Entry: RJE or Remote Batch Terminal.

  #9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote job entry/batch functions.

  #9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

  #9073 Distributed Business Processing - Stand-alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

  #9074 Business System - Small account: Same as **#9073** but in new accounts or in enterprises with small or medium-sized systems only.

  #9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

  #9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

  #9079 Other Business Applications: All other business data processing applications.

  – Other Applications

  #9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

4955 Processor (cont'd)

– Application Unknown

#9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

#92AA Number of Processors
#93BB Sequence Number

For multiple processor configurations, specify **#92AA** where AA is the number of processors in the configuration, and **#93BB** where BB is the sequence number of this processor.

Note: In AAS, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the 3-digit AAS mdl code. For example, in a 2-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence numbers for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For complex multiple processor systems, contact IBM for more information.

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the Specification Table below. To simplify, shorten and improve the usability of these pages, the descriptions of all those features which are available in all processors, the 4965 Diskette Drive and I/O Expansion Unit and the 4959 Storage and I/O Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are mdl-dependent considerations are presented below.

Channel Repower (#1565): Provides channel repower for a 4959 I/O Expansion Unit, and 4965 Storage and I/O Expansion Unit. Required in the processor for a 4959 or 4965 connected to 4955, all mdls. **Field Installation:** Yes.

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed to show status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data lines. Mounts under front cover of 4955. Does not require a feature position. **Field Installation:** Yes.

Communications Power (#2010): Not required for mdl E or F. Provides +/-12 volts regulated power. Required for a processor containing one or more communications features #1310, #1610, #2074, #2075, #2090, #2091, #2092, #2093, #2094, #2095, #2096 and #7881. Also required for Teletypewriter Adapter (#7850) configured for EIA voltage interface or for current loop where Series/1 supplies the power, and for #2080 when V.35 interface is used. This feature is installed in the power supply section and does not occupy a feature position. **Field Installation:** Yes.

Floating Point (#3920): Provides floating point instruction set. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. **Prerequisites:** I/O feature position adjacent to processor cards. **Maximum:** One. **Field Installation:** Yes.

Programmer Console (#5650): Provides data entry/data display console. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. **Field Installation:** Yes.

Storage Addition - 16,384 Bytes (#6325): Provides additional processor main storage in 16,384 byte increments. Mounts in storage addition position. **Maximum:** Three in mdl A, seven in mdl B. May be used as last storage card in mdls C and D. **Field Installation:** Yes.

Storage Addition - 32,768 Bytes (#6326): [Mdls C, D, and E] Provides additional processor main storage in 32,768 byte increments. Mounts in storage addition position. **Maximum:** One in mdl C, three in mdl D. May be used as last storage card in mdl E. **Field Installation:** Yes.

Storage Addition - 65,536 Bytes (#6327): [Mdl E] Provides additional processor main storage in 65,536 byte increments. Mounts in storage addition position. **Maximum:** Three. **Field Installation:** Yes.

Storage Addition - 131,072 Bytes (#6328): [Mdl F] Provides additional processor main storage in 131,072 byte increments. Mounts in storage addition position. **Maximum:** Three **Field Installation:** Yes.

Storage Address Relocation Translator (#6335): [Mdls B, D] Provides capability to address up to 131,072 bytes. Required for storage sizes greater than 65,536 bytes. Does not require I/O feature position. Not required in mdl E or F. **Field Installation:** Yes.

Specification Table: The table below is provided to determine if the 4965 Storage and I/O Expansion Units or the 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero.

Machine/ Feature Number		Feature Positions	Notes
4955-A Processor		-8	
4955-B Processor		-3	
4955-C Processor		-10	
4955-D Processor		-7	
4955-E Processor		-7	
4955-F Processor		-7	
#1200	Series/1 - System 370 Channel Attachment Feature	+1	
#1205	4966 Diskette Magazine Unit Attachment	+1	
#1210	5250 Information Display System Attachment	+2	(5)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	
#1250	Multidrop Workstation Attach	+1	
#1300	Programmable Communications Subsystem Controller	+2	(5)
#1310	Multifunction Attachment	+1	(2)
#1400	Series/1 Local Communications Controller	+1	(7)(1)
#1560	Integrated Digital Input/Output Non-Isolated	+1	(1)
#1565	Channel Repower	+1	(1)
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	(2)
#2074	Binary Synchronous Comm Single Line Control	+1	(2)
#2075	Binary Sync Comm Single Line Control/HS	+1	(2)
#2080	Sync Comm Single Line Control/HS	+1	(8)
#2090	Sync Data Link Control	+1	(2)
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)(6)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)(6)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2)(6)
#3580	4962 Disk Storage Unit Attachment	+1	
#3581	4964 Diskette Unit Attachment	+1	
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	
#3595	4967 High Performance Disk Subsystem Attachment	+1	
#3920	Floating Point	+1	(3)
#5430	Customer Direct Program Control Adapter	+1	(1)
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment-5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(1)
#7840	Timers	+1	(1)
#7850	Teletypewriter Adapter	+1	(4)(1)
#7880	Telephone Communications Controller	+1	
#7881	Telephone Communications Adapter	+1	(2)(6)
#9900	Channel Exit Cable Reservation	+1	(1)
RPQ	D02038 4978 Display Station Attachment	+1	
RPQ	D02118 GPIB Adapter	+1	
RPQ	D02241 Series/1 Attachment	+1	
RPQ	D02242 Series/1 Attachment	+1	

4955 Processor (cont'd)

Notes:

(1) This feature may be placed in 4955 feature position A (leftmost). Other features may not be located in this position.

(2) Requires feature #2010 to provide +/-12 volts when used in mdls A, B, C, or D.

(3) Requires I/O feature position immediately adjacent to processor cards.

(4) Requires feature #2010 (except in mdl E or F) to provide +/-12 volts if the system is to provide power for the current loop or if the EIA voltage compatibility option is selected.

(5) Must be contiguous I/O feature positions.

(6) Must be in contiguous I/O feature position with its associated controller.

(7) Contact IBM when considering the use of this feature.

(8) Requires feature #2010 if the CCITT V.35 interface is used (except in mdls E or F).

MODEL CONVERSIONS (None)

ACCESSORIES

Auxiliary Features/Cables/Connector Kits: Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

SUPPLIES (None)

4956 PROCESSOR

PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

MODELS

Model B	B00	1,024KB maximum, 13 I/O feature locations, full-width unit. 256KB basic storage provided.
Model C	C00	1,024KB maximum, three I/O feature locations, full-width unit. 256KB basic error checking and correcting storage and one built-in diskette drive provided. Second diskette drive optional.
Model 30D	30D	1,024KB maximum, six I/O feature locations, full-width unit. 256K basic storage, with a 30MB disk, optional cache and an optional 1.2MB diskette.

All models are designed for mounting on support rails in a 4997 (see M4997 pages) or in an EIA standard 19-inch enclosure. Models C and 30D can also be mounted in the Stand-Alone Enclosure (#4520).

Limitations: 4999 Battery Backup Unit may not be used with mdl C or 30D. Mdl B is not supported by 4999 when primary power consumption exceeds 800 VA (corrected for power factor).

HIGHLIGHTS

Processor Unit in Series/1 family. Internal performance approximately twice that of 4954. Provides CPU, 262,144 bytes of error checking and correcting main storage, enclosure, and power. Error checking and correction (ECC) corrects all single-bit errors and detects double-bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (eight 64KB address spaces), and communications power. Storage addition cards are available with either 256KB or 512KB of ECC storage. Three additional 256KB storage additional cards may be mounted in I/O feature positions (two additional in mdl C). Basic Storage Upgrade to 512KB (#6332) is available via a 512KB storage addition card, making one additional I/O feature position available at the 512KB storage size. Mdls C can also be mounted in the Stand-Alone Enclosure (#4520). Number of additional 256KB storage increments and I/O feature locations is mdl-dependent. See "Specifications Table" at end of section. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart. Eight general purpose registers per level. Byte-addressable storage. Includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available. Mdl C provides one or two diskette drives and three I/O feature positions. The diskettes, one standard and the second an optional feature, provide the multiple functions of diskette media including input of data and programs generated offline, as well as output of programs and data for personal or offline storage, journaling, recording of audit trail, checkpoints, system errors, etc. Data exchange media is compatible with other systems using the diskette types and formats shown below.

Diskette Types: Either the 2-sided Diskette 2, Diskette 2D, or the 1-sided Diskette 1 may be used.

Diskette Formats: Diskette Type 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette Type 2D may be initialized for 256-, 512-, or 1,024-byte sectors.

Diskette Capacity: Capacity of diskette is dependent upon type and format.

Note: Actual useful capacity depends on the system software used and may be less than capacities shown here.

Bytes/ Sector	Sectors/ Track*	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

*74 Data tracks per surface, Diskette-2 and 2D have two surfaces.

Diskette Drive: Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds. The use of Flexible Diskette Storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the media causing diskette wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life ... see guidelines in *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the media should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

Disk Drive Mdl 30D: Provides a capacity of 30 megabytes per disk drive. This mdl has an average access time of 40 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3,151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

Cache Mdl 30D: The 64 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application-dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See *Customer Site Preparation Manual* (GA34-0050), for details.

Publications: *4956 Model B Processor and Processor Features Description* (GA34-0229), *4956 Model C Processor and Processor Features Description* (GA34-0230), and *IBM Series/1 4956 Model 30D Processor and Processor Feature Description* (GA34-0253).

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes (**#2XXX, #8XXX** and **#9XXX**) apply to plant orders only ... do not use on MES orders.

- Voltage (AC, 1-phase, 60 Hz): With 1.8 meter (6 foot) cord.

  115V **#9901** 230V **#9904**
  120V **#9911** 240V **#9914**
  208V **#9902**

- Type of Distribution Channel: (Specify Only One)

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketer, systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-user Sales: Sales directly to the business concern which will use the system for the intended application. Buying quantity less than five (no discount).

  #9003 Same as #9002 but buying quantity/discount quantity less than 200.

  #9004 Same as #9002 but buying quantity/discount quantity greater than 200.

- Primary Application: (Specify only one)

  - Industry Terminal Systems

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

4956 Processor (cont'd)

- Industrial Automation

#9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

#9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

#9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management Program Product (FC/PM).

#9024 Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM Program Product.

#9025 Facilities Management and Security: All other facilities management and security systems (except Controlled Access System [CAS]).

#9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, N. C. tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

- Communications

#9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

#9031 Front End Processors: For large systems.

#9032 Front End Processors: For small and medium sized systems.

#9033 Message Switching: Message routing and dispatching in a data communications network.

#9034 Telephone Switching: Switching (PABX Control), call routing, and central office switching.

#9035 Audio Store and Forward.

#9039 Other Communications Applications: All other communications applications.

- Scientific Computation

#9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

#9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

- Business Data Processing

#9070 Remote Job Entry: RJE or Remote Batch Terminal.

#9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote Job Entry/Batch functions.

#9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 Distributed Business Processing - Stand-alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with DSD Systems. Offline communications to a host system is optional.

#9074 Business System - Small account: Same as **#9073** but in enterprises with SPD Systems as the largest system or in new accounts.

#9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

#9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

#9079 Other Business Applications: All other business data processing applications.

- Other Applications

#9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

- Application Unknown

#9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

#92AA Number of Processors
#93BB Sequence Number

For multiple processor configurations, specify **#92AA** where AA is the number of processors in the configuration, and **#93BB** where BB is the sequence number of this processor.

Note: In AAS, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the three-digit AAS mdl code. For example, in a two-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl.

- Diskette IPL:

Mdl C:

#9138 First diskette primary IPL, optional diskette not IPL device.
#9139 First diskette alternate IPL, optional diskette not IPL device.
#9140 Second diskette primary IPL, first diskette not IPL device.
#9141 Second diskette alternate IPL, first diskette not IPL device.
#9142 First diskette primary IPL, second diskette alternate.
#9143 Second diskette primary IPL, first diskette alternate.
#9144 No IPL.

Mdl 30D:

#9148 Disk primary IPL, Optional diskette not IPL device
#9149 Disk alternate IPL, Optional diskette not IPL device
#9150 Diskette primary IPL, Disk not IPL device
#9151 Diskette alternate IPL, Disk not IPL device
#9152 Disk primary IPL, Diskette alternate
#9153 Diskette primary IPL, Disk alternate
#9144 No IPL

- When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the Specification Table below. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 Diskette Drive and I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are mdl-dependent considerations are presented below.

Channel Repower (#1565): Provides channel repower for 4959 Input/Output Expansion Unit, and 4965 Storage and I/O Expansion Unit. Required for 4959 and 4965 connected to 4956 mdls B, C, and 30D. **Field Installation:** Yes.

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Line. Mounts under front cover of the processor. Does not require a feature position. **Limitation:** Cannot be installed on a mdl C Processor.

Floating Point (#3925): Provides floating point instruction set. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. Does not require a feature position. **Maximum:** One. **Field Installation:** Yes.

Second Diskette Drive (#4100): Provides for a second diskette drive on the mdl C and a single diskette drive on the mdl 30D. Does not require a feature position. **Field Installation:** Yes.

Stand-Alone Enclosure (#4520): For the 4952 mdls C and 30D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C or 30D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). **Limitations:** Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See

4956 Processor (cont'd)

Note 3 at the end of the "Specification Table". **Field Installation:** Yes.

Stand-Alone Enclosure Cable (#4525): Provides a 3.1 meter (10 foot) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4952 also in a (#4520). **Field Installation:** Yes. **Prerequisites:** #1565.

Programmer Console (#5655): Provides data entry/data display console. New function includes segmentation register display/store and console lock. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. **Field Installation:** Yes.

Storage Addition Card - 262,144 Bytes (#6330): Provides additional processor main storage in 262,144 byte increments. Requires one feature position. **Maximum:** Three in mdl B, two in mdl C. **Field Installation:** Yes.

Storage Addition Card, 512KB (#6331): Provides additional processor main storage in 524,288-byte increments. Requires one feature position. **Limitations:** Total processor main storage in any mdl cannot exceed 1024KB. **Maximum:** One. **Field Installation:** Yes.

Basic Storage Upgrade to 512KB (#6332): Provides 524,288 bytes of processor main storage instead of 262,144 bytes. Does not require a feature position. **Limitations:** Total processor main storage cannot exceed 1024KB. **Maximum:** One. **Field Installation:** No.

Cache (#6400): Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance improvement (mdl 30D). The cache option does not require a feature position. **Field Installation:** No.

Specification Table: The table below is provided to determine if 4965 Diskette Drive and I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl-dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero. All features (#1XXX through #7XXX) may be field installed. **Note:** Storage Addition Card (#6330) occupies a feature position.

Machine/ Feature Number		Feature Positions	Notes
4956-B Processor		-13	
4956-C Processor		-3	
4956-30D Processor		-6	
#1200	4993 Series/1 - System370 Channel Attachment Feature	+1	(3)
#1205	4966 Diskette Magazine Unit Attachment	+1	(3)
#1210	5250 Information Display System Attachment	+2	(1)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	(3)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1250	Multidrop Workstation Attachment	+1	
#1300	Programmable Communications Subsystem Controller	+2	(1,3)
#1310	Multifunction Attachment	+1	
#1400	Series/1 Local Communications Controller	+1	(4)
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	(5)
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	
#2074	Binary Synchronous Comm Single Line Control	+1	
#2075	Binary Sync Comm Single Line Control/HS	+1	
#2080	Sync Comm Single Line Control/HS	+1	
#2090	Sync Data Link Control	+1	
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2)
#3580	4962 Disk Storage Unit Attachment	+1	(3)
#3581	4964 Diskette Unit Attachment	+1	(3)
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	(3)
#3595	4967 High Performance Disk Subsystem Attachment	+1	(3)
#5430	Customer Direct Program Control Adapter	+1	
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment 5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(3)
#6330	Storage Addition Card, 256KB	+1	
#6331	Storage Addition Card, 512KB	+1	
#6332	Basic Storage Upgrade to 512KB	+0	
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	
#7880	Telephone Communications Controller	+1	
#7881	Telephone Communications Adapter	+1	(2)
RPQ D02038	4978 Display Station Attachment	+1	
RPQ D02118	GPIB Adapter	+1	

Notes:

(1) Must be contiguous I/O feature positions.

(2) Must be in contiguous I/O feature position with its associated controllers.

(3) Not supported in the Stand-Alone Enclosure due to flat or internal cabling.

(4) Branch level systems assurance is required before ordering this feature.

(5) Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure Cable (#4525).

Auxiliary Features/Cables/Connector Kits: Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following Specification Table in M4959 pages.

MODEL CONVERSIONS (None)

ACCESSORIES

Frame Stand (P/N 6841365): Provides an attractive, steel stand capable of supporting a 4956 mdl C or 30D, within Stand-Alone Enclosure (#4520), and a 4975 Printer. The stand rests on glides and comes in a pebble gray color only.

SUPPLIES

Diskette: The 4956 mdl C or 30D uses the 2-sided Diskette 2, Diskette 2D, or the 1-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. Diskette 2 is prepared in 128, or 256 bytes per sector and must be re-initialized for other formats. Diskette 2D is prepared in 256, 512, or 1,024 bytes per sector. The 4956 mdl C or 30D may be used to reformat the diskette. Single diskettes are packaged ten to a box. Minimum order is one box.

4959 INPUT/OUTPUT EXPANSION UNIT

PURPOSE

Provides enclosure and power for additional Series/1 features.

MODELS

Model A A00 — 14 I/O feature locations, a full-width unit. Designed for mounting on support rails (fixed) in a 4997 or EIA standard 19-inch rack enclosure.

Limitations: A maximum of 24 data set and/or asynchronous local cables, or 40 of (smaller diameter) RS-422, current loop, and/or TTY cables. A proportional mix is acceptable, such as 12 data set cables and 20 RS-422 cables.

Prerequisites: Processor Unit 4952, 4953 (discontinued), 4954, 4955, 4956. For 4952, 4953 (discontinued) 4954, 4955 and 4956, Channel Repower (#1565) is always required in the processor to attach a 4959. All 4959s attached to another 4959 or 4965 require #1565 in the preceding 4959 or 4965. All integrated communications features (except #2080 when using local connection) require Communications Power (#2010) if mounted in a 4953 B or D, 4955 A, B, C, or D, or 4959 (serial numbers below 22499).

HIGHLIGHTS

Provides space for up to 14 I/O attachment features. See "Specification Table". Two-Channel Switch (#7900) enables switching of all features in this unit (and in 4959s connected to this unit) between two processors.

Publications: *IBM Series/1 4959 Input/Output Expansion Unit Description* (GA34-0056).

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes **#2XXX**, **#8XXX** and **#9XXX**, apply to plant orders only ... do not use on MES orders.

- Voltage (AC, 1-phase, 60 Hz): With a 1.8 meter (6 foot) cord.

  115V **#9901** 230V **#9904**
  120V **#9911** 240V **#9914**
  208V **#9902**

- Extended I/O Channel Cable:

  #9195 Extended Attachment Cable - Two-Channel Switch Only
  #9199 Extended Attachment Cable - Basic Channel or Two-Channel Switch

  For initial system orders including 4997 Rack Enclosures, IBM will locate machines and supply cables as required. For additions to existing systems or for machines located in customer racks, extended cables must be specified where needed. A 4959 Input/Output Expansion Unit must be located immediately above, below or alongside the previous machine on the channel. When located alongside the preceding unit, specify **#9199** (Extended Attachment Cable). A 4959 containing a Two-Channel Switch (#7900) may be located as above or located vertically once removed from the preceding unit. When located vertically once removed, specify **#9195** (Extended Attachment Cable).

- Sequence Numbers:

  For multiple processor configurations, each processor has been assigned a sequence number, **#93BB**. In a system where a 4959 may be connected only to a single processor (private I/O), the 4959 will have the same sequence number **#93BB** as the processor to which it is connected. Alternatively, a 4959 may be attached to two processors through a Two-Channel Switch (#7900). When a 4959 is connected in this manner (a "Y" configuration) the I/O devices are shared between the two processors. Specify both processor sequence numbers for 4959s connected this way.

  In the special case where there are two #7900s interconnecting four machines, only one **#93BB** is specified for each 4959 containing the shared I/O. This is the **#93BB** associated with the processor for which primary or normal attachment is desired. In addition, for each 4959 containing shared I/O and not containing a Two-Channel Switch, specify **#9450** (Extension of Switched I/O Channel).

SPECIAL FEATURES

Non-Communications Features

4993 Series/1 - S/370 Channel Attachment (#1200): In conjunction with the 4993 Termination Enclosure, this attachment provides a high-speed data transfer capability between a Series/1 and the S/370 (mdls 135 through 168), 3031, 3032, 3033, 3081, or 4331, 4341 processors. It occupies 32 device addresses on the S/370 channel and a single device address on the Series/1. Capable of transferring data under joint consent between the S/370 and the Series/1 using a subset of the 3272 control unit commands. The attachment may operate with a selector or block multiplexer channel. Allows IPL of the Series/1 from the host S/370. **Field Installation:** Yes. **Prerequisites:** One 4993 mdl 1 Series/1 - S/370 Termination Enclosure. See M4993 pages for further details.

Specify:

#9520 Remote IPL
#953X To specify the S/370 Control Unit channel code, take the second hex digit of the 370 Control Unit Channel Address and determine X as follows:

2nd Digit S/370 Address	
0	X = 1
2	X = 2
4	X = 3
6	X = 4
8	X = 5
A	X = 6
C	X = 7
E	X = 8

Note: The second digit of the S/370 address must be even and the third digit must be zero. See description of 4993 Terminal Enclosure for further details.

4966 Diskette Magazine Unit Attachment (#1205): Provides for the attachment to Series/1 of one 4966 Diskette Magazine Unit. **Specify: #9521** for Primary IPL ... **#9522** for Alternate IPL. **Note:** When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics. **Field Installation:** Yes.

5250 Information Display System Attachment (#1210): A 2-card feature requiring contiguous I/O feature positions. Provides for the attachment to Series/1 of the following machines and features. See M5251, 5256, and 5291 pages for details.

- 5251 mdl 11 Display Stations with options Keylock (#4655), Magnetic Stripe Reader (#4910), Cable-Thru (#2680), and Display Screen Filter (#3225, #3226). Keyboard (#4600) must be selected.
- 5256 mdl 1, 2, and 3 Printers with options Forms Stand (#4450), Audible Alarm (#1470), Cable-Thru (#2680) .
- 5291 mdl 1 Display Station.

#1210 provides four ports for attachment of the 5250 Information Display System Attachment Cable (#5760), which provides for connection of customer-supplied twinaxial cable. A maximum of seven workstations in any combination may be attached to a single port by using the Cable-Thru (#2680) on the 5251 or 5256s involved. Cable-Thru (#2680) must be provided on all but the last unit attached to any single port. Cable-Thru is a standard feature on the 5291 Display Station. A total of eight workstations may be attached to a single #1210. 5251, 5256 and 5291s each count as one workstation. The maximum length of twinaxial cable to each #1210 port is 1,524 meters (5,000 feet). See #5760 in "Accessories" below ... also *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for additional cabling information. **Field Installation:** Yes.

Magnetic Tape Subsystem Attachment (#1215): Provides for the attachment of one primary 4969 Magnetic Tape Unit and up to three 4969 expansion units, to Series/1. Expansion units are connected to the primary unit in a serial cable arrangement. The subsystem sequence number **#926X** is used to associate the attachment feature with the 4969 tape units making up the subsystem. **Field Installation:** Yes.

Specify:

Subsystem Sequence Number:
#926X (Where X = 1 through 9)

IPL:
#9523 Primary IPL first drive
#9524 Alternate IPL first drive
#9525 Primary IPL second drive
#9526 Alternate IPL second drive

4968 Autoload Streaming Magnetic Tape Unit Attachment (#1220): Provides for the attachment of one 4968 to Series/1. **Specify: #9157** for Alternate IPL only.

Multidrop Workstation Attachment (#1250): Provides for attachment of up to eight 4980 Display Stations. For cabling flexibility, four ports are available to which zero to eight displays may be attached (not to exceed a total of eight displays on each attachment) using twinaxial cabling and the cable-thru feature of the 4980. Maximum total cable length of each port is 1,219 meters (4,000 feet). Outdoor cabling is not supported. A 6 meter (20 foot) Attachment Cable (#5780), may be used to attach to the first display on each port (one #5780 used per port) or, along with twinaxial cable-to-cable connector (B/M **7362230**) to attach to cabling with twinaxial connectors. Berg Connector Kit (B/M **6095524**) may be used for direct attachment of twinaxial cabling.

Multifunction Attachment (#1310): The Multifunction Attachment (#1310) available on all mdls of the Series/1 processor family provides for the attachment of four devices utilizing only one Series/1 I/O feature location. All four of the attachment addresses provide for local

4959 Input/Output Expansion Unit (cont'd)

attachment up to 1,219 meters (4,000 feet) of the 3101 Display Terminal or the 4975 Printer (cable #5770 or equivalent). The first address can be configured to provide for a local attachment or a remote (via common carrier communications facilities) attachment of the IBM 3101 Display Terminal or a 4975 Printer, or a system/terminal utilizing Binary Synchronous Communications (BSC). The remaining addresses are direct connect only. **Limitations:** The Multifunction Attachment aggregate capacity is sensitive to the type of devices attached as well as application utilization of the devices. See *Multifunction Attachment Feature Description* (GA34-0144), for specific configuration information. The customer is responsible for establishing equivalency when utilizing machines other than a 3101 or 4975. It should be recognized that the 3101 and 4975 are customer setup devices, while the Multifunction Attachment is installed by IBM. No more than 24 communication cables (four per #1310), of any mixture can terminate in a Series/1 Processor, 4965 Storage and I/O Expansion Unit, or a 4959 Input/Output Expansion Unit. For information on prerequisites and specify codes see "Integrated Communication Feature Function Specify Codes, Limitations, and Prerequisites". **Field Installation:** Yes.

Specify: The Multifunction Attachment requires a minimum of one and a maximum of six specify codes for each attachment card ordered. These codes provide information for the jumper selection at time of manufacture as well as information for installation by the CE.

1. Specification of Device Attachment (up to four specifications):

   Where X = 0 First Address (RS-232-C/RS-422-A)
   1 Second Address (RS-422-A)
   2 Third Address (RS-422-A)
   3 Fourth Address (RS-422-A)

	Specify Code			
Description	**First #1310**	**Second #1310**	**Third #1310**	**Fourth #1310**
3101 Display Terminal Att'd	**#972X**	**#973X**	**#974X**	**#975X**
4975 Printer Att'd	**#976X**	**#977X**	**#978X**	**#979X**
OEM Device Att'd	**#980X**	**#981X**	**#982X**	**#983X**
Binary Sync Comm (BSC-PTP)	**#9840**	**#9850**	**#9860**	**#9870**
BSC Tributary (BSC-MPT)	**#9530**	**#9540**	**#9550**	**#9560**

Description	**Fifth #1310**	**Sixth #1310**	**Seventh #1310**	**Eighth #1310**
3101 Display Terminal Att'd	**#932X**	**#933X**	**#934X**	**#935X**
4975 Printer Att'd	**#936X**	**#937X**	**#938X**	**#939X**
OEM Device Att'd	**#940X**	**#941X**	**#942X**	**#943X**
Binary Sync Comm (BSC-PTP)	**#9440**	**#9270**	**#9280**	**#9290**
BSC Tributary (BSC-MPT)	**#9460**	**#9470**	**#9480**	**#9490**

2. Specification of First Address Characteristics (one specify required):

	Specify Code			
Description	**First #1310**	**Second #1310**	**Third #1310**	**Fourth #1310**
Local Interface (RS-422-A)	**#9841**	**#9851**	**#9861**	**#9871**
Leased line, FD or Local RS-232	**#9842**	**#9852**	**#9862**	**#9872**
Leased line, HD or Local RS-232	**#9843**	**#9853**	**#9863**	**#9873**
Sw line, FD, no answer tone	**#9844**	**#9854**	**#9864**	**#9874**
Sw line, HD, no answer tone	**#9845**	**#9855**	**#9865**	**#9875**
Sw line, FD, answer tone	**#9846**	**#9856**	**#9866**	**#9876**
Sw line, HD, answer tone	**#9847**	**#9857**	**#9867**	**#9877**

Description	**Fifth #1310**	**Sixth #1310**	**Seventh #1310**	**Eighth #1310**
Local Interface (RS-422-A)	**#9441**	**#9271**	**#9281**	**#9291**
Leased line, FD or Local RS-232	**#9442**	**#9272**	**#9282**	**#9292**
Leased line, HD or Local RS-232	**#9443**	**#9273**	**#9283**	**#9293**
Sw line, FD, no answer tone	**#9444**	**#9274**	**#9284**	**#9294**
Sw line, HD, no answer tone	**#9445**	**#9275**	**#9285**	**#9295**
Sw line, FD, answer tone	**#9446**	**#9276**	**#9286**	**#9296**
Sw line, HD, answer tone	**#9447**	**#9277**	**#9287**	**#9297**

3. Specification of First Address - IPL Capability (one specify required):

	Specify Code			
Description	**First #1310**	**Second #1310**	**Third #1310**	**Fourth #1310**
IPL - Requires BSC capability	**#9122**	**#9124**	**#9126**	**#9128**
No IPL capability required	**#9123**	**#9125**	**#9127**	**#9129**

Description	**Fifth #1310**	**Sixth #1310**	**Seventh #1310**	**Eighth #1310**
IPL - Requires BSC capability	**#9462**	**#9464**	**#9466**	**#9468**
No IPL capability required	**#9463**	**#9465**	**#9467**	**#9469**

Example: A Series/1 with one Multifunction Attachment that will support two 3101 Displays both mdl 13 and two 4975 mdl 02L. The specify codes for this adapter would be:

#9720	3101 on Address 0
#9721	3101 on Address 1
#9762	4975 on Address 2
#9763	4975 on Address 3
#9841	Local Interface used on Address 0
#9123	No IPL capability

Integrated Digital Input/Output Non-Isolated (#1560): Provides 32 points of digital input or process interrupt and 32 points of digital output. Non-isolated, TTL compatible, and high level. Direct program control using four device addresses. Each 16 point group has one external sync and one ready line. See "Accessories" for optional Customer Access Panel (#1590). **Field Installation:** Yes.

Channel Repower (#1565): Resides in preceding unit and provides channel repower for 4959 and 4965 I/O Expansion Units. **Field Installation:** Yes. **Prerequisites:** Required for first and all subsequent 4959s attached to 4952, 4953, 4954, 4955, or 4956 processors. A 4965 attached to a 4959 requires #1565 in the 4959.

Channel Socket Adapter (#1595): Converts IBM card socket-to-socket suitable for commercially available circuit card stock. See "Accessories" for optional Customer Access Panel (#1590) and *IBM Series/1 User's Attachment Manual* (GA34-0033). **Field Installation:** Yes.

4962 Disk Storage Unit Attachment (#3580): Provides for Series/1 attachment to the 4962-1, 1F, or 3 Disk Storage Unit or the disk portion of a 4962-2, 2F, or 4 Disk Storage Unit. **Field Installation:** Yes. **Prerequisites:** #3851 also required for attachment of diskette portion of 4962-2, 2F, or 4 Disk Storage Unit.

Specify:

IPL:

#9133	Primary IPL device
#9134	Alternate IPL device

Mdls:

#9110	Mdl 1 or 2, 4962 attached
#9111	Mdl 1F or 2F 4962 attached
#9112	Mdl 3 or 4, 4962 attached

4964 Diskette Unit Attachment (#3581): Provides for the attachment to Series/1 of 4964 Diskette Unit or a diskette within a 4962-2, 2F, or 4 Disk Storage Unit. **Field Installation:** Yes. **Specify: #9136** for Primary IPL device, **#9137** for Alternate IPL device. **Note:** When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

4979 Display Station Attachment (#3585): Provides for attachment of the 4979 Display Station to Series/1.

4963 Disk Subsystem Attachment (#3590): Each #3590 provides for attachment of one 4963 mdl 23A, 29A, 58A, or 64A primary disk drive, and any mix of up to three 4963 mdl 23B, 29B, 58B, and 64B

4959 Input/Output Expansion Unit (cont'd)

expansion drives, to Series/1. Multiple subsystems may be attached. Each subsystem requires one #3590. For complex subsystems or systems with more than eight 4963 disk storage units contact IBM. **Field Installation:** Yes.

Specify:

Subsystem Number: One subsystem number, in sequence, for each #3590.

#925X Where X is 1 through 8

IPL:
- **#9160** Primary IPL - first drive
- **#9161** Alternate IPL - first drive
- **#9162** Primary IPL - second drive
- **#9163** Alternate IPL - second drive

Number of Drives Attached:
- **#9180** 1 or 2 drives attached
- **#9181** 3 or 4 drives attached

4967 High Performance Disk Subsystem Attachment (#3595): Provides for the attachment of one primary 4967 mdl 2CA disk drive and up to three 4967 mdl 2CB expansion drives, to Series/1. Multiple subsystems may be attached. Each subsystem requires one #3595. For complex subsystems or systems with more than eight 4967 disk units attached contact IBM.

Specify:

Subsystem Number: One subsystem number, in sequence, for each #3595.

#924X Where X is 1 through 8

Number of Drives Attached to this **#924X** Subsystem:
- **#9182** 1 or 2 drives attached
- **#9183** 3 or 4 drives attached

IPL:
- **#9164** Primary IPL first drive
- **#9165** Alternate IPL first drive
- **#9166** Primary IPL second drive
- **#9167** Alternate IPL second drive

Customer Direct Program Control Adapter (#5430): Provides direct program control adapter for up to 16 directly-addressable devices for customer use. See "Accessories" for optional Customer Access Panel (**#1590**). **Field Installation:** Yes.

4974 Printer Attachment (#5620): Provides for Series/1 attachment to the 4974 Printer. Supports program selection of six or eight lines per inch. **Field Installation:** Yes.

4973 Line Printer Attachment (#5630): Provides for attachment of the 4973 Printer to Series/1. **Field Installation:** Yes.

Printer Attachment - 5200 Series (#5640): Provides two ports for the attachment of the following printers to the Series/1:

- Any mix of 5219s mdl D01/D02 and 5224s up to eight printers or,
- One 5225 and a mix, up to seven printers, of 5219s mdl D01/D02 and 5224s, or
- Two 5225s and a mix, up to five printers, of 5219s mdl D01/D02 and 5224s, or
- Three 5225s and a mix, up to three printers, of 5219s mdl D01/D02 and 5224s, or
- Four 5225s and one 5219 mdl D01/D02 or 5224 printer.

Feature #5640 is capable of driving three printer mixes at their rated speed. Actual printer performance, however, will be a function of the operating system. The 5219 mdls D01 and D02, 5224 mdls 1 and 2, and the 5225 mdls 1, 2, 3, and 4 may be attached. Up to seven printers may be attached to a single port on #5640. Printers located within 30.5 meters (100 feet) (actual distance ... not cable length) of #5640 must be of the same machine type. Maximum cable length is 1,524 meters (5,000 feet) using twinaxial cable. See "Accessories" for Attachment Cable (#5780).

4982 Sensor Input/Output Unit Attachment (#6305): Provides for attachment of the 4982 Sensor Input/Output Unit to Series/1. **Field Installation:** Yes.

Specify: Functions included in the attached 4982.

- **#9100** Analog Input
- **#9101** Digital Output
- **#9102** Digital Input Isolated
- **#9103** Digital Input Non-Isolated
- **#9104** Analog Output

Timers (#7840): Two timers per feature. Provides five time-interval options per timer (1, 5, 25, and 50 microseconds internal and one external). May be externally clocked and used as a pulse width or pulse frequency counter. See "Accessories" for optional "Customer Access Panel (**#1590**)". **Field Installation:** Yes.

Teletypewriter Adapter (#7850): Provides for Series/1 attachment to a standard Teletype ASR33, 35, or equivalent device operating full-duplex 20/60 mA current loop. Twelve bit rates (50, 75, 100, 110, 150, 200, 300, 600, 1200, 2400, 4800, 9600 bps). Supports IPL. Provides TTL level compatible capability. An external power supply may be used to provide power to the current loop. Has EIA voltage level capability. Cables #2064 and #2065 are available for EIA full-duplex operation. Cable #2066 is available for current loop connection to the 3101 Display Terminal. For other associated cables ... see "Cables" under "Accessories" below ... also for optional Customer Access Panel (**#1590**). **Limitations:** The EIA voltage level capability is intended for direct connect only. The interface, an EIA RS-232-C subset, is not intended for use with a modem. **Field Installation:** Yes. **Prerequisites:** May require Communications Power (#2010). See #2010 feature description above. **Specify: #9146** for Primary IPL device, **#9147** for Alternate IPL device.

Two-Channel Switch (#7900): Provides ability to switch the Series/1 I/O channel between two processors. Allows a secondary or alternate processor to take control of all I/O devices on the channel beyond the #7900 in the event of failure of the primary or normal processor to which the devices are attached. #7900 can be operated in two modes, manual or backup. In backup mode, the Initial Period Timer is set to a time period selected by the user. If the primary processor fails to reset this timer within the selected time period, #7900 attempts to interrupt the primary processor. The primary processor then has an additional specified warning period in which to issue the Reset Timer command. If at the end of this interval #7900 has not received the Reset Timer command, an interrupt will be issued to both processors. The secondary processor can then issue a Reset and Connect command, which will attach all common I/O to that secondary processor. If #7900 is in manual mode, the common I/O is connected to the processor selected by the position of the manual select switch. A special console is added to a 4959 or 4965 when #7900 is installed. This includes a mode switch (manual or backup), manual select switch, indicator lights, and isolated alarm contacts to allow extend attachment of some alarm device if desired. This console is located adjacent to the 4959 or 4965 power switch and indicator. **Note:** #7900 mounts in either 4959 or 4965 unit. It occupies the I/O channel cable position, not an available I/O feature position.

When the configuration is a simple "Y", one 4959 or 4965 with #7900 and two processors, or a simple "quad", two 4959s or 4965s, each with a #7900 and two processors, no special considerations are required. For more complex configurations contact IBM. System orders which contain a 4959 or 4965 with a Two-Channel Switch (#7900) must include at least two processors in any combination. Independent orders for 4959 or 4965 with #7900, or MES orders for #7900, must be placed against a system including at least two processors. Installed systems to be combined using the Two-Channel Switch must exist under one system number. **Field Installation:** Yes.

Specify:

TCS Timer Period - Initial Period:
- **#9701** 0.125 seconds
- **#9702** 1.0 seconds
- **#9703** 8.0 seconds
- **#9704** 16.0 seconds

TCS Timer Period - Warning Period:
- **#9710** 0.0 seconds
- **#9711** 0.125 seconds
- **#9712** 1.0 seconds

IPL Block:
- **#9120** First processor blocked from IPL by any common I/O device.
- **#9121** Second processor blocked from IPL by any common I/O device.

Communications Features

4987 Programmable Communications Subsystem Controller (#1300): Provides for the attachment of one 4987 Programmable Communications Subsystem. A 2-card feature requiring contiguous I/O feature positions. This feature controls one scanner (included with the 4987) and a maximum of 16 features (up to 32 lines) in the attached 4987. A second #1300 controller may be used with the 4987 Expansion Scanner (#3600 located in 4987) to increase 4987 throughput. In this case, each #1300 serves one scanner and up to eight features (up to 16 lines) in the 4987. **Field Installation:** Yes. **Specify:** Function Code (**#89XY**). For each controller, a function code must be provided of the form **#89XY**, where X, the tens digit, is a sequence number; 1, 2, 3, ... etc., as defined for each 4987 in the configuration, and Y, the units digit, is selected as follows:

4959 Input/Output Expansion Unit (cont'd)

Y	Associated Scanner	Number of 47XX Features Served by Controller
1	Basic	1-2
2	Basic	3-4
3	Basic	5-8
4	Basic	9-16
6	Expansion	1-2
7	Expansion	3-4
8	Expansion	5-8

Series/1 Local Communications Controller (#1400): This feature provides for the interconnection of up to 16 Series/1 processors. The ring is clocked at 2,000,000 bps. A micro-controller and associated circuitry provide for cycle-stealing, control buffers and error handling. A peer-to-peer ring topology is provided through twinaxial cable termination/connection. Maximum cable length between active processors is 1,524 meters (5,000 feet). Refer to "Cables" and connectors under "Accessories" for customer options. The feature includes a bypass relay and 2.44 meter (8 foot) connecting cables. It allows data to flow through a powered-down unit when total twinaxial cable length between active units is less than 1,524 meters (5,000 feet). Two cards are provided, one for the local communications controller and one for the controller cable attachment that plugs into the controller card. Therefore only one feature slot is required. **Field Installation:** Yes.

Asynchronous Communications Single Line Control (#1610): Provides a cycle-steal attachment and control for a single communications line via an EIA RS-232-C/CCITT V.24 interface. Supports half-duplex start/stop operation only. Data rates are program-selectable within two jumperable ranges (37.5 to 1200 and 300 to 9600 bps). Local attachment via the Asynchronous Local Attachment Cable (#2056) or connection to a modem via EIA Data Set Cable (#2057). #1610 provides two modes of operation: PTTC mode for use with the 2740/2741, and 8-bit Data Interchange mode (8 data-bits, 2 stop-bits) for use with the Teletype ASR 33/35. #1610 provides support for point-to-point (switched and nonswitched) and multipoint control operations. Auto-answer facility is provided. See "Integrated Communications Feature Function Specify Codes" below. For associated cables, see "Accessories" below. **Field Installation:** Yes.

Specify: A function specify code is required for each #1610 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
#8100	#2056	Low-speed, direct connect, HD
#8101	#2056	Low-speed, direct connect, FD
#8102	#2057	Low-speed, switched network, HD
#8103	#2057	Low-speed, switched network, FD
#8104	#2057	Low-speed, switched network, HD, carrier-detect provided
#8105	#2057	Low-speed, switched network, FD, carrier-detect provided
#8106	#2057	Low-speed, nonswitched line, HD
#8107	#2057	Low-speed, nonswitched line, FD
#8108	#2057	Low-speed, nonswitched line, HD, carrier-detect provided
#8109	#2057	Low-speed, nonswitched line, FD, carrier-detect provided
#8110	#2056	Medium-speed, direct connect, HD
#8111	#2056	Medium-speed, direct connect, FD
#8112	#2057	Medium-speed, switched network, HD
#8113	#2057	Medium-speed, switched network, FD
#8114	#2057	Medium-speed, switched network, HD, carrier-detect provided
#8115	#2057	Medium-speed, switched network, FD, FD carrier-detect provided
#8116	#2057	Medium-speed, nonswitched line, HD
#8117	#2057	Medium-speed, nonswitched line, FD
#8118	#2057	Medium-speed, nonswitched line, HD, carrier-detect provided
#8119	#2057	Medium-speed, nonswitched line, HD, carrier-detect provided

Communications Indicator Panel (#2000): Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of machine. Does not require a feature position. **Limitations:** Cannot be mounted in half-width units 4952A, 4953A, 4953C, 4954A or full-width units 4952C, 4954C, 4965C, 4965 mdl 001. **Field Installation:** Yes.

Communications Power (#2010): Provides + and - 12 volts DC regulated power. Required in 4953B or D, 4955A, B, C, D or 4959 (up to serial number 22499) containing one or more integrated communications features #1310, #1610, #2074, #2075, #2080, #2090, #2091, #2092, #2093, #2094, #2095, and #2096. Required in above machines containing Teletypewriter Adapters (#7850) configured for EIA voltage interface or for current loop where Series/1 supplies the power. This feature is installed in the power supply section, and does not occupy a feature position. **Field Installation:** Yes.

Binary Synchronous Communication Single Line Control (#2074): Provides a half-duplex single BSC Communications line capability, with an EIA RS-232-C/CCITT V.24 compatible line interface via a cycle-steal channel attachment. Data rates up to 9600 bps are supported. Internal clocking of 1200 bps or 600 bps is provided for those modems which do not provide clocking. Provides support for EBCDIC and ASCII codes, and supports transparency (unrestricted binary data) when using EBCDIC code. #2074 provides support for point-to-point (switched and nonswitched) and multipoint (control and tributary station) operation. Auto-answer facility is provided. IPL from another system is supported by this feature when remote IPL is specified. See "Integrated Communications Feature Function Specify Codes" below. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes.

Specify: #9154 for Remote IPL. A function specify code is required for each #2074 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
#8120	#2057	Multipoint tributary, HD
#8121	#2057	Multipoint tributary, internal clocking, HD
#8122	#2057	Switched network, HD
#8123	#2057	Switched network, ring indicator provided, HD
#8124	#2057	Switched network, internal clocking, HD
#8125	#2057	Switched network, internal clocking, ring indicate provided, HD
#8126	#2057	Nonswitched line, HD
#8127	#2057	Nonswitched line, FD
#8128	#2057	Nonswitched line, internal clocking, HD
#8129	#2057	Nonswitched line, internal clocking, FD

Binary Synchronous Communications Single Line Control/High-Speed (#2075): Provides a half-duplex single BSC communications line capability, with interfaces for a Western Electric 303 Data Set or equivalent (via cable #2058) and for CCITT V.35 compatible Data Sets (via cable #2060), and a cycle-steal channel attachment. Data rates up to 56K bps are supported. Provides support for EBCDIC and ASCII codes and supports transparency (unrestricted binary data) when using EBCDIC code, all under program control. IPL from another system is supported by this adapter when remote IPL is specified. **Limitations:** Maximum of eight in any single machine. See "Integrated Communications Feature Function Specify Codes" below. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes.

Specify: #9155 for Remote IPL. A function specify code is required for each #2075 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
#8161	#2060	CCITT V.35, nonswitched line, HD
#8162	#2060	CCITT V.35, nonswitched line, FD
#8163	#2060	CCITT V.35, multipoint tributary
#8164	#2058	WE303, nonswitched line, HD
#8165	#2058	WE303, nonswitched line, FD
#8166	#2058	WE303, multipoint tributary

Synchronous Communications Single Line Control/High-Speed (#2080): Provides a cycle-stealing attachment and control for a single communications line operating under either a Binary Synchronous Communication (BSC), Synchronous Data Link Control (SDLC), or High Level Data Link Control (HDLC) protocol via a leased CCITT V.35 interface or a local connect interface RS-422-A, or with leased/switched circuit operation of CCITT Recommendation X.21. Can communicate using any 8-bit data code including EBCDIC and ASCII. Zero bit insertion/deletion and block check character generation/checking is automatically performed. NRZ or NRZI coding is available. The attachment provides remote IPL capability using both the BSC and SDLC/HDLC protocols.

Local 1 operation allows for connection using RS-422-A interface without clocking supplied through the cable [1,219 meters (4,000 feet)

4959 Input/Output Expansion Unit (cont'd)

maximum] at 9600 bps (10 multipoint stations allowed). Each station must derive clocking from the data stream. SDLC/HDLC half-duplex (HDX) operation is provided by a local 1 connection.

09Local 2 operation allows for connection using RS-422-A interface with clocking supplied through the cable [300 meters (1,000 feet) maximum] at 48K bps (10 multipoint stations allowed). Both BSC HDX and SDLC/HDLC half or full-duplex (FDX) operation is provided by a local 2 operation.

High-Level Data Link Control (HDLC) is supported for half and full-duplex operation (ABM and NRM mode as described by CCITT Recommendation X.25) at speeds up to 56K bps via a DCE conforming to CCITT V.35 or at speeds up to 48K bps via a CCITT X.21 leased circuit interface. Programming support is provided by X.25/HDLC Communications Support which consists of two programmable interfaces: Frame level interface and packet level interface. These interfaces correspond, respectively, to level 2 and level 3 of CCITT X.25. Remote IPL capability is supported.

Using SNA, HDX operation is supported up to 9600 bps via a CCITT Recommendation X.21 leased/switched circuit interface.

To assist in future migration to SDLC/HDLC protocols, BSC capabilites are provided for HDX up to 56K bps with the V.35 interface and up to 48K bps with the X.21 interface. Provides support for EBCDIC and ASCII codes and supports transparency (unrestricted binary data) when using EBCDIC code. The sustained throughput when using Binary Synchronous Communications at speeds of 48K and 56K bps will be considerably less than clocking rate dependent upon message size to a maximum throughput of 15K bps.

See "Integrated Communications Feature Function Specify Codes" below. Cable #2060 provides connection to a CCITT V.35 compatible modem. Cable #2067 provides connection to a CCITT X.21 interface. The customer is responsible for providing a cable for local connection. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes.

Specify: A function specify code is required for each #2080 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
#8170	#2060	BSC, V.35
#8171	#2060	SDLC/HDLC, V.35
#8172	#2060	BSC, IPL, V.35
#8173	#2060	SDLC/HDLC, IPL, V.35
#8175	#2067	BSC, X.21
#8176	#2067	SDLC/HDLC, X.21
#8177	#2067	BSC, IPL, X.21
#8178	#2067	SDLC/HDLC, IPL, X.21
#8180	#2067	BSC switched X.21
#8181	#2067	SDLC/HDLC, switched X.21
#8182	#2067	BSC, IPL, switched X.21
#8183	#2067	SDLC/HDLC, IPL, switched X.21

SDLC Single Line Control (#2090): Provides a cycle-stealing attachment and control for a single communications line operating under Synchronous Data Link Control (SDLC) or High Level Data Link Control (HLDC) protocol via an EIA RS-232-C/CCITT V.24 interface. The feature card may be connected to switched or nonswitched communication lines. One feature card may be used as a half-duplex communications port or two feature cards may be used as a pair to handle a full-duplex operation at EC level 467013 and above. Data rates up to 19.2K bps using external clocking are supported. Internal (business machine) clocking at 600 or 1200 bps provides for use when the modem does not provide clocking. NRZI coding is used with internal clocking. With external clocking, either NRZ or NRZI coding may be used. Can communicate using any 8-bit data code including EBCDIC and ASCII. Zero-bit insertion/deletion and block check character generation/checking automatically performed.

High Level Data Link Control (HDLC) is supported for half and full-duplex operation (ABM and NRM mode as described by CCITT Recommendation X.25) at speeds up to 19.2K bps via a RS-232-C interface on leased or switched lines. Programming support is provided by X.25/HDLC Communications Support which consists of two programmable interfaces, frame level and packet level. These interfaces correspond respectively, to level 2 and level 3 of CCITT Recommendation X.25.

Using SNA, HDX operation is supported up to 19.2K bps with RS-232-C on leased or switched lines.

See "Integrated Communications Feature Function Specify Codes" below. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes.

Specify: A function specify code is required for each #2090 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
#8130	#2057	Switched network, HD
#8131	#2057	Switched network, ring indicator provided, HD
#8132	#2057	Switched network, internal clocking, ring indicator provided, HD
#8134	#2057	Nonswitched line, HD
#8135	#2057	Nonswitched line, FD
#8136	#2057	Nonswitched line, internal clocking, HD
#8137	#2057	Nonswitched line, internal clocking, FD
#8138	#2062	Switched network, FD
#8139	#2062	Switched network, FD Ring Indicate provided
#8140	#2062	Non-switched line, FD

Asynchronous Communications 8-Line Control (#2091): Provides cycle-stealing control function for one or two Asynchronous Communications 4-Line Adapters (#2092). Provides support for a maximum of eight lines, each operating at a maximum of 2400 bps. See "Integrated Communications Feature Function Specify Codes" below. **Field Installation:** Yes.

Specify: Sequence of controller within processor 4959 or 4965.

#8141 First Controller
#8142 Second Controller
#8143 Third Controller
#8144 Fourth Controller
#8145 Fifth Controller
#8146 Sixth Controller

Asynchronous Communications 4-Line Adapter (#2092): Provides for attachment of up to four half-duplex communications lines. Attachment to the communications lines is via EIA RS-232-C/CCITT V.24 interface. Data rates are program-selectable within two jumper-selectable ranges (37.5 to 1200 and 300 to 2400 bps). The jumper sets the rate range for all four lines. Local attachment of a terminal is via the Asynchronous Local Attachment Cable (#2056) or connection to a modem via EIA Data Set Cable (#2057). This feature in conjunction with the Asynchronous 8-Line Communications Control (#2091) provides functional capability similar to the Asynchronous Communications Single Line Control (#1610) with the exception that no IPL facility is provided and the data rate per line is limited to a maximum of 2400 bps. **Limitations:** No more than two Asynchronous Communications 4-Line Adapters may be controlled by a single Asynchronous Communications 8-Line Control (#2091). #2092 must be located in same machine as its associated controller, and installed in a feature position immediately adjacent to the controller. See "Integrated Communications Feature Function Specify Codes" below. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes. **Prerequisites:** #2091.

Specify: A function specify code is required for each of #2092, ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
X = Controller Number		
#820X	#2056	Low-speed, direct connect, HD
#821X	#2056	Low-speed, direct connect, FD
#822X	#2057	Low-speed, switched network, HD
#823X	#2057	Low-speed, switched network, FD
#824X	#2057	Low-speed, switched network, HD, carrier-detect provided
#825X	#2057	Low-speed, switched network, FD, carrier-detect provided
#826X	#2057	Low-speed, nonswitched line, HD
#827X	#2057	Low-speed, nonswitched line, FD
#828X	#2057	Low-speed, nonswitched line, HD, carrier-detect provided
#829X	#2057	Low-speed, nonswitched line, FD, carrier-detect provided
#830X	#2056	Medium-speed, direct connect, HD
#831X	#2056	Medium-speed, direct connect, FD
#832X	#2057	Medium-speed, switched network, HD
#833X	#2057	Medium-speed, switched network, FD
#834X	#2057	Medium-speed, switched network, HD, carrier-detect provided
#835X	#2057	Medium-speed, switched network, FD, carrier-detect provided
#836X	#2057	Medium-speed, nonswitched line, HD
#837X	#2057	Medium-speed, nonswitched line, FD
#838X	#2057	Medium-speed, nonswitched line, FD, carrier-detect provided
#839X	#2057	Medium-speed, nonswitched line, FD

4959 Input/Output Expansion Unit (cont'd)

Binary Synchronous Communications 8-Line Control (#2093): Provides cycle-stealing control function for one or two Binary Synchronous Communications 4-Line Adapters (#2094). Data rates up to 9600 bps per line are supported with the following limitations:

- Only lines 0 and 1 can operate at 9600 bps.
- With lines 0 and 1 operating at 9600 bps, up to six additional lines at rates up to 2400 bps may be attached.
- When only four lines are attached, each can operate at rates up to 4800 bps.

Internal clocking of 600 to 1200 bps is provided for those modems which do not provide clocking. Features #2093 and #2094 provide functional capability similar to the Binary Synchronous Communications Single Line Control (#2074) with the exception that IPL capability is not provided. See "Integrated Communications Feature Function Specify Codes, Limitations and Prerequisite" below. **Field Installation:** Yes.

Specify: Controller Sequence within a processor, 4959 or 4965.

#8151 First Controller
#8152 Second Controller
#8153 Third Controller

Binary Synchronous Communication 4-Line Adapter (#2094): Provides for attachment of up to four half-duplex BSC communications lines via EIS RS-232-C/CCITT V.24 compatible line interfaces. **Limitations:** No more than two Binary Synchronous Communications 4-Line Adapters may be controlled by one Binary Synchronous Communications 8-Line Controller (#2093). Must be located in the same machine as its associated controller, and must be installed in a feature position immediately adjacent to the controller. See "Integrated Communications Feature Function Specify Codes, Limitations and Prerequisites" below. For associated cables, see "Cables" under "Accessories" below. **Field Installation:** Yes. **Prerequisites:** #2093.

Specify: A function specify code is required for each #2094 ordered. This code is used to set jumper-selectable options of line speed, network attachment and common carrier facility at time of manufacture. They may be reset as required in the field.

Function Specify Code	Compatible IBM Cable(s)	Description
X = Controller Number		
#840X	#2057	Multipoint tributary, HD
#841X	#2057	Multipoint tributary, internal clocking, HD
#842X	#2057	Switched network, HD
#843X	#2057	Switched network, ring indicator provided, HD
#844X	#2057	Switched network, internal clocking, HD
#845X	#2057	Switched network, internal clocking, ring indicator provided, HD
#846X	#2057	Nonswitched line, HD
#847X	#2057	Nonswitched line, FD
#848X	#2057	Nonswitched line, internal clocking, HD
#849X	#2057	Nonswitched line, internal clocking, FD

Feature-Programmable 8-Line Communications Control (#2095): Provides cycle-stealing control function for one or two Feature-Programmable 4-Line Communications Adapters (#2096). Supports the command set (8-bit Data Interchange mode only) provided by the Asynchronous 8-line Communications Control (#2091). Also provides flexibility in the attachment of asynchronous and synchronous protocol devices. Provides support for operator-driven full-duplex terminals as well as support for right-shifted character codes (e.g., ASCII). The aggregate controller throughput is 64,000 bps (when using 12-bit characters). **Note:** The feature-programmable controlling provides character-synchronous operation and accommodates Airline Control protocol but does not support IBM binary synchronous protocol. For Airline Control protocol, two ports of the adapter and EIA Full-Duplex Cable (RPQ D02063) are required. **Field Installation:** Yes.

Feature-Programmable 4-Line Communication Adapter (#2096): Provides for attachment of up to four half-duplex communications lines. Attachment to the communications line is via EIA RS-232-C/CCITT V.24 interface. In addition, each line has the jumper-selectable option to provide local attachment using a 20 mA current loop connection. Data rates for asynchronous operation are program selectable within two jumper selectable ranges (37.5 to 1200 and 300 to 19,200 bps). For synchronous operations, external clocking is required. Modem connection for a line is EIA Data Set Cable (#2057). For current loop operation, connection is provided by the Current Loop Cable (#2061), and by the 3101 Display Terminal Current Loop Cable (#2066) for use with the 3101. Local attachment of an asynchronous terminal to a line is provided, via the Asynchronous Local Attachment Cable (#2056). **Limitations:** No more than two Feature-Programmable 4-Line Communications Adapters may be controlled by a single Feature-Programmable 8-Line Communications Control (#2095). The adapter must be located in the same machine as its associated controller and installed in a feature position immediately adjacent to the controller. A maximum of 20 current loop lines per processor or I/O expansion unit may be configured. **Field Installation:** Yes. **Prerequisites:** #2095.

Telephone Communications Controller (#7880): Provides the control and data transfer function for one to four Telephone Communications Adapters (#7881). **Field Installation:** Yes.

Telephone Communications Adapter (#7881): Provides for attachment to one line of a public or private switched telephone exchange. The adapter will answer and originate calls, generate and detect standard push-button phone signals and digitally encode and decode voice signals. **Limitations:** Adapters must be assigned feature positions immediately adjacent to the attached controller. **Maximum:** Four adapters per controller. **Note:** When used in conjunction with the IBM Audio Distribution System (5719-U20) licensed program, the maximum is three adapters per controller. **Field Installation:** Yes. **Prerequisites:** #7880.

Integrated Communication Feature Function Specify Codes: The units digit of the specify code for each line of a multiline adapter (X in the table) must be the same as the units digit of its associated controller sequence code (1, 2, or 3). Table A shows optional cables and a default function specify code if selection criteria are unavailable. See also special feature sections for valid specify codes.

Series/1 Integrated Communications Features - Table A

Description	Feature	Cable	Default Function Specify Code	Valid Function Specify Codes
Asynchronous:	#1610			
Single-Line with Direct cable		#2056	**#8111**	**#8100, #8101 #8110, #8111**
with EIA Cable		#2057	**#8114**	**#8102-#8109, #8112-#8119**
Binary Synchronous:	#2074			
Single-line with EIA Cable		#2057	**#8123**	**#8120-#8129**
EIA Data Set Cable Full-Duplex		#2062		
Binary Synchronous:	#2075			
Single-line HS-WE303		#2058	**#8165**	**#8164-#8166**
CCITT/V.35		#2060	**#8162**	**#8161-#8163**
SDLC:	#2090			
Single-line with EIA		#2057	**#8134**	**#8130-#8137**
EIA Data Set Cable Full-Duplex		#2062		
Asynchronous:	#2092			
Multi-line with Direct Cable		#2056	**#831X**	**#820X-#821X, #830X-#831X**
with EIA Cable		#2057	**#834X**	**#822X-#829X, #832X-#839X**
BSC:	#2094			
Multi-line with EIA Cable		#2057	**#842X**	**#840X-#849X**
EIA Data Set Cable Full-Duplex		#2062		
Feature Programmable 4-Line Communication Adapter:	#2096			
EIA Data Set Cable		#2057		
Current Loop Cable		#2061		
EIA Data Set Cable Full-Duplex		#2062		
Asynchronous Local Attach Cable		#2065		

4959 Input/Output Expansion Unit (cont'd)

Compatible IBM Modems:

Feature	3872	Modem 3863	3864	3865
#1310 #1610	(2)	(2)	(2)	(2)
#2074 #2075	X	X	X	X
#2090 #2092	X	X	X	X
#2094	X	X	X	X
#2096	(1)	(1)	(1)	(1)

(1) Synchronous mode only.
(2) Binary synchronous mode.

SPECIFICATION TABLE

This table is provided to determine how many 4959 Input/Output Expansion Units are required to contain the desired features. Locations are expressed as a negative number for availability. A positive number is used for feature requirement. The sum of the availability and requirements number cannot exceed zero.

Machine/ Feature Number		Feature Positions	Notes
4959	Input/Output Expansion Unit	-14	
#1200	Series/1 - S/370 Channel Attachment Feature	+1	
#1205	4966 Diskette Magazine Unit Attachment	+1	
#1210	5250 Information Display System Attachment	+2	(2)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	
#1250	Multidrop Workstation Attachment	+1	
#1300	Programable Communications Subsystem Controller	+2	(2)
#1310	Multifunction Attachment	+1	(1)
#1400	Series/1 Local Communications Controller	+1	
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	(1)
#2074	Binary Synchronous Comm Single Line Control	+1	(1)
#2075	Binary Sync Comm Single Line Control/HS	+1	(1)
#2080	Sync Comm Single Line Control/HS	+1	(1)
#2090	Sync Data Link Control	+1	(1)
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(1, 3)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(1, 3)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(1, 3)
#3580	4962 Disk Storage Unit Attachment	+1	
#3581	4964 Diskette Unit Attachment	+1	
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	
#3595	4967 High Performance Disk Subsystem Attachment	+1	
#5430	Customer Direct Program Control Adapter	+1	
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment 5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	(1)
#7880	Telephone Communications Controller	+1	
#7881	Telephone Communications Adapter	+1	(1, 3)
RPQ	D02038 4978 Display Station Attachment	+1	
RPQ	D02118 GPIB Adapter	+1	
RPQ	D02350 8-Line RS-422 Adapter	+1	(1, 3)

Notes:
(1) Requires #2010 to provide + and - 12 volts. Required in 4959 up to serial number 22499.

(2) Must be contiguous I/O feature positions.

(3) Must be in contiguous I/O feature position with its associated controller.

MODEL CONVERSIONS (None)

ACCESSORIES

Customer Access Panel (#1590): Assembly to provide an interface to the surface of rack with quick disconnect type connection for Integrated Digital Input/Output (#1560) or Customer Direct Program Control Adapter (#5430) features (up to four in any mix), plus one Timer (#7840) with external sources and one Teletypewriter Adapter (#7850) can be accommodated by the panel. Connecting cables from panel for Timer and Teletypewriter Adapter are included. Cables for connected Integrated Digital Input/Output and Customer Direct Program Control Adapter are obtained separately. See **#1593** and **#1594** below. **Restrictions:** May not be mounted behind the following units: 4952A without EC375810, any mdl 30D or any unit in a Stand-Alone Enclosure (#4520). **Field Installation:** Yes.

Customer Access Panel - Integrated DI/DO Cable (#1593): Internal cable which connects Integrated Digital Input/Output (#1560) with Customer Access Panel (**#1590**). Provides both plug and receptacle at Customer Access Panel and connectors at Integrated Digital Input/Output feature. Up to a total of six **#1593** and **#1594** may be accommodated in each full-width machine. Half-width machines are limited by available feature positions.

Customer Access Panel-Customer DPC Adapter Cable (#1594): Internal cable which connects Customer Direct Program Control Adapter (#5430) with Customer Access Panel (**#1590**). Provides both plug and receptacle at Customer Access Panel and connectors at Customer Direct Program Control Adapter. Up to a total of six **#1593** and **#1594** may be accommodated in each full-width machine. Half-width machines are limited by available feature positions. **Field Installation:** Yes.

Specify:

#2055 Teletypewriter Cable.
#2059 Teletypewriter, Customer Access Panel Cable.
#2064 Teletypewriter Cable EIA Male ... required for EIA full-duplex operation.
#2065 Teletypewriter Cable EIA Female ... required for EIA full-duplex operation.
#2066 3101 Display Terminal Current-Loop Cable ... required for current-loop connection to the 3101 and with the #7850 adapter in current-loop mode.

Rack Mounting Fixture (#4540): Mounting assembly for half-rack-width units. One rack mounting fixture required to mount one or two half-width units in a 4997 or an EIA standard 19-inch rack enclosure. If only one unit is mounted in #4540, the empty space will be covered with a decorative panel similar to the front covers of Series/1 machines. **Field Installation:** Yes.

5250 Information Display System Attachment Cable (#5760): Provides termination for up to four customer cables (one for each port) to a 5250 Information Display System Attachment Feature (#1210). Cable is 3 meters (10 feet) long. See M5251, and 5256 pages for connectors for customer cable. **Field Installation:** Yes.

Attachment Cable (#5780): Provides a twinaxial cable, 6.1 meters (20 feet) in length, with a Berg connector on one end and a male twinaxial connector on the opposite end. May be used to attach the 5224 or 5225 Printers to Printer Attachment - 5200 Series (#5640). See M5224, 5225 pages for additional cable information.

Cables: Listed Series/1 cables and/or associated parts to attach devices to Series/1 may be purchased from IBM or from a customer-chosen source. For the proper identification of the required connectors, see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). The customer is responsible for the installation and maintenance of the cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the feature(s).

4959 Input/Output Expansion Unit (cont'd)

Cables For Series/1 Local Communications Controller (#1400):

Part Name	IBM No. for Twinax Cable Indoor/Outdoor	IBM No. for Coax Cable Indoor	Outdoor
Cable Assembly (1)	4498426	2577672 (5)	1833108 (5)
Bulk Cable (2)	7362211	0323921 (5)	5252750 (5)
Connector Kit	4498427 (3)	1836418 (4)	1836419 (4)

Notes:
(1) Cable in specified length with connectors at both ends up to a maximum of 610 meters (2,000 feet). Multiple assemblies are required for total twinaxial cable lengths of 610 meters (2,000 feet) to 1,524 meters (5,000 feet).

(2) Cable in specified length without connectors up to a maximum of 610 meters (2,000 feet). Multiple assemblies are required for total twinaxial cable lengths of 610 meters (2,000 feet) to 1,524 meters (5,000 feet).

(3) Two connectors (one male and one female).

(4) Two connectors (both male).

(5) Coax wire is limited to lengths of 610 meters (2000 feet) between active Series/1 processors and cannot be intermixed with Twinaxial wire in the same segment.

Order specifying P/N and desired length of cable.

3101 Display Station - Cable/Attachment Matrix:

Machine	Feat.	3101-All RS-232 Local	3101-All RS-232 Remote (Modem)	3101-12/22 Current Loop	3101-13/23 RS-422
Series/1 Processor, or 4959, or 4965	#1310	#2056 (2)	#2057 (2)		#5770
	#1610	#2056 (2)	#2057 (2)		
	#2092	#2056 (2)	#2057 (2)		
	#2096	#2056 (2)	#2057 (2)	#2066	
	#7850	#2064 (1)		#2066	
	#7850	#2065 (2)			
4987	#4730		#2130 (2)		
	#4731		#2130 (2)		
	#4734			#2066 (1)	
	#4739	#2132 (2)			

Notes:
(1) Requires field modification of pin plug-wiring
(2) Prerequisite is 3101 Modem Cable P/N 5640736

Cable For Communications and other Features:

Cable Code	Cable Description	Feature(s) Used With
#2055	Teletypewriter Cable	#7850
#2056	Asynchronous Local Attachment Comm. Cable	#1310, #1610, #2092, #2096
#2057	EIA Data Set Cable	#1310, #1610, #2074, #2090, #2092, #2094, #2096
#2058	Binary Synchronous Comm/HS Cable (for WE 303 interface)	#2075
#2059	Teletypewriter-Cust. Access Panel Cable	#7850
#2060	Binary Synchronous V.35 HS DDN Cable (for CCITT V.35 Interface)	#2075, #2080
#2061	Feature-Programmable Multiline Current Loop Cable	#2096
#2064	Teletypewriter Adapter Cable with EIA male connector	#7850
#2065	Teletypewriter Adapter Cable with EIA female connector	#7850
#2066	3101 Display Terminal Current Loop Cable 15 meters (50 feet)	#2096, #7850
#2067	X.21 Attachment Cable 10 meters (32.5 feet)	#2080
#2070	DAA Attachment Cable 6.1 Meters (20 feet)	#7881
#2071	VCA Attachment Cable 6.1 Meters (20 feet)	#7881
#5770	Multifunction Attachment Cable 15 meters (50 feet)	#1310, D02350
#5780	Attachment Cable 6.1 meters (20 feet)	#5640

Connectors and Tools:

Connector	B/M Number
2 x 4 Berg Connector Kit	6843689
2 x 4 Berg Connector Kit	6095524
2 x 8 Berg Connector Kit	8327397
2 x 12 Berg Connector Kit	8327398
2 x 20 Berg Connector Kit	8327399
Berg Crimp Tool (1)	8327400
Amphenol 4-Position Connector Plug	8327401
AMP 26-Position Connector Kit	8327402
AMP 160-Position Connector Kit	8327403
AMP Crimp Tool and AMP extractor Tool	8327404
Continental 56-Position Connector Kit	8327405
Connector Kit for Feature #1210	6838819
Berg Crimp Tool for Feature #1210 (2)	6838818

Notes:
(1) Use only with #24 AWG or #26 AWG wire (0.511mm or 0.40mm)

(2) Use only with #18 AWG wire (1.024mm)

Connectors for Feature #1400:

Connectors	IBM Number
Twinax Cable-to-Cable	7362230
Coax Indoor Cable-to-Cable	5252643
Coax Outdoor Cable-to-Cable	5252643
Twinax Connector Kit (1)	4498427
Coax Indoor Connector Kit (2)	1836418
Coax Outdoor Connector Kit (2)	1836419
Twinax Connector (3)	6838959
Twinax Connector (4)	7362229
Coax Indoor Connector (4)	1836444
Coax Outdoor Connector (4)	1836447
Twinax-Coax Adapter (one) (5)	7363102
Twinax Station Protector Kit (6)	7362426

Notes:
(1) One male and one female connector.
(2) Two male connectors.
(3) One female connector.
(4) One male connector.
(5) Required when coaxial cable is used to interconnect feature #1400.
(6) Two protectors. Required when cable is installed outdoors. One at exit from building and one at entrance to building.

Refer to *Order Guide* (Z120-2665).

RPQs

The list of RPQs below has been previously bid to IBM customers and prospects. Their inclusion here in no way guarantees future availability.

4952, 4953, 4954, 4955, 4956 and 4965:

Auto Call Originate Attachment Card (RPQ D02013): Provides a direct program control EIA RS-366 interface suitable to control auto call data sets.

Auto Call Originate Attachment Cable (RPQ D02014): Provides a cable to connect the Auto Call Originate Attachment Card to one or two auto call data sets.

Auto Call Originate DI/DO Cable (RPQ D02031): Provides a cable to attach to the 16 Digital Input and 16 Digital Output points provided on the Auto Call Originate Attachment Card.

Data Collection Interactive-Series/1 (RPQs D02312, D02313, D02314): Provides for the direct attachment of up to 31 5230 Entry Stations for the Series/1. Associates PRPQ (P82600) offers user the opportunity to interact with entry stations on realtime basis.

Data Collection Loop Attachment Panel and Cable (RPQs D02355, D02356): Assemble and cable to provide surface of rack adapter with quick disconnect type connection for Series/1 data entry loops.

EIA Full Duplex Data Set Cable (RPQ D02063): Provides a cable to attach a full-duplex RS-232-C or CCITT V.24 data set to two BSC or two SDLC communications lines.

GPIB Adapter (RPQ D02118): Provides a cycle-stealing General Purpose Interface Bus adhering generally to the IEEE Standard 488-1975 and 1978.

GPIB Adapter Cable (RPQ D02119): Provides a 4 meter (13 foot) cable to attach RPQ D02118 to an IEEE 488 device.

Series/1-to-Series/1 (RPQs D02241, D02242): Provides a direct cycle-steal channel attachment between two Series/1 at a maximum data rate of 65K bytes per second. (D02241 - Primary, D02242 - Secondary).

4959 Input/Output Expansion Unit (cont'd)

Single Line Asynch Single Stop-Bit (RPQ D02236): Provides a single line asynchronous communications adapter with one or two stop-bit capability.

System/3 BSC Attachment (RPQ D02120): Authorizes local or remote attachment of the System/3 Processor to a BSC communication line.

Video Monitor Attach (RPQ D02224): Enables a customer provided video monitor to be attached to the 4979 attachment feature, without the 4979.

3601 BSC Attachment (RPQ D02100): Authorizes local or remote attachment of the 3601-C Finance Communication Controller to a BSC communication line.

3601 SDLC Attachment (RPQ D02122): Authorizes local or remote attachment of the 3601-C Finance Communication Controller to a SDLC communication line.

3684 BSC Attachment (RPQ D02319): Authorizes local or remote attachment of the 3684 Point-Of-Sale Control Unit to a BSC communications line.

3741/5231 BSC Attachment (RPQ D02123): Authorizes remote attachment of the 3741 mdl 2 Data Station, 3741 mdl 4 Programmable Workstation, and 5231 mdl 2 Controller to a BSC communications line.

3777 BSC Attachment (RPQ D02321): Authorizes remote attachment of the 3777 Communications Terminal to a BSC communications line. This allows the attachment of the 3203 Line Printer, 2502 Card Reader, and 3521 Card Punch.

4978 Display Station Attachment (RPQ D02038): Provides for Series/1 attachment to the 4978 Display Station.

5935-LO3 Start/Stop Attachment (RPQ 8T1040): Provides authorization to attached the 4935-LO3 Banking Terminal via start/stop.

5935-LO3 SDLC Attachment (RPQ 8T1051): Provides authorization to attach the 5935-LO3 via SDLC. There is a SOTC prerequisite for this RPQ.

4955 Processor:

Mdl Change A/B (D02300): Provides for field change of the 4955 from mdl A to mdl B.

Mdl Change C/D (D02301): Provides for field change of the 4955 from mdl C to mdl D.

4973 Line Printer:

OCR-A Print Belt (D02099): Provides a print belt for the 4973 containing certain OCR-A characters.

4974 Printer:

Forms Cutter Bar (D02018): Provides a manually operated cutter bar which facilitates tearing single or multipart perforated forms within five inches of the first print line.

Tractor/Cutter (D02078): Provides a variable-width forms tractor with a mechanical cutter to separate a single or multipart perforated form within 1.5 inches of the first print line. A field installable version is also available.

Rear Document Insertion (D02331): Provides a removable document insertion device which facilitates use of cut forms in the 4974. A field installable version is also available.

4979 Display Station:

Video Monitor Attachment (D02223): Enables the customer to connect one or more video monitors to duplicate the display image.

4982 Sensor Input/Output Unit:

Analog Input-14 Bits (D02071): Provides a differential analog input with resolution of 13 bits plus sign or 14 bits unipolar.

4987 Programmable Communication Subsystem:

3780 BSC Attachment (D02227): Authorizes local and remote point-to-point attachment of the 3780 Communications Terminal and 3781 Card punch, providing 350 lpm printer, 600 cpm card reader, and 160 cps card punch.

Audio First Line (D02337): Provides the first feature card whereby Touchtone® telephones may be used for input to the Series/1. The output of the system is audio messages constructed from a digitized vocabulary.

Audio I/O Additional Line (D02338): Provides additional audio lines as described under D02337, up to a maximum of 16 per PCS.

® Trademark of Western Electric Company

4997 Rack Enclosure:

Noise Reduction (D02162, D02163): Provides audible noise reduction packaging suitable for office environment. Related RPQs are available for most Series/1 rack-mounted units.

Series/1 Noise Reduction:

Noise Reduction (D02162 - D02165, D02168, D02169): Provide noise reduction packaging suitable for office environment. Available on Series/1 units except printers.

4962 DISK STORAGE UNIT

PURPOSE

The 4962 is a disk storage unit for Series/1.

MODELS

Model 1	001	9.3MB disk unit
Model 1F	01F	9.3MB disk unit with fixed heads and 123KB capacity
Model 2	002	9.3MB disk unit with diskette unit
Model 2F	02F	9.3MB disk unit with fixed heads, 123KB capacity, and diskette unit
Model 3	003	13.9MB disk unit
Model 4	004	13.9MB disk unit with diskette unit

Limitations: One 4962 per 4997 mdl 1, two per 4997 mdl 2.

Prerequisites: #3580 for each 4962 and also #3581 required for 4962 mdls 2, 2F, and 4 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4962 is designed for mounting on a 4997 or an EIA standard 19-inch rack enclosure. It is a full-width unit, 19 inches high.

Mdls 1, 1F, 2, and 2F have two data heads and a capacity of 9,308,160 bytes. Mdls 3 and 4 have three data heads and a capacity of 13,962,240 bytes. There are 303 data tracks per head, 60 sectors per track, and 256 bytes per sector. Access times are 10 milliseconds minimum, 40 milliseconds average, and 70 milliseconds maximum. Average rotational latency is 10.1 milliseconds. The disk rotates at 2,964 rpm, yielding an instantaneous data rate of 889,000 bytes per second. Mdls 1F and 2F have eight fixed heads with a data capacity of 122,880 bytes.

Mdl 2 is similar to mdl 1, mdl 2F is similar to mdl 1F, and mdl 4 is similar to mdl 3, except that mdls 2, 2F, and 4 include diskette units identical in function to the 4964.

Publications: *4962 Disk Storage Unit and 4964 Diskette Unit Description* (GA34-0024).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Diskettes: Mdls 2, 2F, and 4 use a 2-sided diskette, P/N 2736700. This diskette is initialized for 256 bytes per sector and must be re-initialized for another format. Mdls 2, 2F, and 4 may be used to reformat the diskette. Diskettes are packaged 10 per box. Minimum order is one box.

4963 DISK SUBSYSTEM

PURPOSE

The 4963 is a medium capacity, disk subsystem for Series/1.

MODELS

Model 23A	23MB primary disk unit with fixed heads
Model 23B	23MB expansion disk unit with fixed heads
Model 29A	29MB primary disk unit
Model 29B	29MB expansion disk unit
Model 58A	58MB primary disk unit with fixed heads
Model 58B	58MB expansion disk unit with fixed heads
Model 64A	64MB primary disk unit
Model 64B	64MB expansion disk unit

Limitations: The subsystem primary drive must mount in lowest rack position. First expansion unit placed directly above. Third and fourth units in lowest positions of adjacent rack.

Prerequisites: #3590 (see M4959 pages) for each 4963 mdl 23A, 29A, 58A, or 64A plus an available I/O slot in a processor, 4959 I/O expansion unit, or a 4965 I/O expansion unit.

HIGHLIGHTS

High performance disk subsystem featuring multiple microprocessors to both offload the Series/1 processor and optimize disk performance. Each subsystem has one primary drive and may have up to three expansion drives ... mdls may be intermixed. Designed for mounting in a 4997 or an EIA standard 19-inch rack enclosure. Full-width unit 14 inches high. Automatic retries on soft error, automatic seek to alternate sector (one alternate sector per track plus use of spare sectors on tracks in same or adjacent cylinder eliminates seeks to alternate track), automatic seek overlap with read or write, and automatic error handling under subsystem microprocessor control. The microprocessor executes self-test diagnostics on power-up, reset command, and during quiscient periods. A 3-sector speed matching buffer reduces extra revolutions often encountered on multiple sector read or write operations. Multiple subsystems may be attached ... one 4963 Disk Subsystem Attachment (#3590) required for each.

Standard 4963 drives have 64,520,192-byte or 29,327,360-byte capacities. Substitution of eight fixed heads on one data recording surface for one moving head lowers capacity under moving heads to 58,654,720 or 23,461,888 bytes and adds 131,072 bytes under fixed heads. Fixed heads allow faster access to data by eliminating the access arm movement.

Publications: *4963 Disk Subsystem Description* (GA34-0051).

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes **#2XXX**, **#8XXX**, and **#9XXX** apply to plant orders only ... do not use for MES order.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, **#9904** for 230V.
- Power Cord: 1.8 meters (6 feet) long, no specify required.
- Unit Sequence for B Mdl Expansion Drives: Specify **#9150** for second unit, **#9151** for third unit, **#9152** for fourth unit.
- Subsystem Number: Specify **#925X**. The subsystem number is the same as the subsystem number used with attachment feature #3590 (see M4959 pages). It must be used with each unit in the subsystem.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

4964 DISKETTE UNIT

PURPOSE

The 4964 provides removable magnetic storage media for Series/1.

MODELS

Model 1 001

Prerequisites: #3581 on a processor unit, 4959, or 4965. Space in Rack Mounting Fixture (#4540). See "Accessories" in the M4959 pages.

HIGHLIGHTS

The 4964 is a half-width unit designed for mounting on a 4997 or EIA standard 19-inch rack enclosure using the Rack Mounting Fixture (#4540).

The 4964 provides multiple functions of diskette writing and reading including input of data and programs generated offline, output of programs, output of data for personal use or offline storage, journaling, recording of an audit trail, checkpoints, system errors, etc. Data exchange media is compatible with other systems.

Diskette Types: Either the 1-sided Diskette 1 or the 2-sided Diskette 2 may be used.

Formats: Diskettes may be initialized for 128-, 256-, or 512-byte sectors. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. Diskette 2 is prepared in 128 or 256 bytes per sector. The 4964 may be used to reformat the diskette.

Diskette Capacity: Capacity is dependent upon type and format.

Bytes/ Sector	Sectors/ Track *	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208

* 74 tracks per surface; Diskette 2 has two surfaces.

Diskette drive access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskettes rotate at 360 rpm, yielding a data rate of 31,250 bytes per second and an average latency of 83.8 milliseconds.

Note: During recording and reading, the head is in contact with the diskette, causing wear over time. Variation in the rate of wear will depend on the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life. See guidelines in the *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data so that accessing occurs over the entire recording surface with about the same frequency can extend the useful life of the diskette. Unpredictable circumstances such as contamination or severe handling can cause an early error to occur. For all of the above reasons, consideration should be given to providing an adequate recovery plan.

Publications: *4962 Disk Storage Unit and 4964 Diskette Unit Description* (GA34-0024).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Diskettes: The 4964 uses either Diskette 1 or Diskette 2. Diskettes are packaged 10 per box. Minimum order is one box.

4965 STORAGE and I/O EXPANSION UNIT

PURPOSE

Provides storage and additional I/O feature locations for Series/1.

MODELS

Model 1	001	1.2MB of diskette storage and four available I/O feature locations with provisions for an optional second 1.2MB diskette drive.
Model 30D	30D	30MB of disk storage, seven available I/O feature locations with provisions for an optional 1.2MB diskette drive and cache storage.

Limitations: The 4999 Battery Backup may not be used with the 4965.

Prerequisites: All models are full-width units designed for mounting on support rails (fixed) in a 4997 (see M4997 pages), or EIA standard 19-inch enclosure. Models 001 and 30D can also be mounted in Stand-Alone Enclosure (#4520). #1565 is required in the preceeding unit when attaching a 4965 to a 4952, 4953, 4954, 4955, 4959, or 4956 Processor or 4959 I/O Expansion Unit or another 4965.

HIGHLIGHTS

Provides multiple functions by combining the I/O expansion capability with a 30MB fixed disk with an optional 1.2MB diskette, or a single 1.2MB diskette with a optional second 1.2MB diskette. Data exchange media is compatible with other systems.

Disk Drive Mdl 30D: Provides a capacity of 30 megabytes per disk drive. This mdl has an average access time of 40 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3,151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundry. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

Cache Mdl 30D: The 64 kilobyte cache is microprocessor-controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application-dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from the cache function.

Diskette Drive: Diskette drive access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskettes rotate at 360 rpm, yielding a data rate of 62,500 bytes per second and an average latency of 83.8 milliseconds. The use of flexible diskette storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading the read/write head is in contact with the diskette, causing wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in storage, use, and handling can also affect diskette life. See guidelines in the *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the media should be replaced. Unpredictable circumstances, such as contamination or severe handling, can dramatically shorten useful life. For all of the above reasons, consideration should be given to providing an adequate recovery plan.

Diskette Types: Either the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D may be used.

Formats: Diskettes 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette 2D may be initialized for 256-, 512-, or 1,024-byte sectors.

Diskette Capacity: Capacity is dependent upon type and format. Actual usable capacity is dependent upon programming support and may be less than the amount shown.

Bytes/ Sector	Sectors/ Track *	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

* 74 data tracks per surface; Diskettes 2 and 2D have two surfaces.

Publications:

Mdl 001:

4965 Storage and I/O Expansion Unit Description (GA34-0155), *4965 Storage and I/O Expansion Unit Maintenance Information* (SY34-0228), and *4965 Storage and I/O Expansion Unit Parts Catalog* (S134-0059).

Mdl 30D:

4965 Storage and I/O Expansion Unit Description, Model 30D (GA34-0254), *4965 Storage and I/O Expansion Unit Maintenance Information, Model 30D* (SY34-0313), and *4965 Storage and I/O Expansion Unit Parts Catalog, Model 30D* (S134-0104).

SPECIFY

Unless otherwise indicated these specify features are only available at time of manufacture. Specify codes **#2XXX, #8XXX, and #9XXX** apply only to plant orders ... do not use for MES orders.

- Voltage (AC, 60 Hz, 1-phase): With 1.8 meter (6 foot) cord. Specify **#9901** for 115V, **#9911** for 120V, **#9902** for 208V, **#9904** for 230V, **#9914** for 240V.

- Extended I/O Channel Cable: Specify **#9195** for Extended Attachment Cable - Two-Channel Switch (#7900) only, or **#9199** for Extended Attachment Cable - Basic Channel or Two-Channel Switch (#7900) only.

  For initial system orders including 4997 Rack Enclosures, IBM will locate machines and supply cables as required. For additions to existing rack mounted systems or for machines located in customer racks, extended cables must be specified where needed. A 4959 Input/Output Expansion Unit or 4965 Storage and I/O Expansion Unit must be located immediately above, below, or alongside the previous machine on the channel. When located alongside the preceding unit, specify **#9199**. A 4959 or 4965 containing a Two-Channel Switch (#7900) may be located as above or located vertically once removed from the preceding unit. When located vertically once removed, specify **#9195**. See *IBM Series/1 Configurator* (GA34-0042) for details.

- Processor Sequence: Specify **#93BB** for sequence number(s) and **#9450** for extension of switched I/O channel.

  For multiple processor configurations, each processor has been assigned a sequence number, **#93BB**. In such a system, a 4959 or 4965 may be connected only to a single processor (private I/O). Alternatively, a 4959 or 4965 may contain, or be down a chain of 4959s or 4965s from, a Two-Channel Switch (#7900), and is then connected to two processors (shared I/O). Where a 4959 or 4965 contains private I/O, specify the same **#93BB** as the processor to which it is connected. Where a single #7900 connects one or a chain of 4959 or 4965 machines to two processors (a "Y" configuration), specify both associated **#93BBs** for each 4959 or 4965 containing shared I/O.

  In the special case where there are two #7900s interconnecting four machines, only one **#93BB** is specified for each 4959 or 4965 containing the shared I/O. This is the **#93BB** associated with the processor for which primary or normal attachment is desired.

  In addition, for each 4959 or 4965 containing shared I/O and not containing a Two-Channel Switch, specify **#9450** for extension of switched I/O channel.

- Diskette IPL:

  Mdl 001:

#9138	Diskette primary IPL, Optional diskette not IPL device
#9139	Diskette alternate IPL, Optional diskette not IPL device
#9140	2nd diskette primary IPL, 1st diskette not IPL device
#9141	2nd diskette alternate IPL, 1st diskette not IPL device
#9142	1st diskette primary IPL, 2nd diskette alternate
#9143	2nd diskette primary IPL, 1st diskette alternate
#9144	No IPL

  Mdl 30D:

#9148	Diskette primary IPL, Optional diskette not IPL device
#9149	Diskette alternate IPL, Optional diskette not IPL device
#9150	Diskette primary IPL, Disk not IPL device

4965 Storage and I/O Expansion Unit (cont'd)

#9151	Diskette alternate IPL, Disk not IPL device
#9152	Disk primary IPL, Diskette alternate
#9153	Diskette primary IPL, Disk alternate
#9144	No IPL

SPECIAL FEATURES

All channel features which may use a feature position in the 4965 are presented in the "Specification Table" below. To simplify, shorten, and improve the usability of these pages, descriptions of those features which are available on all processors, the 4959, and the 4965 are presented in the M4959 pages. Features unique to this unit or for which there are mdl-dependent considerations are presented below.

Channel Repower (#1565): Located on the preceding unit, and provides channel repower for the 4965 and for the 4959. Required to connect a 4965 to a 4952, 4954, 4955 and a 4956. A 4965 attached to a 4959 or another 4965 requires #1565 on the preceding 4959 or 4965. **Field Installation:** Yes.

2nd Diskette Drive (#4100): Provides for a second diskette drive on mdl 001 or a single diskette drive on mdl 30D. Does not require a feature position. **Field Installation:** Yes.

Stand-Alone Enclosure (#4520): For the 4952 mdls C and 30D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C or 30D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). **Limitations:** Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 4 at the end of the "Specification Table". **Field Installation:** Yes.

Stand-Alone Enclosure Cable (#4525): Provides a 3.1 meter (10 foot) external shielded cable group (four cables) between a 4965 in a Stand-Alone Enclosure (#4520) and another 4965 Processor, 4952, 4954, or 4956. **Field Installation:** Yes. **Prerequisites:** #1565.

Cache (#6400): Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance improvement (mdl 30D). The cache option does not require a feature position. **Field Installation:** No.

Two-Channel Switch (#7900): Provides capability to switch the Series/1 I/O channel between two processors. Allows a secondary or alternate processor to take control of all I/O devices on the channel beyond the #7900 in the event of failure of the primary or normal processor to which the devices are attached. #7900 can be operated in two modes, manual or backup.

In backup mode, the Initial Period Timer is set to a time period selected by the user. If the primary processor fails to reset this timer within the selected time period, #7900 attempts to interrupt the primary processor. The primary processor then has an additional specified warning period in which to issue the Reset Timer command. If at the end of this interval, #7900 has not received the Reset Timer command, an interrupt will be issued to both processors. The secondary processor can then issue a Reset and Connect command, which will attach all common I/O to that secondary processor. If #7900 is in manual mode, the common I/O is connected to the processor selected by the position of the manual select switch.

A special console is added to a 4959 or 4965 when #7900 is installed. This includes a mode switch (manual or backup), manual select switch, indicator lights, and isolated alarm contacts to allow extend attachment of some alarm device if desired. This console is located adjacent to the 4959 or 4965 power switch and indicator.

Note: #7900 mounts on either 4959 or 4965 units. It occupies the I/O channel cable position, not an available I/O feature position.

When the configuration is a simple "Y", one 4959 or 4965 with #7900 and two processors, or a simple "quad", two 4959s or 4965s, each with a #7900 and two processors, no special considerations are required. For more complex configurations, contact IBM.

System orders which contain a 4959 or 4965 with a Two-Channel Switch must include at least two processors in any combination. Independent orders for 4959 or 4965 with #7900, or MES orders for #7900, must be placed against a system including at least two processors. Installed systems to be combined using the Two-Channel Switch must exist under one system number. For more complex configurations, consult IBM. **Note:** See "Processor Sequence" in "Specify". **Field Installation:** Yes.

Specify:

TCS Timer Period - Initial Period

0.125 seconds	**#9701**
1 second	**#9702**
8 seconds	**#9703**
16 seconds	**#9704**

TCS Timer Period - Warning Period

0 seconds	**#9710**
0.125 seconds	**#9711**
1 second	**#9712**

IPL Block

First processor blocked from IPL by any common I/O device	**#9120**
Second processor blocked from IPL by any common I/O device	**#9121**

Specification Table: This table is provided to determine those features that may be desired on the 4965. Locations are expressed as a negative number for availability. A positive number is used for feature requirement. The sum of the availability and requirements numbers must not exceed zero. **Field Installation:** Yes.

Machine/ Feature Number		Feature Positions	Notes
4965-001	Storage and I/O Expansion	-4	
4965-30D	Storage and I/O Expansion	-7	
#1200	Series/1 - S/370 Channel Attach	+1	(3)
#1205	4966 Diskette Magazine Unit Attach	+1	(3)
#1210	5250 Info Display System Attach	+2	(1)
#1215	4969 Magnetic Tape Subsystem Attach	+1	(3)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1250	Multidrop Workstation Attachment	+1	
#1300	Programmable Communications Subsystem Controller	+2	(1,3)
#1310	Multifunction Attach	+1	
#1400	Series/1 Local Comm Controller	+1	
#1560	Intgrtd Digital I/O Non-Isolated	+1	
#1565	Channel Repower	+1	
#1595	Channel Socket Adapter	+1	
#1610	Async Comm Single Line Control	+1	
#2074	Binary Sync Comm Single Line Control	+1	
#2075	Binary Sync Comm Single Line Control, High-Speed	+1	
#2080	Sync Comm Single Line Control, High-Speed	+1	
#2090	Sync Data Link Control	+1	
#2091	Async Comm 8-Line Control	+1	
#2092	Async Comm 4-Line Adapter	+1	(2)
#2093	Binary Sync Comm 8-Line Control	+1	
#2094	Binary Sync Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2)
#3580	4962 Disk Storage Unit Attach	+1	(3)
#3581	4964 Diskette Unit Attach	+1	(3)
#3585	4979 Display Station Attach	+1	
#3590	4963 Disk Subsystem Attach	+1	(3)
#3595	4967 High Performance Disk Subsystem Attachment	+1	(3)
#5430	Customer Direct Program Control Adapter	+1	
#5620	4974 Printer Attach	+1	
#5630	4973 Line Printer Attach	+1	
#5640	Printer Attachment - 5200 Series	+1	
#6305	4982 Sensor I/O Unit Attach	+1	(3)
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	(2)
#7880	Telephone Comm Controller	+1	
#7881	Telephone Comm Adapter	+1	(2)
RPQ	D02038 4978 Display Station Attach	+1	
RPQ	D02118 GPIB Adapter	+1	

Notes:

(1) Must be contiguous I/O feature positions.

(2) Must be contiguous I/O feature position with its associated controller.

(3) Not supported in the Stand-Alone Enclosure due to flat or internal cabling.

Auxilliary Features, Cables, Connector Kits: Certain devices, cables, etc., involved in system installation are available and may be ordered with this unit. For details see "Accessories" in M4959 pages.

MODEL CONVERSIONS (None)

ACCESSORIES

Frame Stand (P/N 6841365): Provides a steel stand capable of supporting a 4965 mdl 001 or 30D, and a 4975 Printer. The stand rests on glides and comes in a pebble gray color only.

SUPPLIES

Diskettes: The 4965 uses either the 2-sided Diskette 2, or the 1-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. Diskette 2 is prepared in 128 or 256 bytes per sector formats. The

4965 Storage and I/O Expansion Unit (cont'd)

4965 may be used to reformat the diskettes. Diskettes are packaged 10 per box. Minimum order is one box.

4966 DISKETTE MAGAZINE UNIT

PURPOSE

The 4966 provides random access to 23 diskettes contained in two diskette magazines (10 diskettes each) and three individual diskette slots.

MODELS

Model 1 001

Prerequisites: #1205 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4966 is designed for mounting on a 4997 or an EIA standard 19-inch rack enclosure. It is a full-width unit.

The 4966 enhances and expands the multiple functions of diskette writing and reading by providing randomly accessible multiple diskettes conveniently packaged for efficient operation. Data exchange media is compatible with other IBM systems.

Autoloader: Carriage mechanism accommodates three single diskettes and two diskette magazines (10 diskettes each). Random access autoload mechanism moves left or right to align program-selected diskette with diskette drive unit. Average access time to adjacent diskettes is three seconds, and to furthest diskette is five seconds.

Diskette drive access time includes five milliseconds per track crossed plus 35 milliseconds for head settling. It has a maximum instantaneous data rate of 125K bytes per second with Diskette 2D. Rotational speed is 720 rpm.

Diskette Types: Either the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D may be used.

Formats: Diskettes 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette 2D may be initialized for 256-, 512-, or 1,024-byte sectors.

Diskette Capacity: Capacity is dependent upon type and format.

Bytes/ Sector	Sectors/ Track *	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

* 74 tracks per surface; Diskettes 2 and 2D have two surfaces.

Note: During recording and reading, the head is in contact with the diskette, causing wear over time. Variation in the rate of wear will depend on the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life. See guidelines in the *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data over the entire recording surface, so that accessing occurs with about the same frequency at all locations, can extend the useful life of the diskette. Unpredictable circumstances such as contamination or severe handling can cause an early error to occur. For all of the above reasons, consideration should be given to providing an adequate recovery plan.

Publications: *4966 Diskette Magazine Unit Description* (GA34-0052).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Diskettes: The 4966 uses Diskettes 1, 2, and 2D. Single diskettes are packaged 10 per box. Minimum order is one box.

Magazines: The 4966 uses the diskette magazine. Magazines are shipped without diskettes and are available in increments of five.

4967 HIGH PERFORMANCE DISK SUBSYSTEM

PURPOSE

High performance, cached, large capacity, fast access, high data rate, general purpose, disk subsystem for Series/1.

MODELS

Model 2CA 200MB primary disk unit
Model 2CB 200MB expansion disk unit

Prerequisites: #3595 for each subsystem in a processor unit, a 4959 Input/Output Expansion Unit, or a 4965 Input/Output Expansion Unit.

Limitations: One 4967 mdl 2CA and up to three 4967 mdl 2CB drives may be attached via one 4967 High Performance Disk Subsystem Attachment (#3595) ... see M4959 pages. Two I/O addresses are required if one or two drives are attached, four addresses if three or four drives are attached. The first 4967 drive must mount 5-1/4 inches from the bottom of the rack. The second 4967 drive is installed directly above the first. Third and fourth units mount in the same positions of the adjacent rack. Feature #3595 may not be installed in a 4952 mdl A or 4954 mdl A. See *Customer Site Preparation Manual* (GA34-0050) for positioning requirements.

HIGHLIGHTS

High performance disk subsystem featuring multiple microprocessors to offload the Series/1 processor and optimize disk performance. Each subsystem has one primary drive and may have up to three expansion drives. The 384 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in the cache. The microprocessor monitors it's own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the 4967 to dynamically adapt to changes in the jobstream. Performance improvements are application dependent. Test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. However, no guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from the cache function. In such cases, the standard performance parameters of 25 milliseconds average access time and 10.1 milliseconds latency are seen. Cache functions are transparent to programming. During a write operation data is placed in cache after being written to the disk.

Further 4967 features include automatic retries on soft error, automatic seek to alternate sector (always in same cylinder ... eliminates seek to alternate track), automatic seek overlap with read or write. Error correction code (ECC) mechanism corrects the most common form of disk read errors and detects all uncorrectable forms. Up to four drives (800 megabytes) capacity per subsystem. Multiple subsystems may be attached ... one per 4967 High Performance Disk Subsystem Attachment (#3595). Each subsystem has cache (384KB). Designed for mounting in a 4997 or an EIA standard 19-inch rack enclosure. Full-width unit.

Publications: *IBM Series/1 4967 High Performance Disk Subsystem - Attachment Feature Description* (GA34-0227).

SPECIFY

Unless indicated otherwise, these specify features are available only at the time of manufacture. Specify codes **#2XXX**, **#8XXX** and **#9XXX** apply to plant orders only ... do not use on MES orders.

- Voltage (AC, 60 Hz, 1-phase): With a 1.8 meter (6 foot) cord. Specify **#9901** for 115V, **#9911** for 120V, **#9902** for 208V, **#9904** for 230V, **#9914** for 240V.
- Subsystem Number: One subsystem number, in sequence, for each #3595 ... see M4959 pages.

  #924X, where X is 1 through 8.

  - Number of drives in this (**#924X**) subsystem:

    #9182 One or two drives attached.
    #9183 Three or four drives attached.

  - Unit sequence for expansion drives in this (**#924X**) subsystem:

    #9185 First expansion drive.
    #9186 Second expansion drive.
    #9187 Third expansion drive.

  - IPL (not applicable if specified in another subsystem):

    #9164 Primary IPL - first drive.
    #9165 Alternate IPL - first drive.
    #9166 Primary IPL - second drive.
    #9167 Alternate IPL - second drive.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

4968 AUTOLOAD STREAMING MAGNETIC TAPE UNIT

PURPOSE

Provides fast, convenient save/restore for medium to large Series/1 DASD as well as limited performance magnetic tape processing capabilities.

MODELS

Model 1AS Automatic loading, writes 160K bytes per second in streaming mode at 50 ips. Writes ANSI compatible phase encoded 1600 Bpi at 25 and 100 ips and noncompatible 3200 Bpi at 50 ips. Up to 25 ips read/write operation at 1600 Bpi in limited performance start/stop mode. Capacity per 2,400 foot tape reel exceeds 70 megabytes (at 3200 Bpi).

Prerequisites: #1220 in a processor, 4959 I/O Expansion Unit or 4965 I/O Expansion Unit. See M4959 pages for description of #1220 special feature. 128KB storage to ensure streaming on quiescent system under EDX. 4968 Diagnostic Package requires 32KB or larger processor storage capacity.

Limitations: Each #1220 attaches only one tape drive.

HIGHLIGHTS

Key parameters of save/restore are speed, capacity, and convenience ... 4968 has these attributes:

Speed: In streaming write mode at 50 ips data rate is 160KB per second. 4968 will save 70MB in approximately 10 minutes, 200MB in approximately 30 minutes, exclusive of tape handling. Software is designed to ensure streaming on a quiescent system in a save operation.

Capacity: In the 3200 Bpi mode each 2,400 foot tape reel has a capacity of approximately 70MB. Saves 40% of 200MB on a single reel, full 200MB on three reels.

Convenience: Autoload eliminates tape threading by the operator. Autoload plus large per reel tape capacity make operator convenience a key 4968 highlight. The autoload mechanism features self-seating, self-locking tape hub and tape reel upside-down detect. Software support for save/restore operations minimizes operator intervention on single or multiple reel operations. Designed for mounting in a 4997-2 or an EIA standard 19-inch rack enclosure. Full-width unit , 8.5 inches high.

Publications: *IBM Series/1 4968 Autoload Streaming Magnetic Tape Unit Description Manual* (GA34-0263).

SPECIFY

- Voltage (AC, 60 Hz, 1-phase): With a 1.8 meter (6 foot) cord. Specify **#9901** for 115V, **#9911** for 120V, **#9902** for 208V, **#9904** for 230V, **#9914** for 240V.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

4969 MAGNETIC TAPE SUBSYSTEM

PURPOSE

The 4969 provides magnetic tape units and controller for Series/1.

MODELS

Model 4D	04D	36 or 72KB/second, 45 ips, dual density 800 bpi NRZI or 1600 bpi PE
Model 4N	04N	36KB/second, 45 ips, 800 bpi NRZI
Model 4P	04P	72KB/second, 45 ips, 1600 bpi PE
Model 7D	07D	60 or 120KB/second, 75 ips, dual density 800 bpi NRZI or 1600 bpi PE
Model 7N	07N	60KB/second, 75 ips, 800 bpi NRZI
Model 7P	07P	120KB/second, 75 ips, 1600 bpi PE

Subsystem Configurations:

Primary Unit	Features Required	Additional Units
4D	#1550	4D, 4N, or 4P (1, 2, or 3 units - any mix)
4N	#1540 or #1550	4N (1, 2, or 3 units)
4P	#1545 or #1550	4P (1, 2, or 3 units)
7D	#1550	7D, 7N, or 7P (1, 2, or 3 units - any mix)
7N	#1540 or #1550	7N (1, 2, or 3 units)
7P	#1545 or #1550	7P (1, 2, or 3 units)

Limitations: Controller features (#15XX) are not field installable. Recommended for field installation only when factory mounted on 4997 mdl 2. For installation on existing customer-owned 4997 mdl 2 or EIA standard enclosures, see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). A maximum of four tape units per 4969 Magnetic Tape Subsystem Attachment (#1215) is allowed. All units within a subsystem must be the same speed. Each unit in the subsystem must be mounted immediately alongside, above, or below the previous unit due to cabling restrictions. Air conditioned with year-round humidity control. Mdls 7D, 7N, and 7P (vacuum column) have an altitude limit of 1,524 meters (5,000 feet). The 4969 may not be installed on a 4997 mdl 1.

Prerequisites: One 4969 Magnetic Tape Subsystem Attachment (#1215) on a processor unit, 4959, or 4965 for each 4969. For primary unit (first in a subsystem), a controller #1540, #1545, or #1550 must be included. Requires 28 inches of available rack space on 4997 mdl 2 enclosure or customer-owned EIA standard 19-inch enclosure. Requires additional 5-1/4 inches of air space above the unit when mounted on top of the 4997. See *Customer Site Preparation Manual* (GA34-0050) for details.

HIGHLIGHTS

The 4969 is designed for mounting on a 4997 mdl 2 or an EIA standard 19-inch rack enclosure. It is a full-width unit, 28 inches high.

Tape speeds of 45 and 75 ips, NRZI (800 bpi) and PE (1600 bpi), and dual density units are available. Program-selectable density on dual density mdls. Single density add-on units may be attached to a dual density primary unit of the same speed. Provision for marginal data recovery. Simplified tape threading path. Subsystem consists of one primary unit and up to three additional units of the same speed.

Tape Buffer	Mdls 4D, 4N, 4P - Tension Arm	Mdls 7D, 7N, 7P - Vacuum Column
Nominal read/write access time	8.3ms	5.3ms
Nominal IBG	0.6 inches	0.6 inches
Nominal rewind time	3.2 minutes	2.4 minutes
Nominal tape speed	45 ips	75 ips

Publications: *4969 Magnetic Tape Subsystem Description* (GA34-0087).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.
- Subsystem Number: Specify **#926X** for subsystem (group) number, where X is a number 1 through 9.
- Unit Sequence for B Mdl Expansion Drives: Specify **#9101** for the first magnetic tape in a subsystem, **#9102** for the second, **#9103** for the third, or **#9104** for the fourth.
- Additional Units: For second, third, or fourth unit, specify **#9271** if preceding unit is NRZI or dual, or **#9272** if preceding unit is PE.
- Unit Mounting: Specify **#9273** for unit to be factory-mounted on a 4997 mdl 2, or **#9274** for unit to be in a shipping frame, pallet-mounted. **Field Installation:** Not recommended.

SPECIAL FEATURES

Controller for 800 bpi, NRZI Unit Mdls 4N and 7N (#1540): Mounts on primary drive and supplies formatting and control function for primary and up to three additional 800 bpi NRZI units of the same speed.

Controller for 1600 bpi, PE Unit Mdls 4P and 7P (#1545): Mounts on primary drive and supplies formatting and control functions for primary and up to three additional 1600 bpi PE units of the same speed.

Controller for Dual Density Units, All Mdls (#1550): Mounts on primary unit and supplies formatting and control functions for primary and up to three additional units of the same speed and either of the supported formats.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Tapes and Reels: The following tapes and reels may be used: IBM Series 500, IBM Heavy Duty, IBM Dynexcel, or formulations which meet the tape and reel criteria in *Tape Specifications* (GA32-0006). **Note:** IBM tapes other than those above do not provide adequate reliability and should not be used.

4973 LINE PRINTER

PURPOSE

The 4973 is a line printer for Series/1.

MODELS

Model 1 001 150 lpm (nominal speed)

Model 2 002 400 lpm (nominal speed)

Prerequisites: #5630 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4973 is a free-standing impact printer complete with base. Mdl 1 prints 155 lpm maximum speed with 48-character set, 120 lpm with 64-character set, or 80 lpm with 96-character set. Mdl 2 prints 414 lpm maximum speed with 48-character set, 300 lpm with 64-character set, or 235 lpm with 96-character set. Included as standard is one interchangeable print belt (48-, 64-, or 96-character sets). See "Specify". A variable-width forms tractor for feeding continuous forms up to 15 inches overall width, printer forms control, forms stand, and paper jam detection are provided. Character spacing is 10 per inch with 132 print positions per line. Line spacing is six or eight lines per inch. Note: Print overlap may occur at eight lpi. May be attached up to 45 meters (150 feet).

Publications: *4973 Line Printer Description* (GA34-0044).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (115V AC, 1-phase, 60 Hz): Specify **#9901**.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.
- Print Belt Character Set: Choose one.

#9490 48-character EBCDIC
#9491 64-character EBCDIC
#9492 96-character EBCDIC

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from the carton and provides for forms stacking after printing. #4450 is recommended for handling of continuous forms for mdl 1 only (mdl 2 has a built-in forms stand).

Cables (#5700, 5701): Basic cable 6 meters (20 feet) long is included with the 4973 to connect it to its attachment feature. For longer cables between 9 meters (30 feet) and 45 meters (150 feet) obtained in 3 meter (10 foot) increments, order **#5700** in quantities between 1 and 13.

Replacement cable to attach the 4973 to Series/1 may be purchased from IBM or from a customer-selected source. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for cable and connector details.

To order replacement cable by MES, use two feature codes. The first code, **#5701**, provides connectors and 6 meters (20 feet) of cable. The second code, **#5700**, is used to order 3 meter (10 foot) increments (minimum order of one). 6 meter (20 foot) replacement cable is not available by MES. Cables must be ordered by part number.

Print Belt, Add'l: Permits customer to obtain more than one character set print belt for various applications. Order **#5821** for 48-character EBCDIC, **#5822** for 64-character EBCDIC, or **#5823** for 96-character EBCDIC.

SUPPLIES

Ribbons: A black ribbon, P/N 1136634 or equivalent, is required for mdl 1, and P/N 1136670 or equivalent is required for mdl 2. Contact IBM.

4974 PRINTER

PURPOSE

The 4974 is a serial printer for Series/1.

MODELS

Model 1 001

Prerequisites: #5620 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4974 is a 120 cps serial printer with a 64-character set and bidirectional printing. It prints 10 characters per inch and either six or eight lines per inch selectable under program control. It has vertical forms control. The 4974 is a table-top device, and may be attached up to 45 meters (150 feet).

The unit has a pressure feed platen that permits feeding of forms in a range of 3 to 15 inches overall width. Continuous forms fold-to-fold length may range from 3 to 14 inches. Edge-punched continuous forms are fed using the adjustable forms tractor, which is standard.

Matrix characters are formed by eight vertical wires printing dots in up to 4 of 7 possible horizontal positions. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. Up to 6-part forms can be printed with a maximum thickness of 4.6mm (.018 inches). 5- and 6-part forms should be tried for satisfactory feeding, registrations, and print quality. Card stock continuous forms are not recommended. For optimum handling of continuous forms, the Forms Stand (**#4450**) is recommended.

Publications: *4974 Printer Description* (GA34-0025).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from the carton and provides for forms stacking after printing. It is recommended for optimum handling of continuous forms.

Cables: A basic 6 meter (20 foot) cable is included with the 4974 to connect it to its attachment feature. For longer cables between 9 meters (30 feet) and 45 meters (150 feet), obtained in 3 meter (10 foot) increments, order **#5720** in quantities between 1 and 13.

Replacement cable to attach the 4974 to Series/1 may be purchased from IBM or from a customer-selected source. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for cable and connector details.

To order replacement cable by MES, use two feature codes. The first code, **#5721**, provides connectors and 6 meters (20 feet) of cable. The second code, **#5720**, is used to order 3 meter (10 foot) increments (minimum order of one). 6 meter (20 foot) replacement cable is not available by MES. Cables must be ordered by part number.

Tractor/Separator (RPQ D02078): Provides variable-width forms tractor with a mechanical cutter to separate single or multi-part perforated forms within 1.5 inches of the first print line. **Field Installation:** No.

Tractor/Separator-FI (RPQ D02079): Provides a field installable version of RPQ D02078. **Limitations:** Available for field installation (MES) only.

SUPPLIES

Ribbons: A black ribbon, P/N 1136653 or equivalent, is required for machines shipped prior to August 29, 1980 or on machines not modified to accept the cartridge ribbon. A black cartridge ribbon, P/N 7034535 or equivalent, is required for all machines shipped on or after August 29, 1980 or on machines modified to accept the cartridge ribbon. Installed printers may be thus modified by ordering RPQ D09005. Contact IBM.

4975 PRINTER

PURPOSE

Serial Printer for Series/1.

MODELS

Model 01L	80 cps*
Model 01R	80 cps**
Model 02L	160/40 cps*
Model 02R	160/40 cps**

* Local to 1,219 meters (4,000 feet)
** Remote

Prerequisites: A Multifunction Attachment feature (#1310) with an appropriate attachment address (local or remote) available in a Processor or I/O Expansion Unit. For local attachment a Multifunction Attachment cable (#5770) or equivalent is required for each 4975.

Customer Setup: All mdls of the 4975 are designated as customer setup machines (CSU) thus offering the customer availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customer - Customer Setup* (G120-2743).

HIGHLIGHTS

The 4975 is a family of wire matrix table-top printers providing bidirectional printing at a maximum of 80 (mdl 01L and 01R) or 160 (mdl 02L and 02R) characters per second. All mdls of the 4975 printer have the following program-selectable functions:

- Vertical spacing of six or eight lines per inch.
- Horizontal print density of 10 or 15 characters per inch.
- Maximum line length of 13.2 inches.
- Incremental horizontal spacing commands .
- Incremental spacing at 1/96 inch.
- Multipart forms up to four-part maximum.

All mdls of the 4975 include a cartridge ribbon and a variable-width forms tractor which provides a forms feeding device for continuous marginally punched forms. A Rear Document Insertion Device (#6100) may be ordered for the 4975.

Two mdls of the 4975 (mdl 01L and 02L) provide for local attachment to the Series/1 using four-wire cabling at distances up to 1,219 meters (4,000 feet). Two other mdls of the 4975 (mdl 01R and 02R) provide for attachment to the Series/1 via leased line common carrier communication facilities. The Series/1 Multifunction Attachment feature (#1310) is used for both local and remote attachment of the 4975 to the Series/1.

The 4975 mdls 02L and 02R have a quality print capability in addition to the normal print capability. This quality print facility is provided through a quality print cartridge (provided with the printer). When operating in quality print mode the 4975 is limited to a maximum rate of 40 cps.

In quality print mode, the 4975 prints at half-normal speed and prints each line in two passes, resulting in high density, proportionally spaced printing at a rated speed of 40 cps. Quality printing is best suited to cut-forms and cut-form sets. Quality printing on continous forms should be tested for satisfactory results.

Publications: *IBM Series/1 4975 Printer and Multifunction Attachment Feature Description* (GA34-0144).

AAS Ordering Instructions: The 4975 is a System Component.

SPECIFY

Specify codes apply to Plant Orders only, do not use on MES orders.

- Voltage (115V AC, 1-phase, 60 Hz): **#9901** with 2.4m (8 foot) cord.

SPECIAL FEATURES

Special Printing Cartridge (#1601): Provides an operator-installable cartridge on installed mdls 02L and 02R only, which under program control, enhances printing capability. Expanded characters (2-, 4-, or 8-times single line height), bar codes (Code 39®, MSI Plessy, UPC and EAN), and OCR-A printing can be produced in addition to quality print capability. The cartridge will produce a reasonable facsimile of bar codes and OCR-A printing as specified by national standards, industry standards and manufacturer's specifications for wanding and scanning mechanisms. Code 39 bar code printed by the 4975 meets MIL-STD-1189. The 4975, prints a subset of OCR-A for human-readable interpretation of Code 39 characters. See *IBM 4975 Printer Special Printing Cartridge Feature Description* (GA34-0250) for the OCR-A characters provided. Customers should test all bar code and OCR characters printed by the 4975 to ensure that their wanding and scanning devices will adequately read the printed information. Bar code and OCR-A printing have been tested with commercially available wanding mechanisms. See *IBM 4975 Printer Special Printing Cartridge Feature Description* (GA34-0250) for examples of OCR-A subsets provided. When printing bar code or expended characters, more ink will be used requiring more frequent ribbon changes. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** #1310 at or later than EC 466759 (see M4959 pages) and a CE Diskette Initializer at or later than EC 331653.

® Registered Trademark of Interface Mechanisms, Inc.

Special Printing Cartridge (#1610): Provides an operator-installable cartridge on plant orders of mdls 02L and 02R only, which under program control, enhances printing capability. Expanded characters (2-, 4-, or 8-times single line height), bar codes (Code 39, MSI Plessy, UPC and EAN) and OCR-A printing can be produced in addition to quality print capability. The cartridge will produce a reasonable facsimile of bar codes and OCR-A printing as specified by national standards, industry standards and manufacturer's specifications for wanding and scanning mechanisms. Code 39 bar code printed by the 4975 meets MIL-STD-1189. The 4975, prints a subset of OCR-A for human-readable interpretation of Code 39 characters. See *IBM 4975 Printer Special Printing Cartridge Feature Description* (GA34-0250) for the OCR-A characters provided. Customers should test all bar code and OCR characters printed by the 4975 to ensure that their wanding and scanning devices will adequately read the printed information. Bar code and OCR-A printing have been tested with commercially available wanding mechanisms. See *IBM 4975 Printer Special Printing Cartridge Feature Description* (GA34-0250) for examples of OCR-A subsets provided. When printing bar code or expended characters, more ink will be used requiring more frequent ribbon changes. **Maximum:** One. **Field Installation:** No. **Prerequisites:** #1310 at or later than EC 466759 (see M4959 pages) and a CE Diskette Initializer at or later than EC 331653.

Rear Document Insertion Device (#6100): Provides the capability for manually inserting individual cut forms or cut forms sets. The forms tractor is removed by the operator and the Rear Document Insertion Device is installed. Adjustable guides permit forms from 14.6cm (5 3/4 inches) to 30.5cm (12 inches) wide to be used. Form length can be from 7.6cm (3 inches) to 35.6cm (14 inches). Up to four-part forms may be used. Forms should always be tested to ensure customer acceptance. The leading edge (top edge) of form sets must be glued. Scribed lines on the forms guide assist in form alignment. **Maximum:** One. **Field Installation** Yes. **Customer Setup:** Yes.

MODEL CONVERSIONS

Model changes are not available.

ACCESSORIES

Forms Stand (#4450): A one-shelf, floor standing forms stand provides for stacking of continuous forms after printing. **Field Installation:** Yes.

SUPPLIES

Ribbons: A black ribbon in cartridge form; P/N 7034535 or equivalent (mdl 01L/R), or P/N 7032550 (mdl 02L/R). Contact IBM.

4978 DISPLAY STATION

PURPOSE

The 4978 (RPQ D02055) is an advanced function display station for entering, editing, and displaying alphameric data. A movable keyboard permits the operator to manipulate data on the screen in a flexible and efficient manner.

MODELS

Model 1 001

Model 2 002

Prerequisites: RPQ D02038 on a processor unit, 4959, or 4965. Corequisite is RPQ D02055 along with the 4978.

HIGHLIGHTS

The 4978 is an interactive CRT display station capable of displaying 1,920 characters, 24 lines of 80 characters each. Multiple keyboard types and an extensive set of local functions are available. Display graphics and keybutton roles (i.e., data entry, local function, program function) are user-definable. The 4978 may be attached at up to 150 meters (500 feet).

Mdl 1 measures 533mm (21 inches) wide, 394mm (15.5 inches) high, and 394mm (15.5 inches) deep. Mdl 2 is functionally identical to mdl 1, but offers a 37 percent (volumetric) size reduction. Mdl 2 is available with either a 25mm (1 inch) or an 83mm (3.25 inch) base. The larger base is recommended when display and keyboard are to be mounted on the same horizontal surface. Mdl 2 measures 476mm (18.75 inches) wide, 298mm (11.75 inches) high with the smaller base and 356mm (14 inches) high with the larger base, and 325mm (12.8 inches) deep.

Publications: *IBM Series/1 4978 Display Station (RPQ D02055) and Attachment (RPQ D02038) General Information* (GA34-1550).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.
- Base Size (mdl 2 only):

  #6513 25mm (1 inch) base
  #6514 83mm (3.25 inch) base

SPECIAL FEATURES

Multiple keyboards are available to permit a variety of display station configurations. Key arrangements are fixed for a given keyboard. The role of each key may be user-modified through the use of user-accessible tables on the 4978 Display Station Attachment. Most keys identified as program function keys are fitted with a plastic cap to facilitate user-prepared and installed key identification. With the exception of RPQ D02064 (DAS/C Keyboard), a 1 meter (3 foot) cable is provided, which allows approximately 0.7 meters (2.5 feet) of machine separation to allow attachment to the 4978 keyboard, maximum of one keyboard per 4978.

Extended Keyboard (RPQ D02056): A general purpose keyboard suitable for a wide variety of data entry and operator console applications. Contains a 122-key typewriter-like keyboard, including a 13-key control keypad, a 14-key numeric keypad, and 35 program function keys. Four cursor control keys (up, down, left, right) and the space key are typamatic. All other keys have momentary action. All keys other than the fixed function keys may be typamatic by simultaneous depression of a repeat key. **Field Installation:** Yes.

Basic Keyboard (RPQ D02057): An 81-key typewriter-like keyboard, including a separate 11-key adding machine type numeric keypad. The space bar is typamatic. Other keys have momentary action. Suitable for a variety of data entry applications. **Field Installation:** Yes.

Audible Tone Alarm (RPQ D02060): An audible alarm to alert the operator to a special condition. The alarm may be sounded when a character is entered into a program-defined position on the screen, when an operator attempts to perform certain non-permissible operations, or under program control. **Field Installation:** Yes.

DAS/C Keyboard (RPQs D02064 and D02065): These keyboards are intended primarily for use in telephone directory assistance applications. Keytop legends are designed for this application. All keys are interrupt keys, irrespective of legend. Features include typewriter-like key arrangement, extended program function key capability, and replaceable legend keytops. RPQ D02064 provides a 2 meter (6 foot) cable and RPQ D02065 provides a 1 meter (3 foot) cable between the keyboard and the display station. The keyboards are identical in all other respects. **Field Installation:** Yes.

Video Monitor Attach (RPQ D02222): Permits attachment of an OEM video monitor to the 4978 for use in duplicating the display image being presented at the 4978. **Field Installation:** Yes.

Keyboard - Data Entry Large (RPQ D02275): Keyboard consists of 122 keys arranged in four groups. These groups are a typewriter-like arrangement of data entry keys, local function keypad, numeric data entry keypad, and interrupt request keys. Program function key capability and replaceable legend keys are provided. Keyboard is intended for use with the Intelligent Data Entry FDP (5798-NPY and 5798-NXQ). **Field Installation:** Yes.

Keyboard - Data Entry Small (RPQ D02276): Keyboard consists of 82 keys featuring typewriter-like key arrangement, EBCDIC character set, uppercase and lowercase alphabetics, 11-key numeric keypad, program function key capability, 13 replaceable legend keytops, expanded line and screen editing functions, and redefining key capability. Keyboard is intended for use with the Intelligent Data Entry FDP (5798-NPY and 5798-NXQ). **Field Installation:** Yes.

Keyboard - Text Entry and Edit (RPQ D02375): Intended for use with the Text Entry and Edit FDP (5798-RAR). Combination provides an input and editing device for authors, editors, and typographers. Keyboard consists of 122 keys featuring a typewriter layout, replaceable legend keybuttons, and special keys relating to FDP (5798-RAR). **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The cables and/or associated parts to attach the 4978 to the Series/1 processor may be purchased from IBM or from a customer-selected source. The customer is responsible for laying, routing, maintenance, and availability of attachment cables for display installation by IBM. For IBM attachment cables, see RPQs D02032, D02033, and D02034 and below for delivery scheduling independent of machine type.

Cable Increments (RPQ D02032): Provides 3 meter (10 foot) cable increments for extending the basic 6 meter (20 foot) 4978 attachment cable to a maximum length of 150 meters (500 feet). Must be ordered concurrently with either RPQ D02033 or D02034 and in quantity corresponding to desired length defined in the following table.

Total Cable Length Desired		Number of Cable
Meters	Feet	Increments Required
9	30	1
12	40	2
15	50	3
18	60	4
21	70	5
24	80	6
27	90	7
30	100	8
33	110	9
36	120	10
39	130	11
42	140	12
45	150	13
60	200	18
75	250	23
90	300	28
105	350	33
120	400	38
135	450	43
150	500	48

Cable Basic - 4978 Mdl 1 (RPQ D02033): Provides a basic 6 meter (20 foot) 4978 mdl 1 attachment cable. May be used with Cable Increments (RPQ D02032) to obtain a cable length up to a maximum of 150 meters (500 feet). **Maximum:** One.

Cable Basic - 4978 Mdl 2 (RPQ D02034): Provides a basic 6 meter (20 foot) 4978 mdl 2 attachment cable. May be used with Cable Increments (RPQ D02032) to obtain a cable length up to a maximum of 150 meters (500 feet). **Maximum:** One.

4978 Attachment Cables:

Attachment cables may be ordered as accessory bills of material for independent scheduling. Allow 60 days for delivery.

4978 Display Station (cont'd)

Length Meters	Length Feet	Mdl 1 B/M Number	Mdl 2 B/M Number
6	20	4412507	6841244
9	30	4412551	6841245
12	40	4412552	6841246
15	50	4412553	6841247
18	60	4412554	6841248
21	70	4412555	6841249
24	80	4412556	6841250
27	90	4412557	6841251
30	100	4412558	6841252
33	110	4412559	6841253
36	120	4413511	6841254
39	130	4413512	6841255
42	140	4413513	6841256
45	150	4413514	6841287
60	200	4413724	6841257
75	250	4413725	6841258
90	300	4413726	6841259
105	350	4413727	6841260
120	400	4413728	6841261
135	450	4413729	6841262
150	500	4413534	6841263

Keyboard Accessories: Keyboard accessories are available which allow the customer to change the inscriptions and messages on most of the keybuttons of the 4978 keyboards. These accessories consist of replaceable legend and blank keybuttons. Replaceable legend keybuttons consist of two parts, a molded base and a removable clear plastic cover. Blank keybuttons are available for customer engraving. Refer to the specific keyboard product description manual for a description of key sizes and positions. Contact IBM for ordering assistance.

The following terms are used in the keybutton descriptions:

B	Blank keybutton available for customer engraving
RL-L	Large replaceable legend keybutton, stem slot on left
RL-R	Large replaceable legend keybutton, stem slot on right
RL	Small replaceable legend keybutton, stem slot in center

The following is a list of keybuttons available for keyboards D02056, D02275, and D02375:

Type	Size	Color	Part No.	Fits Key Positions
B	1x1	Light Gray	1853563	68-80, 82, 83, 85
B	1x1	Dark Gray	1853567	86, 87, 104, 105, 107, 108, 109
RL	1x1	White	5188775	125-130
RL	1x1	Dark Gray	8627192	146, 147, 149, 150, 151, 168
RL	1x1	Light Gray	8542831	169, 173
B	1x1	Light Gray	1853564	88-103
B	1x1	Dark Gray	1853568	88-103
B	1x1	Blue	1853451	88-103
B	1x1	Light Gray	1853565	111-123
B	1x1	Dark Gray	1853569	111-123
B	1x1	Light Gray	1853566	132-143
B	1x1	Dark Gray	1853570	132-143
RL-L	1x1-1/2	Dark Gray	5192813	1, 4, 7, 10, 13, 17, 20, 23, 26, 29, 32, 35, 39, 42, 61, 64, 81
RL-R	1x1-1/2	Dark Gray	5192815	3, 6, 9, 12, 15, 19, 22, 25, 28, 31, 34, 37, 41, 44, 63, 66, 67
B	1x2	Dark Gray	5192807	106
B	1x2	Light Gray	5192811	172
B	1x1-1/2	Dark Gray	5192801	124
B	1x1-1/2	Blue	1853452	110

The following is a list of keybuttons available for keyboards D02064 and D02065:

Type	Size	Color	Part No.	Fits Key Positions
B	1x1	Light Gray	1853563	68-80
B	1x1	Dark Gray	1853567	82-87
RL	1x1	White	5188775	104-109
RL	1x1	Dark Gray	8627192	125-130
RL	1x1	Light Gray	8542831	146-151, 170-173
B	1x1	Light Gray	1853564	88-103
B	1x1	Dark Gray	1853568	88-103
B	1x1	Blue	1853451	88-103
B	1x1	Light Gray	1853565	111-123
B	1x1	Dark Gray	1853569	111-123
B	1x1	Light Gray	1853566	132-144
B	1x1	Dark Gray	1853570	132-144
RL-L	1x1-1/2	Dark Gray	5192813	1, 4, 7, 10, 13, 17, 20, 23, 26, 29, 32, 35, 39, 42, 61, 64, 81
RL-R	1x1-1/2	Dark Gray	5192815	3, 6, 9, 12, 15, 19, 22, 25, 28, 31, 34, 37, 41, 44, 63, 66, 67
B	1x2	Light Gray	5192811	169
B	1x1-1/2	Dark Gray	5192801	124
B	1x1-1/2	Blue	1853452	110

The following is a list of keybuttons available for keyboards D02057 and D02276:

Type	Size	Color	Part No.	Fits Key Positions
B	1x1	Light Gray	1853563	39, 40, 41, 61, 62, 63
B	1x1	Dark Gray	1853567	71-80, 85
RL	1x1	White	5188775	104-106
RL	1x1	Dark Gray	8627192	125-127
RL	1x1	Light Gray	8542831	146-151, 170, 171
B	1x1	Blue	1853451	88-103
B	1x1	Light Gray	1853564	91-103
B	1x1	Dark Gray	1853568	91-103
B	1x1-1/2	Blue	1853445	113
B	1x1	Light Gray	1853565	114-123
B	1x1	Dark Gray	1852569	114-123
B	1x1	Light Gray	1853566	135-144
B	1x1	Dark Gray	1853570	135-144
RL-R	1x1-1/2	Dark Gray	5192815	26, 29, 32, 35, 38, 70
RL-L	1x1-1/2	Dark Gray	5192813	27, 30, 33, 36, 81
B	1x2	Light Gray	5192811	169
B	1x1-1/2	Dark Gray	5192801	124

Keybutton Extractor (P/N 9900373): The keybutton extractor is a small plier-like device which fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on a keybutton and it may be pulled off its stem. The customer may find this helpful when replacing keybuttons or in doing any rearranging of the keyboard.

Labels (P/N 6842611): A die-cut 8-1/2 x 11 inch sheet containing 72 white self-stick blank labels for the 1x1-1/2 replaceable legend keybuttons and 48 self-stick blank labels for the 1x1 replaceable legend keybuttons.

Connectors: The listed connector kits and tools may be used with bulk 4978 attachment cable. Contact IBM for ordering assistance.

2 x 12 Berg Connector Kit	B/M 6841320
Berg Crimp Tool *	B/M 8327400
AMP 25-Position Connector Kit	B/M 6841321
AMP Crimp Tool and AMP Extractor Tool	B/M 8327404

* Use only with #24 AWG or #26 AWG wire (0.511mm or 0.40mm).

SUPPLIES (None)

4979 DISPLAY STATION

PURPOSE

The 4979 is a data entry station and operator console for Series/1.

MODELS

Model 1 001

Prerequisites: #3585 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4979 displays 24 lines of 80 characters on a 12-inch CRT and has a 66-key data entry keyboard. It interacts with central processing unit on a line basis. The 4979 is a table-top device, and may be attached at up to 45 meters (150 feet).

Publications: *4979 Display Station Description* (GA34-0026).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: A basic cable 6 meters (20 feet) long is included with the 4979 to connect it to its attachment feature. For longer cables, between 9 meters (30 feet) and 45 meters (150 feet) obtained in 3 meter (10 foot) increments, order **#5740** in quantities between 1 and 13.

Replacement cables to attach the 4979 to Series/1 may be purchased from IBM or from a customer-selected source. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for cable and connector details.

To order replacement cables by MES, use two feature codes. The first code, **#5741**, provides a connector and 6 meters (20 feet) of cable. The second code, **#5740**, is used to order 3 meter (10 foot) increments (minimum order of one). 6 meter (20 foot) replacement cable is not available by MES. It must be ordered by part number.

SUPPLIES (None)

4980 DISPLAY STATION MDL 1

PURPOSE

The 4980 Display Station can be used with Series/1 for entering, editing and displaying alphameric data. A movable keyboard permits the operator to enter, display, and manipulate data on the screen in a highly flexible and efficient manner. This display station performs the same basic functions as the 4978 in a compact package with a low-profile keyboard and a tiltable display screen. Displays up to 1,920 characters with 24 lines of 80 characters each. The display station status, including cursor location (row/column), is shown on the 25th line.

MODELS

Model 1 001

Prerequisites: A Series/1 processor with #1250. A storage load is required for the 4980 and is provided by a diskette that is shipped with feature #1250, or may be ordered by P/N **6114487**. The storage load is also provided by EDX V4.0.

Customer Setup (CSU): The 4980 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine.

HIGHLIGHTS

The programmable character set includes 256 characters. The character set, definition of keyboard keys, function of the 24 command keys and the eight replaceable legend keys and additional microcode are down-loaded from the Series/1 at initialization. See "Type Catalog" for keyboard layout. Cable-Thru is a standard capability. A display screen glare-reduction treatment is provided. Displayed characters may be protected (displayed with normal intensity) or unprotected (displayed with high-intensity). The operator can reverse the image of the entire screen. Operator selection of a block or underscore cursor is also available. An adjustable audible alarm, is provided to alert the operator to special conditions. The low-profile keyboard has an adjustable slope. It has 127 total keys including 24 program-assigned command function keys to provide input and control flexibility.

Cabling: The cable attachment between the 4980(s) and/or Multidrop Workstation Attachment (#1250) must be made with twinaxial cable. Up to eight workstations may be installed up to 1,219 meters (4,000 feet) from Series/1 via the cable-thru capability of the 4980. A 6 meter (20 foot) Attachment Cable (#5780), is available on the Series/1 to attach the first 4980 to the Multidrop Workstation Attachment (#1250). Outdoor use of cabling is not supported.

Data transmission rates to the Series/1 can be up to 500K bps depending on twinaxial cable length. Transmission rates may be selected consistent with the following table.

Total Length of Twinaxial Cable/Port	Speed
Up to 244 meters (800 feet)	500K bps
Up to 488 meters (1,600 feet)	250K bps
Up to 1,219 meters (4,000 feet)	100K bps

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 4980 Display Station Problem Determination Procedures* (GX21-9299). Also, see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 4980.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions.
- Relocation of the 4980, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 4980 prior to calling for IBM service.
- Providing a desk or table to support the 4980.
- Installation and maintenance of signal cables and associated parts for interconnecting the 4980s and the Multidrop Workstation Attachment (#1250).
- When adding additional display stations to Series/1, the customer may have to modify the system configuration specifications. See *IBM Series/1 Attachment Feature Storage Load User's Guide* (GA34-0133.

Publications: *IBM Series/1 Display Station Description and Reference Manual* (GX21-9296), *IBM 4980 Display Station Problem Determination Procedures* (GX21-9299), shipped with the product; *IBM 4980 Series/1 Display Station Setup Procedures* (GA21-9297), shipped with the product; *IBM 4980 Keyboard Template* (GX21-9298), one will be shipped with the product.

AAS Ordering Instructions: The 4980 is a system component.

SPECIFY

Default Order Entry: Specify Codes are not required when ordering a 4980.

- Power Default (100-127V AC, 1-Phase, 60 Hz): A standard nonlocking plug (uses customer standard type receptacle) will be furnished. Standard Power cord is 2.4 meters (8 feet), no specify is required.
- Color: Pearl white only. No specify code required.
- Cables: See "Accessories" for 4980 mdl 1 twinaxial cable and associated components ordering instructions. For cable specifications, see the *IBM Series/1 Site Preparation Manual* (GA34-0050).

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Power Cable: A 1.8 meter (6 foot) power cable with standard nonlocking plug is available. The power cable is pluggable at the machine.

Signal Cables: The twinaxial cables and/or associated parts to interconnect the 4980 Display Station(s) and attached system may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM Series/1 Site Preparation Manual* (GA34-0050). Twixaxial cables are available with either vinyl or Teflon® covering. Teflon-covered cable complies with the National Electrical Code Requirements for low smoke-producing, plenum-installed cables.

The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine. Order as follows:

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors are available for replacement. Order as follows:

P/N **7362268**	Connector Kit for vinyl-covered cables
P/N **7362063**	Connector Kit for Teflon-covered cables
P/N **7362229**	Individual connector (replacement) for vinylor Teflon-covered cables

Twinaxial Wire: Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. Order as follows:

P/N **7362211**	For vinyl-covered cable
P/N **7362061**	For Teflon-covered cable

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order as follows:

P/N **7362267**	Cable assembly with vinly-coated wire
P/N **7362062**	Cable assembly with Teflon-coated wire

Twinax Adapter (P/N **3762230**): Permits two Twinax Cable Assemblies to be joined together.

Order cables via part number. Allow a lead time of 120 days.

Keytop Protective Cap: Clear plastic caps that cover replaceable-legend keytops to protect the label from normal wear. A full compliment of keytop caps is provided with the machine. For replacement/spares order:

P/N **4585103** Keytop Cap (Qty: 1 each)

Keytop Label Sheets: Labels that provide the user with keytop blanks for labeling of replaceable legend keys. One sheet with 30 blank labels is provided with the machine. For replacement/spares order:

P/N **6019429** Labels, Blank (Qty: 1 sheet = 30 labels)

Storage Load Diskette: A storage load is required for the 4980 and is provided with a Multidrop Workstation Attachment (#1250), EDX V4.0 and Realtime Programming System 6.2 or higher. For those customers not utilizing one of the above listed sources, a 4980 storage load diskette may be ordered by P/N **6114487**.

SUPPLIES (None)

® Teflon is a trademark of El DuPont De NeMours Co, Inc.

4982 SENSOR INPUT/OUTPUT UNIT

PURPOSE

The 4982 provides sensor I/O subsystem for Series/1.

MODELS

Model 1 001

Prerequisites: #6305 on a processor unit, 4959, or 4965. Space in Rack Mounting Fixture (**#4540**). See "Accessories" in the M4959 pages.

HIGHLIGHTS

The 4982 is a half-width unit designed for mounting on a 4997 or EIA standard 19-inch rack enclosure using the Rack Mounting Fixture (**#4540**). It provides power and feature positions for a set of sensor I/O features. Space for up to eight features is provided on each unit.

Publications: *4982 Sensor Input/Output Unit Description* (GA34-0027).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES

Analog Input Control (#1060): Provides analog to digital conversion function. Resolution 11 bits plus sign. **Maximum:** One per 4982. **Field Installation:** Yes.

Analog Output (#1065): Two points per card. Resolution 10 bits. **Field Installation:** Yes.

Specify:

First point:

#9174	-10V	to	+10V	DC
#9175	-5V	to	+5V	DC
#9176	0V	to	+10V	DC

Second point:

#9177	-10V	to	+10V	DC
#9178	-5V	to	+5V	DC
#9179	0V	to	+10V	DC

Amplifier Multirange (#1070): Has seven program-controlled gain ranges. **Maximum:** One per 4982. **Field Installation:** Yes. **Prerequisites:** #1060.

Digital Input/Process Interrupt Non-Isolated (#3525): Provides 16 points of non-isolated digital input or 16 process interrupt lines. **Field Installation:** Yes.

Digital Input/Process Interrupt Isolated (#3532): Provides 16 points of optically isolated digital input or 16 process interrupt lines. **Field Installation:** Yes.

Digital Output Non-Isolated (#3535): Provides 16 points of digital output. **Field Installation:** Yes.

Multiplexer/Reed Relay (#4940): Reed relay, eight points per card. 200V common mode voltage if Amplifier Multirange (#1070) installed. Located in contiguous group adjacent to Analog Input Control (#1060) or Amplifier Multirange (#1070) if used. May be mixed with #4950. **Maximum:** Seven per 4982. **Field Installation:** Yes. **Prerequisites:** #1060.

Multiplexer/Solid State (#4950): Solid state, 16 points per card. 10V common mode voltage. Located in contiguous group adjacent to Analog Input Control (#1060) or Amplifier Multirange (#1070), if used. May be mixed with #4940. **Maximum:** Seven per 4982. **Field Installation:** Yes. **Prerequisites:** #1060.

Specification Table: This table is provided to determine how many 4982s are required to contain the desired features. The feature locations are expressed as a negative number for availability. A positive number is used for feature requirement. The sum of the availability and requirements cannot exceed zero.

Machine/ Feature Number		Feature Positions	Notes
4982	Sensor Input/Output Unit	-8	
#1060	Analog Input Control	+1	
#1065	Analog Output	+1	
#1070	Amplifier Multirange	+1	(1)
#3525	Digital Input/Process Interrupt Non-Isolated	+1	
#3532	Digital Input/Process Interrupt Isolated	+1	
#3535	Digital Output Non-Isolated	+1	
#4940	Multiplexer/Reed Relay	+1	(2)
#4950	Multiplexer/Solid State	+1	(2)

Notes:

(1) Must be contiguous to #1060.

(2) Must be contiguous to #1060 or to the #1070 if the #1070 is installed.

MODEL CONVERSIONS (None)

ACCESSORIES

Connectors: Listed Series/1 cables and/or associated parts to attach devices to Series/1 may be purchased from IBM or from a customer-chosen source. For the proper identification of the required connectors, see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). The customer is responsible for the installation and maintenance of cables and associated parts.

Connectors	B/M Number
2 x 4 Berg Connector Kit	6843689
2 x 8 Berg Connector Kit	8327397
2 x 12 Berg Connector Kit	8327398
2 x 20 Berg Connector Kit	8327399
Berg Crimp Tool *	8327400
Amphenol 4-Position Connector Plug Kit	8327401
AMP 26-Position Connector Kit	8327402
AMP 160-Position Connector Kit	8327403
AMP Crimp Tool and AMP Extractor Tool	8327404
Continental 56-Position Connector Kit	8327405
Connector Kit for #1210	6838819
Berg Crimp Tool for #1210 **	6838818

* Use only with #24 AWG or #26 AWG wire (0.511 mm or 0.404 mm).

** Use only with #18 AWG wire (1.024 mm).

Contact IBM for assistance in ordering accessories.

SUPPLIES (None)

4987 PROGRAMMABLE COMMUNICATION SUBSYSTEM

PURPOSE

The 4987 provides programmable communications multiplexing facility for Series/1.

MODELS

Model 1 001

Designed for mounting in a 4997 or EIA standard 19-inch rack enclosure. Full width unit.

HIGHLIGHTS

The 4987 provides the ability to handle requirements of a wide variety of both standard and special terminals. It may be used in a wide range of applications involving large numbers of terminals and lines with speeds in the 45 to 9600 bits per second range. Asynchronous and synchronous terminals and system tapes can be connected to the same Series/1 system. The subsystem can be programmed to accommodate both standard and nonstandard line speeds, codes, line protocols, error checking, polling, and clocking.

The 4987 can accommodate up to 32 lines of point-to-point leased, point-to-point switched, or multipoint. In addition to programmability, the subsystem provides several communications features including auto-call, integrated modems, Data-Phone® digital service adapters, current interface, and modemless attachments. The 4987 includes a basic scanner. It attaches to Series/1 through one or two Programmable Communications Subsystem Controllers (#1300). The optional second controller (#1300) and associated Expansion Scanner (#3600) provide improved throughput for the 4987.

Prerequisites: Programmable Communications Subsystem Controller (#1300) in a Processor Unit or 4959 Input/Output Expansion Unit. A second controller is optional.

Publications: *4987 Programmable Communications Subsystem and 4990 Model 1 Communications Console Description* (GA34-0049).

SPECIFY

Specify codes **#8XXX** and **#9XXX** apply to plant orders only; do not use on MES orders.

- Voltage (AC, 1-phase, 60 Hz): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 220V.
- Power Cord: A 1.8 meter (6 foot) cord is supplied as standard.
- Subsystem Number: For each 4987 included in a system, a functional sequence number must be specified. The number is the tens digit in the specify code **#89X0**. The first 4987 is designated **#8910**, the second **#8920**, etc.

SPECIAL FEATURES

All features except cables and the Expansion Scanner (#3600) require function specify codes. See "Attachment Feature Function Codes".

Note: #47XX features require two device addresses.

Expansion Scanner (#3600): The 16 feature locations in the 4987 can be divided into two 8-feature groups of up to 16 lines in each by adding one #3600. **Field Installation:** Yes. **Prerequisites:** A second Programmable Communications Subsystem Controller (#1300) in a Processor Unit or 4959 Input/Output Expansion Unit.

Half-Duplex Attachment (#4730): For digital communications equipment. Provides for attachment of two independent switched or nonswitched, synchronous or asynchronous external data sets. If synchronous, it will use external clocking at speeds from 600 to 9600 bps. If asynchronous, it will use internal clocking at speeds from 45 to 1200 bps or 2400, 4800, or 9600 bps. Can accommodate two Data Set Attachment Cables (**#2130**) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

Full-Duplex Attachment (#4731): For digital communications equipment. Identical to #4730 except provides one full-duplex line instead of two half-duplex lines. Accommodates one Data Set Attachment Cable (**#2130**) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

TTY Current Attachment (#4734): Provides two DC current loop attachments for teletypewriters or equivalent devices. Supports 2- or 4-wire half-duplex operation. A programmable local copy option is also supported in 4-wire operation. Can accommodate two TTY Current Attachment Cables (**#2131**) and/or 3101 Current Loop Cable (**#2066**) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

Data-Phone® Adapter (#4736): [Effective February 1, 1984, NO LONGER AVAILABLE.] Provides Data-Phone Digital Service (DDS) attachment to a nonswitched network via a channel service unit at line speeds of 2400, 4800, and 9600 bps for non-SDLC synchronous disciplines. Can accommodate one DDS Attachment Cable (**#2136**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

Asynchronous Local Attachment (#4739): Provides two interfaces for asynchronous transmission to systems or terminals without the use of modems. Operates at speeds from 45 to 1200 bps and 2400, 4800, and 9600 bps. Operates in half-duplex mode only. Can accommodate two Local Attachment Cables (**#2132**) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

Synchronous Local Attachment (#4740): Provides two interfaces for synchronous transmission to terminals and other systems without the use of modems. Operates in half-duplex mode only with speeds of 600, 1200, 2400, 4800, or 9600 bps. Can accommodate two Local Attachment Cables (**#2132**) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

Auto-Call Attachment (#4743): Provides one half-duplex digital communications equipment attachment and one EIA RS-366 auto-call attachment. Operation of the half-duplex attachment is the same as the #4730 half-duplex attachment. Compatible with a Western Electric 801C or equivalent units. Can accommodate one Data Set Attachment Cable (**#2130**) and one Auto-Call Attachment Cable (**#2133**) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4746): [Effective February 1, 1984, NO LONGER AVAILABLE.] For asynchronous switched network. Provides a complete switched network modem; auto-answer function, auto-answer test, and wrap test. May be used as manual answer. Operates at speeds of 45 to 1200 bps. Can accommodate one Integrated Modem Switched Network Cable (**#2134**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4747): [Effective February 1, 1984, NO LONGER AVAILABLE.] For asynchronous leased line with switched network backup. Provides a complete leased line modem with switched network backup auto-answer. Provides auto-answer function, auto-answer test, and wrap test. Operates at speeds of 45 to 1200 bps. Can accommodate one Integrated Modem Switched Network Cable (**#2134**) (Effective February 1, 1984, NO LONGER AVAILABLE) and one Integrated Modem Leased Line Cable (**#2135**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4748): [Effective February 1, 1984, NO LONGER AVAILABLE.] For asynchronous leased line. Provides a complete leased line modem with wrap test. Operates at speeds of 45 to 1200 bps. Can accommodate one Integrated Modem Leased Line cable (**#2135**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4751): [Effective February 1, 1984, NO LONGER AVAILABLE.] With clock for synchronous switched network. Provides a complete switched network modem for synchronous operation at 600 or 1200 bps (program-selectable). Provides auto-answer function, auto-answer test, and wrap test. Can accommodate one Integrated Modem Switched Network Cable (**#2134**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4752): [Effective February 1, 1984, NO LONGER AVAILABLE.] With clock for synchronous leased line and switched network backup. Provides a complete leased line modem with switched network backup for synchronous operation at 600 or 1200 bps (program-selectable). Includes wrap test. Can accommodate one Integrated Modem Switched Network Cable (**#2134**) (Effective February 1, 1984, NO LONGER AVAILABLE) and one Integrated Modem Leased Line Cable (**#2135**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalents. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

1200 bps Integrated Modem (#4753): With clock for synchronous leased line. Provides a complete leased line modem for synchronous operation at 600 or 1200 bps (program-selectable). Can accommodate one Integrated Modem Leased Line Cable (**#2135**) (Effective February 1, 1984, NO LONGER AVAILABLE) or customer-supplied equivalent. **Field Installation:** Yes. **Specify:** Function (see "Attachment Feature Function Codes").

4987 Programmable Communication Subsystem (cont'd)

Attachment Feature Function Codes: A unique function code must be specified for each attachment feature used on the 4987. Determine if the feature is attached to the basic scanner or to the Expansion Scanner (#3600). For each feature, determine specify code **#8XXX** from appropriate column and table.

Feature Number	Description	Basic Scanner	Expansion Scanner
#4730	Half-Duplex DCE Attachment	**#85XX** See Table 1	**#86XX** See Table 1
#4731	Full-Duplex DCE Attachment	**#858X** See Table 2	**#868X** See Table 2
#4734	TTY Current Attachment	**#853X** See Table 3	**#863X** See Table 3
#4736	Data-Phone Digital Service Adapter [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#854X** See Table 4	**#864X** See Table 4
#4739	Asynchronous Local Attachment	**#8550**	**#8650**
#4740	Synchronous Local Attachment	**#8560**	**#8660**
#4743	Auto-Call Attachment	**#857X** See Table 5	**#867X** See Table 5
#4746	1200 bps Integrated Modem for Asynchronous SN [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#8590**	**#8690**
#4747	1200 bps Integrated Modem for Asynchronous LL-SNBU [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#8591**	**#8691**
#4748	1200 bps Integrated Modem for Asynchronous LL [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#8592**	**#8692**
#4751	1200 bps Integrated Modem with Clock for Synchronous SN [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#8594**	**#8694**
#4752	1200 bps Integrated Modem with Clock for Synchronous LL-SNBU [Effective February 1, 1984, NO LONGER AVAILABLE.]	**#8595**	**#8695**
#4753	1200 bps Integrated Modem with Clock for Synchronous LL	**#8596**	**#8696**

Table 1: 2-Digit Suffix

	2nd Line Leased Half-Duplex Network	2nd Line Leased Full-Duplex Network	2nd Line Switched Half-Duplex Network	2nd Line Switched Full-Duplex Network
1st Line Leased Half-Duplex Network	10	11	12	13
1st Line Leased Full-Duplex Network	14	15	16	17
1st Line Switched Half-Duplex Network	18	19	20	21
1st Line Switched Full-Duplex Network	22	23	24	25

Table 2: Suffix

	Digit
Leased Line	0
Switched Line	1

Table 3: Suffix

	2nd Line Low Speed Less Than 150 bps	2nd Line High Speed Greater Than or Equal to 150 bps
1st Line Low Speed Less Than 150 bps	0	1
1st Line High Speed Greater Than or Equal to 150 bps	2	3

Table 4: Suffix

	Digit
2400 bps	0
4800 bps	1
9600 bps	2

Table 5: Suffix

	Half-Duplex Network	Full-Duplex Network
Leased Line	0	1
Switched Line	2	3

Compatible IBM Modems:

3863	Switched/Nonswitched
3864	Switched/Nonswitched
3865	Nonswitched
3868 mdl 1	Nonswitched
3868 mdl 2	Nonswitched
3868 mdl 3/4	Nonswitched
3872	Nonswitched

1200 bps Integrated Modems

MODEL CONVERSIONS (None)

ACCESSORIES

Cables:

Cable Code	Cable Description	Feature(s) Used With
#2066	3101 Current Loop Cable 15 meter (50 foot) cable for attaching 3101 Display Terminal mdl 12 and 22.	#4734
#2100	Extension Cable 6 meter (20 foot) extension cable increment. For all synchronous or asynchronous attachments operating at speeds over 7200 bps only one extension is allowed. All others allow nine extensions, for a total of 61 meters (200 feet).	#4730, #4731, #4739, #4740, #4743
#2130	Data Set Attachment Cable 6 meter (20 foot) cable with modem interface (male EIA RS-232-C).	#4730, #4731, #4743
#2131	TTY Current Attachment Cable 6 meter (20 foot) 4-conductor cable with ring terminals.	#4734
#2132	Local Attachment Cable 6 meter (20 foot) cable with modem interface (female EIA RS-232-C).	#4739, #4740
#2133	Auto-Call Attachment Cable 6 meter (20 foot) cable with modem interface (male EIA RS-366).	#4743
#2134	Integrated Modem Switched Network Cable 6 meter (20 foot) 9-conductor cable with spade terminals. [Effective February 1, 1984, NO LONGER AVAILABLE.]	#4746, #4747, #4751, #4752
#2135	Integrated Modem Leased Line Cable 6 meter (20 foot) 4-conductor cable with Western Electric Type 283 plug. [Effective February 1, 1984, NO LONGER AVAILABLE.]	#4747, #4748, #4752, #4753
#2136	Data-Phone Digital Service Attachment Cable 6 meter (20 foot) cable with modem interface (male DDS Connector). [Effective February 1, 1984, NO LONGER AVAILABLE.]	#4736

Connectors: Associated parts to attach devices to the Programmable Communication Subsystem may be purchased from IBM or a

4987 Programmable Communication Subsystem (cont'd)

customer-chosen source. The customer is responsible for installation and maintenance of the cables and their associated parts.

Connector	B/M Number	Cable Number
2 x 8 Berg Connector Kit	6327397	#2130, #2132, #2133, #2135, #2136, #2137
2 x 12 Berg Connector Kit	6327398	#2131
2 x 16 Berg Connector Kit	6060876	#2134
EIA Female Connector Kit	6060877	#2132
EIA Male Connector Kit	6060878	#2130, #2133
Integrated Modem Connector Kit	6060879	#2135
Digital Data Service Adapter Connector Kit	6060880	#2136

Tools: Berg Crimp Tool #22 AWG (HT 66-2266), B/M Number 6060698.

SUPPLIES (None)

4990 COMMUNICATIONS CONSOLE

PURPOSE

The 4990 provides a debug and problem determination tool for the 4987 Programmable Communication Subsystem.

MODELS

Model 1 001

HIGHLIGHTS

The 4990 provides a portable function keyboard and set of displays for debugging programs and for problem determination in the feature and interfaces of the 4987. When the 4987 is equipped with two scanners, the console may be interchanged between them. A single console may be used on multiple 4987 subsystems by plugging into the appropriate unit. Power is supplied by the 4987.

Publications: *4987 Programmable Subsystem and Attachments and 4990-1 Communications Console Description* (GA34-0049).

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

4993 SERIES/1-IBM S/370 CHANNEL TERMINATION ENCLOSURE

PURPOSE

The 4993 provides physical support, mechanical connection, and electrical termination for IBM S/370 channel interface cables. It is used in conjunction with the Series/1-IBM S/370 Channel Attachment (#1200) for connection to IBM S/370 (models 135-168), 3031, 3032, 3033, 4331, and 4341.

MODELS

Model 1 001

Limitations: One 4993 per 4997 rack. On a 4997, this unit will be mounted at the bottom of the rack. It may not be installed with 4962 on 4997 mdl 1, or with two 4962s on 4997 mdl 2. Field installation may require Series/1 system reconfiguration.

Prerequisites: #1200 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4993 is designed for mounting on a 4997 or an EIA standard 19-inch rack enclosure. It is a full-width unit 5.25 inches high.

The 4993 contains channel drive and receive terminators, power source, power on/off control, control unit enable/disable control, disable indicator lamp, and mechanical assembly. It provides capability for select-out bypass. The function occupies one control unit position on the S/370 channel interface, requiring 32 channel addresses. Up to eight Series/1s with 4993s may be connected to an S/370 system channel.

Publications: *System/370 Channel Attachment Feature and 4993 Termination Enclosure Description* (GA34-0057).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: S/370 channel cables are not provided with the 4993. These cables (cable group 1806) should be identified and ordered when the S/370, 303X, or 43XX installation planning associated with the Series/1 is accomplished. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for details. Contact IBM for assistance.

SUPPLIES (None)

4994 ASCII DEVICE CONTROL UNIT

PURPOSE

Provides an ASCII Device Control Unit that can accommodate a variety of ASCII terminals including the 3101 model 1.

MODELS

Model A00 16 RS-232-C Ports, 1 meter Rack

Model B00 32 RS-232-C Ports, 1 meter Rack

Model C00 48 RS-232-C Ports, 1 meter Rack

Limitations: The 4994 is not featureable.

Prerequisites: 4331, 4341, 4361, or 4381. S/370 Block Multiplexer Channel.

HIGHLIGHTS

The 4994 provides the ability to attach ASCII devices to host processors. The display terminals that can be attached are defined in Terminal Definition Tables which are down-loaded from the host to the controller. In order to be supported, the devices at a minimum must perform the following functions upon receipt of appropriate character sequences from the communication line:

- Clear-screen or clear to end-of-screen
- Absolute cursor positioning
- A character written to a screen position should replace (not over-strike) the previous character in that position.

The communication interface for the 4994 is an asynchronous EIA RS-232-C/CCITT V.24. In addition each line has a jumper-selectable 20mA Current Loop connection. Data rates for asynchronous operation are program-selectable in two jumper-selectable ranges (37.5 to 1200 and 300 to 19,200 bps).

Programming Support: Program support for the 4994 is the Host Loaded Yale ASCII Communications System (5798-RRJ). This program offering provides a down-stream load capability for the 4994 control unit program. This program support runs under VM/SP Rel. 2.1 or 3.0 (5664-167) in the host.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These contaminants may be found in certain industrial and general urban environments. This machine should be protected from hostile, ambient conditions. See *IBM 4994 ASCII Device Control Unit General Information Manual* (GA34-0282), for details.

Publications: *IBM Series/1 Customer Site Preparation Manual* (GA34-0050), *IBM 4994 ASCII Device Control Unit General Information Manual* (GA34-0282).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz):

  200V **#2732** 208V **#9902**
  220V **#2803** 240V **#9914**

- Power Cord: Standard power cord is 4.3 meters (14 feet), no specify required. Specify **#9986** for special 1.8 meter (6 foot) cord when required by local jurisdiction.
- Machine Nomenclature: English US only.
- Color Selection:

Willow Green	**#9060**	Classic Blue	**#9063**
Garnet Rose	**#9061**	Charcoal Brown	**#9064**
Sunrise Yellow	**#9062**	Pebble Gray	**#9065**

- Type of Distribution Channel: (Specify Only One)

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketers, systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: (Specify only one)

  - Industry Terminal Systems

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  - Industrial Automation

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

  #9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

  #9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management (FC/PM) licensed program.

  #9024 Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM licensed program.

  #9025 Facilities Management and Security: All other facilities management and security systems [except Controlled Access System (CAS)].

  #9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numeric control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators.

  - Communications

  #9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

  #9031 Front End Processors: For large systems.

  #9032 Front End Processors: For small and medium sized systems.

  #9033 Message Switching: Message routing and dispatching in a data communications network.

  #9034 Telephone Switching: Switching (PABX Control), call routing, and central office switching.

  #9035 Audio Store and Forward.

  #9039 Other Communications Applications: All other communications applications.

  - Scientific Computation

  #9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

  #9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

  - Business Data Processing

  #9070 Remote Job Entry: RJE or Remote Batch Terminal.

  #9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with Remote Job Entry/Batch functions.

  #9072 Distributed Processing - Host-Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

  #9073 Distributed Business Processing - Stand-Alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

  #9074 Business System - Small Account: Same as **#9073** but in new accounts or in enterprises with small or medium-sized systems only.

  #9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

  #9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

  #9079 Other Business Applications: All other business data processing applications.

  - Other Applications

  #9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

4994 ASCII Device Control Unit (cont'd)

- Application Unknown

#9096 Applications temporarily unknown: Specify within 15 days of order entry.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Connectors/Tools : For information on connectors and tools ... see "Accessories" in M4959 pages.

Device Attachment Cable (#2056): Asynchronous local attachment cable.

EIA Data Set Cable (#2057): EIA data set attachment.

S/370 Channel Cables: Not provided with the 4994. These cables (Cable Group **1800**) should be identified and ordered through Field Engineering and the marketing divisions when the 4331, 4341, 4361, or 4381 planning associated with the 4994 is accomplished. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for details.

SUPPLIES (None)

4997 RACK ENCLOSURE

PURPOSE

The 4997 is a rack mounting enclosure for Series/1 units.

MODELS

Model 1A	01A	1 meter (39.4 inches), plain covers
Model 1B	01B	1 meter (39.4 inches), decorative covers
Model 2A	02A	1.8 meters (70.1 inches), plain covers
Model 2B	02B	1.8 meters (70.1 inches), decorative covers

Limitations: 1 meter (39.4 inch) and 1.8 meter (70.1 inch) racks may not be mixed on a single system.

Prerequisites: Half-width units require the Rack Mounting Fixture (**#4540**). Two half-width units can fit into one fixture. See *System Selection Guide* (GA34-0143).

HIGHLIGHTS

The 4997 provides an EIA standard 19-inch rack type enclosure for mounting of Series/1 units. See *Customer Site Preparation Manual* (GA34-0050) for details. Mdl 1A allows for mounting of two full-width units. Dimensions are approximately 1 meter (39.4 inches) high, 750mm (29.5 inches) deep, and 610mm (24 inches) wide. All unused openings are covered with plain black aluminum covers. Mdl 1B is similar to 1A, but includes decorative covers over all unused spaces and is more suitable for areas of public display. Mdl 2A is supplied with three sets of support rails (fixed) but space is available for mounting four full-width units. Supplemental units to be mounted within the 4997 will require additional support rails. All unused openings are covered with plain black aluminum covers. Mdl 2B is similar to 2A, but also includes decorative covers over all unused spaces. Dimensions are approximately 1.8 meters (70.1 inches) high, 750mm (29.5 inches) deep, and 610mm (24 inches) wide. All mdls include primary power receptacle panel and instantaneous power off switch.

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.

  Note: The rack enclosure line cord is limited to 16 amperes. For detail power requirement, see *Customer Site Preparation Manual* (GA34-0050). In general, 115V AC 1-phase power will be limited to small systems such as mount on a 4997 mdl 1A or 1B.

- Power Cord: Standard power cord is 4.3 meters (14 feet), no specify required. Obtain special 1.8 meter (6 foot) cord when required by local jurisdiction, specify **#9986**.

- Rack Sequence: Specify **#9197** for first rack, **#9198** for subsequent rack. Unit location on 4997 is determined by IBM. For details, see *IBM Series/1 System Selection Guide* (GA34-0143). For special system configurations, submit RPQ. Relocation after delivery is billable CE service under Series/1 relocation plan.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Covers:

Plain 3.5 inch	B/M 6841313
Plain 5.25 inch	B/M 6841315
Plain 14 inch	B/M 6841314
Decorative 3.5 inch	B/M 6841318
Decorative 5.25 inch	B/M 6841316
Decorative 14 inch	B/M 6841317

Support Rails (Fixed):

Mdl 1	B/M 6841311
Mdl 2	B/M 6841312

Contact IBM for assistance in ordering accessories.

SUPPLIES (None)

4999 BATTERY BACKUP UNIT

PURPOSE

The 4999 provides battery backup for processor units in conjunction with user-supplied batteries and charger.

MODELS

Model 1	001	For processors operating on 100 to 123.5V AC, 50/60 Hz
Model 2	002	For processors operating on 200 to 235V AC, 50/60 Hz

Limitations: May not be used with 4952 mdl C, 4954 mdl C, 4956 mdl C, or 4965. For 4952 mdl B, 4954 mdl B, 4955 mdls E and F, and 4956 mdl B, maximum configuration support is 800 VA (corrected for power factor). Contact IBM for further information. May not be used with 4952 mdl A prior to serial number 50000 (EC 375810).

Prerequisites: Space in Rack Mounting Fixture (**#4540**). See "Accessories" in the M4959 pages. #1565 is required for 4955 with 4959 attached.

HIGHLIGHTS

The 4999 is a half-width unit designed for mounting on a 4997 or an EIA standard 19-inch rack enclosure using the Rack Mounting Fixture (**#4540**). It provides capability for battery takeover in case of power failure. Duration of battery support depends on processor loading and customer-supplied battery characteristics. The 4999 does not include battery or battery charger.

Publications: *4999 Battery Backup Unit Description* (GA34-0032).

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5010 PROCESSOR MODULE

PURPOSE

Provides the arithmetic, logic and control functions for System/7.

MODELS

Mdls	Storage (words)	
A2	2,048	Stand-alone
A4	4,096	Stand-alone
A6	6,144	Stand-alone
A8	8,192	Stand-alone
A10*	10,240	Stand-alone
A12*	12,288	Stand-alone
A14*	14,336	Stand-alone
A16*	16,384	Stand-alone
B2	2,048	1130 attach
B4	4,096	1130 attach
B6	6,144	1130 attach
B8	8,192	1130 attach
B10*	10,240	1130 attach
B12*	12,288	1130 attach
B14*	14,336	1130 attach
B16*	16,384	1130 attach
E16	16,384	Stand-alone
E20	20,480	Stand-alone
E24	24,576	Stand-alone
E28	28,672	Stand-alone
E32	32,768	Stand-alone
E36	36,864	Stand-alone
E40	40,960	Stand-alone
E44	45,056	Stand-alone
E48	49,152	Stand-alone
E52	53,248	Stand-alone

* Requires #7401 in 5026.

Limitations: Program preparation on configurations with 2K storage are not supported by IBM-supplied programming.

Prerequisites: The first module location in the 5026 Enclosure mdl A2, C3, or C6. A and B mdls with more than 8K of storage require Storage Power Addition (#7401) in the 5026 Enclosure ... see M5026 pages. #7401 is not required for E mdls. For E mdls replacing installed A or B mdls, or vice versa, an MES (lease) or RPQ (purchase) must be ordered for the proper 5026 Power Specify Code ... see M5026 pages. The B mdls require a Storage Access Channel (#7490) on the 1131 or a Storage Access Channel II (#7492) on an 1133.

HIGHLIGHTS

Uses binary arithmetic, fixed word length of 16 data bits plus two parity bits. Storage cycle time is 400 nanoseconds. Instructions are one or two words in length with full storage addressing. Standard features include 64 priority interrupts, including four interrupt levels with 16 sublevels, seven index registers, one accumulator, and one instruction address register per interrupt level, two interval timers, and an interface for the 5028 Operator Station. The 5010 Processor Module includes a read-only Tape Cassette Recorder attachment and associated connection cable (P/N 2703633). The attachment provides the capability to IPL and program load either Diagnostic Programs or the Disk Support System (DSS/7) (5707-SC2) from a tape cassette recorder (Norelco mdl 1420 or equivalent).

The A and E mdls have an Aysnchronous or Binary Synchronous Communications Adapter as an optional feature. This circuitry provides the capability for initial program load of the System/7 from a remote system with no resident program in the System/7. The B mdls have an interface for connection to an 1130 System as a standard feature.

Publications: *System/7 Summary* (GA34-0002).

SPECIFY

- Voltage: Voltages are specified for the 5026 Enclosure mdls. See M5026 pages.
- For the location of the Modules in the system: Specify one of the following.

  #9141: Where location of all I/O Modules are to be determined at the plant. Specify **#9143** if I/O Modules cannot be used.

  #9142: Where location of all I/O Modules are specified by the customer. Specify **#9143** must be used in each I/O Module order.

  #9144: For shipment without mounting in an enclosure.
- For identification of major application: Specify **#9XXX** on all mdls. See "Special Features" for identifier code. No-charge feature.
- System Control Programs: Must be ordered prior to Order Confirmation (OC) time.
- Cables: Use cable order form number Z120-2498.

SPECIAL FEATURES

Asynchronous Communications Control (#1610): [Mdls A, E] Provides control circuits for one asynchronous communications line adapter. #1610 is used for communication with S/360 and S/370 (via 2701, 2702, 2703, 3704, 3705), S/370 mdl 115 with Integrated Communications Adapter (#4640), S/370 mdl 125 with Integrated Communications Adapter (#4640), S/370 mdl 135 with Integrated Communications Adapter (#4640). **Note:** See the 3704 and 3705 Machines and Programming pages for attachment capability. Also see the host system Programming pages for possible restrictions to the above.

Data transmission is serial by bit using start/stop method of character and bit synchronization. The IBM PTTC/EBCD code is used. Point-to-point or multidrop transmission at speeds of 134.5 or 600 bps (14.8 or 66.7 characters per second) are available. Speed changes can be made in the field. Line control characters are identical to 2740 mdl 1. Line control characters are used in a manner similar to 2740 mdl 1, with error checking. See *IBM System/7 Functional Characteristics* (GA34-0003), for exact description of use. Communication Control provides the capability to load a program from the communication network into System/7 with no resident program in System/7 (remote IPL). For information on communications facilities, see M2700 pages. **Limitations:** Cannot be installed with Binary Synchronous Communications Adapter (#2074). **Maximum:** One #1610 per system. **Field Installation:** Yes.

Bi-Sync Control (BSCA) (#2074): [Mdls A ,E] Provides circuitry for one binary synchronous communications adapter. This feature is used for communications with S/370, another System/7 with BSCA (#2074), or a System/3 mdl 4, 6, 8, 10, 12, or 15 with BSCA, or a System/32 with BSCA (#2074) (switched or nonswitched point-to-point only), a System/34 with its Communications Adapter (switched or nonswitched point-to-point only), a System/3 mdl 8, 10, 12, or 15 with BSCA and EIA Local Attachment (#3601 or #3602), or a System/3 mdl 6, 10, or 15 with Local Communications Adapter (LCA) (#4765), or a System/3 mdl 8 or 12 with Integrated Communications Adapter (ICA) (#4645) or ICA-Local Interface, or a System/3 mdl 8 with ICA or BSCA. Data transmission is half-duplex over 2- or 4-wire circuits using binary synchronous line control. Data transfer on point-to-point (switched or nonswitched) and multipoint configurations are supported. In multipoint configurations, System/7 operates as a tributary station. On point-to-point networks System/7 functions as a processor terminal. Transmission codes supported are EBCDIC and ASCII, software controlled. Transparent mode is standard in the BSCA, but allowed only in EBCDIC. Control circuitry provides the capability for IPL of the System/7 from a remote system with no resident program in the System/7. Control of the IPL sequence is by the remote system. IPL can be accomplished on point-to-point switched and multipoint configurations and requires the use of transparent EBCDIC transmission code.

Local Attachment to System/3: Point-to-point nonswitched communication is also provided with the System/3 BSCA-EIA-Local, LCA, or ICA-Local.

S/3 Mdl	BSCA-EIA-Local LCA (#4765) Speed(bps)	(#3601, #3602) Speed(bps)	ICA (#4645) Speed(bps)
6	2400	N/A	N/A
8	N/A	2400, 4800, 8000	2400, 8000
10	2400	2400, 4800, 8000	N/A
12	N/A	2400, 4800, 8000	2400, 8000
15	2400	2400, 4800, 8000	N/A

For local attachment to a System/3 BSCA-EIA-Local, ICA-Local, or LCA, an appropriate cable order is required. *Installation Manual - Physical Planning* (GA34-0004), includes cable description and ordering information. **Limitations:** Cannot be installed with Asynchronous Communications Control (#1610), support as a multipoint central system is not provided. **Maximum:** One #2074 per system. **Field Installation:** Yes. **Prerequisites:** 5010 mdl A6 or larger, or mdl E16 or larger.

Common Carrier Adapter (#2165): [Mdls A, E] Provides interface to an external modem meeting EIA standard RS-232-C. The interface lines provided are Transmitted Data, Received Data, Request to Send, Clear to Send, Data Set Ready, Data Terminal Ready, Signal Ground and Protective Ground. **Limitations:** Cannot be used with Line Adapter (#4750, #4751 or #4752). **Maximum:** One per #1610. **Field Installation:** Yes. **Prerequisites:** #1610.

Cycle-Steal Basic (#2662): Provides a path between 5010 main storage for the 5022 Disk Storage Module, equipped with companion cycle-steal attachment, Disk Cycle-Steal (#2664). **Maximum:** One per 5010. **Field Installation:** Yes. **Prerequisites:** Mdl A4 or larger, mdl B4 or larger, or mdl E16 or larger. Required for 5998-T01, 3340 Attachment.

5024 Attachment Feature (#4115): [Mdl E] Provides a path between 5010E main storage for the 5024 I/O Attachment to enclosure. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500 or #5501) or with S/360/370 Channel Attach (RPQ D08112).

5010 Processor Module (cont'd)

Other 5010E RPQs must be submitted for review. **Maximum:** One per 5010E. **Field Installation:** Yes.

Internal Clock (#4703): [Mdls A, E] Provides BSCA clocking when modems do not provide clock pulses. Speed options are 1200, 2000, and 2400 bps which are hardware selectable. **Limitations:** Not available with Line Interface Type 1G (#4805). Do not use if System/7 is to interface to a System/3 mdl 8, 10, 12, or 15 BSCA-EIA-Local Attachment (#3601, 3602) or a System/3 mdl 6, 10, or 15 Local Communications Adapter (#4765), or a System/3 mdl 8 or 12 Integrated Communications Adapter (#4645). **Maximum:** One per #2074. **Field Installation:** Yes. **Prerequisites:** #2074.

Line Adapter, Limited Distance Type 2B (#4750): [Mdls A, E] A limited distance type 2B modem for 2-wire use up to 13 wire-km (8.25 wire-miles) at speeds of 134.5 or 600 bps. Point-to-point or multipoint communication facilities can be used. See Line Adapter Limited Distance Type 2B in GA24-3435 for specifications and requirements. **Limitations:** Cannot be used with Line Adapters (#4751 or #4752) or Common Carrier Adapter (#2165). **Maximum:** One per #1610. **Field Installation:** Yes. **Prerequisites:** #1610.

Line Adapter, Leased Line Type 1A (#4751): [Mdls A, E] A leased line type 1A modem for 2-wire unlimited distance use at speeds of 134.5 or 600 bps. Only point-to-point communications facilities can be used. See Line Adapter Leased Line Type 1A in GA24-3435 for specifications and requirements. **Limitations:** Cannot be used with Line Adapters (#4750 or #4752) or Common Carrier Adapter (#2165). **Maximum:** One per #1610. **Field Installation:** Yes. **Prerequisites:** #1610.

Line Adapter, Leased Line Type 1B (#4752): [Mdls A, E] A leased line type 1B modem for 4-wire unlimited distance use at speeds of 134.5 or 600 bps. Point-to-point or multipoint communications facilities can be used. See Line Adapter Leased Line Type 1B in GA24-3435 for specifications and requirements. **Limitations:** Cannot be used with Line Adapters (#4750 or #4751) or Common Carrier Adapter (#2165). **Maximum:** One per #1610. **Field Installation:** Yes. **Prerequisites:** #1610.

Line Interface Type 1D (#4800): [Mdls A, E] Provides a low- and medium-speed interface to permit operation with external modems that comply with the EIA RS-232-C standard and with System/3 mdl 8, 10, 12, 15 with BSCA and EIA Local Attachment (#3601, #3602), or a System/3 mdl 6, 10, or 15 with Local Communications Adapter (#4765), or System/3 mdl 8 or 12 with Integrated Communications Adapter (#4645). Modems of this type operate on switched or nonswitched facilities up to 2400 bps and over nonswitched facilities at up to 7200 bps. Auto-answer capability is supported. **Limitations:** Cannot be installed with Line Interface Type 1G (#4805) or 1200 bps Integrated Modem (#5500, 5501). **Maximum:** One per #2074. **Field Installation:** Yes. **Prerequisite:** #2074.

Line Interface Type 1G (#4805): Mdls A and E operating up to 50.0K bps max. Provides a high-speed interface for stand-alone modems operating on a wide band interface. Modems of this type operate at speeds of 10,000 bps and higher only on nonswitched lines. **Maximum:** One per #2074. **Limitations:** Cannot be installed with #4800, #5500, #5501. Internal Clock (#4703) is not available with this feature. Will not interface to S/370 mdl 135, Integrated Communications Adapter (#4640). **Field Installation:** Yes. **Prerequisites:** #2074.

1200 bps Integrated Modem, Leased (#5500): [Mdls A, E] Provides one 1200 bps Integrated Modem which is suitable for communication over facility D5 with another 1200 bps Integrated Modem. **Limitations:** Cannot be installed with #4115, #4800, #4805, or #5501; Will not interface to S/370 mdl 135 Integrated Communications Adapter (#4640). **Maximum:** One per #2074. **Field Installation:** Yes. **Prerequisites:** #2074, #4703.

1200 bps Integrated Modem, Switched (#5501): [Mdls A, E] Provides one 1200 bps Integrated Modem which is suitable for communication over facility C4 with another 1200 bps Integrated Modem. **Note:** Attachment to the switched network is via FCC registered protective circuitry of the CBS Type (or equivalent) provided by the user. This adapter includes the automatic answer capability. **Limitations:** Cannot be installed with #4115, #4800, #4805, or #5500. Will not interface to S/370 mdl 135 Integrated Communications Adapter (#4640). **Maximum:** One per #2074. **Field Installation:** Yes. **Prerequisites:** #2074, #4703.

IBM Modems that can be attached:

2400 bps:	3863
	3868 mdl 1
	3872
4800 bps:	3864
	3868 mdl 2
9600 bps:	3865
	3868 mdl 3/4

For Communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3865, and 3872.

BSCA Communications Facilities:

Speed (bps)	*BSCA Features*
1200	#4800, #5500, #5501, #4703
2000	#4800, #4703
2400	#4800, #4703
4800	#4800
7200	#4800
19.2K	#4805
40.8K	#4805
50.0K	#4805

System/7 Application Identifier Codes: Specify codes have been added to the 5010 Processor Unit. These are no-charge features which identify the major application on the system.

Processing Unit - major applications on order in the account. Identifier **9XXX** all mdls.

Code	Feature (Application)
#9001	Data Collection
#9002	Telephone Data Entry
#9003	Power Management
#9004	Message Switching
#9005	Other TP Applications
#9006	CAS
#9007	Testing/Monitoring
#9008	Process Control
#9009	Lab. Applications
#9010	Stand-alone Scientific
#9011	Maritime
#9012	TTS/TR
#9013	CAMA
#9014	ACLR
#9015	ACDMS

Maximum: Only one code per 5010 can be specified.

MODEL CONVERSIONS

Conversions within mdls A, B or E are field installable. Replacement of A or B mdls with E mdls requires a 5026 MES to remove code #7401 or **#9490** on both and add code **#9491** (see M5026 pages). Conversions from A or B mdl to E mdl (and vice versa) within a 5010 cannot be field installed. Conversions from A mdl to B mdl (and vice versa) are not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

5012 MULTIFUNCTION MODULE

PURPOSE

To provide digital/input output, analog input/output, and 2790 control on System/7.

MODELS

Model A01

Maximum Configuration: The total number of input/output modules (5012, 5013, 5014, and 5022 in any combination) per system cannot exceed 11.

Prerequisites: One module location in a 5026 Enclosure model A2, C3, C6, D3, or D6.

HIGHLIGHTS

Provides capability for:

- Attachment of a 2790 Control.
- Up to 128 digital input points.
- Up to 32 isolated process interrupt points.
- Up to 64 digital output points.
- Up to 32 differential analog input points.
- Up to 2 isolated analog output points.

2790 Control: Provides the required logical interface for attachment of 2790 Data Communication devices to System/7. This allows System/7 to act as the "system controller" for 2791/2793 Area Stations or 2792 Remote Communication Controller. The 2790 Control allows transmission of data between System/7 and 2791/2793 Area Stations, 2795/2796/2797 Data Entry Units, and 2798 Guidance Display Units. Transmission rate is approximately 500,000 bits per second (900 characters per second). The combined number of 2791/2793s and 2792 mdl 1s on each 5012 or 5013 may not exceed 16. **Maximum:** Four 2790 Controls per system, one per 5012 Multifunction Module.

Digital Input: Provides up to eight groups of 16 digital input points. Either isolated or non-isolated digital input groups are available. Each digital input point is a voltage or contact sense, 2-terminal circuit. Each group can be program controlled for latching or non-latching operation. Any one of the eight groups may be read under direct program control. The first two groups of digital inputs may be converted to process interrupt points through the addition of the Process Interrupt feature.

Process Interrupt: An interrupt-on-change feature is offered on the first two groups of digital inputs. This feature provides the capability to compare the input of 16-bit groups against a program-loadable 16-bit register and initiate an interrupt on either an equal or unequal comparison.

Digital Output: Provides up to four groups of 16 digital output points. Each digital output point may be set or reset under program control. Each digital output group may be one of the following circuit types: low power, medium power, medium power non-isolated, or contact output. Low power output provides switching with a maximum rating of 6 volts at 4 milliamps. Medium power and medium power non-isolated operate up to 48 volts at 450 milliamps. Contact output provides a Form A mercury-wetted relay contact rated at 125V DC max., or 88V AC rms max., 2A AC rms max. The product of peak voltage and peak current must not exceed 100 (100VA maximum). Digital outputs operate under direct program control. Medium power and contact output points are isolated and may be directly connected to the standard digital input points. This provides the capability for wrap-around testing and multiplexing of digital and analog inputs with digital output points.

Analog Input: Provides up to eight groups of four differential analog input points. A multiplexer connects each point to an analog-to-digital converter which is capable of converting voltage signals, in the range of +/- 10 millivolts to +/- 5.12 volts full-scale, into binary values of 14 bits plus sign. Either an amplifier with a unit gain or an automatic multirange amplifier must be selected. The unity gain or high level amplifier provides a full-scale range of +/- 5.12 volts. The multirange amplifier provides full-scale ranges (plus or minus) of 10mV, 20mV, 40mV, 80mV, 160mV, 640mV, and 5.12 volts. Analog input is under direct program control. Immediate and external synchronization operations are both available. Two analog scanning rates are provided, #5246 uses a mercury-wetted relay multiplexer operating at a scanning rate of up to 200 points per second. #5248 uses a solid state multiplexer operating at scanning rates up to 20,000 points per second, depending on the level of the input signal and mode of operation. For thermocouple operations, resistance bulb thermometer (RBT) termination cards are available to be used for measurement of the reference junction temperature. **Limitations:** All of the 32 analog input points must use the same type of multiplexer in each multifunction module. The RBT capability is available only on the multirange amplifier.

Analog Ouput: Provides one or two isolated analog output voltages. The output signal has a polarized full-scale range from 0 to 10.24 volts, with a resolution of 10 bits and an accuracy of +/- 0.15% of full scale. Polarity of the output signal depends on the side of the isolated output that is grounded. Analog output operates under direct program control at a rate of 25 kHz (including amplifier settling time).

Attachment Accessories: A customer access area is provided in the back of every I/O Module. Termination cards and connectors can be installed in this area to provide for connecting customer signals to the System/7 I/O interface. For detailed information, see "5029 Attachment Accessories for System/7" in M5029 pages.

Publications: *System/7 Summary* (GA34-0002), *System/7 Installation Manual - Physical Planning* (GA34-0004).

SPECIFY

- Housing: For location of the 5012 I/O Module, specify as follows. If feature **#9141** was specified on the 5010, do not specify the following:

  #9143: Also enter the desired module location number in the quantity column of the order form. See "Module Locations" table in M5026 pages. Specify **#9142** in M5010 pages.

  #9144: For shipment without mounting in an enclosure (spare).

- Side Panels: Customer's signal wires enter through the rear side panels of the module. Three types of side panels are available: Type 1 provides a slot for cables, Type 2 has individual holes for each pair of wires, and Type 3 is a blank panel that can be customized by the customer. Separate side panels are used for digital and analog input signal wires. For details, refer to *System/7 Installation Manual - Physical Planning* (GA34-0004).

  For digital input/output specify one: **#9501** for Side Panel Digital Type 1, **#9502** for Side Panel Digital Type 2, or **#9503** for Side Panel Digital Type 3.

  For analog input specify one: **#9511** for Side Panel Analog Type 1, **#9512** for Side Panel Analog Type 2, or **#9513** for Side Panel Analog Type 3.

- 2790 Control (#8195): When #8195 is ordered on 5012 specify: **#9444** (Multiloop Device) for each new 5012 in a multiloop system. **Note:** When upgrading from a single loop system, **#9444** must be ordered on MES for the installed 5012 which contains #8195. It must also be ordered on MES for any 5013 which has #8195.

SPECIAL FEATURES

Amplifier High Level B (#1210): Provides a unity gain amplifier for high level analog input with a full-scale range of +/- 5.12 volts. **Limitations:** Cannot be ordered with Amplifier Multirange B (#1215). **Maximum:** One per #1232. **Field Installation:** Yes. **Prerequisites:** #1232.

Amplifier High Level C (#1211): Provides a unity gain amplifier for high level analog input with a full-scale range of +/- 5.12 volts. **Limitations:** Cannot be ordered with Amplifier Multirange C (#1216). **Maximum:** One per #1213. **Field Installation:** Yes. **Prerequisites:** #1213.

Analog Input Control Mdl C (#1213): Provides control and analog-to-digital conversion for an amplifier and eight groups of solid state multiplexers. Multiplexer scanning rate is up to 14,000 points per second for low level signals, and up to 20,000 points per second for high level inputs. For auto-ranging mode, maximum scanning rate is 7,000 points per second. **Limitations:** Cannot be ordered with Analog Input Control Mdl B (#1232). **Maximum:** One per #1221. **Field Installation:** Yes. **Prerequisites:** #1221.

Amplifier Multirange B (#1215): Provides a multirange amplifier for analog input signals. Full-scale ranges (plus or minus) of 10mV, 20mV, 40mV, 80mV, 160mV, 640mV, and 5.12 volts can either be preset under program control or automatically selected during the conversion process. With preset gains, a resolution of 14 bits plus sign is obtained. With auto-ranging, a resolution of 12 bits plus sign and three bits for gain indication is obtained. **Limitations:** Cannot be ordered with Amplifier High Level B (#1210). **Maximum:** One per #1232. **Field Installation:** Yes. **Prerequisites:** #1232.

Amplifier Multirange C (#1216): Provides a multirange amplifier for analog input signals. Full-scale ranges (plus or minus) of 10mV, 20mV, 40mV, 80mV, 160mV, 640mV, and 5.12 volts can either be preset under program control or automatically selected during the conversion process. With preset gains, a resolution of 14 bits plus sign is obtained, while auto-ranging provides a resolution of 12 bits plus sign and 3 bits gain indication. **Limitations:** Cannot be ordered with Amplifier High Level C (#1211). **Maximum:** One per #1213. **Field Installation:** Yes. **Prerequisites:** #1213.

Analog Basic (#1221): Provides the basic analog capability within the 5012. **Maximum:** One per 5012. **Field Installation:** Yes.

Analog Input Control Mdl B (#1232): Provides control and analog-to-digital conversion for an amplifier and eight groups of mercury-wetted relay multiplexers. Multiplexing is at a maximum scanning rate of 200 points per second. **Limitations:** Cannot be ordered with Analog Input Control Mdl C (#1213). **Maximum:** One per #1221. **Field Installation:** Yes. **Prerequisites:** #1221.

5012 Multifunction Module (cont'd)

Analog Output Control (#1245): Provides control for one or two Analog Output Points (#1246). **Maximum:** One per #1221. **Field Installation:** Yes. **Prerequisites:** #1221.

Analog Output Point (#1246): Provides a 0 to 10.24 volts isolated output signal. Polarity of the signal depends on the side of the signal that is grounded. **Maximum:** Two per #1245. **Field Installation:** Yes. **Prerequisites:** #1245 and customer signal connection. See M5029 pages.

Digital Input Control (#3284): Provides control for up to four digital inputs #3289 or #3292. **Maximum:** Two per 5012. **Field Installation:** Yes.

Digital Input Group (#3289): Provides 16 latching or non-latching digital input voltage or contact points. The voltage or contact and the isolation capability of each point is determined by the termination card used. **Maximum:** Four #3289s or #3292s in any combination per #3284. **Field Installation:** Yes. **Prerequisites:** #3284 and customer signal connection. See M5029 pages.

Digital Input Non-Isolated (#3292): Provides 16 latching or non-latching points of contact sense capabiltity. Input signals are referenced to frame ground. **Limitations:** Cannot be modified by Process Interrupt (#5710). **Maximum:** Four #3289s or #3292s in any combination per #3284. **Field Installation:** Yes. **Prerequisites:** #3284 and customer signal connection. See M5029 pages.

Function (max., one per group)	**1st Digital Input Control (#3284)** 1st Group	2nd Group	3rd Group	4th Group
Digital Input Isolated	#3289	#3289	#3289	#3289
Process Interrupt Isolated	#3289 and #5710	#3289 and #5710	N/A	N/A
Digital Input Non-Isolated	#3292	#3292	#3292	#9292
Process Interrupt Non-Isolated	N/A	N/A	N/A	N/A

Function (max., one per group)	**2nd Digital Input Control (#3284)** 5th Group	6th Group	7th Group	8th Group
Digital Input Isolated	#3289	#3289	#3289	#3289
Process Interrupt Isolated	N/A	N/A	N/A	N/A
Digital Input Non-Isolated	#3292	#3292	#3292	#3292
Process Interrupt Non-Isolated	N/A	N/A	N/A	N/A

Digital Output Control (#3296): Provides control for up to four groups of digital outputs (#3420, #3421, #3422, #3424) in any combination. **Maximum:** One per 5012. **Field Installation:** Yes.

DO Contact Group (#3420): Provides 16 isolated single-pole Form A mercury-wetted relay contacts rated at 125V DC max., or 88V AC rms max., 2A AC rms max. The product of peak voltage and peak current must not exceed 100 (100VA maximum). **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

DO Low Power Group (#3421): Provides 16 low power (4mA, 6V) digital output points. A user power supply is not required. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

DO Medium Power Group (#3422): Provides 16 isolated medium power solid state digital output switches. Power up to 48V DC and 450mA must be provided by the user. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

DO Medium Power Non-Isolated (#3424): Provides 16 non-isolated medium power (0mA at 5.5V to 12mA at 2.4V supplied by IBM) solid state digital output switches. Output signals are referenced to frame-ground. Customer-powered loads up to 450mA at 52.8V DC can be switched. **Maximum:** Four #3420s, 3421s, 3422s, 3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

Multiplexer/MR4 (#5246): Provides a group of four mercury-wetted relay multiplexer points for analog input signals. Multiplexing is at a maximum rate of 200 points per second. Signals may be in the range of 0 to +/- 5.12 volts. **Maximum:** Eight per #1210 or #1215. **Field Installation:** Yes. **Prerequisites:** #1210 or #1215, and customer signal connection. See M5029 pages.

Multiplexer/MS4 (#5248): Provides a group of four solid state multiplexer points for analog input signals. Multiplexing is at a maximum scanning rate of 20,000 points per second. Signals may be in the range of 0 to +/- 5.12 volts. **Maximum:** Eight per #1211 or #1216. **Field Installation:** Yes. **Prerequisites:** #1211 or #1216, and customer signal connection. See M5029 pages.

Process Interrupt (#5710): Converts a Digital Input Group (#3289) to a process interrupt group. **Limitations:** #5710 cannot be installed on Digital Input Non-Isolated (#3292). **Maximum:** Two per 5012. Can only be used with the first two groups of Digital Input Group (#3289) in a 5012. **Field Installation:** Yes. **Prerequisites:** #3289.

Temperature Reference Attachment (#7830): Provides the capability to attach termination cards containing resistance bulb thermometers for determining the reference junction temperatures in thermocouple applications. See M5029 pages. **Maximum:** one per #1221. **Field Installation:** Yes. **Prerequisites:** #1215 or #1216, and customer signal connection. See M5029 pages.

2790 Control (#8195): Interface for 2790 Data Communication devices. For 2790 devices supported by programming, see MSP/7 in programming pages. **Limitations:** Online diagnostics are available for maintenace of the 2790 - System/7 and must be implemented on all systems which include a 2792 or have more than 16 area stations. See "System/7 Macro Library/Relocatable", PP 5707-AC1, in programming pages. All 5012 and 5013 modules with 2790 Control (#8195) must reside within the same 5026 Enclosure, mdl C or D. **Maximum:** One per 5012, four per System/7. MSP/7 provides support for a maximum of four 2792 mdl 1s (up to two per 2790 Control) or a maximum of 64 2791/2792 mdl 1/2793s (16 per 2790 Control). **Field Installation:** Yes. **Prerequisites:** Customer signal connection required, see 5029.

MODEL CONVERSIONS (None)

ACCESSORIES

Attachment Accessories: A customer access area is provided in the back of every I/O module. Termination cards and connectors can be installed in this area to provide for connecting customer signals to the System/7 interface. Cards and connectors are provided as accessories in the 5029. For details, see "5029 Attachment Accessories for System/7" in M5029 pages.

SUPPLIES (None)

5013 DIGITAL INPUT/OUTPUT MODULE

PURPOSE

To provide digital input/output, expansion capability for custom products, and 2790 control on a System/7.

MODELS

Model A01

Prerequisites: One module location in a 5026 Enclosure mdl A2, C3, C6, D3, or D6.

Maximum Configuration: The total number of Input/Output Modules (5012, 5013, 5014, and 5022 in any combination) per system may not exceed 11.

HIGHLIGHTS

Designed specifically to provide expansion capability for applications that require custom products along with digital input/output and 2790 control.

Provides capability for:

- Expansion for custom products.
- Attachment of a 2790 Control.
- Up to 128 digital input points.
- Up to 32 isolated process interrupt points.
- Up to 64 digital output points.

Expansion Capability: Provides the space, power, and logical interface to attach various custom products to the System/7. Refer to *System/7 Custom Product Marketing Guide* for available custom features or contact IBM.

2790 Control: Provides the required logical interface for attachment of 2790 Data Communication devices to System/7. This allows System/7 to act as the "system controller" for 2791/2793 Area Stations or 2792 Remote Communication Controller. The 2790 Control allows transmission of data between System/7 and the 2791/2793 Area Stations, 2795/2796/2797 Data Entry Units, and 2798 Guidance Display Units. Transmission rate is approximately 500,000 bits per second (900 characters per second). The combined number of 2791/2793s and 2792 mdl 1s on each 5012 or 5013 may not exceed 16. **Maximum:** Four 2790 Controls per system, one per 5013 Digital Input/Output Module.

Digital Input: Provides up to eight groups of 16 digital input points. Either isolated or non-isolated digital input groups are available. Each digital input point is a voltage or contact sense, 2-terminal circuit. Each group can be program-controlled for latching or non-latching operation. Any one of the eight groups may be read under direct program control. The first two groups of digital inputs may be converted to process interrupt points through the addition of the Process Interrupt feature.

Process Interrupt: An "interrupt-on-change" feature is offered on the first two groups of digital inputs. This feature provides the capability to compare the input of the 16-bit groups against a program-loadable 16-bit register and initiate an interrupt on either an equal or unequal comparison.

Digital Output: Provides up to four groups of 16 digital output points. Each digital output point may be set or reset under program control. Each digital output group may be one of the following circuit types: Low power, medium power, medium power non-isolated, or contact output. Low power output provides switching with a maximum rating of 6 volts at 4 milliamps. Medium power and medium power non-isolated operate up to 48 volts at 450 milliamps. Contact output provides a Form A mercury-wetted relay contact rated at 125V DC max., or 88V AC rms max., 2A AC rms max. The product of peak voltage and peak current must not exceed 100 (100VA maximum). Digital outputs operate under direct program control. Medium power and contact output points are isolated and may be directly connected to the standard digital input points. This provides the capability for wrap-around testing and multiplexing of digital and analog inputs with digital output points.

Publications: *System/7 Summary* (GA34-0002), *IBM System/7 Installation Manual - Physical Planning* (GA34-0004).

SPECIFY

- Housing: For location of the 5013, specify as follows. If feature **#9141** was specified on the 5010, do not use the following specify features.

  #9143: Also enter the desired module location number, in the quantity column of the order form. See "Module Locations" table under "Models", in the M5026 pages. Specify **#9142** in the 5010 Processor Module.

  #9144: For shipment without mounting in an enclosure (spare).

- Side Panels: Customer's signal wires enter through the rear side panels of the module. Three types of side panels are available: Type 1 provides a slot for cables, Type 2 has individual holes for each pair of wires, Type 3 is a blank panel that can be customized by the customer. Separate side panels are used for digital and analog input signals. For details, refer to *IBM System/7 Installation Manual - Physical Planning* (GA34-0004). For Digital Input/Output specify one: **#9501** for Side Panel Digital Type 1, **#9502** for Side Panel Digital Type 2, **#9503** for Side Panel Digital Type 3.
- 2790 Control: When 2790 Control (#8195) is ordered on 5013, specify **#9444** (Multiloop Device) for each new 5013 in a multiloop system. **Note:** When upgrading from a single loop system, **#9444** must be ordered on MES for the installed 5013 which contains #8195. It must also be ordered on MES for any 5012 which has #8195.

SPECIAL FEATURES

Digital Input Control (#3284): Provides control of up to four Digital Input (#3289 or #3292) groups. **Maximum:** Two per 5013. **Field Installation:** Yes.

Digital Input Group (#3289): Provides 16 latching or non-latching digital input voltage or contact points. The voltage or contact and the isolation capability of each point is determined by the termination card used. **Maximum:** Four #3289 or #3292 in any combination per #3284. **Field Installation:** Yes. **Prerequisites:** #3284 and customer signal connection required. See M5029 pages.

Digital Input Non-Isolated (#3292): Provides 16 latching or non-latching points of contact sense capability. Input signals are referenced to frame ground. **Limitations:** Cannot be modified by Process Interrupt (#5710). **Maximum:** Four #3289 or #3292 in any combination per #3284. **Field Installation:** Yes. **Prerequisites:** #3284 and customer signal connection. See M5029 pages.

Function (max., one per group)	**1st Digital Input Control (#3284)**			
	1st Group	2nd Group	3rd Group	4th Group
Digital Input Isolated	#3289	#3289	#3289	#3289
Process Interrupt Isolated	#3289 and #5710	#3289 and #5710	N/A	N/A
Digital Input Non-Isolated	#3292	#3292	#3292	#9292
Process Interrupt Non-Isolated	N/A	N/A	N/A	N/A

Function (max., one per group)	**2 nd Digital Input Control (#3284)**			
	5th Group	6th Group	7th Group	8th Group
Digital Input Isolated	#3289	#3289	#3289	#3289
Process Interrupt Isolated	N/A	N/A	N/A	N/A
Digital Input Non-Isolated	#3292	#3292	#3292	#3292
Process Interrupt Non-Isolated	N/A	N/A	N/A	N/A

Digital Output Control (#3296): Provides control for up to four groups of Digital Outputs (#3420, #3421, #3422, #3424) in any combination. **Maximum:** One per 5013. **Field Installation:** Yes.

DO Contact Group (#3420): Provides 16 isolated single-pole Form A mercury-wetted relay contacts rated at 125V DC max., or 88V AC rms max., 2A AC rms max. The product of peak voltage and peak current must not exceed 100VA maximum. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

DO Low Power Group (#3421): Provides 16 low power (4mA, 6V) digital output points. A user power supply is not required. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

DO Medium Power Group (#3422): Provides 16 isolated medium power solid state digital output switches. Power, up to 48V DC, and 450mA, must be provided by the user. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #3296. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

5013 Digital Input/Output Module (cont'd)

DO Medium Power Non-Isolated (#3424): Provides 16 non-isolated medium power (0mA at 5.5V to 12mA at 2.4V supplied by IBM) solid state digital output switches. Output signals are referenced to frame-ground. Customer-powered loads up to 450mA at 52.8V DC can be switched. **Maximum:** Four #3420s, #3421s, #3422s, #3424s in any combination per #2396. **Field Installation:** Yes. **Prerequisites:** #3296 and customer signal connection. See M5029 pages.

Process Interrupt (#5710): Converts a Digital Input Group (#3289) to a process interrupt group. **Limitations:** #5710 cannot be installed on Digital Input Non-Isolated (#3292). **Maximum:** Two per 5013. Can only be used with the first two groups of Digital Input Group (#3289) in a 5013. **Field Installation:** Yes. **Prerequisites:** #3289.

2790 Control (#8195): Interface for 2790 Data Communication devices. For 2790 devices supported by programming, see MSP/7 in programming pages. **Limitations:** Online diagnostics are available for maintenance of the 2790 - System/7 and must be implemented on all systems which include a 2792 or have more than 16 area stations. See "System/7 Macro Library/Relocatable", PP 5707-AC1, in programming pages. All 5012 and 5013 modules with 2790 Control (#8195) must reside within the same 5026 Enclosure mdl C or D. **Maximum:** One per 5013, four per System/7. MSP/7 provides support for a maximum of four 2792 mdl 1s (up to two per 2790 control) or a maximum of 64 2791/2792 mdl 1/2793s (16 per 2790 control). **Field Installation:** Yes. **Prerequisites:** Customer signal connection. See M5029 pages.

MODEL CONVERSIONS (None)

ACCESSORIES

Attachment Accessories: Termination cards and connectors for customer signal wires are provided as accessories. For details, see M5029 pages.

SUPPLIES (None)

5014 ANALOG INPUT MODULE

PURPOSE

To provide System/7 with the capability to use voltage signals as input data. The 5014 Analog Input Module provides capability for up to 128 analog input points.

MODELS

Model B1	B01	Scanning rate up to 200 points per second.
Model C1	C01	Scanning rate up to 20,000 points per second.
Model D1	D01	Scanning rate up to 100 points per second.
Model E1	E01	Expander for 5014 model D1.
Model E2	E02	Expander for 5014 model B1.

Limitations: The first mdl E1 must be located directly under its associated mdl D1. The second mdl E1 must be located directly under the first mdl E1. The first mdl E2 must be located directly under its associated mdl B1. The second mdl E2 must be located directly under the first mdl E2.

Maximum Configuration: Total number of Input/Output Modules (5012, 5013, 5014, 5022, and customer product modules in any combination) per system cannot exceed 11.

Prerequisites: One module location in 5026 Enclosure mdl A2, C3, C6, D3, or D6.

HIGHLIGHTS

Provides analog input capability including multiplexing, amplification, and analog-to-digital conversion.

Model Descriptions:

Mdl B1: Provides amplification, analog-to-digital conversion, and addressing of 128 analog input points at a scanning rate up to 200 points per second using mercury-wetted relay multiplexers. A special feature provides addressing for an additional 256 points in two attached mdl E2s (total 384 points).

Mdl C1: Provides amplification, analog-to-digital conversion, and addressing of 128 analog input points at a scanning rate up to 20,000 points per second using solid state multiplexers. The maximum scanning rate is dependent upon the input signal level and mode of operation. Low level signals may be scanned at a maximum rate of 14,000 points per second. High level signals may be scanned at a maximum rate of 20,000 points per second. Maximum scanning rate with auto-ranging is 7,000 points per second.

Mdl D1: Provides amplification, analog-to-digital conversion, and addressing of 384 analog input points at a scanning rate up to 100 points per second using mercury-wetted relay or dry-contact relay multiplexers. The first 128 points of relay multiplexers are installed in the mdl D1. The second 128 points of relay multiplexers are installed in a mdl E1 attached to the mdl D1. The third 128 points of relay multiplexers are installed in a mdl E1 attached to the first mdl E1.

Mdl E1: Expansion mdl for mdl D1. Provides for 128 analog input points selected by mercury-wetted relay or dry-contact relay multiplexers. It is connected to and uses the amplification, analog-to-digital conversion, and addressing circuits of a mdl D1. The maximum scanning speed is the same as the mdl D1 (100 points per second). **Limitations:** The first mdl E1 must be located directly under the mdl D1 to which it is attached. The second mdl E1 must be located directly under the first mdl E1. **Maximum:** Two per 5014 mdl D1. **Prerequisites:** 5014 mdl D1.

Mdl E2: Expansion module for mdl B1. Provides for 128 analog input points selected by mercury-wetted relay multiplexers. It is connected to and uses the amplification, analog-to-digital conversion, and addressing circuits of a mdl B1. The maximum scanning speed is the same as the mdl B1 (200 points per second). **Limitations:** The first mdl E2 must be located directly under the mdl B1 to which it is attached. The second mdl E2 must be located directly under the first mdl E2. **Maximum:** Two per 5014 mdl B1. **Prerequisites:** #1250 on the 5014 mdl B1.

Input signals may range from 0 to +/- 5.12 volts full-scale with mercury-wetted relay multiplexers and solid state multiplexers. Input signals may range from -640mV to +5.12 volts full-scale with dry-contact relay multiplexers.

The analog-to-digital converter has a resolution of 14 bits plus sign. Analog conversion and point addressing of the multiplexers are under program control. Immediate and external synchronization operations are both available. A special feature provides for attachment of resistance bulb thermometer (RBT) termination cards for determining the reference junction temperature in thermocouple applications. Connection of customer signals and signal conditioning is achieved by termination cards in the customer access area at the back of the Analog Input Module.

Publications: *System/7 Summary* (GA34-0002), *IBM System/7 Installation Manual - Physical Planning* (GA34-0004).

SPECIFY

- Housing: For location of the 5014, specify as follows. If feature **#9141** was specified on the 5010, do not use the following specify features.

  #9143: Also enter the desired module location number, in the quantity column of the order form. See "Module Locations" table in M5026 pages under "Models". Specify **#9142**, on the 5010 Processor Module.

  #9144: For shipment without mounting in an enclosure (spare).

- Side Panels: Customer's signal wires enter through the rear side panels of the module. Three types of panels are available: Type 1 provides a slot for cables, Type 2 has individual holes for each pair of wires, Type 3 is a blank panel that can be customized by the customer. For details refer to *IBM System/7 Installation Manual - Physical Planning* (GA34-0004). Specify one: **#9511** for Side Panel Analog Type 1, **#9512** for Side Panel Analog Type 2, **#9513** for Side Panel Analog Type 3.

- On each 5014 mdl E specify one of the following:

  #9185: For expansion from 128 to 256 points. First 5014 mdl E is connected to a single 5014 mdl B or D.

  #9186: For expansion from 256 to 384 points. Second 5014 mdl E is connected to a single 5014 mdl B or D.

SPECIAL FEATURES

Amplifier High Level B (#1210): [Mdl B1] Provides a unity gain amplifier for high level analog input signals with a full-scale range of +/- 5.12 volts. **Limitations:** Cannot be ordered with Amplifier Multirange B (#1215). **Maximum:** One per 5014 mdl B1. **Field Installation:** Yes.

Amplifier High Level C (#1211): [Mdl C1] Provides a unity gain amplifier for high level analog input signals with a full-scale range of +/- 5.12 volts. **Limitations:** Cannot be ordered with Amplifier Multirange C (#1216). **Maximum:** One per 5014 mdl C1. **Field Installation:** Yes.

Amplifier High Level D (#1212): [Mdl D1] Provides a unity gain amplifier for high level analog input signals with a full-scale range of +/- 5.12 volts with Multiplexer/MR16 (#5247) or -640mV to +5.12 volts with Multiplexer/MD16 (#5245). **Limitations:** Cannot be ordered with Amplifier Multirange D (#1217). **Maximum:** One per 5014 mdl D1. **Field Installation:** Yes.

Amplifier Multirange B (#1215): [Mdl B1] Provides a multirange amplifier for analog input signals. The amplifier gains can be set by the program or determined automatically by the amplifier. Amplifier ranges are (plus or minus) 10mV, 20mV, 40mv, 80mV, 160mV, 640mV, and 5.12 volts full-scale. In program-selected-gain mode of operation, 14 bits of data plus sign are generated. In auto-ranging mode of operation, 12 bits of data plus sign are generated. The remaining three bits are used to indicate the range. **Limitations:** Cannot be ordered with Amplifier High Level B (#1210). **Maximum:** One per 5014 mdl B1. **Field Installation:** Yes.

Amplifier Multirange C (#1216): [Mdl C1] Provides a multirange amplifier for analog input signals. The amplifier gains can be set by the program or determined automatically by the amplifier. Amplifier ranges are (plus or minus) 10mV, 20mV, 40mV, 80mV, 160mV, 640mV, and 5.12 volts full-scale. In program-selected-gain mode of operation, 14 bits of data plus sign are generated. In auto-ranging mode of operation, 12 bits of data plus sign are generated. The remaining three bits are used to indicate the range. **Limitations:** Cannot be ordered with Amplifier High Level C (#1211). **Maximum:** One per 5014 mdl C1 **Field Installation:** Yes.

Amplifier Multirange D (#1217): [Mdl D1] Provides a multirange amplifier for analog input signals. The amplifier gain is set by the program. When used with Multiplexer/MR16 (#5247), the full-scale ranges are (plus or minus) 10mV, 20mV, 40mV, 80mV, 160mV, 640mV, and 5.12 volts. When used with Multiplexer/MD16 (#5245), all of the above ranges are available with the exception that the +/- 5.12 volt range is modified to the range of -640mV to +5.12 volts. 14 bits of data plus sign are generated. **Limitations:** Cannot be ordered with Amplifier High Level D (#1212). **Maximum:** One per 5014 mdl D1. **Field Installation:** Yes.

Analog Input Adapter B (#1230): [Mdl B1] Provides capability for two Multiplexer/MR16 (#5247) groups. **Maximum:** Four per 5014 mdl B1. **Field Installation:** Yes. **Prerequisites:** #1210 or #1215.

Analog Input Adapter C (#1231): [Mdl C1] Provides capability for two Multiplexer/MS16 (#5249) groups. **Maximum:** Four per 5014 mdl C1. **Field Installation:** Yes. **Prerequisites:** #1211 or #1216.

Analog Input Adapter D/E (#1233): [Mdl D1, E1, E2] Provides capability for two Multiplexer/MR16 (#5247) groups on mdl D1, E1, E2, or two Multiplexer/MD16 (#5245) groups on mdl D1, or E1. **Maximum:** Four per 5014 mdl D1, E1, or E2. **Field Installation:** Yes. **Prerequisites:** #1212 or #1217 on 5014 mdl D1.

5014 Analog Input Module (cont'd)

Analog Input Expander B (#1250): [Mdl B1] Provides the capability to attach one or two 5014 mdl E2s to a 5014 mdl B1. This provides up to 384 analog input point addresses on a 5014 mdl B1. **Maximum:** One per 5014 mdl B1. **Field Installation:** Yes. **Prerequisites:** #1210 or #1215.

Multiplexer/MD16 (#5245): [Mdl D1, E1] Provides a group of 16 analog input points. Input points are multiplexed by dry-contact relays. Input signals can be in the range of -640mV to +5.12 volts. **Limitations:** The combined quantity of Multiplexer/MD16 (#5245) and Multiplexer/MR16 (#5247) must not exceed two per Analog Input Adapter D/E (#1233). Common-mode voltage must not exceed 100 volts and the average sampling rate per point must not exceed 20 samples per minute when averaged over at least 24 hours. This means that a single input point must not be addressed more than 28,800 times in 24 hours. **Maximum:** Two per Analog Input Adapter D/E (#1233). **Field Installation:** Yes. **Prerequisites:** #1233 and customer signal connection. See M5029 pages.

Multiplexer/MR16 (#5247): [Mdl B1, D1, E1, E2] Provides a group of 16 analog input points. Input points are multiplexed by mercury-wetted relays. Input signals can be in the range of +/- 5.12 volts. **Limitations:** The combined quantity of Multiplexer/MR16 (#5247) and Multiplexer/MD16 (#5245) must not exceed two per Analog Input Adapter B (#1230) or Analog Input Adapter D/E (#1233). Common-mode voltage must not exceed 250 volts and the average sampling rate is not limited. **Maximum:** Two per Analog Input Adapter B (#1230) or Analog Input Adapter D/E (#1233). **Field Installation:** Yes. **Prerequisites:** #1230 on 5014 mdl B1 or #1233 on mdl D1, E1, or E2. Customer signal connection required. See M5029 pages.

Multiplexer/MS16 (#5249): [Mdl C1] Provides a group of 16 analog input points. Input points are multiplexed by solid state switches. Input signals can be in the range of +/- 5.12 volts. **Limitations:** Common-mode voltage must not exceed 10 volts and the average sampling rate is not limited. **Maximum:** Two per Analog Input Adapter C (#1231). **Field Installation:** Yes. **Prerequisites:** #1231 and customer signal connection. See M5029 pages.

Temperature Reference Attachment (#7830): [Mdl B1, C1, D1] Provides the capability to attach termination cards containing resistance bulb thermometers (RBT). See M5029 pages. When this feature is installed in a 5014 mdl B1 or D1 the capability is extended to 5014 mdl E1 or E2 associated with it. **Limitations:** A maximum of 32 RBT termination cards can be attached to one Temperature Reference Attachment (#7830). **Maximum:** One per 5014 mdl B1, C1, or D1. **Field Installation:** Yes. **Prerequisites:** #1215, #1216 or #1217.

Maximum Feature Quantity Per Mdl:

Feature	Mdl B1 200 pt per sec	Mdl C1 20K pt per sec	Mdl D1 100 pt per sec	Mdl E1 100 pt per sec	Mdl E2 200 pt per sec
Amplifier High Level B (#1210)	1	0	0	0	0
Amplifier High Level C (#1211)	0	1	0	0	0
Amplifier High Level D (#1212)	0	0	1	0	0
Amplifier Multirange B (#1215)	1	0	0	0	0
Amplifier Multirange C (#1216)	0	1	0	0	0
Amplifier Multirange D (#1217)	0	0	1	0	0
Analog Input Adapter B (#1230)	4	0	0	0	0
Analog Input Adapter C (#1231)	0	4	0	0	0
Analog Input Adapter D/E (#1233)	0	0	4	4	4
Analog Input Expander B (#1250)	1	0	0	0	0
Multiplexer/MD 16 (#5245)	0	0	8	8	0
Multiplexer/MR 16 (#5247)	8	0	8	8	8
Multiplexer/MS 16 (#5249)	0	8	0	0	0
Temperature Reference Attachment (#7830)	1	1	1	0	0

MODEL CONVERSIONS

Conversions between model E1 and E2 are field installable. Conversions from B to C to D and vice versa are not recommended for field installation.

ACCESSORIES

See M5029 pages.

SUPPLIES (None)

5022 DISK STORAGE MODULE

PURPOSE

Disk storage unit for System/7.

MODELS

Model 1	001	Single drive, 2.457 million 16-bit words. Access 200 cylinders on removable cartridge and 200 cylinders on its non-removable disk. 269 millisecond average access time.
Model 2	002	Single drive, same as mdl 1 except 126 millisecond average access time.
Model 3	003	Single drive, 1.228 million 16-bit words. Access 200 cylinders on one non-removable disk. Average access time 269 milliseconds.
Model 4	004	Single drive, same as mdl 3 except 126 millisecond average access time.

Prerequisites:

1. An available I/O module location in the 5026 Enclosure.
2. Each 5022 mdl 1 or 2 requires a 5440 Disk Cartridge. See "Supplies".
3. Integral Power Supply (#4650) is required for:
   - Each additional 5022 after the first 5022 within a single 5026 Enclosure.
   - A 5022 installed in a 5026 mdl A2. See "Special Features".

HIGHLIGHTS

Removable Disk Cartridges: Each 5022 mdl 1 or 2 uses a removable 5440 Disk Cartridge that provides virtually unlimited offline disk storage. 5440s must be ordered separately.

Cylinder Concept: The access mechanism with four vertically aligned heads gives access to the top and bottom tracks of both the removable 5440 and the 5022s non-removable disk for mdl 1 or mdl 2. With one positioning of the access mechanism, 12,288 16-bit words are available. The access mechanism on mdl 3 or mdl 4 with two vertical aligned heads gives access to the top and bottom tracks of the non-removable disk, providing 6,144 16-bit words with one positioning of the access mechanism.

Formats: Each of the 200 customer-usable cylinders, three alternate cylinders and one CE cylinder on each disk is composed of two tracks of 24 sectors each. Each sector provides a fixed-length 128 word data field.

Housing: The 5022 can reside in an I/O module location in any of the 5026 enclosures. However, it is recommended that it be installed in the bottom module location for user accessability. See "Housing" under "Specify".

Access Times: On mdls 1 and 3, minimum access time is 39 milliseconds, average is 269 milliseconds and maximum is 750 milliseconds. On mdls 2 and 4, minimum access time is 28 milliseconds, average is 126 milliseconds and maximum is 255 milliseconds.

Data Transfer Rate: The disk rotates at 1,500 rpm, providing a data rate of 99,500 words per second and a rotational period of 40 milliseconds.

Environment: The 5022 operates within the following temperature and humidity range.

Temperature *	15°C-32°C (60°F-90°F)
Relative Humidity	8-95%
Max. Wet Bulb Temperature	29°C (85°F)
Non-Operating Temperature	10°C-43°C (50°F-110°F)
Non-Operating Humidity	8-95%

* In systems without Internal Air Isolation (#4621 or #4622 on 5026), the maximum operating temperature for a 5022 mdl 3 or 4 (fixed pack) is 40°C (105°F) if the disk is located in the bottom position of a 5026 Enclosure (module locations 2, 5, 8, or 11).

Configuration: Multiple 5022s may be installed on a single System/7. IBM-supplied programming support for Disk Cycle Steal (#2664) is mutually exclusive with Direct Program Control Disk support. Drives of both types are not supported on the same system. Multiple drives of either type are supported.

Publications: *System/7 Summary* (GA34-0002).

SPECIFY

- Voltage: Must be consistent with that of the 5026 Enclosure. See "Voltage" under "Specify" in the M5026 pages.
- Housing:

  #9143: For location of the module, also enter the desired module location number in the quantity column of the order form. See "Module Locations" chart in M5026 pages.

  #9144: For shipment without mounting in an enclosure (spare).

Limitations: The following limitations apply to the location where a 5022 module can be installed in a 5026 Enclosure. A 5022 cannot be located in a top position of a 5026 (module locations 0, 3, 6, or 9). It is recommended that 5022s be located in the bottom position of a 5026 enclosure (module locations 2, 5, 8, or 11). Only when absolutely necessary should a 5022 be located in the middle position of a 5026 enclosure (module locations 1, 4, 7, or 10). Locating a 5022 mdl 3 or 4 in the bottom position of a 5026 enclosure in systems without Internal Air Isolation (#4621 or #4622) will increase its maximum allowable operating temperature from 32°C to 40°C (90°F to 105°F). Housing a 5022 in a 5026 mdl D3 or D6 is not recommended due to the increased processor loading during data transfer.

SPECIAL FEATURES

Disk Cycle Steal (#2664): Provides data transfers between the 5022 and main storage of a 5010 equipped with companion Cycle Steal Basic (#2662). **Limitations:** One per 5022. **Field Installation:** Yes. **Prerequisites:** #2662 on the 5010.

Integral Power Supply (#4650): Provides 24 volt power supply required for, (1) Installation of each additional 5022 after the first 5022 within a single 5026 Enclosure, (2) Installation of 5022 on a 5026 Enclosure mdl A2 . **Field Installation:** Yes.

RPQs

5998-T01 3340 Direct Access Storage Facility Attachment (RPQ DO8331): Provides a module with the basic control logic for attaching and controlling the 3340 Direct Access Storage Facility to the System/7. The 3340 used with the System/7 may consist of up to eight drives. The prerequisite 3340 mdl A02 contains two drives and a control unit. Up to three additional 3340 mdl B units may be attached giving maximum configuration of eight drives. Allows the 3348 Data Module to be formatted to S/370 OS/VS and DOS/VS Standards. It also allows the System/7 programmer to access the 3348 Data Module as multiple 5022s and/or with a new direct access method. Application programs using MSP/7 symbolic file support access methods can be converted by changing parameters in specification macros such as #DIT, #DISK, #CONF, etc., and recompiling using programming supplied with the hardware (PSH). The 3340 is an initial program load device. The 3340 can be used as an auto-restart device in conjunction with 5026 Power Fail Detect (#5731). **Limitations:** Limited to 5026 mdl C03 equipped with 60 Hz high-power RPQ DO8332 or a 5026 mdl C06. The 5998-T01 must be mounted in position 2 of the 5026. Power loading characteristics influence the maximum configuration. May not be installed in environments where airborne contaminants exist. Installation of Internal Air Isolation (#4621), is not permitted.

This RPQ restricts the System/7 to Class B environment:

Temperature	15.6°C-32.2°C (60°F-90°F)
Relative Humidity	8 to 80%
Non-Operating Temperature	10°C-43.3°C (50°F-110°F)
Max. Wet Bulb Temperature	22.8°C (73.0°F)

3340 features not supported by this RPQ are: Remote Switch Attachment (#6148), Rotational Position Sensing (#6201, #6202), String Switch (#8150). A 5022 module cannot be mounted in Position 1 of a 5026 Enclosure when a 5998-T01 is mounted in Position 2. 5998-T01 to be installed in Position 2 of 5026. Specify **#9590** (System/7 mdl E) on 3340 mdl A02. Refer to M3340 and 3348 pages for further details. Power for 3340 must be consistent with that of 5026 Enclosure. **Maximum:** One 5998-T01 per System/7. **Prerequisites:** 5010 mdl E28 with #2662. If ordered for C03 Enclosure, RPQ DO8332 is required. 5028 required for each system.

MODEL CONVERSIONS

Field Installable.

ACCESSORIES (None)

SUPPLIES

Disk Cartridge: 5022 requires a 5440 Disk Cartridge that must be ordered seperately. Contact IBM for details.

5024 I/O ATTACHMENT ENCLOSURE

PURPOSE

The 5024 provides line printing and/or card reading capability for System/7.

MODELS

Model 1	001	Basic enclosure with line printer.
Model 2	002	Basic enclosure with 2502 Attachment.
Model 3	003	Expanded enclosure with line printer and 2502 Attachment.

Prerequisites: #2662 and #4115 on a 5010 mdl E. For 5024 mdls 2 or 3, a 2502 mdl A2 with specify features **#9901** for 115V AC and **#9046** for white color.

HIGHLIGHTS

Enclosure: The 5024 is a data processing oriented addition to the System/7. The enclosure provides basic space, power, and logic to attach a printer, a card reader, or both. If both a printer and a card reader are utilized, an enclosure expansion is provided. The 5024 attaches to any 5010 Processor Module mdl E equipped with 5024 Attachment (#4115). A fixed-length cable is supplied with the 5024. See *System/7 Installation Manual - Physical Planning* (GA34-0004) for further details.

5024 Attachment (#4115) on the 5010: Provides the interface between the 5010 mdl E and the 5024 and handles data transfers between 5010 mdl E storage and the 5024 on a cycle-steal basis. Cycle-Steal Basic (#2662) is required on the 5010 mdl E. If both a card reader and a printer are attached, operations may be interleaved but not overlapped. In the interleave mode of operation, performance of the devices will be less than the individual unit's rated speeds of 300 cpm reading and 155 lpm printing. For more details, see *System/7 Summary* (GA34-0002). Only one 5024 may be attached per 5010 mdl E. The 5024 Attachment is mutually exclusive with 1200 bps Integrated Modems (#5500, #5501) and S/360 and S/370 Channel Attachment (RPQ D08112). All systems planning to use any 5010 RPQ (except D08119, Sensor Based Control Adapter) together with #4115 must resubmit the RPQ for evaluation before it is proposed to the customer.

Publications: *System/7 Summary* (GA34-0002) and *System/7 Installation Manual - Physical Planning* (GA34-0004).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): Specify **#9901**.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Print Belt: Specify **#9490** for 96-character belt, **#9491** for 64-character belt, or **#9492** for 48-character belt. The 48-character belt uses a character set with equal sign, left parenthesis, and right parenthesis rather than cent sign, percent sign, and comma, respectively.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Conversions from model 1 or 2 to model 3 are field installable. No other model conversions can be made.

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from the carton and provides for forms stacking after printing. This accessory is a one-shelf forms stand.

Print Belt, Add'l: Permits the customer to print more than one character set for various applications. Can be interchangeably used with the belt provided with the machine. Order by feature number with the machine or by MES for field installation.

48-character	**#5552**
64-character	**#5551**
96-character	**#5550**

SUPPLIES (None)

5026 ENCLOSURE

PURPOSE

To provide housing and power for System/7 Processor and Input/Output Modules.

MODELS

Model A2	A02	2-Position, for a Processor Module and one I/O Module.
Model C3	C03	3-Position, for a Processor Module and two I/O Modules.
Model C6	C06	6-Position, for a Processor Module and five I/O Modules.
Model D3	D03	3-Position Extension, three additional I/O Module locations with C3 or C6.
Model D6	D06	6-Position Extension, six additional I/O Module locations with C3 or C6.

Mdl D3 or D6 is cable attached to mdl C3 or C6 and may be located up to 60 meters (200 feet) from the mdl C3 or C6.

Prerequisites: Mdls D3 and D6 require a DX Enclosure Attachment (#3715) in mdls C3 and C6 enclosures.

Module Locations:

Mdl	Module Locations (front view)											
C3	0	1	2	-	-	-	-	-	-	-	-	-
C6	0	1	2	3	4	5	-	-	-	-	-	-
D3	-	-	-	-	-	-	6	7	8	-	-	-
D6	-	-	-	-	-	-	6	7	8	9	10	11

HIGHLIGHTS

Provides housing for the Processor Module and all Input/Output Modules. Also included are the necessary power supplies (see RPQ D08331 for power restrictions on 3340 Attachment) and interface connections for all modules. The Processor Module must be located in the first module location of A2, C3, or C6 mdls. I/O Modules may be housed in any of the remaining module locations, except Module 5998-TO1 which must be located in module position 2 and if it is installed, a 5022 module may not be located in module position 1. The D3 or D6 mdl may be located up to 60 meters (200 feet) from the C3 or C6 mdl. An Internal Air Isolation feature (not available on mdl A2) seals the enclosure and prevents the outside air from entering into the enclosure. Internal air is filtered through an activated carbon filtration system. Heat within the enclosure is dissipated through an air-to-air heat exchanger. This feature allows the System/7 to be used in environments where airborne elements might harm the electronic circuitry. Because this feature is not available on mdl A2 enclosures, in environments where there is a possibility of existence of contaminants, a C3 or C6 mdl must be used.

An Early Warning corrosion detector card is installed as a standard item in every System/7 enclosure. This card is specifically designed to be sensitive to airborne contaminants. Inspection of this card gives an early warning so that appropriate action for protection of the system may be taken.

A Power Failure Detect Feature (#5731) provides an early indication of imminent power failure so that the program can bring the system to an orderly halt. When power is restored, the auto-restart function of the system can provide automatic program load from either the Operator Station or host teleprocessing link. The processor console switch must be appropriately set.

A thermal detector in the enclosure generates a warning interrupt if the internal temperature of the enclosure rises above a specified operating level. The thermal detector causes a power shutdown after the warning signal is generated. The time between the thermal interrupt and the power shutdown could be used by the program to cause an orderly halt of the operation.

Publications: *System/7 Summary* (GA34-0002).

SPECIFY

- Voltage:

  Mdl A2, C3, D3 (AC, 1-phase, 60 Hz): For 208V, specify **#9902** or for 230V **#9904**.

  Mdl C3, C6, D3, D6 (AC, 3-phase, 60 Hz): For 208V, specify **#9903** or for 230V **#9905**.

  Note: When options are available, use of 3-phase power is recommended. This would eliminate the need for rewiring for system expansion to mdls C6 or D6.

- 5010 Power: Specify **#9490** for 5010 mdl A or B, or **#9491** for 5010 mdl E.

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

- Storage Power Addition (#7401) required for systems with more than 8K of storage (5010 mdls AXX and BXX only). See "Special Features".

- Kickstrips: **#9431**, if needed. When kickstrips are installed, the open area underneath the machine is enclosed. This may be inconvenient for the operator or for signal wiring. Use of kickstrips is recommended only when the physical appearance of the system is of prime importance.

- Cables: For System/7 external cables for 5026 mdl D3 and D6, supplied by IBM, use cable order form number Z120-2368.

SPECIAL FEATURES

DX Enclosure Attachment (#3715): [Mdls C3, C6] This feature provides for the connection of the Enclosure mdls D3 or D6 to mdls C3 or C6. **Maximum:** One per system. **Field Installation:** Yes.

Internal Air Isolation 3 (#4621): (not with 5998-TO1) [Mdls C3, D3] This feature seals the mdl C3 or D3 enclosures and provides an air-to-air heat exchanger for dissipation of the internal heat. An activated carbon filtration system filters the internal air. The feature isolates the inside air from the outside and is used in severe industrial environments where gaseous contaminants harmful to electronic circuitry exist. **Limitations:** Proposals are not to recommend the #4621 unless the FE Installation Planning Representative has determined that the feature is required, or the internal system detector indicates measures are necessary to protect an installed system. **Maximum:** One per C3 or D3 enclosure. **Field Installation:** Yes.

Internal Air Isolation 6 (#4622): (not with 5998-TO1) [Mdls C6, D6] This feature is identical to #4621 and is provided for mdl C6 or D6 enclosures. **Maximum:** One per C6 or D6 enclosure. **Field Installation:** Yes.

Power Failure Detect (#5731): Provides a signal to the system when the input AC voltage falls below a safe level. This signal is used by the program to bring the system to an orderly halt. This feature also provides auto-restart which can automatically restart system power when input AC power is restored. **Maximum:** One per enclosure. **Field Installation:** Yes.

Storage Power Addition (#7401): [Mdls A2, C3, C6] Provides a power supply for the 5010 Processor Module mdls AXX and BXX only, with storage in excess of 8K words. **Maximum:** One per system. **Field Installation:** Yes.

MODEL CONVERSIONS

Conversion from C3 to C6 and from D3 to D6 are field installable. No other model changes can be made.

ACCESSORIES

Cables: See "Specify".

SUPPLIES (None)

5028 OPERATOR STATION

PURPOSE

Purpose: To provide an operator and computer input/output device for System/7.

MODELS

Model 001:

Prerequisites: 5010.

HIGHLIGHTS

The 5028 Operator Station provides a keyboard, printer, paper tape punch, and paper tape reader. It is attached via a multi-wire cable to a System/7 Processor Module. The printer, paper tape reader, and paper tape punch operate at a speed of 10 characters per second. Transmission code is 7-level ASCII, with the 8th level for "even parity". The paper tape reader and punch can also read and punch 8-bit binary code without parity. The recording tape is one-inch wide and may be paper (P/N 304469 or 426362), or lubricated non-metallic plastic. A printing line is 72 characters with six lines per inch. Only single-part paper may be used for printing.

Local remote switches provide for offline and online operations. The 5028 is used for program loading, data input/output, and paper tape preparation.

The 5028 Operator Station must be available for system maintenance in all configurations. An Operator Station may be shared among several System/7s, except those with 5998-TO1. The customer must attach the Operator Station to the system requiring maintenance prior to the arrival of a customer engineer. Delays due to the relocation of an Operator Station from one system to another may result in extended down-time. Before ordering a system without an Operator Station, the customer must realize the above condition as well as the procedure for diconnecting an Operator Station that requires these steps: stop system, power off OperatorStation, disconnect Operator Station, start system.

Publications: *System/7 Summary* (GA34-0002).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901**.
- Cables: Use cable order form Z120-2498.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Ribbon: A black ribbon, P/N 1136260 or equivalent, is required.

Paper Tape: Paper tape P/N 304469 or 426362.

5029 MDL 1 ATTACHMENT ACCESSORIES

PURPOSE

5029 Model 1 is an accessory control number used for ordering components and termination cards for connection of customer signal wires to the System/7 interface. 5029 is not a machine in itself; but it is entered in the machine field for ordering. Specify 5029 in the machine field only once per system for all termination cards and components. Features on 5029 cannot be ordered by MES. Accessories in the 5029 are for purchase only and no maintenance service is available. Normal parts warranty of three months applies to the accessories. **Note:** Agreement for Purchase of IBM Machines, Z120-7086, is not required for 5029 mdl 1.

HIGHLIGHTS

5029 Attachment Accessories provide a number of cards and components used for connection of customer signals to System/7 as well as conditioning and filtering of the signals. Standard circuits are offered for each type of sensor I/O point. Special circuits can be constructed by the customer on the custom cards. Termination cards provide a screw-down terminal for connection of customer wires. This feature offers several advantages:

- The customer can wire the signals to the cards prior to system arrival at the site, thereby reducing the installation time.
- When a system is upgraded, rewiring is merely a matter of unplugging the cards from the old module and plugging them into the new module.
- Sensor-based points may be quickly disconnected for trouble shooting.

Publications: *System/7 Summary* (GA34-0002).

ACCESSORIES

The tables below show a summary of the requirements for the attachment accessories.

AI Custom (#1110): This card contains screw-terminals for customer connection of four analog input signals to Multiplexer/MR16 (#5247) in 5014, Multiplexer/MD16 (#5245) in 5014, Multiplexer/MR4 (#5246) in 5012, Multiplexer/MS16 (#5249) in 5014, or Multiplexer/MS4 (#5248) in 5012. Solder terminals are provided for the customer addition of networks to each point to complete the connection. This card should be used where customers desire to construct analog input networks of their own design. **Limitations:** Use of this card can affect accuracy and repeatability of the analog-to-digital conversion of analog signals connected to it.

AI/MR Filter (#1113): This card contains filter circuits and screw-terminals for customer connection of four analog input signals to Multiplexer/MR16 (#5247) in 5014, Multiplexer/MD16 (#5245) in 5014, or Multiplexer/MR4 (#5246) in 5012. Current resistors can be added to the terminals. No provision is made to add other components.

AI/MR RBT/Filter (#1114): This card contains one resistance bulb thermometer circuit plus three filter circuits for customer connection of three analog input signals to Multiplexer/MR16 (#5247) in 5014, Multiplexer/MD16 (#5245) in 5014, or Multiplexer/MR4 (#5246) in 5012. The resistance bulb thermometer circuit output can be used to calculate a reference junction temperature. Current resistors cannot be added to the terminals. No provision is made to add components. **Maximum:** 32 per Temperature Reference Attachment (#7830). **Prerequisites:** #7830 in 5012 or 5014.

AI/MS Non-Polarized Filter (#1121): This card contains filter circuits and screw-terminals for customer connection of four analog input signals to Multiplexer/MSl6 (#5249) in 5014 or Multiplexer/MS4 (#5248) in 5012. The filter circuit is a non-polarized network, and therefore can accept both positive and negative signals. Current resistors can be added to the terminals. No provision is made to add other components.

AI/MS Connector (#1122): This card contains circuits and screw terminals for customer connection of four analog input signals to Multiplexer/MS16 (#5249) in 5014 or Multiplexer/MS4 (#5248) in 5012. No filter circuits are provided. Current resistors can be added to the terminals. No provision is made to add other components. **Limitations:** Use of this card can affect accuracy and repeatability of the analog-to-digital conversion of analog signals connected to it.

AI/MS RBT/Non-Polarized Filter (#1123): This card contains one resistance bulb thermometer circuit plus three filter circuits for customer connection of three analog input signals to Multiplexer/MS16 (#5249) in 5014 or Multiplexer/MS4 (#5248) in 5012. The resistance bulb thermometer circuit output can be used to calculate a reference junction temperature. The filter circuit is a non-polarized network and accepts both positive and negative signals. Current resistors cannot be added to the terminals. No provision is made to add other components. **Maximum:** 32 per Temperature Reference Attachment (#7830). **Prerequisites:** #7830 in 5012 or 5014.

AI/MS Polarized Filter (#1124): This card is identical to the AI/MS Non-Polarized Filter (#1121), except the filter circuit is polarized, and therefore accepts only a single polarity signal.

Voltage Check Card (#1184): This card provides seven voltage outputs of either polarity suitable for use as an analog input checking source. The card can be plugged into a specific socket and wired to one analog input point at a time to be used as a program-addressable voltage check source. The following voltages are provided: 4 volts, 512 millivolts, l28 millivolts, 64 millivolts, 32 millivolts, 15 millivolts, and 5 millivolts.

Connector, 3-Pin (#1240): This cable plug is used to connect the customer analog output signal wires to the analog output points on the 5012. One is required for each Analog Output Point (#1246) in 5012. Installation of wires on the connector is a customer responsibility.

Capacitor Non-Polarized 10uF (#1570): A special capacitor used to construct the network on the AI/MS Non-Polarized Filter (#1121) termination card. This 10 microfarad, 5 volt, non-polarized capacitor has very low dielectric absorption, low leakage, and small physical size.

Current Resistor 4-20mA (#1670): This precision resistor can be connected across analog input terminals to act as a current shunt. It converts 4 to 20 milliamperes into 128 to 640 millivolts. **Limitations:** Cannot be used on analog input termination cards AI/MR RBT/Filter (#1114) or AI/MS RBT/Non-Polarized Filter (#1123).

Current Resistor 10-50mA (#1671): This precision resistor can be connected across analog input terminals to act as a current shunt. It converts 10 to 50 milliamperes into 128 to 640 millivolts. **Limitations:** Cannot be used on analog input termination cards AI/MR RBT/Filter (#1114) or AI/MS RBT/Non-Polarized Filter (#1123).

DI Contact Sense Non-Isolated (#3280): This card contains contact sensing circuits and screw-terminals for customer connection of eight digital input signals to Digital Input Non-Isolated (#3292) in the 5012 or 5013. One side of each contact sensing point is connected to a common 48 volts DC to provide contact sensing capability. No provision is made to add components.

DI Contact Sense (#3281): This card contains contact sensing circuits and screw-terminals for customer connection of eight digital input signals to Digital Input Group (#3289) in 5012 or 5013 or Process Interrupt (#5710) in 5012 or 5013. One side of each contact sensing point is connected to a common 48 volts DC to provide contact sensing capability. No provision is made to add components.

DI Custom (#3282): This card contains screw-terminals for customer connection of eight digital input signals to Digital Input Group (#3289) in 5012 or 5013, Digital Input Non-Insolated (#3292) in 5012 or 5013, or Process Interrupt (#5710) in 5012 or 5013. Solder terminals are provided for the customer addition of networks to each point to complete the connection. This card should be used where customers desire to use digital input networks of their own design.

DI Voltage Sense (#3283): This card contains circuits and screw terminals for customer connection of eight contact digital input signals to Digital Input Group (#3289) in 5012 or 5013 or Process Interrupt (#5710) in 5012 or 5013. No provision is made to add components on this card.

DO Connector (#3410): This card contains screw-terminals for direct customer connection of eight digit output signals to DO Low Power Group (#3421) in 5012 or 5013, DO Medium Power Group (#3422) in 5012 or 5013, DO Medium Power Non-Isolated (#3424) in 5012 or 5013, or DO Contact Group (#3420) in 5012 or 5013. No provision is made to add components.

DO Custom (#3430): This card contains screw-terminals for customer connection of eight digital output signals to DO Low Power Group (#3421) in 5012 or 5013, DO Medium Power Group (#3422) in 5012 or 5013, DO Medium Power Non-Isolated (#3424) in 5012 or 5013, or DO Contact Group (#3420) in 5012 or 5013. Solder terminals are provided for the customer-addition of networks to each point.

Connector, 4-Pin (#8185): This plug is used to connect the 2790 loop transmission lines to the 2790 Control (#8195) in the 5012. One is required for the #8195. This plug is also used to connect to the external synchronization control on the 5012 and 5014. One is required for each 5014 and one for each 5012 with Analog Input Control Mdl B (#1232) or Analog Input Control Mdl C (#1213). Installation of wires on the connector is a customer responsibility.

5029 Attachment Accessories for System/7: Components required to connect to each sensor input/output feature.

Analog Sensor Input/Output Features

Analog Input(AI) Components	Multiplexers					Analog Output Point
Termination Cards:	MR4 #5246	MD16 #5245	MR16 #5247	MS4 #5248	MS16 #5429	#1246
AI/MR Filter (#1131)	1	4	4	--	--	--
AI/MR RBT/Filter (#1114)	1	4	4	--	--	--
AI Custom (#1110)	1	4	4	1	4	--
AI/MS Connector (#1122)	--	--	--	1	4	--
AI/MS Non-Polarized Filter (#1121)	--	--	--	1	4	--
AI/MS Polarized Filter (#1124)	--	--	--	1	4	--

5029 Mdl 1 Attachment Accessories (cont'd)

AI/MS RBT/Non-Polarized Filter (#1123)	--	--	--	1	4	--
Total-Maximum Cards per AI Group	1	4	4	1	4	--
Current Resistors:						
Current Resistor 4-10mA (#1670)	4	16	16	4	16	--
Current Resistor 10-50mA (#1671)	4	16	16	4	16	--
Total-Maximum Resistors per AI Group	4	16	16	4	16	--
Connectors per Point:						
Connector, 3-Pin (#1240)	--	--	--	--	--	1
Feature Points per Group	4	16	16	4	16	1

Digital I/O Components	**Digital Sensor Input/Output Features**					
	Digital Input			Digital Output		
Termination Cards:	#3289	#3292	#3420	#3422	#3424	#3421
DI Contact Sense (#3281)	2	--	--	--	--	--
DI Contact Sense, Non-Isolated (#3280)	--	2	--	--	--	--
DI Voltage Sense (#3283)	2	--	--	--	--	--
DI Customer (#3282)	2	2	--	--	--	--
Total-Maximum Cards per DI Group	2	2	--	--	--	--
DO Connector (#3410)	--	--	2	2	2	2
DO Custom (#3430)	--	--	2	2	2	2
Total-Maximum Cards per DO Group	--	--	2	2	2	2
Feature Points per Group	16	16	16	16	16	16

Component	**Comments**
Connector, 4-Pin (#8185)	One per I/O module. One per loop on 2790 Control (#8195) in 5012 or 5013, four loops per system.
AI Voltage Check Card (#1184)	Available to check AI. Maximum: One per 5012 with #1213 or #1232. Four per 5014.
Capacitor Non-Polarized 10uF (#1570)	Available to construct custom networks.

5081 DISPLAY

PURPOSE

A raster display, available in a color or monochrome model, for the 5080 Graphics System. The user interacts with the display via an alphameric or APL keyboard, a 5083 tablet, a lighted program function keyboard, and/or a Dials feature when these are connected to a 5085 Graphics Processor.

MODELS

Model 1 001 Monochrome Display

Model 2 002 Color Display

Prerequisites: A 5085 Graphics Processor. See M5085 pages for peripheral attachments for use with the 5081.

HIGHLIGHTS

- A steady, bright image using special phosphors uniquely adapted to a 50 Hz non-interlaced refresh rate.
- A sharp image on both the color and monochrome mdls because of the small pixel (spot) sizes they generate.
- Up to 256 simultaneously-displayable gray shades (mdl 1) or colors (mdl 2) selected from a range of 4,096.
- User controls for coarse convergence adjustment (mdl 2 only), picture centering, contrast and brightness, as well as four indicators for fault isolation are located at the bottom of the front of the display behind a flip-down cover.
- An anti-reflective treatment in both the color and the monochrome display screens for clear, comfortable operator viewing.
- Enhanced contrast through the use of special filter additives to the glass on the display.
- A 19-inch (diagonal) screen with a 1,024 x 1,024 pixel array displayed on an area 284mm (11.2 in.) by 284mm (11.2 in.).
- Compact dimensions - 490mm (19.29 in.) high, 490mm (19.29 in.) wide, and 553mm (21.77 in.) deep.
- A convenient tilt-and-swivel mechanism for user selection of viewing positions.
- A plug-in Peripheral Connection Assembly (PCA) can be housed in the base of the 5081 display for attachment of an Alphameric or APL Keyboard, Dials feature, a 5083 Tablet, and a Lighted Program Function Keyboard. The PCA is attached to the 5085 Graphics Processor by a single, 3.0m (9.8 ft.) cable which eliminates the need for separate, long cables connecting the 5085 to each peripheral device.
- Each 5081 provides an RS 343 attachment for the cable connection of an additional 5081 of the same mdl number. All 5081s connected in this fashion display the same picture.

Peripherals: The 5085 Processor controls the following peripherals which can be attached via a connection box stored in the tilt-swivel base of the 5081 Display:

5083 Tablet (see M5083 pages)
Dials (see M5085 pages)
Alphameric Keyboard (see M5085 pages)
Lighted Program Function Keyboard (see M5085 pages)

Physical Specifications:

	Model 1	Model 2
Width	490mm (19.29 in.)	490mm (19.29 in.)
Depth	553mm (21.77 in.)	553mm (21.77 in.)
Height	490mm (19.29 in.)	490mm (19.29 in.)
Weight	39.0kg (86 pounds)	44.0kg (97 pounds)

Customer Responsibilities: The customer is responsible for:

- Physical planning and site preparation.
- Provision of the required electrical service and facilities. See *5080 Graphics System Site Planning and Preparation Guide*, GA23-0129, for details on these responsibilities.
- Setup and installation of the 5081.
- Training of 5081 operators.

Maintenance: The 5081 is offered with Field Engineering on-site service under an MMMC.

Cables: Cables from the 5085 to the 5081 (three video coaxial cables and the 3.0m (9.8 ft.) flat ribbon cable with a special connector for the attachment of peripheral devices) are supplied with the 5085.

Cables for the peripheral devices controlled by the 5085, but physically attached to the front of the 5081 Display, are supplied with each device except for the alphameric keyboard cables which are supplied with the 5085. See GA23-0129 for descriptions.

The attachment of additional (output only) color Displays to the first 5081 mdl 2 requires a customer-supplied video coaxial cable made up of a combination of three cables (RG-59/U type). The attachment of additional (output-only) mono Displays to the first 5081 mdl 1 requires a customer-supplied single video coaxial cable (RG-59/U type). See GA23-0129 for further descriptions.

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Attachment to a 120V power source is required for the 5081 and the 5085. The 5081 and its controlling 5085 must both be connected to the same supply voltage phase.
- **For Additional Displays:** A 9 ft. linecord is supplied with each additional 5081. If a 6-foot linecord is required, specify **#9986**. For an additional 5081 attached to a 5085, or for additional 5081s attached to 5081s, specify **#2001**.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5083 TABLET

PURPOSE

The Tablet is a thin flat-surfaced unit of compact design, which offers a comfortable, easy-to-use way for users to interact with, for example, the 5080 Graphics System's 5081 Display and 5085 Graphics Processor. It has a palm rest and tilt-height adjustments so it can be used either on a desk or a user's lap. The X,Y coordinate position of the cursor or stylus is transmitted, for example, to the 5085 Graphics Processor when, and whenever, these units are moved on the tablet's active surface.

MODELS

Model 1 001

HIGHLIGHTS

- Has a resolution characteristic of 127mm (0.005 in.).
- The cursor feature provides users with a convenient hand-held "mouse-shaped" unit which has four buttons for application use and a fine cross-hair for precise alignment and accurate digitizing of source data.
- The stylus feature provides a pen-like device for user interaction with the 5080 system. An indication is provided to the application program when the user activates the stylus tip switch by pressing the stylus tip to the tablet surface. The tactile feedback from pressing the stylus tip assures the user that a selection has been made.
- Can be used for 3250 light-pen emulation using either the stylus or cursor feature.

Description: Has dimensions of 400mm (15.75 in.) wide, 431.5mm (17 in.) long, and 21mm (0.82 in.) deep which includes an active area of 292mm (11.5 in.) by 292mm (11.5 in.). Weighs 2.9kg (6.5 pounds). Has a thin cable connection to the Peripheral Control Assembly in the base of the 5081 Display.

Customer Responsibilities: The customer is responsible for setup and installation of the 5083 and training of the 5083 user.

Customer Problem Analysis and Resolution: The 5083 is offered with Field Engineering service under an MMMC.

SPECIFY (None)

SPECIAL FEATURES

Cursor (#1511): For user interaction with the displayed image through cursor location on the surface of the Tablet. Can also be used to emulate 3250 Light-Pen operation. Can be used for conveniently digitizing drawings placed on top of the Tablet surface. The cross-hair facilitates accurate positioning. Four buttons can be used to transmit additional information to the graphics application programs. Has cable to connect to the 5083 Tablet. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be used concurrently with Stylus Feature (#6351).

Stylus (#6351): For user interaction with the displayed image through stylus pen contact with the surface of the Tablet. Can also be used to emulate 3250 Light-Pen operation. Has cable to connect to the 5083. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be used concurrently with Cursor Feature (#1511).

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5085 GRAPHICS PROCESSOR

PURPOSE

The 5085 has a comprehensive graphics architecture which includes 3250 Graphics Display System capability. The 5085 is dedicated to the operation of 5080 Graphics Systems units. The 5085 provides a powerful graphics order set with more than 75 orders and also controls the 5081/5085 workstations' display list buffers, concurrent graphics, and 3270 data mode sessions (with the optional 3270 feature), peripheral device attachments, and, for example, 7374 and 7375 color plotter attachments, and display functions. It contains up to 1.1 megabytes of system memory.

MODELS

Model 1 001 Configurable to individual application requirements.

Model 1 S01 Pre-configured with 128K bytes of storage, one increment of expansion pixel memory (#3621), an alphameric keyboard (#4631) and lighted program function keys (#4710). Associated 5081 Displays, 5083 Tablets, and 5088 Graphic Channel Controllers are orderable through normal ordering procedures.

Prerequisites: A 5088 Graphics Channel Controller or a 3258 Control Unit. Use of the 3258 limits the data rate to/from the 5085 to 1.0 megabits/second. It may be 2.0 megabits/second when using the 5088 ... provided no 3251/3255 workstations are attached. When a 3251/3255 workstation is in the configuration, the data rate must be 1.0 megabits/second.

Peripherals: The 5085 controls the following peripherals attached via connectors in the 5085's attached Peripheral Connection Assembly in the tilt-swivel base of the 5081 Display:

IBM 5083 Tablet (see M5083 pages)
Dials Feature (see "Special Features")
Alphameric Keyboard (see "Special Features")
APL Keyboard (see "Special Features")
Lighted Program Function Keyboard (See "Special Features")

Other devices are attachable through the 3270 and RS 232-C Attachment Feature (#5510). Two RS 232-C attachment ports are available. For example, both an 7374 and 7375 Color Plotter could be attached at the same time.

HIGHLIGHTS

- Compact size for convenient office placement ... fits beside a desk or under a table.
- 128K bytes of system memory for storage of display lists and 5085 control programming (expandable to 1.1 megabytes with the addition of system memory features). In a system which has the base 128K bytes of system memory, 64K bytes are reserved for the 5085 control program. Of the remaining 64K bytes, an additional 8K bytes are reserved for such display list functions as area fill workspace, area fill pattern, line patterns and future expansion. The remaining 56K bytes, as well as any additional system memory is available to the user for storage of information, such as display lists, and programmable vector character sets. **Note:** The 3270 and RS 232-C Attachment Feature includes an additional 192K of system memory which is used for the 3270 and RS 232-C microcode as well as for host generated device protocols and data used to communicate with devices attached to the RS 232-C ports.
- Polygon Area Fill with the following characteristics:
  - Use of solid, or user-defined fill patterns;
  - Filling of 2D objects including those being dynamically:
    - transformed (e.g rotated, scaled, and translated)
    - clipped.
  - Filling of circles as well as concave and convex objects.
  - Filling of multiple overlapped, and disjointed polygons that contain shapes (islands), and/or crossing sides (bowties).
- Has both fixed and programmable line type and character set generators.
  - Four fixed line types and four fixed character sets are provided in the hardware. Fixed characters and line types are not scaled which facilitates reading of text and easy line type identification when a picture has been scaled.
  - The programmable character generator permits users to define their own vector definitions for any character. These vector-defined characters can be scaled and rotated like any other vectors the 5085 processes. Multiple programmable character sets and line types may be loaded in the 5085 system memory with the active programmable character set and line type dynamically selectable by the user.
- Four simultaneously displayable colors or gray shades (expandable to 256 with the addition of Pixel Memory features)..)
- Automatic mapping of color to monochrome images to facilitate the intermixing of color and monochrome displays.
- 3250 graphic order compatibility *(Important:* See "3250 Compatibility" below.)
- Double frame buffers facilitate smooth picture transitions without blanking or flashing.
- A 3D, 64K (X) by 64K (Y) by 64K (Z) virtual world coordinate space.
- 4K by 4K virtual image space mapped to the 1K x 1K real screen coordinates.
- Images generated by a bit-map in the host can be conveniently displayed using a special graphic order.
- Circle generation is provided. This reduces the amount of information from the host required to draw a circle. The circle generation facility also allows circles, which are scaled using this facility, to retain a smooth form without requiring host interaction.
- An audible alarm with volume control.
- A frame buffer write/erase protect function which facilitates animation, menu overlays, and visual detection of vector intersections.
- Design for customer setup. For example, the user can set the addresses of the 5085 and its attachments without CE assistance.
- A 5-1/4 inch diskette drive with a formatted capacity of 360K/bytes to store the 5085 microcode, error statistics, and configuration data.

Performance: The new 5080 orders, in combination with the increased amount of 5080 system memory available to the user and the workstation-based microprocessor intelligence, enable an application to significantly offload host processing. The 5085 Graphics Processor uses multiple processors and specially designed hardware to achieve the following performance characteristics:

- Hardware-generated high-speed vector-to-raster conversion.
  - The pixel generator writes pixels in any direction at the rate of 100 nanoseconds per pixel. Actual drawing time varies based on the graphic order used for drawing and system variables such as dynamic RAM refresh time.
  - Horizontal pixel write speeds for certain area fill operations may be accomplished at faster rates.
- A high-speed fixed-character generator is provided by using special, dedicated high-performance memory.
- A separate microprocessor dedicated to handling data transfers between the 5085 and 5088 at the rate of 2 megabits/second. This permits other microprocessors in the 5085 to perform parallel processing of display lists, and peripheral device control.
- High-speed display list-order processing is provided by a 16-bit bit-sliced processor.
- High-speed transformations (scaling, rotating, and translation), with coordinate clipping of 2-and 3-dimensional objects is available with an optional feature. These permit image manipulations and successive transformations without interrupting the host application.
- Calculation capabilities, such as arithmetic operations including sine and cosine along with stacking and concatenation of transformation matrices.
- A separate microprocessor for the optional 3270 and RS 232-C attachment feature to permit 3270 processing in parallel with all other operations.
- Peripheral I/O units contain microprocessors to offload the 5085 and also provide diagnostic functions.

3250 Compatibility: Many 3250 Graphics Display System applications will work on an 5080 System unchanged. This is due in part to the internal functional compatibility of the two systems, and in part to the way information is displayed on the displays. Drawing the same characters on 3251 and raster technology screens would ordinarily cause the loss of half of any character around the screen border. A special 3250 migration aid ensures that the information shown on a 5081 remains equivalent to that shown on a 3251. The function is an option that can be activated by a user through the configuration and parameter specification function, called "setup".

3255 Display Control Units and 5085 Graphics Processors can be attached to the same 5088 Graphics Channel Controller or the same 3258 Control Unit.

Compatibility with existing IBM graphics systems, and their related application programs, is provided by GAM/SP Release 2 (5668-978). In addition to supporting all of the advanced graphics functions of the 5080 System, GAM/SP Release 2 also provides host programming support for the 3250 Graphics Display System in a manner compatible with the existing support provided by GAM/SP Release 1 (under

5085 Graphics Processor (cont'd)

VM/SP-CMS) or Graphics Programming Services (GPS) GAM under MVS or VS/1. Existing application programs should run unaltered within the same operating environment.

Although the 5080 System is functionally compatible with the 3250 System for major functions, there are certain incompatibilities due to the use of a raster display (the 5081) to emulate a directed beam display (the 3251) and to certain performance or function differences. These differences are found in the following areas. (See *IBM 5080 Graphics System Principles of Operation,* GA23-0134, for details.)

- Highlighting by overwriting of vectors
- Vectors with a single endpoint off the screen
- Never-Ending Display List
- Wrapping of vectors in coordinate space
- Last position of an unprotected field
- Buffer Wrap
- Address returned by GEOS (i.e., end of order list)
- End of Application
- Time-dependent display list programs

3270 Compatibility: 5080 system operation for 3270 applications requires the 3270 and RS 232-C Attachment Feature (#5510). It is recommended for systems with color 5081 Displays that at least one additional Expansion Pixel Memory feature be added in the 5085 Graphics Processor to achieve compatibility with color 3270 displays.

3270 programs can operate with the 5080 system using host systems which support SNA/SDLC 3270 attachment, and applications which use the supported features. IBM-provided programs (e.g., TSO, CICS, IMS, etc.) will also operate with the 3270 mode feature of the 5080 system.

The following 3270 functions and attachments are not supported:

- Data Entry Keyboards
- Numeric Lock
- Magnetic Slot Reader
- Magnetic Hand Scanner
- Loadable Programmed Symbols (PSS)
- Multiple Partitions with Scrolling
- Tablet emulation of a light-pen
- Keylock

Physical Specifications:

Width - 321mm (12.6 inches)
Depth - 568mm (22.37 inches)
Height - 590mm (23.23 inches)
Weight - 20kg (44 pounds)

Customer Responsibilities: The customer is responsible for:

- Physical Planning and Site Preparation.
- Providing the required electrical service and facilities. See *IBM 5080 Graphics System Site Planning and Preparation Guide,* GA23-0129, for details.
- Setup and installation of: The 5085 Graphics Processor and peripheral features (e.g., Lighted Program Function Keyboard, Alphameric Keyboard, Dials)
- Ordering and provision of the appropriate cables ... see "Cables" in Specify.
- Modem and TP line equipment for use with the 3270 feature.
- Education of 5080 System users.

Maintenance: The 5085 is offered with Field Engineering on-site service under an MMMC.

3270 and RS 232-C ATTACHMENT FEATURE

This feature adds both a 3270 feature processor and the ability to attach RS 232-C compatible devices.

3270 Feature: The 3270 feature permits an IBM 5080 Graphics System user to access 3270 applications in host systems which support an SNA/SDLC attachment. Separate and simultaneous interaction with 3270 and 5080 graphics applications can be maintained. The user may alternate images on the 5081 Display by a simple keyboard action. The integrity of the 3270 display image is preserved by the 5085 Graphics Processor. (The integrity of the 5085 graphics image is maintained assuming a display list capable of regenerating the image is retained in the 5085. This is normally the case.)

The 5080 Graphics System supports the data and graphics computing needs of engineers and other professionals in a single workstation by providing access to both 3270 applications and 5080 graphics applications.

The 5080 Graphics System 3270 feature supports the following 3270 Functions:

- Base 3270 Functions.
- Regular- and high-intensity for each of seven specifiable colors, provided that a color display and at least one additional Expansion Pixel Memory Feature is present.
- Screen Sizes (80 characters per line): 12 lines (960 characters), 24 lines (1,920 characters), as the default, 32 lines (2,560 characters), and 43 lines (3,440 characters).
- Multiple Partitions.
- Extended Highlighting: Blinking, Reverse Video and Underscore.
- Field Validation.
- Audible Alarm.
- Alphameric Keyboard with 24 Program Function Keys.
- APL using the APL keyboard and 12 of the 24 Program Function Keys.
- TP Communications using:
  SNA and SDLC protocols.
  External Modems only.
  Self-Clocked Modems only.
  Speeds up to 9600 bps.

Note: The 3270 Feature may be multi-dropped.

RS 232-C Feature: The 5085 Graphics Processor can have two 25-pin RS 232-C attachment ports which will support devices such as plotters that:

1. Conform to electrical interface specifications, EIA RS 232-C and CCITT V24, and
2. Have a transmission protocol which can be supported using the generalized 5085 RS 232-C attachment interface architecture.

The RS 232-C attachment port can support data transmissions up to 9600 bps for ASYNC. This is suitable for many devices, including the IBM 7374 and 7375 color plotters. Each RS 232-C port is addressed separately by the host application. Activated RS 232-C ports correspondingly reduce the number of 5085s and 3251/3255s that can be attached to the 5088.

When a device is attached to the RS 232-C port, it can run concurrently with the 5080 system graphics and 3270 capabilities. Two areas of 16K bytes each are provided with the feature for host generated device protocols and data used to communicate with the RS 232-C attached devices.

PERIPHERAL DEVICE FEATURES

Alphameric Keyboard: This feature is a low-profile, cable-attached, EBCDIC typewriter-like keyboard which can be adjusted to any of three surface inclinations matching a user's preferred hand position.

The keyboard has104 keys which may be operated with, or without audible feedback. The key arrangement has four clusters of keys. Three of them are side by side (left to right) with the fourth located at the rear center. The clusters are:

1. 10 keys (2x5) which are used for special functions.
2. 59 keys in QWERTY arrangement, plus special standard keys for engineering graphics.
3. 11 keys for cursor control, and special functions, such as shifting between 5080 graphic and 3270 modes.
4. 24 Program Function (PF) Keys arranged in two horizontal rows of twelve. In 5080 graphics mode, these PF keys can be used in place of the first 24 lighted program function keys, if lighted tops aren't required. Normal PF key function is supported in 3270 mode.

The keyboard cable required to attach the keyboard is shipped with the 5085 Graphics Processor.

APL Keyboard: The APL keyboard has modified keytops to facilitate the entry of 81 specific APL characters. Entry to and exit from APL mode is controlled through a special APL on/off key. In other respects the APL keyboard resembles the Alphameric keyboard. **Note:** The APL keyboard is supported via the 3270 feature only.

Lighted Program Function Keyboard: The lighted program function keyboard is a separate assembly with 32 keytops in which amber-colored light-emitting diodes (LED) are imbedded. The case profile and surface inclination adjustment are designed to match those of the alphameric keyboards.

The keyboard LEDs can be turned on and off under host application control to indicate which keys may be selected at a given moment. Correspondingly, a unique signal is returned to the application for any key pressed. In this way a user and an application may interact. The keyboard functions operate compatibly with 3250 programs.

Dials Feature: The Dials feature flat, compact, low-profiled, desk-top unit with eight, cone-like dials. The dials may be turned continuously in either direction by easy manipulation with one, or more fingers. Upon rotating the dials, a range of scalar values indicating extent of rotation and direction are signaled to the 5085 Graphics Processor. An

5085 Graphics Processor (cont'd)

application can read and interpret this input for any suitable purpose, such as panning, zooming, and rotating 2- or 3-dimensional images.

SPECIFY

* Voltage (AC, 1-phase, 3-wire, 60 Hz): Attachment to a 120 volt power source is required for the 5081, and 5085. The 5081 and its controlling 5085 must be connected to the same supply voltage phase. The line cord supplied is 9 feet long. Specify **#9986** if a 6 foot cord is required.

- Host System Designation and Location: Specify **#9333** to indicate host system location and CPU type on the first 5085 attached to that host. Supplementary information is to be filled out exactly as follows and entered at order entry time for the 5085. (Specify **#9444** on all additional 5085s other than the first attached to the host.)

  Line 1 - Company or Organization Name
  Line 2 - Street Address (or P.O. Box)
  Line 3 - City, State, Zip code
  Line 4 - Host CPU type and operating system used.

- **Cables:** For the 5085: Cables from the 5085 to the 5088 or 3258 are a customer responsibility to supply. Cables from the 5085 to the 5081 (three video coaxial cables and the 3.0m (9.8 ft.) flat ribbon cable with a special connector for the attachment of peripheral devices) are supplied with the 5085. The 3270 and RS 232-C Attachment Feature (#5510) includes one 10-foot cable for attachment to modems with EIA connectors.

  Cables for the peripheral devices controlled by the 5085, but physically attached to the front of the 5081 Display, are supplied with each device except for the Alphameric Keyboard cables which are supplied with the 5085. See GA23-0129 for further descriptions.

SPECIAL FEATURES

Transformation and Clipping Feature (#1021): Provides 2D, 3D Transformation (scale, rotate, translate) and 3D viewing capabilities, and sine, cosine, and multiply functions. **Maximum:** One. **Field Installation:** Yes.

Expansion Pixel Memory (#3621): Increases color or gray shade capability from base of 4 to 16 in first increment, 17 to 64 in second increment, and 65 to 256 in third, and final, increment. **Maximum:** Three. **Field Installation:** Yes.

Alphameric Keyboard (#4631): Has 104 keys with QWERTY layout and control keys. Serves graphics and 3270 modes. 24 Program Function Keys (PFK) are normally used for application -specific inputs. They may also be used as Lighted Program Function Keys (without lights). If a Lighted Program Function Keyboard (LPFK ... feature #4710) is attached to the 5085, the 24 PFKs serve as alternates to the first 24 keys on the (32-key) LPFK. If an LPFK is not attached to the 5085, the 24 PFKs may be used as a 24-key LPFK. Attachment cable is shipped with the 5085. Unit has operator-adjustable height, is movable, and has audible indication of character input. **Maximum:** One per 5085. **Field Installation:** Yes.

Lighted Program Function Keyboard (#4710): Has 32 backlighted function keys. Provides 3250 program compatibility. Has tilt adjustment and palm rest. **Maximum:** One per 5085. **Field Installation:** Yes.

3270 and RS 232-C Attachment Feature (#5510): Provides 3270 emulation. Also provides two RS 232-C interfaces (Ports) for attachment of up to two devices. The RS 232-C ports support data rates up to 9600 bps for each ASYNC port and are suitable for attachment of devices such as the 7374 and 7375 Color Plotters. Each RS 232-C port requires a separate host address and, when a corresponding device is attached, reduces the number of 5085 Graphics Processors or 3251/3255 workstations attached to a 5088 Graphics Channel Controller, or to a 3258 Control Unit, by one. Two areas of 16K bytes each are provided with the feature for host-generated device protocols and data used to communicate with the RS 232-C attached devices. **Maximum:** One per 5085. **Field Installation:** Yes.

System Memory (#6311): [Mdl 1] 512K expansion increments. **Maximum:** Two increments. **Field Installation:** Yes.

Dials (#8710): A separate, compact, desk top unit with eight dials for operator input of scalar values. Each dial discerns 128 discrete values within a dial rotation. The analog action each dial represents is a function of the application program in use. **Maximum:** One per 5085. **Field Installation:** Yes.

APL Keyboard (#4641): Same as Alphameric Keyboard but with APL symbols activated by an APL on/off key. **Maximum:** One per 5085. **Field Installation:** Yes.

MODEL CONVERSION (None)

ACCESSORIES (None)

SUPPLIES (None)

5088 GRAPHICS CHANNEL CONTROLLER

PURPOSE

The 5088 operates as a shared, high-speed control unit to 5081/5085 or 3251/3255 workstations. It can attach to a S/370, 4300 or 30XX channel with a channel data rate of up to 2.5 megabytes/second in data streaming mode, or up to 1 megabyte/second in conventional channel mode. Its functional compatibility with the 3258 permits both 3255s and 5085s to be attached. Since 5085s may also attach to the 3258, there is the capability to mix units from the 5080 Graphics System and the 3250 Graphics Display System.

MODELS

Model 1 001 — Permits the attachment of up to a maximum of 16 5081/5085s, 3251/3255s, and RS 232-C* compatibile decices. (In a 5085-only environment, the link between the 5088 and the 5085 can operate at 2 megabits/second. In a 5085 and 3255, or a 3255-only configuration, the link speed is limited to 1 megabit/second.)

Model 2 002 — Provides the same attachment capability as the model 1 for the first set of 16 5081/5085s, 3251/3255s and RS 232-C-compatible devices. The model 2, in addition, provides for the attachment of a second set of 16 5081/5085s, 3251/3255s and RS 232-C-compatibile devices with the same capabilities. This allows a maximum attachment capability of 32 workstations.

* Each RS 232-C-compatible device connected to a 5085's 3270 and RS 232-C attachment feature correspondingly reduces by one the number of workstations which may be attached to the 5088. This applies, for example, to attachment of the 7374 and 7375 color plotters.

Channel Attachment: Requires a control unit position on a system channel. The 5088 will attach to a Block Multiplexer, Selector, or Byte Multiplexer (burst mode only) Channel.

HIGHLIGHTS

Has the same physical dimensions as the 5085 Processor for easy placement relative to the host channel.

Attaches to all S/370, 4300, 30XX channel interfaces at a maximum distance of 121.9m (400 ft). Operates on block multiplexer, selector, or byte multiplexer (burst mode only) channels.

- Minimizes channel overhead for transmissions greater than 32K by using channel data buffering of approximately 64K.
- Provides new channel command capabilities which permit applications to use advanced or extended functions in the 5085 Graphics Processor. These capabilities include:
  - Control of display lists that are greater than 64K bytes.
  - Select Write/Read memory area commands for minimizing channel utilization on large writes/reads.
  - Loading of programmable vector character sets into system memory.
  - Controlling allocation of 5085 memory for functions such as large polygon fills which require more than the default workspace.
  - Overlapping of device processing.

  Note: The 5088 also supports the 3258 channel commands in order to assist existing 3250 users in either mixing 5080 systems with 3250 systems or to permit the use of the currently available GAM or GAM/SP1 access methods. When the 5088 execution is limited to 3258 channel commands, the performance characteristics of the 5088 may be less than those of the 3258 depending upon the amount of data which the application reads from the terminals. If the reading frequency and/or volume of input data is low, then the 5088 performance should be comparable to a 3258. (This is normally the case for the IBM-supported CAD/CAM applications.)
- Provides additional 5085 sense information to assist in fault isolation, program debugging, etc. Sense information is provided separately for each 5085 device.
- Provides additional RAS capabilities:
  - Enhanced 5088/5085 link problem determination capabilities.
  - Improved error detection.
  - I/O error alert.
  - Machine check broadcast to 5085 with optional automatic restart of the 5088.
- Can be powered on/off remotely from the host CPU (via the standard power control interface).

Physical Specifications:

	Model 1	Model 2
Width	320.6mm (12.6 inches)	320.6mm (12.6 inches)
Depth	568mm (22.3 inches)	568mm (22.3 inches)
Height	590mm (23.23 inches)	590mm (23.23 inches)
Weight	22.7kg (50 pounds)	24.5kg (54 pounds)

Cables: Cables to the S/370, 4300, 303X, or 308X processor must be ordered. Cables to the 5085/3255 are a customer responsibility to supply.

The 5088 uses either 3250 type (75 ohm) cable or 3270 type (93 ohm) cable for attachment to 5085 Processors. **Note:** The maximum distance between the 5088 and a 5085 depends upon the attenuation characteristics of the cable and any connectors (customer supplied). Use of RG-59/U (75 ohm) and RG-62/AU (93 ohm) cable (used in many 3270 installations) permits attachment up to 1,000m (3,280 ft.) apart. The use of special low-loss 75 ohm impedance coaxial cable will permit attachment up to 5,000m (16,400 ft.) apart. See *IBM 5080 Graphics System Site Planning and Preparation Guide,* GA23-0129, for details.

Customer Responsibilities: The customer is responsible for:

- Physical planning and site preparation.
- The provision of the required electrical service and facilities. (See *IBM 5080 Graphics System Site Planning and Preparation Guide,* GA23-0129, for details on the above responsibilities.)
- Ordering of cables to the S/370, 4300, or 30XX processor.
- Provision of cables to the 5085/3255.

Customer Problem Analysis and Resolution: The 5088 is offered with Field Engineering on-site service under an MMMC.

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Attachment of a 120V power source is supplied as standard; specify **#9902** for 208V. Plugs supplied are non-locking. The linecord supplied is 9 feet long. Specify **#9986** if a 6 foot cord is required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5103 PRINTER

PURPOSE

Provides hard-copy output for the 5110 Computer and the 5120 Computing System.

MODELS

Model 11	011	[NO LONGER AVAILABLE] 80 cps maximum bidirectional printer
Model 12	012	[NO LONGER AVAILABLE] 120 cps maximum bidirectional printer

Customer Setup: The 5103 is designed as Customer Setup. Refer to the GI section for details. The CSU allowance is one day.

HIGHLIGHTS

Prints serially in both left-to-right and right-to-left directions. The maximum print line is 132 print positions at 10 characters per inch. Line spacing is at six lines per inch. All APL and BASIC special characters can be printed. Throughput is dependent upon output format and line length.

The 5103 mdls 11 and 12 allow the 5110 to overlap printing with processing functions. Mdls 11 and 12 also support both upper and lower case character printing.

The 5103 is packaged in its own table-top covers, measuring 61 x 36.8 x 30.5cm (24 x 14-1/2 x 12 inches), and weighing 24.8kg (55 pounds). The standard forms tractor allows multi-part, fan-fold paper. Overall forms width ranges from 8.9 to 38cm (3-1/2 to 15 inches). Continuous forms fold-to-fold length may vary from 7.6 to 35.6cm (3 to 14 inches). Up to 6-part forms can be printed with a maximum thickness of .046cm (.018 inches). 5- and 6-part forms should be tried for satisfactory feeding, registration, and print quality. Forms that exceed .046cm (.018 inches) thickness can create printer feeding registration and print quality problems. Card stock continuous forms are not recommended. Matrix characters are formed by eight vertical wires printing dots in up to four of seven possible horizontal positions. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations.

Customer Responsibilities: The marketing representative must advise customers of their responsibilities before receipt of the machine. Use of the *Information Bulletin for Customers - Customer Setup* (G120-2743) is required. The customer is responsible for providing a desk or table-top to support the 5103.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify required.
- Power Cord: 1.8 meter (6 foot) cable, nonlocking plug.
- Color: Pearl White only. No specify required.
- Attachment: Attachment to the computer , 5106, or 5114 is via a 1.2 meter (4 foot) cable.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

The upgrade purchase price for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements prior to purchasing a system.

For serial numbers 30000 and above, submit an MES for model 11 to model 12 upgrade.

ACCESSORIES

Forms Stand (#4450): This one-shelf stand permits feeding of continuous forms from the carton and provides for forms stacking after printing. For shipment to the field, order by feature number.

SUPPLIES

Ribbons: A black ribbon, P/N 1136653 or equivalent, is required on machines shipped before August 29, 1980 or on machines not having RPQ D09005 installed. A black cartridge ribbon, P/N 7034535 or equivalent, is required for all machines shipped on or after August 29, 1980 or on machines having RPQ D09005 installed.

5106 AUXILIARY TAPE UNIT

PURPOSE

Provides a second tape cartridge I/O unit for the 5110 Computer.

MODELS

Model 11	011	Attaches to the 5110 model 1

Customer Setup: The 5106 is designated as Customer Setup. Refer to the GI section for details. The CSU allowance is one day.

HIGHLIGHTS

Attractive for the user with extensive tape data storage requirements. Provides ease of copy and file update.

Housed in its own covers, the 5106 measures 31 x 26 x 19cm (12-1/4 x 10 x 7-1/4 inches) and weighs 8kg (20 pounds). Its characteristics are the same as those of the inboard unit provided with the 5110.

Customer Responsibilities: The marketing representative must advise customers of their responsibilities before receipt of the machine. Use of the *Information Bulletin for Customers - Customer Setup* (G120-2743) is required.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify required.
- Power Cord: 1.8 meter (6 foot) cable, nonlocking plug. No specify required.
- Color: Pearl White only. No specify required.
- Attachment: Attachment to the portable computer is via a 0.6 meter (2 foot) cable.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Tape Cartridge: A tape cartridge is required and is available in packages of five from IBM.

SUPPLIES (None)

5110 COMPUTER MDL 3

[NO LONGER AVAILABLE]

PURPOSE

Designed to address a wide variety of commercial and problem solving applications in both the small and large business.

MODELS

The 5110 model 3 is the processor for the 5120 Computing System. The following chart gives the model number by memory size and programming language.

Models	Languages	Main Storage Bytes
A31	APL	16K
A32	APL	32K
A33	APL	48K
A34	APL	64K
B31	BASIC	16K
B32	BASIC	32K
B33	BASIC	48K
B34	BASIC	64K
C31	APL and BASIC	16K
C32	APL and BASIC	32K
C33	APL and BASIC	48K
C34	APL and BASIC	64K

Customer Setup (CSU): The 5110 mdl 3 is designated as Customer Setup. The Marketing Representative/BCC must advise the customers of their responsibilities before receipt of the machine. For information on CSU, refer to the "GI" section, and contact IBM. Use of the *Information Bulletin for Customers-Customer Setup* (G120-2743) is required. The CSU allowance is one day.

HIGHLIGHTS

- User-oriented data processing.
- Built-in high level interactive language ... APL, BASIC, or both.
- Integrated diskette storage of 2.4 megabyte capacity.
- Nine-inch CRT display screen.
- Easy-to-use keyboard for programs and data.
- Audible Alarm, standard.
- Composite Video Adapter, standard.
- Optional Asynchronous or Binary Synchronous Communications Adapters.
- Optional Serial I/O Adapter via EIA Standard RS-232-C .
- Optional Diskette Sort feature.

Features:

- Metal Oxide Semiconductor Field Effect Transistor (MOSFET) main storage.
- 530 nanosecond main storage cycle time.
- Internal parity checking.
- All features are field installable. Upgrades are field installable.
- Main storage available in 16K, 32K, 48K, or 64K bytes. **Note:** The language interpreters utilize part of main storage which is not available to the user, with BASIC this amounts to 4,624 bytes and with APL it is 6,915 bytes.

Keyboard: It has a familiar typewriter layout plus a numeric keypad. Four arithmetic operator keys located to the right of the numeric keypad provide convenient data entry in desk calculator mode. With a BASIC machine, the keys on the 10-key pad can be programmed by the user to perform special functions. These functions are activated by the COMMAND key. Keytops indicate special characters for APL and/or BASIC, depending on mdl. The top row of typewriter keys provides machine commands when depressed with the COMMAND key. Frequently used APL and/or BASIC statements are printed on the front of the keys. The user may then enter a statement keyword, such as GOTO or PRINT, by pressing the COMMAND key and the appropriate word key. The primary purpose of the COMMAND key is to make use of the 5110 mdl 3 easier and faster.

Display Screen: Is used to display keyed input, provide user guidance and display output. Up to 1,024 characters can be displayed on the nine-inch screen 16 lines of 64-characters each. Under program control, the user is permitted full-screen management and display of upper/lower case characters.

Interactive Languages: Implemented in three options within Read Only Storage (ROS): APL, BASIC and a combined APL/BASIC. With a combination machine, the language is selectable with a switch and a combined APL/BASIC keyboard is provided.

Input/Output Operations: Provide for update-in-place and Record I/O with Diskette.

Customer Support Functions: Are distributed with the 5110 mdl 3 on diskette. The functions provided include a relocatable loader, diskette initialize, diskette compress, diskette-to-diskette copy, diskette recovery and label display. Also included, but applicable only to 5110 mdl 1s, are: Tape-to-tape copy, tape-to-diskette copy, tape header recovery, tape data recovery and diskette-to-tape copy.

Composite Video Adapter: Provided for simultaneous display of CRT data on additional screens.

Audible Alarm: The audible alarm is provided to signal "system attention required" and under program control, operator messages like "end of job".

Customer Responsibilities: The customer is responsible for:

- The customer is responsible for providing a desk or table-top to support the 5110 mdl 3.
- Making arrangements for installation, pricing, and charges for the data communications facility and attachment of selected data sets.
- Toll charges, if required for installation and/or maintenance of BSCA, are to be paid by the customer.
- The IBM Marketing Representative/BCC must have the customer obtain a firm installation date for transmission service (including modems) before the order, BSCA (#2074), can be confirmed. For further information refer to "Teleprocessing Systems" and M2700 pages.

The customer must be advised *in writing* that he is responsible for:

- Attaching a device which meets the defined EIA Standard RS-232-C Specifications (Interface Type D) for Serial I/O.
- Assuring with the device manufacturer the time between data transfer is sufficient for their application.
- Supporting the I/O device with APL or BASIC programs.
- Determining program storage requirements.
- Maintenance of common carrier facilities/services as well as the IBM equipment. For further information see M2700 pages and "Teleprocessing Systems".

AAS Ordering Instructions: The 5110 mdl 3 is a Computer System.

Codes: SIU = 5110 ID = N40

SPECIFY

- Power (120V AC, 1-phase, 60 Hz): Nonlocking plug.
- Color: Pearl white
- Cables:
  - Standard Power - 1.8 meters (6 feet)
  - Asynchronous Communications Adapter (#1525) - 1.8 meters (6 feet)
  - EIA Interface (#3701) - 6 meters (20 feet)
  - Serial I/O (#6301) - 1.8 meters (6 feet)

SPECIAL FEATURES

Non-Communications Features

Expansion Feature (#1524): A prerequisite for attachment of the Asynchronous Communications Adapter (#1525) or the Serial I/O Adapter (#6301). **Limitations:** See "5120 Computing System Configuration Considerations". **Maximum:** One. **Field Installation:** Yes.

Channel Terminator (#1600): Required when the 5103 Printer is not attached. It logically and physically provides load termination to the channel. **Field Installations:** Yes.

Diskette Sort (#3200): Provides the 5110 mdl 3 user with the ability to sort diskette data files. Both full-record sorts and address-out (ADDROUT) sorts are possible. The sort resides in ROS and can be initiated through the system language or the keyboard. **Maximum:** One. **Field Installation:** Yes.

Serial I/O Adapter (#6301): Provides the 5110 mdl 3 with the capability to attach anyone of a variety of peripherals which satisfy EIA Standard RS-232-C Specifications. The customer may select 5-, 6-, 7-, or 8-bit code rates from 20 to 9600 bps (2400 maximum for 5-bit). Interaction with an attached device is through the APL or BASIC languages. **Limitations:** May not be installed with Asynchronous Communications Adapter(#1525) if Binary Synchronous Communications Adapter (#2074) is installed. See "5120 Computing System Configuration Considerations". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1524. **References:** For Serial I/O Feature, refer to the "GI" section and *Site Preparation Manual* (GA34-0130) for

5110 Computer Mdl 3 (cont'd)

information concerning attachment requirements for the 5110 mdl 3 Serial I/O Adapter.

Communications Features

Asynchronous Communications Adapter (#1525): Provides the 5120 Computing System with the capability to appear as 2741 (using EBCDIC or Correspondence notation) to a remote system. The customer may select 134.5 bps or 300 bps start/stop transmission speeds, depending upon the remote system. Operation will be over appropriate B1, B2, C1, C2, and D1 facilities. Line connection is through a customer-supplied modem. The 5120 Computing System is supported in stop/start mode connected to a S/370, 303X, or 4300 Processor via an Integrated Communications Adapter (ICA), a 3704/3705/3725 Communications Controller with the Emulation Program (EP/VS), or the Network Control Program (NCP/VS). See M2700 pages for details concerning the facilities and prerequisites on these units. When in asynchronous communications mode, the 5120 Computing System is supported as a 2741 by the following:

SCP	Options	TP Access Methods
OS/VS1		BTAM, TCAM, or VTAM
OS/VS2	TSO (via TCAM)	BTAM, TCAM, or VTAM
DOS/VS		VTAM
VM/370		

In the asynchronous communications mode, the 5110 mdl 3 keyboard will be used in the same way as a 2741 keyboard. Output will be displayed on the CRT and may be printed on an optional printer. The user may also use the diskette to transmit and receive data from the remote system. While in the asynchronous communications mode the 5120 Computing System is a dedicated terminal device. Therefore, interaction with the APL or BASIC interpreter takes place only after the session is completed. **Limitations:** May not be installed with Serial I/O Adapter (#6301) if Binary Synchronous Communications Adapter (#2074 is installed). See "5120 Computing System Configuration Considerations". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A customer-supplied modem meeting EIA RS-232-C Specifications and #1524.

References:

- See M2700 pages for additional information concerning communication facilities, machine attachment requirements, operating capabilities and customer responsibilities.
- *IBM General Information and Site Preparation Manual* (GA34-0130), for physical installation requirements.

Notes:

- For questions regarding emulation of 2741 features and/or RPQs, contact Special Product Marketing .
- The functions of Receive Interrupt and Transmit Interrupt features on the 2741 are standard with the 5110 mdl 3 Asynchronous Communications feature, but require full-duplex modems. OS/VS BTAM does not support the transmit interrupt feature.

Bi-Sync Comm. Adapter [BSCA] (#2074): In conjunction with APL or BASIC program control, this feature permits the 5120 Computing System to function on a switched or nonswitched (leased or private) communications line as a processor terminal emulating 3741 line protocol with:

- A System/3 equipped with BSCA (#2074 or #2084) or BSCC (#2094).
- A System/32 equipped with BSCA (#2074)
- A System/34 equipped with Communications Adapter (#2500, #3500 or #4500).
- A System/36 equipped with Communications Adapter (#2500 or #4500).
- A 5110 equipped with BSCA (#2074).
- A 5120 Computing System equipped with BSCA (#2074).
- A 3741 mdl 2 or 4.
- Or when emulating 2770 line Protocol with: A S/370, 303X, or 4300 Processor, which is supported by OS/VS1, OS/VS2, TCAM, DOS/VS BTAM via an Integrated Communications Adapter, or a 3704/3705/3725 Communications Controller with NCP or EP, any of which are equipped with a binary synchronous adapter and appropriate sub-features.

This feature will operate with any of the above systems capable of communicating at the following nominal transmission rates on a point-to-point 1200/600, 2000, 2400, and 4800 bps. See M2700 pages for information on communications facilities. The 5120 Computing System may also operate as a tributary station residing on a multipoint (leased or private) communications line as a compatible member of the IBM family of BSC terminals in conjunction with a S/370, 303X, or 4300 Processor control station at transmission rates of 1200 to 4800 bps. This feature will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over leased (or equivalent private) communications lines which may be half or full-duplex facilities. Operation of this feature on the 5110 mdl 3 will be overlapped with printer operation at all rates including 4800 bps. BSC units at each termination of a data link to which the 5120 Computing System is attached must be set to operate at the same transmission rate and to use the same transmission code.

This feature supports, as a basic capability, the transmission and reception of blocked records. Switched network versions include the support of Manual Dial and Manual or Auto-Answer (where the attached modem supports this capability). The feature may be configured to operate with the EBCDIC transmission code or EBCDIC transparency code. The Internal Clock will generate synchronizing and timing signals for BSCA operation when they are not provided by the attached modem. The decision to use, or not use, the internal clock is made at configuration time. When the internal clock is used, all other terminals attached to the same data link must also be equipped with similar internal clocking capability. Transmission rates of 600 or 1200 bps are selectable at configuration time and initialization time. One of the IBM modems, 3863 (2400 bps), 3872 (2400 bps), or 3864 (4800 bps) may be attached to the BSCA (#2074) of the 5110 mdl 3. For more information on the capabilities of these modems refer to M3863 and 3864 pages. Communications facilities attachments for the 5110 mdl 3 BSCA are designed to operate on transmission facilities such as:

- Common Carrier leased telephone line services (voice grade), AT&T or Western Union Class 3002 (to 4800 bps) .
- Voice Grade nonswitched (common carrier or private) lines supporting a 4800 bps transmission rate. Channel requirements may vary according to the type of data set selected. The data set manufacturer should be consulted by the customer for this information.
- Voice Grade switchedcommon carrier network telephone service at 600, 1200, 2400, or 4800 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.

See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities and customer responsibilities.

Supported Configurations:

- Leased point-to-point, switched point-to-point, multipoint tributary
- Internal clock, modem clock
- EIA RS-232-C Interface
- Full-speed, half-speed line rate
- Full-duplex, half-duplex
- Use Switched Network Backup (SNBU), no SNBU
- Use 202 mode - Yes/No
- Use Auto-Answer - Yes/No
- Transparency Mode - Yes/No
- Error Threshold (1:18, 1:14, 1:2, 1:1, 2:1, 4:1, 8:1)
- Transmit/Receive
- Protocol Emulation 2770/3741
- Blank Truncation - Yes/No
- ENQ maximum count
- NAK maximum count
- 5110 Inactive timer
- Line Hold Timer (default 20 seconds)
- Record Length
- Poll ID
- Select ID
- Local ID
- Remote ID
- Space Compression Expansion - Yes/No
- Punch Device Number (DCI/DC2/DC3)
- Read/Write with Hold - Yes/No
- Connect dataset to line - Yes/No
- Send answer tone - Yes/No
- Online Test - Yes/No
- Calling Station - Yes/No
- Write Unblocked - Yes/No

5110 Computer Mdl 3 (cont'd)

Modem and Data Set interface to the BSCA (#2074) feature are:

Facility	Speed	Service	Modem
C4	1200/600	Switched	Integrated
C4M	1200/600	Switched	Stand-alone
C5	2400	Switched	3863
C5	2400	Switched	3872
C5M	2000/2400	Switched	Stand-alone
C6	4800	Switched	3864
C6M	4800	Switched	Stand-alone
D3	1200/600	Nonswitched	Integrated
D3M	1200/600	Nonswitched	Stand-alone
D4	2400	Nonswitched	3863, 3868 mdl 1
D4	2400	Nonswitched	3872
D4M	2000/2400	Nonswitched	Stand-alone
D4SB	2400/1200	Nonswitched	3872
D5	4800	Nonswitched	3864-C4, D6
D5M	4800	Nonswitched	Stand-alone
X1M	2400	Private	Stand-alone
X2M	4800	Private	Stand-alone

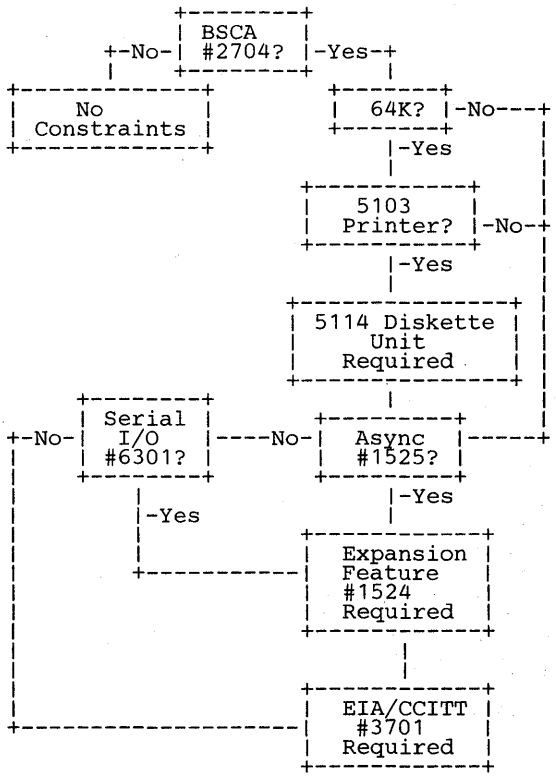
Limitations: See "5120 Computing System Configuration Considerations". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** In addition to the basic functions of Binary Synchronous Communications, #3701 must be added.

EIA/CCITT Interface (#3701): Provides a cable and interface for the attachment of an IBM or non-IBM modem meeting EIA RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074.

5120 Computing System Configuration:

Most configurations of I/O and optional features are possible, but due to power and packaging considerations, some configurations are not available.

If BSCA is installed, the following options and constraints apply:



If BSCA (#2074) is used in conjunction with APL, a 32K minimum 5110 mdl 3 is required. If a 5103 printer is attached to the 5110 mdls A34, B34, or C34, a 5114 Diskette Unit is required.

MODEL CONVERSIONS

Upgrades of model 3 are field installable. Field conversion to the combination model (A to C, B to C) is permitted. Model upgrades from a 5110 model 1 or 2 to a model 3 are not permitted.

The upgrade purchase price for conversions may be greater than the the original purchase price of a larger model. The customer should carefully evaluate future requirements prior to purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Cables: Cables to attach peripheral devices to the 5110 via the Parallel I/O Adapter may be purchased from IBM or from a customer-selected source. See *5110 General Information and Physical Planning Manual* (GA21-9300), for cable and connector specifications. Assembled cables 2 meters (6.5 feet) long may be purchased from IBM. Order on MES from Rochester plant, A/N **4836338.** **Note:** Maximum interconnecting device cabling as specified in IEEE 488-1975 standard is 20 meters (65 feet).

SUPPLIES

Diskettes: Preinitialized diskettes for the 5110 mdl 3 are available in packages of ten from IBM.

5114 DISKETTE UNIT

[NO LONGER AVAILABLE]

PURPOSE

The 5114 provides diskette attachment to the 5110 Computer.

MODELS

Model 1 001

Maximum: A maximum of one 5114 is possible on the 5110 mdl 3, and a maximum of two 5114s is possible on the 5110 mdls 1 and 2.

Customer Setup: The 5114 is designated as Customer Setup. The CSU allowance is one day.

HIGHLIGHTS

- 1.2 to 2.4MB storage capacity.
- Direct access capability.
- Multiple open files (maximum of 10).
- Media exchange capability with other diskette devices that conform to basic interchange conventions.
- Self-contained floor-standing unit.
- Average access .243 seconds (25 tracks including latency, excluding head load).

Housed in its own covers, the 5114 measures 45 x 57 x 74cm (17-3/4 x 22-1/4 x 29 inches) and weighs from 55 to 62kg (120 to 136 pounds). Diskettes 1, 2, and 2D can be initialized and used to read/write data and to load/save programs and data. Rotational speed is 360 rpm, yielding (in 1,000 bytes per second):

Diskette Type	Maximum Capacity	Data Transfer	Read	Write and Verify
1	303	31.3	24	9.5
2	606	31.3	24	9.5
2D	1,212	62.5	48	18.9

One diskette drive is standard. A second drive is optional.

Customer Responsibilities: The Marketing Representative must advise customers of their responsibilities before receipt of the machine. Use of the *Information Bulletin for Customers - Customer Setup* (G120-2743) is required.

SPECIFY (None)

SPECIAL FEATURES

2nd Diskette Drive (#3240): Provides for up to twice the capacity on a single 5114 Diskette Unit. The second drive can be used for increased capacity and backup requirements. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

Diskettes: Pre-initialized diskettes for the 5114 are available in packages of 10 from IBM.

5150 PERSONAL COMPUTER

PURPOSE

The 5150 Personal Computer is a low-cost system that provides computing capability in a small package. A variety of operating systems and programming languages is supported. Software is available to allow stand-alone use for applications such as professional decision-making support, word processing, computer-based training, business accounting, and home entertainment. The 5150 Personal Computer may also be used as an intelligent workstation, connected to a wide variety of IBM data processing and office automation systems. Such connection allows the 5150 user to take advantage of the additional computing power, communications, mass storage, high-speed printing, application software, and data bases provided by the host system.

MODELS

Model 104 System Unit/Keyboard, 64KB Memory.

Model 114 System Unit/Keyboard, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, one 5-1/4 Inch Single-Sided Diskette Drive.

Model 164 System Unit/Keyboard, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, one 5-1/4 Inch Double-Sided Diskette Drive.

Model 174 System Unit/Keyboard, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, two 5-1/4 Inch Double-Sided Diskette Drives.

Model X14 System Unit, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, one 5-1/4 Inch Single-Sided Diskette Drive. For use with the 3270 Personal Computer Attachment.

Model X64 System Unit, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, one 5-1/4 Inch Double-Sided Diskette Drive. For use with the 3270 Personal Computer Attachment.

Model X74 System Unit, 64KB Memory, 5-1/4 Inch Diskette Drive Adapter, two 5-1/4 Inch Double-Sided Diskette Drives. For use with the 3270 Personal Computer Attachment.

Prerequisites:

— **For mdls 104, 114, 164, 174:**
Attachment of one of the following display options:
- A 5151 Monochrome Display mdl 001 and the Monochrome Display and Printer Adapter (#4900)
- A 5153 Color Display mdl 001 and the Color/Graphics Monitor Adapter(#4910)
- A user-supplied direct-drive color or black and white video monitor, or a user-supplied color or black and white television set with an RF modulator, and the Color/Graphics Monitor Adapter (#4910)

— **For mdls X14, X64, X74:**
- Color/Graphics Monitor Adapter (#4910) (for use with 3278 mdls 1, 2, 3, 4, 5) or Monochrome Display and Printer Adapter (#4900) (for use with 3278 mdls 1, 2, 3, 4)

— For additional ordering information and prerequisites for the IBM 3270 Personal Computer Attachment, see IBM.

Customer Setup (CSU): All mdls and special features of the 5150 Personal Computer are customer setup.

HIGHLIGHTS

- The System Unit is the heart of the 5150 Personal Computer. This table-top unit houses the high-performance microprocessor, up to two 5-1/4 Inch diskette drives, 40KB of read-only memory (ROM), up to 640KB of random access memory for user programs, five system expansion slots, attachment for a customer-supplied cassette recorder, a speaker which can be programmed to produce tones, and a power supply. The system can be further expanded through options that provide additional configuration flexibility.
- The following features are supplied as standard with the 5150 Personal Computer System Unit:
  - 83-key keyboard (mdls 104, 114, 164, 174 only)
  - Five system expansion slots (one slot is required for a display adapter; one additional slot is used for the 5-1/4 Inch Diskette Drive Adapter (#3780) if required.
  - Intel 8088 Microprocessor
    4.77 MHz clock speed
    410 ns cycle time
  - 64KB random access memory
    Parity checking
    250 ns memory access time
  - 40KB read-only memory
    Enhanced version of BASIC-80 Interpreter (cassette level)
    Built-in power-on diagnostic self-test
  - 5-1/4 Inch Diskette Drive(s) and adapter
    One single-sided drive standard on mdls 114 and X14
    One double-sided drive standard on mdls 164 and X64
    Two double-sided drives standard on mdls 174 and X74
  - 63.5 watt power supply with cooling fan
  - Attachment for a user-supplied cassette recorder for loading or saving programs or data
  - Programmable speaker which can be used to produce tones
- Dimensions (approximate):
  Height: 142mm (6")
  Width: 500mm (20")
  Depth: 410mm (16")
- Weight (approximate): 9.5kg (21 lbs) (without diskette drives or adapter)
- Some of the options available for the 5150 Personal Computer include:
  - Attachment of the 5161 Expansion Unit mdl 001 provides:
    10MB Fixed Disk Drive for increased storage capacity
    Additional configuration flexibility
  - 5151 Monochrome Display mdl 001
  - 5153 Color Display mdl 001
  - 5152 Graphics Printer mdl 002
- Highlights of the BASIC-80 Interpreter include:
  - Full screen editor for easy program creation and modification
  - Select 40- or 80-character display lines
  - Up to 16 foreground and 8 background colors (with appropriate monitor and adapter)
  - Automatic line numbering
  - 40-character variable names (all characters significant)
  - Multiple statements per program line
  - 250 characters per program line
  - Comments on program lines
  - Up to 17-digit numeric precision
  - Supports sequential cassette files
  - Error trapping
  - Addressable workspace up to 60KB
  - Integer/real/string variables
  - Single-and double-precision floating point numbers
- When turned on, the 5150 automatically runs a power-on self-test to verify system readiness. If the validation is successfully completed, the BASIC ROM Interpreter (cassette level) is made ready and identified on the display screen. The user may now enter a program from the keyboard or load it from a cassette recorder. If a failure is found, an identifying number will appear on the screen. If a diskette drive is installed, the 5150 automatically loads from the diskette in drive "A". This is typically the Disk Operating System (DOS) or an application program. The DOS may in turn invoke the Disk or Advanced levels of BASIC, followed then by the manual or automatic execution of one or more BASIC programs.

Bibliography: *IBM Personal Computer 3278/79 Emulation Adapter Technical Reference Manual Addendum* (#2336): Provides detailed information about the Personal Computer 3278/79 Emulation Adapter (#2507) for users of the *IBM Personal Computer Technical Reference Manual* (#5005).

IBM Personal Computer 3278/79 Emulation Adapter Hardware Maintenance and Service Manual Addendum (#2337): Provides detailed maintenance information about the Personal Computer 3278/79 Emulation Adapter (#2507) for users of the *IBM Personal Computer Hardware Maintenance and Service Manual* (#5072).

Display Station Emulation Adapter Hardware Maintenance and Technical Reference Manual Version 2 (#2883): Provides maintenance information for a Display Station Emulation Adapter (#2887) used with the 5520/Personal Computer Attachment Program Version 2 (#2884). This manual will enable the customer to perform problem diagnosis to the field replaceable unit level.

Display Station Emulation Adapter Hardware Maintenance Manual (#2889): Provides maintenance information for a Display Station Emulation Adapter (#2887) used with the 5520/Personal Computer Attachment Program Version 1 (#2888) or the Personal Computer 5250 Emulation Program (#2885). This manual will enable the customer to perform problem diagnosis to the field replaceable unit level.

Learning to Use DOS 2 (#4080): A guide to the use of the IBM Personal Computer DOS - Version 2. It takes new users of DOS step-by-step through the most commonly used DOS 2 commands. The course starts with the fundamentals of DOS. It then moves on to the use of the fixed disk and a list of similarities and differences between DOS 2 and DOS 1.1. Rather than teaching complex concepts, it teaches step-by-step procedures to accomplish everyday tasks.

IBM Personal Computer Technical Reference (#5005): This manual is designed to provide hardware design and interface information. The publication also provides Basic Input Output System (BIOS) information as well as programming support material. The manual is intended for programmers, engineers involved in hardware and software design, designers, and interested persons who have a need to know how the 5150 is designed and works.

5150 Personal Computer (cont'd)

BASIC Reference Manual (#5010): The 5150 BASIC interpreter consists of three upward compatible versions: Cassette, Disk, and Advanced. This manual is a reference for all three versions of BASIC release 1.10. The manual is packaged in a 3-ring looseleaf binder, and it is shipped as a standard item with each 5150.

IBM Personal Computer Hardware Maintenance and Service (#5072): Provides step-by-step instructions that aid the user in identifying the failure of an IBM Personal Computer Field Replaceable Unit (FRU). When the FRU has been identified, the manual provides the necessary information to complete the repair activity (i.e., adjustments, replacements, etc.).

SPECIFY

- Voltage (110V AC, 60 Hz): No specify required.

SPECIAL FEATURES

16KB Memory Expansion Kit (#1001): This feature may be ordered to expand the user memory for 5150 mdls 001 and 813 which have been withdrawn from marketing. Up to 64KB of memory can be plugged into the system board. This memory is available in 16KB increments and must be used to provide the first 64KB of memory. **Maximum:** Three per supported 5150 System Unit. **Field Installation:** Yes. **Prerequisites:** An available set of user memory sockets on the system board of a 5150 mdl 001 or mdl 813. **Customer Setup:** Yes.

Math Co-processor Option (#1002): Provides for the addition of the Intel 8087 Processor as a companion to the Intel 8088 to increase speed and precision in arithmetic, logarithmic, and trigonometric functions. The Option Kit provides a matched Intel 8088 along with the Intel 8087 to ensure high performance. The Intel 8087 multiplies 32-bit and 64-bit floating point numbers approximately 80 times faster than the Intel 8088. This option is supported only by IBM Personal Computer APL and by the Macro Assembler "escape" instruction. **Maximum:** One. **Field Installation:** Yes. The customer is responsible for ensuring that the Math Co-processor Option is installed by a technically skilled person. It is recommended that IBM or an IBM-authorized Personal Computer Dealer install this option.

64KB Memory Module Kit (#1003): Provides a 64KB increment of parity-checked random access memory which may be plugged into sockets on the 5150 system board (mdls 104, 114, 164, 174, X14, X64 X74 only) or the 64/256KB Memory Expansion Option (#1013). The 64KB Memory Module Kits are sold as small, plug-in circuits with instructions for user installation. **Maximum:** Up to three 64KB Memory Module Kit increments may be customer installed on the system board, to provide an additional 192KB of memory. The 64/256KB Memory Expansion Option provides 64KB of memory as standard. Up to three 64KB Memory Module Kit increments may be customer-installed on a 64/256KB Memory Expansion Option, to provide an additional 192KB of memory. **Field Installation:** Yes. **Prerequisites:** Available sockets on the 5150 system board or available sockets on a 64/256KB Memory Expansion Option. **Customer Setup:** Yes.

64/256KB Memory Expansion Option (#1013): Increments system memory by 64KB (65,536 bytes) and is easily expandable to 256KB by plugging in additional increments of 64KB with 64KB Memory Module Kits (#1003). The 64/256KB Memory Expansion Option is packaged as a circuit card designed to plug into one of the 5150's five system expansion slots. **Technical Information:** Random access memory ... starting address is set by switches ... 250 ns access time ... 410 ns memory cycle time ... parity checking ... sockets for expansion to 256KB. **Limitations:** The 5150 supports a maximum addressable memory of 640K bytes. The combination of the memory installed on the system board, and any installed 64/256KB Memory Expansion Options, and 64KB Memory Module Kits must not exceed a total of 640KB of memory. The 64/256KB Memory Expansion Option must be installed in the 5150 System Unit and not in a 5161 Expansion Unit. **Maximum:** A maximum of two 64/256KB Memory Expansion Options may be installed in a 5150. **Field Installation:** Yes. **Prerequisites:** The system board must have 256KB of memory installed (mdls 104, 114, 164, 174, X14,X64, X74 only) or 64KB (other mdls) before adding any additional memory via memory expansion options. An available system expansion slot is required for each 64/256KB Memory Expansion Option. **Customer Setup:** Yes.

Keyboard (#1100): The keyboard (standard on mdls 104, 114, 164, 174) is attached to the 5150 with a 1.8m (6 foot) coiled cable, permitting adaptation to a variety of work environments. The 83-key keyboard, with an adjustable typing angle, offers commonly-used data and word processing functions in a design that combines the familiar typewriter and calculator pad layouts. All non-control keys are typamatic (repeating). Ten program-supported function keys (total of 40 possible functions using keyboard shift keys) are standard. Special symbols, such as those used to draw lines, may be accessed with a combination of keys. Depending on the application program, from ten to forty special function keys may be supported. Other keys, like those used to print the current screen contents, correct a typing error, or "scroll" a long document, are clearly labeled. Access to all 256 characters (ASCII and special) is provided by the use of the ALT key. The keyboard is plugged directly into the 5150. The approximate dimensions of the keyboard are: 57mm (2.5") height, 500mm (20") width, 200mm (8") depth. The approximate weight is 2.8kg (6 lbs). **Limitations:** The keyboard is not provided with 5150 mdls X14, X64, and X74. When integrated into the 3270 system, the 3278 keyboard is used with these 5150 mdls. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Game Control Adapter (#1300): Provides support for two customer-supplied joysticks for video game interaction, allowing the user to move an object on the screen in any direction, or it supports up to four customer-supplied game "paddles" for simple horizontal or vertical movement. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available special or full-feature system expansion slot. **Customer Setup:** Yes.

Prototype Card (#1400): Professional engineers or hobbyists may utilize the Prototype Card as a base for building and testing custom attachments to the system. The Prototype Card is designed to plug into one of the 5150's five expansion slots. It is a full-size, high-quality circuit board. Circuitry and module holes are provided for interface with the IBM bus. A bracket is included to secure the card in the 5150 with a cut-out provided for up to a 37-pin external connector. Detailed instructions and component identifications are included for I/O decode attachment logic. **Technical Information:** Physical dimensions -- 107mm (4.2") high x 335mm (13.2") long ... completely etched and drilled with plated-through holes ... preprinted circuitry for interface to IBM bus ... attachment bracket and screws included ... block diagram and I/O decode logic description included. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot. **Customer Setup:** Yes.

Asynchronous Communications Adapter (#2074): Provides a channel to data processing or input/output devices outside of the immediate system. Such devices can be connected by telephone using a plug-in modem, or directly by cable when the device is nearby. The communication "target" may be a large host computer, a Series/1, another 5150/5160, a paper tape reader, a communicating typewriter, a laboratory instrument, or other machines providing the popular RS-232-C asynchronous interface. This adapter is flexible enough to match most of the computers and related products available in the microcomputer marketplace. The user's program selects the appropriate speed (50-9600 bps), format (5-, 6-, 7-, or 8-bit characters), parity and stop bits to reflect the attached device. Once communication has been established, the user's program performs reads and writes. Interrupts permit the program to perform data processing such as calculating, diskette reading or writing, or printing, and then pause to resume communications when a signal appears on the line. The adapter provides an EIA RS-232-C interface. One 25-pin "D" shell, male-type connector is provided to attach various peripheral devices. In addition, a current-loop interface is located in the same connector. A jumper block is provided to select manually either the voltage or the current-loop interface. **Maximum:** Two. **Cable:** A user-supplied communication cable is required for connection of external modems or other devices to the Asynchronous Communications Adapter. **Field Installation:** Yes. **Prerequisites:** An available special or full-feature system expansion slot is required. **Customer Setup:** Yes.

Binary Synchronous Communications (BSC) Adapter (#2075): The BSC Adapter when used with the BSC 3270 Emulation Program (6024037) can be used to emulate 3270 interactive BSC operation. The adapter provides the ability for a 5150 attached to a host system via communications lines to participate in a network using BSC protocol. The network may be either switched or nonswitched line. When used as a 3270 with the BSC 3270 Emulation Program, the 5150 operates as and appears to a host as one of the following 3270 devices:

3271 mdl 2/3277 mdl 2	Nonswitched line
3274 mdl 51C/3278 mdl 2	Nonswitched line
3275 mdl 2	Switched and nonswitched line
3276 mdl 2	Nonswitched line

Technical Information: EIA RS-232-C interface ... operates at up to 9600 bps with switched or nonswitched line support ... provides modem control functions ... facilitates program controlled data transfer ... supports electrical wrap and error status reporting ... prioritized interrupt system controls. **Limitations:** Only one BSC Adapter may be installed if an SDLC Adapter is installed in the same system. **Maximum:** Two. **Cable:** The Communications Adapter Cable (#2067) allows the user to connect the BSC Adapter card to a modem via a plug at the rear of the 5150. The cable is double shielded and approximately 3m (10 feet) long. A wrap connector is provided to test the cable. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot. Software such as the BSC 3270 Emulation Program is required for communication. An external modem must be cable-connected between the BSC Adapter and the telephone line. **Customer Setup:** Yes.

SDLC Communications Adapter (#2090): The SDLC Communications Adapter when used with the SNA 3270 Emulation and RJE Support Program (6024036) permits the 5150 to emulate 3270 interactive SNA operation or 3770 batch SNA. The adapter provides the ability for a 5150 attached to a host system via communications lines to participate in a network using SDLC protocol. When used as a 3270 with the SNA 3270 Emulation and RJE Support Program, the 5150 operates as and appears to a host as a 3278 mdl 2 attached to a 3274 mdl 51C.

5150 Personal Computer (cont'd)

Technical Information: EIA RS-232-C interface ... operates at up to 9600 bps (up to 4800 bps when used with the SNA 3270 Emulation and RJE Support Program) with switched or nonswitched line support (including multipoint) ... provides modem control functions ... facilitates program-controlled data transfer ... supports electrical wrap and error status reporting ... prioritized interrupt system controls. **Limitations:** Only one Asynchronous Communications Adapter may be installed if the SDLC Communications Adapter is installed. **Maximum:** One. **Cable:** The Communications Adapter Cable (#2067) allows the user to connect the SDLC Communications Adapter card to a modem via a plug at the rear of the 5150. The cable is double-shielded and approximately 3m (10 feet) long. A wrap connector is provided to test the cable. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot. Software such as the SNA 3270 Emulation and RJE Support Program (6024036) is required to allow communication. An external modem must be cable-connected between the SDLC Communications Adapter and the telephone line. **Customer Setup:** Yes.

3278/79 Emulation Adapter (#2507): Expands the capabilities of the 5150 by providing coaxial cable attachment to the 3274 Control Unit, the 4321, 4331, or 4361 Processor Display/Printer Adapter, or the 4701 Finance Communication Controller. When used with the Personal Computer 3278/79 Emulation Control Program (6024134), the 5150 can emulate the functions of an 3278 Display Station mdl 2 or a 3279 Color Display Station mdl 2A or S2A and can also support file transfer with the host. Both the host-controlled 3270 session and a local IBM Personal Computer DOS session can be active concurrently and the user can interact with either session alternately. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** An available 5150 system unit expansion slot is required. A customer-supplied coaxial cable is required for host system attachment. Software such as the 3278/79 Emulation Control Program (#4134) is required. A 3270-PC File Transfer Program (such as 5664-281 for VM/SP or 5665-311 for MVS/TSO) or equivalent is required to allow for file transfer. For attachment to the 4321 or 4331, specify code **#9843** must be installed on the 4321 or 4331. For attachment to the 4701, the Device Cluster Adapter (#3101) must be installed on the 4701. **Limitations:** File transfer is not supported when attached to the 4701. For additional information, limitations, and prerequisites, see IBM.

5253 Emulation Installation Convenience Kit Version 2 (#2882): Provides the following items necessary to permit attachment of the 5150 to the 5520 Administrative System:

- Display Station Emulation Adapter (#2887)
- 5520/Personal Computer Attachment Program Version 2 (#2884)
- T-connector (#2891)
- Twinaxial Cable Assembly (#2892)

When emulating a 5253, the 5150 user has access to the word- and record-processing functions, storage, distribution facilities, and most other functions of the 5520 Administrative System. This option (#2882) provides the function of the 5253 Emulation Installation Convenience Kit Version 1 (#2890) plus expanded configuration support, 3270 emulation, display of special characters and symbols, and usability enhancements. **Maximum:** One. **Field Installation:** Yes. **Customer setup:** Yes. **Prerequisites:** A 5150 with a minimum of 128KB of user memory, an available full-feature system expansion slot, one 5-1/4 Inch Diskette Drive Adapter (#3780), one 5-1/4 Inch Diskette Drive (single-sided, #3800 or double-sided, #3810), and one of the following display options: A) A 5151 Monochrome Display and the Monochrome Display and Printer Adapter (#4900), or B) an 5153 Color Display and the Color/Graphics Monitor Adapter (#4910), or C) a user-supplied 80-column color video monitor and the Color/Graphics Monitor Adapter (#4910). One Terminator (#2893) is required only if the 5150 is the last display station or only display station on a twinaxial line. IBM Personal Computer Disk Operating System (DOS) Version 2 (6024061) is required. **Limitations:** The 5150 should not be used as the master display station or as the alternative master display station on the 5520 Administrative System. For additional information, limitations, and prerequisites, refer to IBM.

5250 Emulation Convenience Kit (#2886): Provides the following items necessary to permit attachment of the 5150 to the System/34, System/36, or System/38:

- Display Station Emulation Adapter (#2887)
- Personal Computer 5250 Emulation Program (#2885)
- T-connector (#2891)
- Twinaxial Cable Assembly (#2892)

Allows connection of a 5150 as a peripheral to a System/34, System/36, or System/38 either as a locally-attached workstation or remotely by using a 5251-12. The 5150 in 5250 emulation mode has access to the functions of the host system available to a display station operator, providing the user with the power of the System/34, System/36, or System/38. The 5150 can also operate as a stand-alone personal computer. **Maximum:** One. **Prerequisites:** A 5150 with a minimum of 64KB of user memory, an available system expansion slot, one 5-1/4 Inch Diskette Drive Adapter (#3780), one 5-1/4 Inch Diskette Drive (single-sided #3800 or double-sided #3810), and one of the following display options: A) A 5151 Monochrome Display and the Monochrome Display and Printer Adapter (#4900), or B) a 5153 Color Display and the Color/Graphics Monitor Adapter (#4910), or C) a user-supplied 80-column color video monitor and the Color/Graphics Monitor Adapter (#4910). One Twinaxial Cable Adapter (#2894) is required in place of the T-connector if the 5150 is the last display station or only display station on a twinaxial line. IBM Personal Computer Disk Operating System (DOS) is required. **Limitations:** The Display Station Emulation Adapter (#2887) must be installed in the 5150 system unit and not in a 5161 Expansion Unit. For additional information, limitations, and prerequisites, refer to IBM.

Display Station Emulation Adapter (#2887): Allows connection of the 5150 to the 5520 Administrative System or to the System/34, System/36, or System/38. When used with the 5520/Personal Computer Attachment Program Version 1 (#2888) or Version 2 (#2884), a 5150 equipped with this option has access to the word processing, records processing, storage, distribution, and 3270 emulation (Version 2 only) facilities of a local 5520 system. When used with the Personal Computer 5250 Emulation Program (#2885), a 5150 equipped with this option can be connected to a System/34, System/36, or System/38 either as a locally attached workstation or remotely by using a 5251-12 Display Station. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot is required. For attachment of this option to the 5520 Administrative System, a T-connector (#2891) and Twinaxial Cable Assembly (#2892) are required. In addition, a Terminator (#2893) is required if the 5150 is the last display station, or only display station, on a twinaxial line. For attachment of this option to a System/34, System/36, or System/38, a Twinaxial Cable Assembly (#2892) is required. In addition, a T-connector (#2891) is required if the 5150 is not the last device on a twinaxial line. A Twinaxial Cable Adapter (#2894) is required in place of the T-connector if the 5150 is the last or only device on a twinaxial line. **Customer setup:** Yes. **Limitations:** When used with the Personal Computer 5250 Emulation Program (#2885) or the 5520/Personal Computer Attachment Program Version 1 (#2888) this option must reside in the 5150 system unit and not in a 5161 Expansion Unit.

5253 Emulation Installation Convenience Kit Version 1 (#2890): Provides the following items necessary to permit attachment of the 5150 to the 5520 Administrative System:

- Display Station Emulation Adapter (#2887)
- 5520/Personal Computer Attachment Program Version 1 (#2888)
- T-connector (#2891)
- Twinaxial Cable Assembly (#2892)

When emulating a 5253, the 5150 user has access to the word- and record-processing functions, storage, distribution facilities, and most other functions of the 5520 Administrative System. **Maximum:** One. **Field Installation:** Yes. **Customer setup:** Yes. **Prerequisites:** A 5150 with a minimum of 64KB of user memory, an available system expansion slot, one 5-1/4 Inch Diskette Drive Adapter (#3780), one 5-1/4 Inch Diskette Drive (single-sided (#3800) or double-sided (#3810)), a 5151 Monochrome Display and the Monochrome Display and Printer Adapter (#4900). One Terminator (#2893) is required only if the 5150 is the last display station or only display station on a twinaxial line. IBM Personal Computer Disk Operating System (DOS) Version 1.1 (6024001) is required. **Limitations:** The 5150 should not be used as the master display station or as the alternative master display station on the 5520 Administrative System. The 5150, when operating in 5253 emulation mode, cannot emulate a 3270 through the 5520 Administrative Processing Program. The Display Station Emulation Adapter (#2887) must be installed in the 5150 system unit and not in a 5161 Expansion Unit. For additional information, limitations, and prerequisites, refer to IBM.

T-connector (#2891): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the system twinaxial cables of the 5520 Administrative System or the System/34, System/36, or System/38. **Limitations:** Required for System/34, System/36, or System/38 attachment only if the 5150 is not the last device on the cable. **Prerequisites:** #2892 is required. **Maximum:** One. **Field Installation:** Yes.

5150 Personal Computer (cont'd)

Twinaxial Cable Assembly (#2892): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the system twinaxial cables of the 5520 Administrative System or the System/34, System/36, or System/38. **Prerequisites:** #2887. **Maximum:** One. **Field Installation:** Yes.

Terminator (#2893): Required to permit attachment of the Personal Computer/Display Station Emulation Adapter (#2887) to the 5520 Administrative System if the 5150 is the last display station, or only display station, on a twinaxial line. **Prerequisites:** #2891 and #2892. **Maximum:** One. **Field Installation:** Yes.

Twinaxial Cable Adapter (#2894): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the System/34, System/36, or System/38 if the 5150 is the last or only device on a twinaxial line. **Prerequisites:** #2892. **Maximum:** One. **Field Installation:** Yes.

5-1/4 Inch Diskette Drive Adapter (#3780): Provides for the attachment of up to two 5-1/4 inch diskette drives. Both single-sided and double-sided drives are supported by the adapter. The adapter is a standard feature with 5150 mdls 114, X14, 164, X64, 174, and X74. **Limitations:** The 5-1/4 Inch Diskette Drive Adapter must be installed in the 5150 System Unit and not in the 5161 Expansion Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot is required. **Customer Setup:** Yes.

5-1/4 Inch Single-Sided Diskette Drive (#3800): Provides for the 5150 to read and write data on one side of a soft-sectored 5-1/4 inch diskette. Formatted storage capacity is approximately 160KB (180KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density: 48 tracks per inch ... number of tracks: 40 per surface ... data surfaces: 1 per diskette ... rotational speed: 300 rpm ... access time: 8ms track-to-track ... data transfer rate: 20,480 bytes per second. The 5-1/4 Inch Single-Sided Diskette Drive resides inside the 5150 to provide diskette access from the front. Two drives may be installed, but the left-hand drive is always used to load the disk operating system or machine language program at power-on. **Maximum:** Up to two 5-1/4 Inch Single or Double-Sided Diskette Drives may be installed in a 5150. **Field Installation:** Yes. **Prerequisites:** #3780. **Customer Setup:** Yes.

5-1/4 Inch Double-Sided Diskette Drive (#3810): Allows the 5150 to read and write data on both sides of a soft-sectored 5-1/4 inch diskette. Formatted storage capacity is approximately 320KB (360KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density -- 48 tracks per inch ... number of tracks -- 40 per surface ... data surfaces -- 2 per diskette ... rotational speed -- 300 rpm ... access time -- 6ms track to track ... data transfer rate -- 20,480 bytes per second. The 5-1/4 Inch Double-Sided Diskette Drive resides inside the 5150 to provide diskette access from the front. Two drives may be installed, but the left-hand drive is always used to load the disk operating system or machine language program at power-on. **Maximum:** Up to two 5-1/4 Inch Single or Double-Sided Diskette Drives may be installed in a 5150. **Field Installation:** Yes. **Prerequisites:** #3780. **Customer Setup:** Yes.

Monochrome Display and Printer Adapter (#4900): Provides for the attachment of both the 5151 Monochrome Display mdl 001 and the 5152 Graphics Printer mdl 002. The adapter provides cable connectors for attachment of the printer and the display at the rear of the 5150. **Limitations:** The primary monitor/display adapter must be installed in the 5150 System Unit and not in the 5161 Expansion Unit. **Maximum:** One. **Cable:** The Printer Cable (#5612) is available to connect the 5152 mdl 002 to the Monochrome Display and Printer Adapter. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot. **Customer Setup:** Yes.

Color/Graphics Monitor Adapter (#4910): Provides for the attachment of a color display to the 5150. Either a "direct-drive RGB" signal or a "composite" video signal can be selected. The display can be a direct-drive 5153 Color Display mdl 001, a video monitor, or through a customer-supplied RF modulator, a standard TV set. Either a color or black and white monitor or TV can be attached. 16 foreground and eight background colors are supported in text (character) mode. This attachment also provides support for 4-color medium resolution graphics (320 dots horizontal, 200 dots vertical) and black and white high-resolution graphics (640 dots horizontal, 200 vertical). 256 characters are available in "text" mode, 128 in medium-or high-resolution graphics. The adapter provides 16KB of built-in memory to store multiple display screen contents and supports a customer-supplied light-pen. **Limitations: Limitations:** The primary monitor/display adapter must be installed in the 5150 System Unit and not in the 5161 Expansion Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available system expansion slot. **Customer Setup:** Yes.

Printer Adapter (#5200): Provides for attachment of the 5152 Graphics Printer mdl 002. This option is used when the Color/Graphics Monitor Adapter (#4910) is selected instead of the Monochrome Display and Printer Adapter (#4900), or when support for more than one printer is required and the Monochrome Display and Printer Adapter is already installed. The adapter provides a connector for attachment of the printer cable to the rear of the 5150. **Maximum:** One. **Cable:** The Printer Cable (#5612) is available to connect the 5152 mdl 002 to the Printer Adapter. **Field Installation:** Yes. **Prerequisites:** An available special or full-feature system expansion slot. **Customer Setup:** Yes.

IBM Personal Computer 3278 Attachment Option (#5315, #5316): Permits attachment of 3278 mdls 001 through 005 to the 5150 system unit. The 3278 Display Station and associated keyboard are used in place of the 5150 display and keyboard and are common to both the 3278 Display Station and 5150. This provides for concurrent operation of host and 5150 programming, plus the ability to transfer data between a host and the 5150. The 3270 Personal Computer Attachment (#5315, #5316) contains material for both the 3278 and the 5150 system unit. **Prerequisites:** A 3278 Display Station, mdl 1, 2, 3, 4, or 5, attached to a 3274 Control Unit or 3276 Control Unit Display Station is required. If the 3278 mdl 1, 2, 3, or 4 serial number is in the range A0000 - N9999 or 9V000 - 9W999 order option #5316. For attachment of 3278 mdl 1, 2, 3, or 4 with any other serial number (e.g., P0123, 1A425, 71G65) or for attachment of 3278 mdl 5 order option #5315. An available expansion slot in a supported 5150 system unit is required. Supported system units include A) 5150 mdl X14, X64, or X74 with either the Color/Graphics Monitor Adapter (#4910) (for use with 3278 mdls 1, 2, 3, 4, or 5) or the Monochrome Display and Printer Adapter (#4900) (for use with 3278 mdls 1, 2, 3, or 4) or B) a 5150 system unit with a 5-1/4 Inch Diskette Drive Adapter (#3780), a minimum of one 5-1/4 Inch Single-sided Diskette Drive (#3800) or 5-1/4 Inch Double-sided Diskette Drive (#3810), a minimum of 64KB of memory, and either the Color/Graphics Monitor Adapter (#4910) (for use with 3278 mdls 1, 2, 3, 4, or 5) or the Monochrome Display and Printer Adapter (#4900) (for use with 3278 mdls 1, 2, 3, or 4). **Maximum:** One. **Limitations:** The ability to transfer data between a host system and the 5150 is not available with 3276 attachment. This option can not be installed if the 3278 has feature #4999 (Magnetic Reader Control) installed. See M3274 pages (mdls 1A, 1C, 1D, 31A, 31C, 51C) for control storage requirements or special considerations. **Field Installation:** Yes. For additional information, prerequisites and limitations see IBM.

3279 Attachment Option (#5322): This option permits customers to separately order the 5150 portion of the 3270 Personal Computer Attachment for 3279 Color Display Station (#5325, #5326). The option consists of: An adapter which resides in the 5150 system unit slot number one and connects to the 3279 keyboard and display; additional 1.5 meter (5 ft.) cables to connect the 5150 to the 3279 display and keyboard; a cable distribution box; a user's guide containing user instructions and 5-1/4 inch diskettes. **Maximum:** One. **Prerequisites:** A 3279 Color Display Station, mdl 2A, 3A, 2B, 3B, S2A, S2B, S3G, 2X, or 3X attached to an 3274 control unit or 3276 Control Unit Display Station is required. A 3279 Personal Computer Adapter is required. For 3279 mdls S2A, S2B, or 2X with serial numbers below E0000, and for all mdls S3G and 3X, order feature #5327. For mdls S2A, S2B, or 2X with serial numbers above E0000, order feature #5328. An available expansion slot in a supported 5150 System Unit is required. Supported system units include: A) 5150 mdl X14, X64, or X74 with a Color/Graphics Monitor Adapter (#4910); or B) a 5150 system unit with a 5-1/4 Inch Diskette Drive Adapter (#3780), a minimum of one 5-1/4 Inch Single-sided Diskette Drive (#3800) or 5-1/4 Inch Double-sided Diskette Drive (#3810), a minimum of 64KB of user memory, and the Color/Graphics Monitor Adapter (#4910). **Customer Setup:** Yes. For additional information, limitations, and prerequisites see IBM.

5150 Personal Computer (cont'd)

3270 Personal Computer Attachment for 3279 Color Display Station (#5325, #5326): Permits attachment of 3279 mdls 2A, 3A, 2B, 3B, S2A, S2B, S3G, 2X, or 3X to the 5150 system unit. The 3279 Color Display Station and associated keyboard are used in place of the 5150 display and keyboard and are common to both the 3279 and the 5150. This provides for concurrent operation of host and 5150 programming, plus the ability to transfer data between a host and the 5150. The 3270 Personal Computer Attachment for 3279 Color Display Station (#5325, #5326) contains material for both the 3279 and the 5150. The 5150 portion may be separately ordered as the 3279 Attachment Option (#5322), and the 3279 portion may be separately ordered as the 3279 Personal Computer Adapter (#5327, #5328). **Prerequisites:** A 3279 Color Display Station, mdl 2A, 3A, 2B, 3B, S2A, S2B, S3G, 2X, or 3X attached to an 3274 control unit or 3276 Control Unit Display Station is required. For 3279 mdls S2A, S2B, or 2X with serial numbers below E0000, and for all mdls S3G and 3X, order feature #5325. For mdls S2A, S2B, or 2X with serial numbers above E0000, order feature #5326. An available expansion slot in a supported 5150 System Unit is required. Supported system units include: A) 5150 mdl X14, X64, or X74 with a Color/Graphics Monitor Adapter (#4910); or B) a 5150 System Unit a 5-1/4 Inch Diskette Drive Adapter (#3780), a minimum of one 5-1/4 Inch Single-sided Diskette Drive (#3800) or 5-1/4 Inch Double-sided Diskette Drive (#3810), a minimum of 64KB of user memory, and the Color/Graphics Monitor Adapter (#4910). **Maximum:** One. **Limitations:** The following features cannot be installed on the 3279: Magnetic Reader Control (#4999); Selector Light-Pen (#6350, #6351, or #6360); Video Output (#8750). For data transfer, Configuration Support C (EC level R46 or higher) or Configuration Support D (EC level R60 or higher) is required on the 3274. Data transfer support is not available on the 3276. **Field Installation:** The 3279 Personal Computer Adapter (3279 portion of #5325, #5326) is available for field installation only. **Customer Setup:** The IBM Personal Computer 3279 Attachment Option (5150 portion of #5325, #5326) is customer setup. For additional information, limitations, and prerequisites see IBM.

3279 Personal Computer Adapter (#5327, #5328): This option permits customers to separately order the 3279 portion of the 3270 Personal Computer Attachment for 3279 Color Display Station (#5325, #5326). The option provides: the ability to accept screen images from the 3279 or from the Color/Graphics Monitor Adapter (#4910); a path for data transfer between the 3279 and the 5150; a 3279 I/O panel for cable attachment and a customer-operable test switch. **Maximum:** One. **Prerequisites:** A 3279 Color Display Station, mdl 2A, 3A, 2B, 3B, S2A, S2B, S3G, 2X, or 3X attached to a 3274 control unit or 3276 Control Unit Display Station is required. For 3279 mdls S2A, S2B, or 2X with serial numbers below E0000, and for all mdls S3G and 3X, order feature #5327. For models S2A, S2B, or 2X with serial numbers above E0000, order feature #5328. 3279 Attachment Option (#5322) installed in a supported mdl of the 5150 System Unit is required. **Limitations:** The following features cannot be installed on the 3279: Magnetic Reader Control (#4999); Selector Light-Pen (#6350, #6351, or #6360); Video Output (#8750). For data transfer, Configuration Support C (EC level R46 or higher) or Configuration Support D (EC level R60 or higher) is required on the 3274. Data transfer support is not available on the 3276. **Field Installation:** Field installation only. **Customer Setup:** No. For additional information, limitations, and prerequisites see IBM.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

5151 MONOCHROME DISPLAY

PURPOSE

The 5151 Monochrome Display is a high-resolution video monitor which provides for the display of alphameric output from programs running on the 5150 Personal Computer, the 5160 Personal Computer XT, or the 3270 Personal Computer.

MODELS

Model 001

Prerequisites: The Monochrome Display and Printer Adapter (#4900) is required on the 5150 Personal Computer system or on the 5160 Personal Computer XT system. The 5151 Monochrome Display is supported by the IBM Personal Computer DOS (Versions 1.0, 1.1, and 2.0), CP/M-86*, and the UCSD p-System**, Version IV.

* Trademark of Digital Research, Inc.
** Trademark of the Regents of the University of California

Customer Setup (CSU): The 5151 Monochrome Display is a customer setup machine. Detailed setup and operation instructions are included with each machine. The customer is responsible for unpacking the 5151, attaching it to the Monochrome Display and Printer Adapter, and obtaining an operating system version that supports the 5151, or the 5271 System Unit.

Limitations: The 5151 Monochrome Display attached to the IBM Monochrome Display and Printer Adapter cannot be used to display dot-addressable graphic images such as those that can be created by programs written under Advanced BASIC. A set of line and block graphic characters is supported for simple display drawings and graphs.

Maximum: One per system.

HIGHLIGHTS

- A high-resolution, direct-drive display designed for use with IBM Personal Computer applications requiring alphameric output (such as text processing, programming, and problem solving).
- A 292mm (11-1/2") (diagonal) display with a green phosphor screen. The screen area provides for 25 rows of 80 characters. Alphameric characters are 7x9 dots in a 9x14 dot box. Both upper and lower case letters can be displayed. The character attributes provide underline, blinking, high intensity, reverse image, and non-display. In addition to the normal alphameric characters, a large number of special characters are provided.
- Easily adjusted with front-mounted brightness and contrast controls available to the operator. The Monochrome Display may be placed either on top of the system unit or on a nearby table top or desk.
- Supplied with signal and power cables (approximate length 914mm (3') each). The signal cable is plugged into a Monochrome Display and Printer Adapter which is inserted into an available system expansion slot. The AC power cable is plugged into the system unit, allowing the system unit power On/Off switch to also control the display unit.
- The 5151 Monochrome Display has the following characteristics:
  - Screen size: 292mm (11-1/2") (diagonal) monitor.
  - CRT: High-persistance green phosphor (P39) with etched surface to reduce glare.
  - Video signal: Maximum video bandwidth of 16.27 MHz. Screen refreshed at 50 Hz with 350 vertical lines of resolution and 720 lines of horizontal resolution. Horizontal drive frequency 18.432 kHz, TTL compatible.
  - Dimensions: Width 380mm (15")
Depth 350mm (14")
Height 280mm (11").
  - Weight: Approximately 7.9kg (17 pounds).

SPECIFY

- Voltage (120V AC, 60 Hz): No specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5152 GRAPHICS PRINTER MDL 002

PURPOSE

The 5152 Graphics Printer model 002 provides a versatile, low-cost, quality dot matrix printer for the 5150 Personal Computer, the 5160 Personal Computer XT, and the 3270 Personal Computer. It allows printing of graphic images and an expanded set of text characters. It is a bidirectional printer that prints at 80 characters per second on continuous-feed, single- or multi-part forms.

MODELS

Model 002 Graphics Printer

Prerequisites: A separately purchased Printer Cable (#5612). System or Expansion Unit attachment is made through either the Monochrome Display and Printer Adapter or Printer Adapter using the printer cable option. The 5152 Graphics Printer mdl 002 is supported by the IBM Personal Computer DOS (Versions 1.0, 1.1, and 2.0), CP/M-86*, and the UCSD p-System**, Version IV.

* Trademark of Digital Research, Inc.
** Trademark of the Regents of the University of California

Customer Setup (CSU): The 5152 Graphics Printer mdl 002 is a customer set-up machine. Detailed setup and operation instructions are included with each machine. The customer is responsible for unpacking the 5152 mdl 002, assembling the printer, attaching it to the system unit, connecting the Printer Cable (#5612), and obtaining an operating system version that supports the 5152 mdl 002.

HIGHLIGHTS

- Bidirectional printing
- 80 characters per second rated speed (nominal)
- Line buffer for performance
- 12 character styles
- Normal, compressed, and emphasized modes with double strike, subscript, and superscript. Normal- and double-width combinations, 24 modes in all.
- Character font: 9x9 dot matrix
- Expanded character set consisting of:
  - 96 standard ASCII characters
  - accented alphabetics
  - box drawing
  - gray tone
  - block
  - Greek characters
  - math
- Underlining
- Variable form length
- Skip to top of next page (manual or programmed)
- Horizontal tab stops
- Warning beep when out of forms or activated from system unit
- Printer self-test
- Replaceable print head
- Replaceable ribbon cartridge, black ribbon
- The 5152 Graphics Printer mdl 002 has the following characteristics:
  - Print method: Impact dot matrix
  - Character size (normal):
    Width 2.1mm (0.08")
    Height 3.2mm (0.12")
  - Paper feed: Adjustable pinfeed tractors
  - Paper: Continuous form
  - Paper width: From 101.6mm (4") to 254mm (10")
  - Copies: One original with two carbon copies
  - Paper thickness: 0.3mm (0.01") maximum
  - Line spacing: 4.23mm (1/6"), or programmable
  - Columns: 80 (normal size)
    40 (double width size)
    132 (condensed size)
    66 (condensed - double width size)
  - Dimensions: Length 400mm (16")
    Depth 370mm (15")
    Height 110mm (4.5")
  - Weight: Approximately 5.9kg (13 pounds)

SPECIFY

- Voltage (120V AC, 60 Hz): No specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Printer Cable (#5612): Required for attachment to the Monochrome Display and Printer Adapter or the Printer Adapter.

Printer Stand (#5614): Supports the 5152 Graphics Printer mdl 002 and holds fanfold paper.

SUPPLIES

Contact IBM

5153 COLOR DISPLAY

PURPOSE

The 5153 Color Display provides the capability for programs running on the 5150 Personal Computer system or the 5160 Personal Computer XT system to display text and graphics output in color.

MODELS

Model 001

Prerequisites: A 5150 Personal Computer system or a 5160 Personal Computer XT system with the Color/Graphics Monitor Adapter (#4910) is required. The 5153 Color Display is supported by the IBM Personal Computer DOS (Versions 1.0, 1.1, and 2.0), CP/M-86*, and the UCSD p-System**, Version IV.

* Trademark of Digital Research, Inc.
** Trademark of the Regents of the University of California

Customer Setup (CSU): The 5153 is a customer setup machine. Detailed setup and operational instructions are included with each machine. The customer is responsible for unpacking the 5153, attaching it to the Color/Graphics Monitor Adapter, and obtaining an operating system version that supports the 5153.

Limitations: For word processing and other text use, the 5153 and Color/Graphics Monitor Adapter provide lower resolution than that obtainable with the Monochrome Display attached to the Monochrome Display and Printer Adapter.

Maximum: One.

HIGHLIGHTS

- High resolution, direct-drive display
- Connected to the 5150 or 5160 with the Color/Graphics Monitor Adapter and a 150cm (5-foot) cable that is provided
- 330mm (13") (diagonal) monitor capable of displaying sixteen colors
- Easily adjusted with front-mounted brightness and contrast controls
- The 5153 Color Display has the following characteristics:
  - Screen size: 330mm (13") (diagonal) monitor
  - 640 (horizontal) x 200 (vertical) addressability
  - Colors: 16 (red, green, blue, white, yellow, black, cyan, magenta, brown, light gray, dark gray, light blue, light green, light cyan, light red, and light magenta)
  - Horizontal scanning frequency: 15.75KHz +/- 200Hz
  - Vertical drive: 60 Hz
  - Operating temperature: 16 C to 32 C ambient (60 F to 90 F)
  - Storage temperature: 10 C to 43 C (50 F to 110 F)
  - Relative humidity: 8% to 80% (non-condensing) when on ... 20% to 80% (non-condensing) when off
  - Dimensions: Width 394mm (15-1/2")
    Depth 432mm (17")
    Height 292mm (11-1/2")
  - Weight: Approximately 12kg (26 pounds)

SPECIFY

- Voltage (120V AC, 60 Hz, 1 A, 240 BTU/hour): No specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5160 PERSONAL COMPUTER XT

PURPOSE

The 5160 Personal Computer XT is an extended version of the 5150 Personal Computer. A variety of operating systems and programming languages is supported. Software is available to allow stand-alone use for applications such as professional decision-making support, word processing, computer-based training, business accounting, and home entertainment. The 5160 Personal Computer XT may also be used as an intelligent workstation, connected to a wide variety of IBM data processing and office automation systems. Such connection allows the 5160 user to take advantage of the additional computing power, communications, mass storage, high-speed printing, application software, and data bases provided by the host system. The XT/370 (5160 models 568 and 588) are S/370 intelligent workstations that allow the execution of many S/370 programs (up to 4MB virtual) as well as the capability of attaching as a 3277-2 to 3270 family controllers via coaxial cable. The XT/370 can also operate as a standard XT.

MODELS

Model 087 — System Unit/Keyboard, 128KB Memory, 10MB Fixed Disk Drive, Fixed Disk Drive Adapter, one 5-1/4 Inch Double-Sided Diskette Drive, 5-1/4 Inch Diskette Drive Adapter, Asynchronous Communications Adapter.

Model 568 — System Unit/Keyboard, 256KB Memory on system board, PC/370-M Card (512KB Memory), PC/370-P Card (370 Processor), PC/3277EM Card (3277-2 Emulation), attachment adapter for a 5161, and one 5-1/4 inch 320KB Diskette Drive and Adapter.

Model 588 — System Unit/Keyboard, 256KB Memory on system board, PC/370-M Card (512KB Memory), PC/370-P Card (370 Processor), PC/3277EM Card (3277-2 Emulation), 10MB Fixed Disk and Adapter, one 5-1/4 inch 320KB Diskette Drive and Adapter.

Prerequisites: Attachment of one of the following display options:
- A 5151 Monochrome Display mdl 001 and the Monochrome Display and Printer Adapter (#4900).
- A 5153 Color Display mdl 001 and the Color/Graphics Monitor Adapter (#4910).
- A user-supplied direct-drive color or black and white video monitor (not applicable to mdls 588 and 568), or a user-supplied color or black and white television set with an RF modulator, and the Color/Graphics Monitor Adapter (#4910).
- For 5160 mdl 588 or 568: A user-supplied coaxial cable to attach, via the PC/3277EM Card (3277-2 Emulation), to a 3274 Control Unit (with B type adapter). The maximum length cable is 2,000 feet.

Customer Setup (CSU): All mdls and special features of the 5160 Personal Computer XT are customer setup.

HIGHLIGHTS

- The 5160 Personal Computer XT System Unit is a table-top unit which houses the high-performance microprocessor.
- The 5160 contains eight option (feature) slots. These slots allow the addition of feature cards to support additional devices, features, or memory. Six of these slots are full-feature slots that will accept full-size feature cards. The remaining two are special-feature slots that will accept smaller feature cards.
- The following features are supplied as standard with the 5160:
  - 83-key keyboard
  - Eight system expansion slots (one slot is required for a display adapter; one is used for the 5-1/4 inch Diskette Drive Adapter
  - Intel 8088 Microprocessor
    - 4.77 MHz clock speed
    - 410 ns cycle speed
  - 40KB read-only memory
    - Enhanced version of BASIC-80 Interpreter
    - Built-in power-on diagnostic self-test
  - 5-1/4 inch 320KB Diskette Drive and Adapter (formatted capacity of up to 360KB)
  - 130 watt power supply with cooling fan
  - Programmable speaker which can be used to produce tones
- The following table shows the slot utilization and memory on the system board for the 5160 mdls:

Slot #	Type	Models 087	588	568	Description
1	Full	open	open	open	Recommended for Prereq. Display Adapter
2	Full	open	used	used	PC/3277EM Card (3277-2 Emulation)
3	Full	open	used	used	PC/370-M Card (512KB Memory)
4	Full	open	used	used	PC/370-P Card (370 Processor)
5	Full	used	used	----	Fixed Disk Drive Adapter in mdl 087/588
	Full	----	----	used	Attachment adapter for 5161 in mdl 568
6	Full	used	used	used	5-1/4 inch Diskette Adapter
7	Spec.	open	open	open	
8	Spec.	used	open	open	Asynchronous Communications Adapter
		128KB	256KB	256KB	Memory on XT system board

- Additional memory increments of 64KB are available (unnecessary in mdls 588 and 568). Two additional memory increments can be installed on the system board and the remainder on expansion options (feature cards). The 5160 supports user memory up to a maximum of 640KB in Personal Computer mode but only 480KB in XT/370 mode.
- Further expansion is available with a 5161 Expansion. The 5161 mdl 002 is used as an expansion unit for the 5160 mdls 087 or 588. The 5161 mdl 003 is used as an expansion unit for the 5160 mdl 568. The 5161 mdl 003 contains two additional 10MB fixed drives and hard file adapter. The 5161 mdl 002 contains an additional 10MB Fixed Disk Drive and eight additional option slots. Upon installing the Expansion Unit, the Fixed Disk Drive and Fixed Disk Drive Adapter in the 5160 may be moved into the Expansion Unit for a total of 20MB (two 10MB Fixed Disk Drives) in the Expansion Unit. An additional diskette drive may then be installed in the 5160, resulting in a maximum configured system of 20MB Fixed Disk, 720KB diskette, and 640KB user memory. When the Expansion Unit is attached to the 5160, one slot in each unit is occupied by an attachment card.
- Dimensions (approximate): Height -- 142mm (6 in.) ... Width -- 500mm (20 in.) ... Depth -- 410mm (16 in.).
- Weight (Approximate): 14.5kg (32 lbs).
- Some of the options available for the 5160 Personal Computer XT include:
  - Attachment of the 5161 Expansion Unit mdl 002 provides:
    - 10MB Fixed Disk Drive for increased storage capacity
    - Additional configuration flexibility
  - 5151 Monochrome Display mdl 001
  - 5153 Color Display mdl 001
  - 5152 Graphics Printer mdl 002
  - XT/370 Option Kit
- Highlights of the BASIC-80 Interpreter include:
  - Full screen editor for easy program creation and modification
  - Select 40- or 80-character display lines
  - Up to 16 foreground and 8 background colors (with appropriate monitor and adapter)
  - Automatic line numbering
  - 40-character variable names (all characters significant)
  - Multiple statements per program line
  - 250 characters per program line
  - Comments on program lines
  - Up to 17-digit numeric precision
  - Error trapping
  - Addressable workspace up to 60KB
  - Integer/real/string variables
  - Single- and double-precision floating point numbers

Bibliography: *IBM Personal Computer 3278/79 Emulation Adapter Technical Reference Manual Addendum* (#2336): Provides detailed information about the IBM Personal Computer 3278/79 Emulation Adapter (#2507) for users of the *IBM Personal Computer XT Technical Reference Manual* (#6808).

IBM Personal Computer 3278/79 Emulation Adapter Hardware Maintenance and Service Manual Addendum (#2337): Provides detailed maintenance information about the 3278/79 Emulation Adapter (#2507) for users of the *IBM Personal Computer XT Hardware Maintenance and Service Manual* (#6809).

Display Station Emulation Adapter Hardware Maintenance and Technical Reference Manual Version 2 (#2883): Provides maintenance information for a Display Station Emulation Adapter (#2887) used with the IBM 5520/Personal Computer Attachment Program Version 2 (#2884). This manual will enable the customer to perform problem diagnosis to the field replaceable unit level.

Display Station Emulation Adapter Hardware Maintenance Manual (#2889): Provides maintenance information for a Display Station Emulation Adapter (#2887) used with the IBM Personal Computer IBM 5250 Emulation Program (#2885). This manual will enable the customer to perform problem diagnosis to the field replaceable unit level.

Learning to Use DOS 2 (#4080): A guide to the use of the IBM Personal Computer DOS - Version 2. It takes new users of DOS step-by-step

5160 Personal Computer XT (cont'd)

through the most commonly used DOS 2 commands. The course starts with the fundamentals of DOS. It then moves on to the use of the fixed disk and a list of similarities and differences between DOS 2 and DOS 1.1. Rather than teaching complex concepts, it teaches step-by-step procedures to accomplish everyday tasks.

IBM Personal Computer XT Technical Reference (#6808): This manual is designed to provide hardware design and interface information. The publication also provides Basic Input Output System (BIOS) information as well as programming support material. The manual is intended for programmers, engineers involved in hardware and software design, designers, and interested persons who have a need to know how the IBM Personal Computer XT is designed and works.

IBM Personal Computer XT Hardware Maintenance and Service (#6809): Provides step-by-step instructions that aid the user in identifying the failure of an IBM Personal Computer XT Field Replaceable Unit (FRU). When the FRU has been identified, the manual provides the necessary information to complete the repair activity (i.e., adjustments, replacements, etc.).

SPECIAL FEATURES

Math Co-processor Option (#1002): Provides for the addition of the Intel 8087 Processor as a companion to the Intel 8088 to increase speed and precision in arithmetic, logarithmic, and trigonometric functions. The Option Kit provides a matched Intel 8088 along with the Intel 8087 to ensure high performance. The Intel 8087 multiplies 32-bit and 64-bit floating point numbers approximately 80 times faster than the Intel 8088. This option is supported only by IBM Personal Computer APL and by the Macro Assembler "escape" instruction. **Maximum:** One. **Field Installation:** Yes. The customer is responsible for ensuring that the Math Co-processor Option is installed by a technically skilled person. It is recommended that IBM or an IBM-authorized Personal Computer Dealer install this option.

64KB Memory Module Kit (#1003): [Unnecessary in mdls 588 and 568] Provides a 64KB increment of parity-checked random access memory which may be plugged into sockets on the 5160 system board or the 64/256KB Memory Expansion Option (#1013). The 64KB Memory Module Kits are sold as small, plug-in circuits with instructions for user installation. **Maximum:** Up to two 64KB Memory Module Kit increments may be customer-installed on the system board, to provide an additional 128KB of memory. The 64/256KB Memory Expansion Option provides 64KB of memory as standard. Up to three 64KB Memory Module Kit increments may be customer-installed on a 64/256KB Memory Expansion Option, to provide an additional 192KB of memory. **Field Installation:** Yes. **Prerequisites:** Available sockets on the 5160 system board, or available sockets on a 64/256KB Memory Expansion Option. **Customer Setup:** Yes.

64/256KB Memory Expansion Option (#1013): Increments system memory by 64KB (65,536 bytes) and is easily expandable to 256KB by plugging in additional increments of 64KB with 64KB Memory Module Kits (#1003). The 64/256KB Memory Expansion Option is packaged as a circuit card designed to plug into one of the 5160's full-feature system expansion slots. **Technical Information:** Random access memory ... starting address is set by switches ... 250 ns access time ... 410 ns memory cycle time ... parity checking ... sockets for expansion to 256KB. **Limitations:** The 5160 supports a maximum addressable memory of 640K bytes. The combination of the 256KB installed on the system board, and any installed 64/256KB Memory Expansion Options, and 64KB Memory Module Kits, must not exceed a total of 640KB of memory. The 64/256KB Memory Expansion Option must be installed in the 5160 System Unit and not in a 5161 Expansion Unit. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** The system board must have 256KB of memory installed before adding any additional memory via memory expansion options. An available full-feature system expansion slot is required for each 64/256KB Memory Expansion Option. **Customer Setup:** Yes.

Keyboard (#1100): The keyboard (standard on the 5160 mdls 087, 588 and 568) is attached to the 5160 with a 1.8m (6 foot) coiled cable, permitting adaptation to a variety of work environments. The 83-key keyboard, with an adjustable typing angle, offers commonly-used data and word processing functions in a design that combines the familiar typewriter and calculator pad layouts. All non-control keys are typamatic (repeating). Ten program-supported function keys (total of 40 possible functions using keyboard shift keys) are standard. Special symbols, such as those used to draw lines, may be accessed with a combination of keys. Depending on the application program, from ten to forty special function keys may be supported. Other keys, like those used to print the current screen contents, correct a typing error, or "scroll" a long document, are clearly labeled. Access to all 256 characters (ASCII and special) is provided by the use of the ALT key. The keyboard is plugged directly into the 5160. The approximate dimensions of the keyboard are: 57mm (2.5 in.) height, 500mm (20 in.) width, 200mm (8 in.) depth. The approximate weight is 2.8kg (6 lbs). **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Game Control Adapter (#1300): Provides support for two customer-supplied joysticks for video game interaction, allowing the user to move an object on the screen in any direction, or it supports up to four customer-supplied game "paddles" for simple horizontal or vertical movement. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available special-feature (small) or full-feature system expansion slot. **Customer Setup:** Yes.

Prototype Card (#1400): Professional engineers or hobbyists may utilize the Prototype Card as a base for building and testing custom attachments to the system. The Prototype Card is designed to plug into one of the 5160's full-feature expansion slots. It is a full-size, high-quality circuit board. Circuitry and module holes are provided for interface with the IBM bus. A bracket is included to secure the card in the 5160 with a cut-out provided for up to a 37-pin external connector. Detailed instructions and component identifications are included for I/O decode attachment logic. **Technical Information:** Physical dimensions - 107mm (4.2") high x 335mm (13.2") long ... completely etched and drilled with plated-through holes ... preprinted circuitry for interface to IBM bus ... attachment bracket and screws included ... block diagram and I/O decode logic description included. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

Asynchronous Communications Adapter (#2074): Provides a channel to data processing or input/output devices outside of the immediate system. Such devices can be connected by telephone using a plug-in modem, or directly by cable when the device is nearby. The communication "target" may be a large host computer, a Series/1, another 5150/5160, a paper tape reader, a communicating typewriter, a laboratory instrument, or other machines providing the popular RS-232-C asynchronous interface. The Asynchronous Communications Adapter is a standard feature on the 5160 mdl 087. This adapter is flexible enough to match most of the computers and related products available in the microcomputer marketplace. The user's program selects the appropriate speed (50-9600 bps), format (5-, 6-, 7-, or 8-bit characters), parity and stop bits to reflect the attached device. Once communication has been established, the user's program performs reads and writes. Interrupts permit the program to perform data processing such as calculating, diskette reading or writing, or printing, and then pause to resume communications when a signal appears on the line. The adapter provides an EIA RS-232-C interface. One 25-pin "D" shell, male-type connector is provided to attach various peripheral devices. In addition, a current-loop interface is located in the same connector. A jumper block is provided to select manually either the voltage or the current-loop interface. **Maximum:** Two. **Cable:** A user-supplied communication cable is required for connection of external modems or other devices to the Asynchronous Communications Adapter. **Field Installation:** Yes. **Prerequisites:** An available special-feature (small) or full-feature system expansion slot is required. **Customer Setup:** Yes.

Binary Synchronous Communications (BSC) Adapter (#2075): The BSC Adapter when used with the BSC 3270 Emulation Program (6024037) can be used to emulate 3270 interactive BSC operation. The adapter provides the ability for a 5160 attached to a host system via communications lines to participate in a network using BSC protocol. The network may be either switched or nonswitched line. When used as a 3270 with the BSC 3270 Emulation Program, the 5160 operates as and appears to a host as one of the following 3270 devices:

3271 mdl 2/3277 mdl 2	Nonswitched line
3274 mdl 51C/3278 mdl 2	Nonswitched line
3275 mdl 2	Switched and nonswitched line
3276 mdl 2	Nonswitched line

Technical Information: EIA RS-232-C interface ... operates at up to 9600 bps with switched or nonswitched line support ... provides modem control functions ... facilitates program controlled data transfer ... supports electrical wrap and error status reporting ... prioritized interrupt system controls. **Limitations:** Only one BSC Adapter may be installed if an SDLC Adapter is installed on the same system. **Maximum:** Two. **Cable:** The Communications Adapter Cable (#2067) allows the user to connect the BSC Adapter card to a modem via a plug at the rear of the 5160. The cable is double-shielded and approximately 3m (10 feet) long. A wrap connector is provided to test the cable. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. Software such as the BSC 3270 Emulation Program is required for communication. An external modem must be cable-connected between the BSC Adapter and the telephone line. **Customer Setup:** Yes.

SDLC Communications Adapter (#2090): The SDLC Communications Adapter when used with the SNA 3270 Emulation and RJE Support Program (6024036) permits the 5160 to emulate 3270 interactive SNA operation or 3770 batch SNA. The adapter provides the ability for a 5160 attached to a host system via communications lines to participate in a network using SDLC protocol. When used as a 3270 with the SNA 3270 Emulation and RJE Support Program, the 5160 operates as and appears to a host as a 3278 mdl 2 attached to a 3274 mdl 51C. **Technical Information:** EIA RS-232-C interface ... operates at up to 9600 bps (up to 4800 bps when used with the SNA 3270 Emulation and RJE Support Program) with switched or nonswitched line support (including multipoint) ... provides modem control functions ... facilitates program controlled data transfer ... supports electrical wrap and error status reporting ... prioritized interrupt system controls. **Limitations:** Only one Asynchronous Communications Adapter may be installed if the SDLC Communications Adapter is installed. **Maximum:** One.

5160 Personal Computer XT (cont'd)

Cable: The Communications Adapter Cable (#2067) allows the user to connect the SDLC Communications Adapter card to a modem via a plug at the rear of the 5160. The cable is double-shielded and approximately 3m (10 feet) in length. A wrap connector is provided to test the cable. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. Software such as the SNA 3270 Emulation and RJE Support Program (6024036) is required to allow communication. An external modem must be cable-connected between the SDLC Communications Adapter and the telephone line. **Customer Setup:** Yes.

10MB Fixed Disk Drive (#2500): Provides storage for user programs and data. One 10MB Fixed Disk Drive is provided as standard on the 5160. The disk drive has the same physical dimensions and mounting as the 320KB diskette drive. **Technical Information:** 512 bytes per sector ... 17 sectors per track ... 306 tracks per surface ... 4 surfaces ... 3,600 rpm ... 90ms average access time ... 5M bit per second transfer rate. **Maximum:** One. If a 5161 mdl 002 is attached to the 5160, the 10MB Fixed Disk Drive and the Fixed Disk Drive Adapter in the 5160 must be moved into the 5161 to provide a total of 20MB of fixed disk storage (two 10MB Fixed Disk Drives) available to the system. **Field Installation:** Yes. **Prerequisites:** #2501. **Customer Setup:** Yes.

Fixed Disk Drive Adapter (#2501): Provides the buffering, error detection, and data transfer between the 10MB Fixed Disk Drive (#2500) and the 5160. One Fixed Disk Drive Adapter is included as a standard feature on the 5160. The Fixed Disk Drive Adapter can attach up to two 10MB Fixed Disk Drives. **Technical Information:** 32-bit error-correcting code ... microprocessor controlled ... on-board sector buffers ... internal diagnostics ... direct memory access (DMA) data transfer ... high-level command set ... automatic error detection and correction ... automatic retries on disk access. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

3278/79 Emulation Adapter (#2507): Expands the capabilities of the 5160 by providing coaxial cable attachment to the 3274 Control Unit, the 4321, 4331 or 4361 Processor Display/Printer Adapter, or the 4701 Finance Communication Controller. When used with the IBM Personal Computer 3278/79 Emulation Control Program (6024134), the 5160 can emulate the functions of a 3278 Display Station mdl 2 or a 3279 Color Display Station mdl 2A or S2A and can also support file transfer with the host. Both the host-controlled 3270 session and a local IBM Personal Computer DOS session can be active concurrently and the user can interact with either session alternately. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** An available 5160 system unit full-feature expansion slot is required. A customer-supplied coaxial cable is required for host system attachment. Software such as the Personal Computer 3278/79 Emulation Control Program (#4134) is required. A 3270-PC File Transfer Program (such as 5664-281 for VM/SP or 5665-311 for MVS/TSO) or equivalent is required to allow for file transfer. For attachment to the 4321 or 4331, specify code **#9843** must be installed on the 4321 or 4331. For attachment to the 4701, the Device Cluster Adapter (#3101) must be installed on the 4701. **Limitations:** File transfer is not supported when attached to the 4701. For additional information, limitations, and prerequisites, see IBM.

5250 Emulation Convenience Kit (#2886): Provides the following items necessary to permit attachment of the 5160 to the System/34, System/36, or System/38:

- Personal Computer/Display Station Emulation Adapter (#2887)
- Personal Computer 5250 Emulation Program (#2885)
- T-connector (#2891)
- Twinaxial Cable Assembly (#2892)

Allows connection of a 5160 as a peripheral to a System/34, System/36, or System/38 either as a locally-attached workstation or remotely by using a 5251-12. The 5160 in 5250 emulation mode has access to the functions of the host system available to a display station operator, providing the user with the power of the System/34, System/36, or System/38. The 5160 can also operate as a stand-alone personal computer. **Maximum:** One. **Prerequisites:** A 5160 with a minimum of 64KB of user memory, an available full-feature system expansion slot, one 5-1/4 Inch Diskette Drive Adapter (#3780), one 5-1/4 Inch Diskette Drive (single-sided (#3800) or double-sided (#3810), and one of the following display options: A) A 5151 Monochrome Display and the Monochrome Display and Printer Adapter (#4900), or B) a 5153 Color Display and the Color/Graphics Monitor Adapter (#4910), or C) a user-supplied 80-column color video monitor and the IBM Color/Graphics Monitor Adapter (#4910). One Twinaxial Cable Adapter (#2894) is required in place of the T-connector if the 5160 is the last display station or only display station on a twinaxial line. IBM Personal Computer Disk Operating System (DOS) is required. **Limitations:** The Display Station Emulation Adapter (#2887) must be installed in the 5160 system unit and not in a 5161 Expansion Unit. For additional information, limitations, and prerequisites, refer to IBM.

Display Station Emulation Adapter (#2887): Allows connection of the 5160 to the 5520 Administrative System or to the System/34, System/36, or System/38. When used with the 5520/Personal Computer Attachment Program Version 1 (#2888) or Version 2 (#2884), a 5160 equipped with this option has access to the word processing, records processing, storage, distribution, and 3270 emulation (Version 2 only) facilities of a local 5520 system. When used with the Personal Computer 5250 Emulation Program (#2885), a 5160 equipped with this option can be connected to a System/34, System/36, or System/38 either as a locally attached workstation or remotely by using a 5251-12 Display Station. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot is required. For attachment of this option to the 5520 Administrative System, a T-connector (#2891) and Twinaxial Cable Assembly (#2892) are required. In addition, a Terminator (#2893) is required if the 5160 is the last display station, or only display station, on a twinaxial line. For attachment of this option to a System/34, System/36, or System/38, a Twinaxial Cable Assembly (#2892) is required. In addition, a T-connector (#2891) is required if the 5160 is not the last device on a twinaxial line. A Twinaxial Cable Adapter (#2894) is required in place of the T-connector if the 5160 is the last or only device on a twinaxial line. **Customer setup:** Yes. **Limitations:** When used with the Personal Computer 5250 Emulation Program (#2885) or the 5520/Personal Computer Attachment Program Version 1 (#2888) this option must reside in the 5160 system unit and not in a 5161 Expansion Unit.

T-connector (#2891): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the system twinaxial cables of the 5520 Administrative System or the System/34, System/36, or System/38. **Limitations:** Required for System/34, System/36, or System/38 attachment only if the 5160 is not the last device on the cable. **Prerequisites:** #2892. **Maximum:** One. **Field Installation:** Yes.

Twinaxial Cable Assembly (#2892): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the system twinaxial cables of the 5520 Administrative System or System/34, System/36, or System/38. **Prerequisites:** #2887. **Maximum:** One. **Field Installation:** Yes.

Terminator (#2893): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the 5520 Administrative System if the 5160 is the last display station, or only display station, on a twinaxial line. **Prerequisites:** #2891 and #2892. **Maximum:** One. **Field Installation:** Yes.

Twinaxial Cable Adapter (#2894): Required to permit attachment of the Display Station Emulation Adapter (#2887) to the System/34, System/36, or System/38 if the 5160 is the last or only device on a twinaxial line. **Prerequisites:** #2892. **Maximum:** One. **Field Installation:** Yes.

5-1/4 Inch Diskette Drive Adapter (#3780): Provides for the attachment of up to two 5-1/4 inch diskette drives. Both single-sided and double-sided drives are supported by the adapter. The adapter is a standard feature on the 5160. **Limitations:** The 5-1/4 Inch Diskette Drive Adapter must be installed in the 5160 System Unit and not in a 5161 Expansion Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

5-1/4 Inch Single-Sided Diskette Drive (#3800): Provides for the 5160 to read and write data on one side of a soft-sectored 5-1/4 inch diskette. Formatted storage capacity is approximately 160KB (180KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density -- 48 tracks per inch ... number of tracks -- 40 per surface ... data surfaces -- 1 per diskette ... rotational speed -- 300 rpm ... access time -- 8ms track-to-track ... data transfer rate -- 20,480 bytes per second. **Limitations:** Installation of a 5-1/4 inch single-sided Diskette Drive in the 5160 may require the removal and transfer of a previously installed 10MB Fixed Disk Drive to a 5161 mdl 002. **Maximum:** Up to two diskette drives (single- or double-sided) may be installed in a 5160. **Field Installation:** Yes. **Prerequisites:** #3780. **Customer Setup:** Yes.

5-1/4 Inch Double-Sided Diskette Drive (#3810): Allows the 5160 to read and write data on both sides of a soft-sectored 5-1/4 inch diskette. Formatted storage capacity is approximately 320KB (360KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density -- 48 tracks per inch ... number of tracks -- 40 per surface ... data surfaces -- 2 per diskette ... rotational speed -- 300 rpm ... access time -- 6ms track to track ... data transfer rate -- 20,480 bytes per second. The 5-1/4 Inch Double-Sided Diskette Drive resides inside the 5160 to provide diskette access from the front. One Double-Sided Diskette Drive is standard on the 5160. **Limitations:** Installation of an additional 5-1/4 inch Double-Sided Diskette Drive in the 5160 may require the removal and transfer of a previously-installed 10MB Fixed Disk Drive to a 5161 mdl 002. **Maximum:** Up to two diskette drives (single- or double-sided) may be installed in a 5160. **Field Installation:** Yes. **Prerequisites:** #3780. **Customer Setup:** Yes.

XT/370 Option Kit (#3891): The XT/370 Option Kit is a set of three cards which allow the 5160 to execute many of the S/370 instructions and/or act as a 3277-2 Display Station. Following is a description of these cards:

1. XT/370 Processor Card (PC/370-P Card): Consists of three microprocessors, a page table and attendant circuitry. The first

5160 Personal Computer XT (cont'd)

microprocessor engine executes most of the commonly used fixed point S/370 instructions. The second microprocessor emulates the remaining non-floating point S/370 instructions. The third microprocessor executes S/370 floating point instructions.

2. XT/370 512KB Memory Card (PC/370-M Card): This Auxiliary RAM card contains 512KB of parity-checked RAM accessible from either the PC/370-P Card or the Intel 8088 (the microprocessor for the 5160). Concurrent requests for memory accesses are arbitrated, with the 8088 accesses receiving highest priority. This memory (512KB) is viewed in Personal Computer mode as a contiguous storage area that begins at the end of the 256KB of required 5160 memory. However, in Personal Computer mode, the IBM Personal Computer XT/370 has only 640KB of usable memory. When in this native mode, this memory operates marginally slower than the 256KB of memory on the systems board. The PC/370-P Card views this memory as two separate areas which are not contiguously addressable. The area from 0 to 480KB is addressed from 0 to 480KB and is real S/370 space. The area from 480KB to 512KB is addressed from 0 to 32KB and is control store for the second microprocessor on the PC/370-P Card.
3. XT/370 3277 Emulation Card (PC/3277EM Card): This Card provides the connection which permits the 5160 with XT/370 Option to attach via coaxial cable to an appropriately configured 3270 Control Unit. This permits local and remote operation so that the 5160 can emulate a 3277 mdl 2 using the 5151 Monochrome Display. The Color Display (5153 mdl 001) with appropriate adapter may also be used. Since there is no color support in 3277 mode, the default colors will be used if this color display is installed. This connection is also supported by VM/PC for upload and download of data between host VM systems and the 5160 with XT/370.

Maximum: One. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** Must be installed respectively in full-feature slots numbers 4, 3, and 2 ... Software such as the VM/PC Licensed Program (6936733) ... A user-supplied coaxial cable to attach to a 3270 Controller ... 256KB of memory on 5160 Systems Board.

Monochrome Display and Printer Adapter (#4900): Provides for the attachment of both the 5151 Monochrome Display mdl 001 and the 5152 Graphics Printer mdl 002. The adapter provides cable connectors for attachment of the printer and the display at the rear of the 5160. **Limitations:** The primary monitor/display adapter must be installed in the 5160 System Unit and not in a 5161 Expansion Unit. **Maximum:** One. **Cable:** The Printer Cable (#5612) is available to connect the 5152 mdl 002 to the Monochrome Display and Printer Adapter. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

Color/Graphics Monitor Adapter (#4910): Provides for the attachment of a color display to the 5160. Either a "direct-drive RGB" signal or a "composite" video signal can be selected. The display can be a direct-drive 5153 Color Display mdl 001, a video monitor, or, through a customer-supplied RF modulator, a standard TV set. Either a color or black and white monitor or TV can be attached. 16 foreground and eight background colors are supported in text (character) mode. This attachment also provides support for 4-color medium resolution graphics (320 dots horizontal, 200 dots vertical) and black and white high-resolution graphics (640 dots horizontal, 200 vertical). 256 characters are available in "text" mode, 128 in medium- or high-resolution graphics. The adapter provides 16KB of built-in memory to store multiple display screen contents and supports a customer-supplied light-pen. **Limitations:** The primary monitor/display adapter must be installed in the 5160 System Unit and not in a 5161 Expansion Unit. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

Printer Adapter (#5200): Provides for attachment of the 5152 Graphics Printer mdl 002. This option is used when the Color/Graphics Monitor Adapter (#4910) is selected instead of the Monochrome Display and Printer Adapter (#4900), or when support for more than one printer is required and the Monochrome Display and Printer Adapter is already installed. The adapter provides a connector for attachment of the printer cable to the rear of the 5160. **Maximum:** One. **Cable:** The Printer Cable (#5612) is available to connect the 5152 mdl 002 to the Printer Adapter. **Field Installation:** Yes. **Prerequisites:** An available special-feature (small) or full-feature system expansion slot. **Customer Setup:** Yes.

5253 Emulation Installation Convenience Kit Version 2 (#2882): Provides the following items necessary to permit attachment of the 5160 to the 5520 Administrative System:

- Display Station Emulation Adapter (#2887)
- 5520/Personal Computer Attachment Program Version 2 (#2884)
- T-connector (#2891)
- Twinaxial Cable Assembly (#2892)

When emulating a 5253, the 5160 user has access to the word- and record-processing functions, storage, distribution, and 3270 emulation facilities, and most other functions of the 5520 Administrative System. **Maximum:** One. **Field Installation:** Yes. **Customer setup:** Yes. **Prerequisites:** A 5160 with a minimum of 128KB of user memory, an available full-feature system expansion slot, one 5-1/4 Inch Diskette Drive Adapter (#3780), one 5-1/4 Inch Diskette Drive (single-sided, #3800 or double-sided, #3810), and one of the following display options: A) A 5151 Monochrome Display and the Monochrome Display and Printer Adapter (#4900), or B) a 5153 Color Display and the Color/Graphics Monitor Adapter (#4910), or C) a user-supplied 80-column color video monitor and the Color/Graphics Monitor Adapter (#4910). One Terminator (#2893) is required only if the 5160 is the last display station or only display station on a twinaxial line. IBM Personal Computer Disk Operating System (DOS) Version 2 (6024061) is required. **Limitations:** The 5160 should not be used as the master display station or as the alternative master display station on the 5520 Administrative System. For additional information, limitations, and prerequisites, refer to IBM.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

5161 EXPANSION UNIT

PURPOSE

The 5161 Expansion Unit provides additional configuration flexibility for the 5150 Personal Computer and the 5160 Personal Computer XT. Each Expansion Unit contains one 10MB Fixed Disk Drive and eight option expansion slots which allow for the installation of feature cards to support additional system function. In addition, the 5161 Expansion Unit model 1 contains one Fixed Disk Drive Adapter (#2501) as standard. The primary monitor/display attachment adapter, the diskette adapter, and any memory expansion options must reside in a System Unit. Other IBM attachment adapters may reside in either an Expansion Unit or System Unit. One additional 10MB Fixed Disk Drive (#2500) may be installed in an Expansion Unit for a total of 20MB of fixed disk storage.

MODELS

Model 001 Expansion Unit, 10MB Fixed Disk Drive, Fixed Disk Drive Adapter, attachment cards and cable for a 5150.

Model 002 Expansion Unit, 10MB Fixed Disk Drive, attachment cards and cable for a 5160.

Maximum: One per system.

Prerequisites:

- Mdl 001: A 5150 Personal Computer System Unit with an available system expansion slot is required. A read-only memory (ROM) replacement kit is provided with the Expansion Unit. The kit contains a ROM module which must be used to replace one of the ROM modules in the 5150 System Unit. A tool is provided to facilitate this replacement.
- Mdl 002: A 5160 Personal Computer XT System Unit with an available full-feature system expansion slot is required.

Customer Setup (CSU): All mdls and special features of the 5161 Expansion Unit are customer setup.

HIGHLIGHTS

- The 5161 Expansion Unit mdl 001 attaches to the 5150 Personal Computer, and the 5161 Expansion Unit mdl 002 attaches to the 5160 Personal Computer XT. The Expansion Unit contains one 10MB Fixed Disk Drive, and eight option expansion slots. In addition, the 5161 mdl 001 contains a Fixed Disk Drive Adapter. Six of the expansion slots are full-feature slots which will accept full-size feature cards. The remaining two are special-feature slots which will accept smaller feature cards. The primary monitor/display adapter, the diskette adapter, and any memory expansion options must reside in the 5150/5160. Other IBM feature cards may reside in either an Expansion Unit or a System Unit. One additional 10MB Fixed Disk Drive may be installed in the Expansion Unit to provide a total of 20MB of fixed disk storage.
- The following features are supplied as standard with the 5161 Expansion Unit:
  - Eight system expansion slots (one full-feature slot is required for the Fixed Disk Drive Adapter; one full-feature slot is required for the attachment card)
  - 10MB Fixed Disk Drive (#2500)
  - Fixed Disk Drive Adapter (#2501) (5161 mdl 1 only)
  - 1 meter (39 inch) cable and attachment cards for connection to the System Unit
  - 130 watt power supply with cooling fan
- Dimensions (approximate):
  Height: 142mm (6")
  Width: 500mm (20")
  Depth: 410mm (16")
- Weight (approximate): 12.2kg (27 lbs)
- Environment:

	System On	System Off
Air temperature:	15 to 32 C (60 to 90F)	10 to 43C (50 to 110 F)
Humidity:	8% to 80%	20% to 80%

SPECIFY

- Voltage (120V AC, 60 Hz): No specify required.

SPECIAL FEATURES

10MB Fixed Disk Drive (#2500): Provides storage for user programs and data. One 10MB Fixed Disk Drive is provided as standard on the 5161. **Technical Information:** 512 bytes per sector ... 17 sectors per track ... 306 tracks per surface ... 4 surfaces ... 3,600 rpm ... 90ms average access time ... 5M bit per second transfer rate. **Maximum:** Two 10MB Fixed Disk Drives may be installed in the 5161. If a 5161 mdl 002 is attached to a 5160, the 10MB Fixed Disk Drive and the Fixed Disk Drive Adapter in the 5160 must be moved into the 5161 to provide a total of 20MB of fixed disk storage (two 10MB Fixed Disk Drives) available to the system. **Field Installation:** Yes. **Prerequisites:** Fixed Disk Drive Adapter (#2501). **Customer Setup:** Yes.

Fixed Disk Drive Adapter (#2501): Provides the buffering, error detection, and data transfer between the 10MB Fixed Disk Drive (#2500) and the 5150/5160. One Fixed Disk Drive Adapter is included as a standard feature on the 5161 mdl 001. The Fixed Disk Drive Adapter can attach up to two 10MB Fixed Disk Drives. When a 5161 mdl 002 is attached to a 5160, the 10MB Fixed Disk Drive and the Fixed Disk Drive Adapter in the 5160 must be moved into the 5161 to provide a total of 20MB of fixed disk storage (two 10MB Fixed Disk Drives) available to the system. **Technical Information:** 32-bit error-correcting code ... microprocessor controlled ... on-board sector buffers ... internal diagnostics ... direct memory access (DMA) data transfer ... high-level command set ... automatic error detection and correction ... automatic retries on disk access. **Limitations:** The Fixed Disk Drive Adapter may not be installed in a 5150 expansion slot. Both the 10MB Fixed Disk Drive and the Fixed Disk Adapter must reside in the 5161 mdl 001. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** An available full-feature system expansion slot. **Customer Setup:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5181 COMPACT PRINTER

PURPOSE

The 5181 Compact Printer mdl 001 is a low-cost lightweight dot matrix printer that may be attached to the 4860 PCjr, the 5150 Personal Computer, and the 5160 Personal Computer XT. The 5181 mdl 001 provides 50 characters per second print speed and all-points-addressable graphics on thermally-sensitive cut sheet, roll, or fanfold paper.

MODELS

Model 1 001

Limitations: The 5181 will not operate on the 4860 PCjr if the Parallel Printer Attachment (4860 feature #0009) is installed. The Compact Printer is compatible with Personal Computer programs, but certain unique characteristics should be recognized when using application programs designed for the 5150 or 5160. Limitations and unique characteristics are outlined in detail in the manuals provided with the printer.

Prerequisites: For use with the 4860 PCjr, the attachment cable (provided as standard with the 5181) plugs into the PCjr serial device connector. For use with the 5150 Personal Computer or 5160 Personal Computer XT, the Compact Printer connector adapter (#0102) and an asynchronous communications adapter (feature #2074 on the 5150 or 5160) are required.

Customer Setup (CSU): Yes.

H'GHLIGHTS

- Thermal technology
- Serial interface
- Four print modes:
  - 80 characters per line, 10 cpi (standard)
  - 40 characters per line, 5 cpi (double width)
  - 136 characters per line, 17.5 cpi (compressed)
  - 68 characters per line, 8.75 cpi (compressed double width)
- Print speed (instantaneous):
  - 50 cps (standard character print)
  - 2,400 dots per second (image print)
- Throughput: 25 cps (typical)
- Printing mode: Unidirectional (left to right)
- Paper handling:
  - Friction feed
  - 216mm (8.5 in.) width maximum
- Line spacing: Program selectable at 6 lines/in. or 9 lines/in.
- Print quality: 560 dots per 8-inch line; 8 dots vertically
- Print matrix: Thermal head technology; 5 x 8 dot matrix (5 x 7 for all alpha characters except lower case).
- Interface:
  - Serial EIA (modified RS-232-C)
  - 1200 bits per second
  - 8-bit ASCII (two stop bits; no parity check)
  - 256-character buffer

Physical Specifications:
Width - 312mm (12.3 inches)
Depth - 220mm (8.7 inches)
Height - 88mm (3.5 inches)
Weight - 3.0kg (6.6 pounds)

Customer Responsibilities: The customer is responsible for unpacking and setting up the 5181, attaching it to the system unit, and running the power-on diagnostics. Necessary installation instructions are packed with the printer.

SPECIFY

- Voltage (120V AC, 50/60 Hz), 36 watts, 3-prong grounded plug: No specify required.

MODEL CONVERSIONS (None)

SPECIAL FEATURES

Compact Printer Connector Adapter (#0102): Required for attachment of the 5181 to the 5150 Personal Computer or to the 5160 Personal Computer XT. The connector adapter mates the 16-pin connector on the compact printer cable (which comes as standard on the 5181) with the 25-pin connector of the asynchronous communications adapter on the 5150 or 5160.

ACCESSORIES (None)

SUPPLIES

Paper is available from SSD as follows: roll (P/N 1503923) 89 feet/2 rolls per box; cut sheet (P/N 1503924) 250 sheets; fanfold (P/N 1503926) 250 pages. All paper is 8.5 inches wide, and each sheet or page is 11 inches long. Additional information is available from IBM branch office or IBM direct at 1-800-426-2468.

5182 Color Printer

PURPOSE

The 5182 Color Printer is a versatile bidirectional dot-matrix printer that may be attached to the 5150 Personal Computer and the 5160 Personal Computer XT. The 5182 prints reports and graphic images in any of three programmable states: All black, 4-color (red, green, blue, black), and 8-color (yellow, magenta, cyan, black, orange, green, violet, brown) at speeds of 35 to 200 cps, depending on the image quality desired. Three levels of printing are available: draft at 200 cps, text or correspondence at 110 cps, and near-letter-quality at 35 cps. The last is achieved by dense matrix imaging in a 2-pass print cycle.

MODELS

Model 001

Prerequisites: System unit or expansion unit attachment is made via the monochrome display and printer adapter (feature #4900 on the 5150 or 5160) or the printer adapter (feature #5200 on the 5150 or 5160). A printer cable (#5612) is required.

Customer Setup (CSU): Yes.

HIGHLIGHTS

- Dot-matrix color printer.
- Parallel interface.
- Bidirectional printing.
- 13.5 inch print line - 132 print columns (10 cpi).
- Character set: 191 characters compatible with 5152 mdl 002 Graphics Printer - 96-character upper/lower case ASCII with lower case descenders and IBM Personal Computer special characters.
- Paper width: 127mm to 375mm (5.0 in. to 14.9 in.).
- Paper feeds:
  - Tractor feed.
  - Manual single-sheet feed.
- Paper types:
  - Fanfold.
  - Cut sheet.
  - Single ply.
  - Up to 4-part form (tractor feed only).
- Print speed/quality:
  - 200 cps draft mode (default mode).
  - 120 cps text - proportional spacing.
  - 110 cps text - fixed spacing.
  - 35 cps near-letter-quality (NLQ).
- Print matrix:
  - 8 x 9 draft mode
  - 24 x 9 text mode
  - 36 x 18 NLQ
  - 24 x 14 graphics
- Print head: ballistic type using 9-wire (5 x 4 array) staggered design.
- Character size/pitch: 0.09 in. to 0.10 in. high; 10, 12, 17.1 cpi, double-width characters at each line density; super and subscripting via line indexing - smaller size image, all fonts; line graphic characters 0.167 in. high. 10 pitch is standard. Two aspect ratios are supported: 5:6 (standard), 1:1 (selectable).
- Programmable features: Print mode; line spacing; line width; forms length; intercharacter spacing; margins; tabs; auto underline; fixed/proportional character spacing; auto text justification.
- Forms length control: Switch- and software-selectable; 8.5, 11.0, 12.0, 14.0 in.; also auto perforation skip; TOF control by operator (offline); arbitrary form lengths are software-selectable.
- Slew rate: Stepper-motor pinfeed tractor; 7.5 in./sec.
- Line spacing: 6 or 8 lines/in., switch-selectable. Arbitrary line spacing is software-selectable for bit-image graphics.
- Line buffering: 6KB buffer.
- Graphics: 82.5 x 82.5 DPI matrix (1:1 aspect ratio); each of upper eight print head wires is addressable by one bit of each byte sent in graphics mode. All points addressable.
- Ribbon: Easy-change cartridge 0.75 in. wide, 36 yd. long; 1.5 million character color ribbon; "fails" if a band fails (that is, a dot is unprinted); standard eight colors mixable-color ribbon (yellow/magenta/cyan/black) shipped with each printer.
- Ribbon saver: Automatic band lift at end of page (black ribbon usage).
- Printer diagnostics: Auto power-on; operator-initiated self-test with alphameric patterns repeated, colors tested; host-driven test.

Physical Specifications:

Width - 549mm (21.6 inches)
Depth - 315mm (12.4 inches)
Height - 231mm (9.1 inches)
Weight - 16.3kg (36 pounds)

Customer Responsibilities: The customer is responsible for unpacking and setting up the Color Printer, attaching it to the system unit, and running the power-on diagnostics. Necessary installation instructions are packed with the printer.

Publications: *Color Printer Hardware Maintenance and Service Manual* (#2383): Provides diagnostic and service information for the 5182 Color Printer.

SPECIFY

- Voltage (100/120/200/220V AC, 50/60 Hz): Factory set to 120V AC, 60 Hz. No specify required.
- Power cord standard. No specify required.

MODEL CONVERSIONS (None)

SPECIAL FEATURES

Color Printer Paper Rack (#0101): Provides a convenient stand for stacking printed paper. Attaches by simply snapping ends into indicated holes in printer cover. The option is a wire rack which can hold a stack of single sheets or continuous fanfold paper printed by the 5182 Color Printer. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

Printer Cable (#5612): Required for attachment to the monochrome display and printer adapter or the printer adapter of the 5150 or 5160.

ACCESSORIES (None)

SUPPLIES

Ribbons: Ribbons for the 5182 Color Printer are available from SSD as follows: Black (P/N 6320194); 4-color primary (red, green, blue, black) (P/N 1501573); 8-color process (yellow, magenta, cyan, black); to obtain 8-color capability, the printer must make a second pass and ribbon shifts to mix the colors (P/N 1501574). Additional information is available from IBM branch office or call IBM Direct at 1-800-426-2468.

MODEL CONVERSION(None)

ACCESSORIES (None)

5210 PRINTER MDLS E01, E02

PURPOSE

A bidirectional, impact printer providing high quality printed output for the 8100 Information System. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style and graphic variations.

MODELS

Model E01	40 cps
Model E02	60 cps

Prerequisites: Appropriately configured IBM 8100 Information System and DPCX/DOSF Release 3 or DPPX/SP.

Customer Setup (CSU): The 5210 is designed as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine.

Limitations:

1. Continuous forms:

   Pinfed continuous forms can be used. See "Optional Features" for Forms Stand and Continuous Forms Feed Device. Both edges of the pinfed forms must be fastened in the forms tractors. No staples are permitted in the areas exposed to the interchangeable print wheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

   Paper Specifications:
   - Maximum carbons: 5
   - Maximum paper width: 392mm (15.4 in.)
   - Maximum pin-to-pin width on forms tractor is 368mm (14.5 in.)
   - Maximum print-line width: 335mm (13.2 in.)

2. Single sheet feed is by hand insertion, unless the optional Cut Sheet Feed Device (#7860) or Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875) is used.

3. Drawer selection of the sheet feed is limited to the L2DCA (SNA-LU1) data stream. Only the bottom drawer is accessible with the SCS (SNA-LU1) data stream using the forms feed command. The writing line is reduced to 11.69 inches maximum when using automatic cut sheet paper handling equipment.

4. Cut Sheet Feed and Front Exit Sheet and Envelope Feed Device Paper Recommendations:

   Suitable Paper: All of the papers placed in the IBM Cut Sheet Feed and Front Exit Sheet and Envelope Feed Devices should be new, unused and without packaging damage. To ensure feed reliability, all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the IBM Cut Sheet Feed and Front Exit Sheet and Envelope Feed Devices.

   Type and Composition: Plain bond paper of one of the following compositions:

   - No. 1 sulfite (100% chemical wood pulp)
   - 25% cotton content
   - 50% cotton content
   - 100% cotton content
   - Paper made from recycled office paper.

   Size: The following paper sizes can be fed either lengthwise or sideways unless otherwise noted.

– *	178mm x 267mm	(7.0" x 10.5")
– *	185mm x 267mm	(7.25" x 10.5")
– *	191mm x 267mm	(7.5" x 10.5")
–	203mm x 267mm	(8.0" x 10.5")
– *	203mm x 330mm	(8.0" x 13.0")
–	216mm x 279mm	(8.5" x 11.0")
– *	216mm x 330mm	(8.5" x 13.0")
– *	216mm x 356mm	(8.5" x 14.0")

   *Feed lengthwise only.

   Basis weights:

   - 60g/square meter to 90g/square meter (16 to 24 lb.)
   - Optimum: 75g/square meter to 90g/square meter (20-24 lb. bond) 25% or 50% cotton content

   Unsuitable Paper for the cut sheet feeders: Following is a list of paper supplies that may be found in an office that will not feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive.)

   - Coated paper
   - Vellum paper
   - Coated erasable bond paper
   - Synthetic papers (rice paper, parchment, etc.)
   - Translucent paper
   - Multi-sheet forms and documents (bound or unbound)
   - Peel-off, pressure sensitive labels
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper)
   - Preprinted forms requiring critical character placement
   - Dark colored paper
   - Envelopes
   - Card stock
   - Folded or creased documents
   - Paper with exposed gummed surfaces, holes, perforations, cutouts or windows
   - Highly embossed paper* (embossment height exceeding 0.508mm (0.02")
   - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Device or printer components
   - A mix of different sizes and types of paper in a paper tray
   - Paper in unsatisfactory conditions:
     - Paper with excessive curl or waviness exceeding 3mm (0.118 inch)
     - Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition)
     - Paper with poorly cut (rough) edges

   Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

   * **Note:** Embossments should not be located within 15mm (0.59") of any edge of the sheet.

5. Envelope Recommendations:

   Suitable Envelopes:

   Envelope feeding characteristics vary with the type size and weight of envelopes used.

   All of the envelopes placed in the Front Exit Sheet and Envelope Feed devices should be new, unused, and without packaging damage. The envelopes defined in this section are the only ones considered acceptable for use in the Front Exit Sheet and Envelope Feed devices.

   Type and Composition:

   United States: Plain bond envelopes of one of the following compositions:

   - No. 1 sulfite (100% chemical wood pulp)
   - 25% cotton content
   - 50% cotton content
   - 100% cotton content
   - Paper made from recycled office paper
   - White wove envelopes.

   World Trade: Well sized bond paper with non-coated surfaces.

   Size: The following United States standard envelope sizes can be fed:

   - No. 7 3/4 98.4mm x 190.5mm (3.875" x 7.5")
   - No. 9 98.4mm x 225.4mm (3.875" x 8.875")
   - No. 10 114.8mm x 241.3mm (4.5" x 9.5")

   The size of World Trade envelopes which can be fed range from 98.4mm to 114.8mm (3.875" to 4.5") in width and 190.5mm to 241.3mm (7.5" to 9.5") in length.

   Basis weights:

   - Optimum: 75g/square meter (20 lb.) sulfite or 25% cotton content plain bond envelopes.

   Unsuitable Envelopes:

   Following is a list of envelope supplies that may be found in an office that will not feed reliably and may cause misfeeds and envelope jams. (This list is not intended to be all-inclusive.)

   - Window envelopes
   - Envelopes with holes, perforations, cut out or deep embossing
   - Envelopes with side flaps, i.e., flaps that fold along the short dimension of the envelope
   - Envelopes with flaps that extend more than 60mm (2.36") beyond the line of the fold

   Unsuitable Envelope Conditions:

   - Envelopes that are stuck together
   - Envelopes that will not stack flat
   - Envelopes that are damaged or bent such that they are interlocked

5210 Printer Mdls E01, E02 (cont'd)

HIGHLIGHTS

- Mdl E01 has a rated burst print speed of up to 40 cps (assumes 96-character set with 10 pitch). Mdl E02 has a rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10-pitch, 12-pitch, 15-pitch or proportional spacing, according to the print wheel selected (see 8100 DOSF Release 3 or DPPX/SP for limitations).
- Vertical spacing of 5-1/3, 6, or 8 lines per inch (see 8100/DOSF Release 3 or DPPX/SP for limitations). (Metric platen one line per centimeter.)
- Half-line spacing for superscripts and subscripts to a single level.
- First line registration, form skipping and spacing performed at the console by the user and then controlled by the licensed program.
- Single-speed carriage with skipping at up to 6 inches per second.
- Single sheet feeding by hand, or the optional Cut Sheet Feed Device (#7860) or Front Exit Sheet Feed and Envelope Feed (#7875) is used.
- Forms tractor for feeding continuous forms is optional.
- Multiple 96-character print wheel options available by type style and language graphic variations. See "Specify" and "Print Wheel" chart in "Accessories" for details.
- Attaches to the 8100 System via the direct-attach loop (9600 bps or 38.4K bps), or data link-attached loop (9600 bps only).
- Ribbon Saver: Provides two modes of ribbon feed via a switch on the printer to allow two levels of print quality. Quality Mode provides approximately one million character yield; Saver Mode provides approximately three million character yield.
- Optional forms stand.
- Customer setup for early availability and relocation flexibility.

Problem Determination Procedures: Problem Determination (and recovery) Procedures are provided by IBM with the 5210 Printer. These procedures are designed to be easy to follow and use by the customer and it is the customer's responsibility to follow them prior to calling for IBM service.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5210.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and follow IBM instructions for relocation of the 5210 Printer.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal or relocation instructions and packing materials (if required) will be ordered by the Branch Office.
- Relocation of the 5210, if required, to allow IBM service access.
- Installation and maintenance of signal cables and associated cable connectors for attaching the 5210 to the direct attach loop on the 8100 System.

Bibliography: See *KWIC INDEX*, GA20-1621, or Specific System Bibliography.

AAS Ordering Instructions: The 5210 is a system component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard non-locking plug (uses customer standard type receptacle). Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if the 1.8 meter cord is required specify **#9986**.
- Color: Pearl white only (no specify required).
- Language: English (no specify required).
- Print Wheel Type Style: One US Courier 10 Data Processing print wheel is provided with the machine. See chart of available print wheel assemblies in "Accessories" section. Additional print wheels may be ordered as supplies by part number. Part numbers of all available print wheel assemblies are included in the Accessories chart. See SSD sales manual for additional details.
- DPPX/SP Attachment: For attachment to an 8100 Information System running DPPX/SP, specify **#9901**.

SPECIAL FEATURES

Metric Platen (#300): An optional platen; the attaching system is required to support one line per centimeter index spacing (Set Single Line Density, SSLD in DCA-L2). This option is effected only with friction feed. Tractor feeding is unaffected by this option. English index increments are nominally short by approximately 0.005mm per mm of platen movement. **Field Installation:** No. No charge.

Continuous Forms Feed Device (#7850): Provides a variable-width tractor for feeding continuous forms. **Field installation:** Yes.

Cut Sheet Feed Device (#7860): Provides for feeding cut sheets of paper from two source trays under system control. Consists of paper transport and output tray. Paper is stacked face down. See "Limitations" for paper specifications. **Field installation:** Yes.

Front Exit Sheet Feed (#7870): Provides for feeding cut sheets of paper from two source trays under system control. Consists of paper transport and output tray. Paper is stacked face down. **Field Installation:** Yes. **Customer Setup:** Yes. See "Limitations" for Paper Specifications. Must have cable adapter for use with mdls E01 and E02. Cable adapter shipped with printer or with Front Exit Cut Sheet Feed Device if ordered for field installation. **Prerequisites:** Direct-Attach Loop or a Data Link-Attach Loop. **Limitations:** Refer to "Limitations", Item 3.

Front Exit Sheet and Envelope Feed (#7875): Provides for feeding cut sheets of paper from two paper source trays and envelopes from a separate source tray under system control. Consists of paper transport and separate output trays for cut sheets and envelopes. Paper is stacked face down. **Field Installation:** Yes. **Customer Setup:** Yes for mdls E01 and E02 above serial number 55166. Must have cable adapter for use with mdls E01 and E02. Cable adapter shipped with printer or with Front Exit Cut Sheet and Envelope Feed Device if ordered for field installation. **Prerequisites:** Direct-Attach Loop or Data Link-Attach Loop. **Limitations:** Refer to "Limitations", Item 3.

MODEL CONVERSIONS

Model changes E01 to E02 are field installable. All features may be field installed.

ACCESSORIES

Accessories are available on purchase-only basis.

Add Envelope Feed Capability to the Front Exit Sheet Feed (#7876): Field Installation: Only. **Prerequisites:** Must have #7870 installed; must be above serial number 55166.

Add Envelope Feed Capability to the Front Exit Sheet Feed (#7877): Field Installation: Only. **Prerequisites:** Must have #7870 installed and serial number must be below serial number 55167.

Front Exit Sheet and Envelope Feed (#7878): Provides cut sheet paper from two source trays and envelopes from a separate source tray under system control. Consists of paper transport and separate output trays for cut sheets and envelopes. **Field Installation:** Only. Serial number must be below 55167. Must have cable adapter which is shipped with this feature.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing. For shipment with the machine order by P/N.

Paper Table (P/N 1495352): Provides paper support and a movable guide to assist manual cut sheet insertion when Paper Feed Devices #7850, #7860, #7870, or #7875 are not ordered.

Paper Trays (Top P/N 6819687, Bottom P/N 6819442): Provides additional trays for Cut Sheet Feed Device (#7860), Front Exit Sheet Feed (#7870) and Front Exit Sheet and Envelope Feed (#7875). Eliminates paper removal/installation from trays when customer uses a wide variety of papers.

Print Wheels: Additional print wheels are available in a variety of print styles and character sets. These are supply items and are interchangeable with the print wheel supplied with the machine. Replacement and installation of the print wheel is the customer's responsibility. Additional print wheels for the 5210 may be ordered from IBM. Specify quantity required, quoting following P/Ns as appropriate:

5210 Printer Mdls E01, E02 (cont'd)

Descriptions Specify Codes	Modern PSM	Boldface PSM	Essay PSM	Courier 10	Artisan 10	Prestige Pica 10
US/Australia KB ID 001-	1439517	1439504	1439526	1439511	1439520	1439503
Swiss-German/ Swiss-French KB ID 049&051-	1439518	1439509	1439527	1439512	1439521	1439505
Germany/Austria KB ID 029-	1439597	1439589	1439629	1439565	1439613	1439581
France KB ID 251-	1439598	1439590	1439630	1439566	1439614	1439582
UK/Israel/Latin KB ID 067-	1439599	1439591	1439631	1439567	1439615	1439583
Sweden/Finland KB ID 053-	1439602	1439594	1439634	1439570	1439618	1439586
French/Belgium KB ID 031-				1439650*		
Denmark/Norway KB ID 057&055-	1439519	1439510	1439528	1439513	1439522	1439506
US Accounting KB ID 017-				1439654*		
EBCDIC KB ID 101-				1439653*		
ASCII KB ID 103-				1439652*		
Canada/English KB ID 037-	1439550	1439538	1439562	1439546	1439558	1439534
Canada Bilingual KB ID 039-	1439551	1439539	1439563	1439547	1439559	1439535
Latin America/P/R. KB ID 025-	1439547	1439537	1439561	1439545	1439557	1439533
Italy KB ID 041-	1439600	1439592	1439632	1439568	1439616	1439584
Netherlands/So. Africa KB ID 043-	1439601	1439593	1439633	1439569	1439617	1439585
Spain KB ID 045-	1439603	1439595	1439635	1439571	1439619	1439587
UK/Israel/Latin 88 KB ID 066-				1439638*		
Canada/Bilingual 88 KB ID 038-				1439639*		
Sweden/Finland 88 KB ID 052-				1439640*		
Swiss/French 88 KB ID 048-				1439641*		
Swiss/German 88 KB ID 050-				1439642*		
Japan/English	1439552	1439540		1439548		1439536

5210 Printer Mdls E01, E02 (cont'd)

Descriptions and Specify Codes	Prest'g Elite 12	Courier 12	Letter Gothic 12	Prest'g 15	Symbol 12*	Rhetoric *
US/Australia KB ID001-	1439502	1439523	1439514	1439655	* 1439639	1439736
Swiss-German/ Swiss-French KB ID 049&051-	1439507	1439524	1439515	1439689		1439745
Germany/Austria KB ID 029-	1439573	1439605	1439621	1439681		1439738
France KB ID 251-	1439574	1439606	1439622	1439694		1439749
UK/Israel/Latin KB ID 067-	1439575	1439607	1439623	1439683		1439739
Sweden/Finland KB ID 053-	1439578	1439610	1439626	1439688		1439744
French/Belgium KB ID 031-	1439651			1439682		
Denmark/Norway KB ID 057&055-	1439508	1439525	1439516	1439690		1439746
Canada/English KB ID 037-	1439530	1439554	1439542	1439684		1439740
Canada Bilingual KB ID 039-	1439531	1439555	1439543	1439685		1439741
Japan/English	1439532		1439544			

* Only available as additional print wheels

SUPPLIES

Ribbons: The IBM 463 Ribbon (P/N 1299463) or equivalent.

5210 PRINTER MDLS G01, G02

PURPOSE

A bidirectional, impact printer providing correspondence quality printed output for the 3274 Control Unit (all mdls), a 3276 Control Unit Display Station (mdls 1, 2, 3, 4, 11, 12, 13, 14), a 4701 Finance Communication Controller, or a 8775 Control Unit Display Station. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style and graphic variations with appropriate application programming.

MODELS

Model G01	G01	40 cps	(13.2 inch writing line*)
Model G02	G02	60 cps	(13.2 inch writing line*)

* 11.69 inch writing line when using feature #7860.

Note: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must be considered in determining actual throughput.

The FIVE 3270 SE Aid is available to estimate printer performance for a particular environment in which the 5210 model G01, G02 will be installed. Use of this Aid is essential for understanding the effects of transmission line speed, data stream, protocol, and message sizes on system throughput.

Prerequisites: Customer must supply the printer to system (controller) coax attachment cable. The 3274 requires an available category A terminal port. The 3276 requires an available port or added feature #3255, #3256, or #3257. The 4701 requires an available port on the Device Cluster Adapter feature #3101. An 8775 requires Printer Attachment feature #5580.

Customer Setup (CSU): The 5210 is designed as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine.

Limitations:

1. Continuous forms:

   Pin fed continuous forms can be used. (See "Special Features" for Forms Stand and Continuous Forms Feed Device.)

   Both edges of the pin fed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable print wheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

   Paper Specifications:
   - Maximum carbons: 5
   - Maximum paper width: 392mm (15.4 in)
   - Maximum pin-to-pin width on forms tractor is 368mm (14.5 in)
   - Maximum print-line width: 335mm (13.2).

2. Single sheet feed is by hand insertion, unless the optional Cut Sheet Feed Device (#7860) is used. A top margin of one third of an inch is minimum for cutsheet paper. Application attempts to print in this area will result in the printer first moving the writing line (vertically) such that the base line of the graphic to be printed will appear one third of an inch from the top of the sheet. First print lines which contain superscripts will print the superscripts on the base line.

   Printing should not include the last physical line area (0.19 of an inch - 4.8mm from the bottom of the sheet) on a cutsheet. Attempts to do so may result in loss of printed data.

3. Drawer selection of the sheet feed is limited to the DCA-L2 (SNA-LU1) data streams. Only the bottom drawer is accessible with the other data stream using the forms feed command. The writing line is reduced to 11.69 inches maximum when using automatic cutsheet paper handling equipment.

   Cut Sheet Feed Drive Paper Recommendations:

   Suitable Paper: All of the papers placed in the Cut Sheet Feed Device Handler should be new, unused and without packaging damage. To insure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the Cut Sheet Feed Device.

   Type and Composition: Plain bond paper of one of the following compositions:

   - No. 1 sulfite (100% chemical wood pulp)
   - 25% cotton content
   - 50% cotton content
   - 100% cotton content
   - Paper made from recycled office paper

   Size: The following paper sizes can be fed either lengthwise or sidewise unless otherwise noted.

   - 178mm x 267mm * (7.0" x 10.5")
   - 185mm x 267mm * (7.25" x 10.5")
   - 191mm x 267mm * (7.5" x 10.5")
   - 203mm x 267mm (8.0" x 10.5")
   - 203mm x 330mm * (8.0" x 13.0")
   - 216mm x 279mm (8.5" x 11.0")
   - 216mm x 330mm * (8.5" x 13.0")
   - 216mm x 356mm * (8.5" x 14.0")

     * Feed lengthwise only.

   Basis weights:

   - 60g/square meter to 90g/square meter (16 to 24 lb.)
   - Optimum: 75g/square meter to 90g/square meter (20-24 lb. bond) 25% or 50% cotton content

   • Unsuitable Paper for the cut sheet feeder.

   Following is a list of paper supplies that may be found in an office that will not feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive).

   - Coated paper
   - Vellum paper
   - Coated erasable bond paper
   - Synthetic papers (rice paper, parchment, etc)
   - Translucent paper
   - Multi-sheet forms and documents (bound or unbound)
   - Peel-off, pressure sensitive labels
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper)
   - Preprinted forms requiring critical character placement
   - Dark colored paper
   - Envelopes
   - Card stock
   - Folded or creased documents
   - Paper with exposed gummed surfaces, holes, perforations, cutouts or windows
   - Highly embossed paper* (embossment height exceeding 0.508mm (0.02")
   - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Device or printer components
   - A mix of different sizes and types of paper in a paper tray
   - Paper in unsatisfactory conditions:
     - Paper with excessive curl or waviness exceeding 3mm (0.118 inch)
     - Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition.)
     - Paper with poorly cut (rough) edges

   Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

   Note: Embossments should not be located within 15mm (0.59") of any edge of the sheet.

4. The 5210 G01, G02, at power on (default) is set to 10 pitch 6 lines per inch and the Courier 10 data processing print wheel is assumed mounted. When the DCA-L2 data stream is selected, the printer is set to 10 pitch, 6 lines per inch and the operator will be instructed to mount the Courier 10 word processing printwheel. Other pitch line space selections and character print wheel arrangements supported by the printer must be transmitted to the printer via the data stream from the connecting host/controller or entered via the printer console by the operator when transmitting 3270 Display/Printer Data Streams. 5-1/3, 9.6, 12, 24 and 48 lines per inch, 1 line per cm and PSM require DCA-L2 data stream application support.

   Some configurations do not support all data stream architectures. See attaching system/controller for support provided.

5. Printer interface support when attached to 3274s, 3276s or 8775s is either LU type 3 using 3270 Display/printer data stream or as LU type 1 using the SCS data stream. 3274 also supports using the DCA-L2 data stream as LU type 1. Non-SNA (BSC/Direct Channel) data streams are also supported. The 4701 supports the SCS data stream only.

6. See the operators guide for additional super/subscripting limitations.

5210 Printer Mdls G01, G02 (cont'd)

HIGHLIGHTS

- The 5210 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special user selectable features (at time of order) permit tailoring of the printer to user requirements.
- Mdl G01 has a rated burst print speed of up to 40 cps (assumes 96-character set with 10 pitch). Mdl G02 has a rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Provides printing for either 3270 mode (SNA LU3 or BSC/Direct Channel), SCS (SNA LU1) mode or Document Content Architecture DCA-L2* (SNA LU1) mode (see note 5 under Limitations).
- Dual case operation.
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, 15 pitch, or proportional spacing (DCA-L2 with 3274 only), according to the print wheel selected (see limitations 4).
- Vertical spacing of 3.4, 5-1/3, 6, 8, 9.6, 12, 24, or 48 lines per inch and 1 line per centimeter (see limitations 4 and 5).
- Cancel print.
- Half-line spacing for superscripts and subscripts to a single level (DCA-L2 only). (See limitations 2 and 6.)
- First line registration, form indexing and spacing performed at the console by the user and then controlled by the user program.
- Operator selectable national use character sets (SCS and 3270 data streams only).
- Maximum print positions available when using cutsheet manual or continuous form feed/10 pitch - 132; 12 pitch - 158; 15 pitch - 198; (PSM max is dependent upon text content).
- Multiple speed carriage with indexing at up to 6 inches per second vertically.
- Single sheet feeding by hand, or the optional Cut Sheet Feed Device (see limitations 3).
- Variable width forms tractor for feeding continuous forms is optional (see limitations 1).
- Multiple 96-character print wheel options available by type style and language graphic variations. See "Specify" and "Print Wheel" chart in "Accessories" for details.
- Metric platen (1 line/cm with CDA-L2 control) optional.
- Ribbon Saver: Provides two modes of ribbon feed via a switch on the printer to allow two levels of print quality. General Correspondence Mode provides approximately one million character yield; Saver Mode provides approximately three million character yield with a decrease in print quality.
- Optional forms stand.
- Customer Setup for early availability and relocation flexibility.

Problem Determination Procedures: Problem Determination (and recovery) Procedures are provided by IBM with the 5210 Printer. These procedures are designed to be easy to follow and use by the customer and it is the customer's responsibility to follow them prior to calling for IBM service. See "Customer Responsibilities".

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5210.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and follow IBM instructions for relocation of the 5210 Printer.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal or relocation instructions and packing materials (if required) will be ordered by the Branch Office.
- Relocation of the 5210, if required, to allow IBM service access.
- Procurement, installation and maintenance of coaxial signal cables and associated cable connectors for attaching the 5210 to the 3274, 3276 and 8775 controllers. Maximum length is 1.5 kilometers.

Basic Configuration: Base machine is shipped with the following specifications:

- Voltage 120V AC, 1-phase, 3-wire, 60Hz
- Power cord plug; nonlocking
- Power cord length; 3 meters (9.8 feet)
- Printwheel: 10 pitch Courier (data processing)
- Print ribbon cartridge: IBM Part No. 1299463
- Character print operation: 1920 bytes

Bibliography: See KWIC INDEX, GA20-1621, or specific system bibliography.

AAS Ordering Instructions: The 5210 is a system component

SPECIFY

Note: A 3 meter power cord and plug are shipped from the plant of manufacture.

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard nonlocking plug (uses customer standard type receptacle). Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if the 1.8 meter cord is required specify **#9986**.
- Color: Pearl white only (no specify required).
- Language: English (no specify required).
- Print Wheel Type Styles (no specify required) data processing Courier 10.
- Cables: See "Accessories" and *Installation Manual - Physical Planning,* GA27-2787 (3268 Printer), for cable details.
- Compatibility Options for the 3270 Data Stream (Non-SCS/DCA-L2) Operation: Operation of the 5210 is defined as standard. Alternate operation may be specified. *Note:* Standard 5210 operation is the same as the standard 3287 mdls 1 and 2.

1. CARRIAGE RETURN (CR) AT MPP PLUS 1

Standard:	An automatic New Line (NL) is executed at MPP plus 1, then the CR is executed. The next print position will be the first print position of the next line.
#9608	No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

2. NEW LINE (NL) AT MPP PLUS 1

Standard:	An automatic New Line (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.
#9609	No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

3. FORM FEED FOLLOWED BY DATA

Standard:	The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.
#9610	The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220-SC3752.

4. FORM FEED IS LAST CHARACTER IN PRINT ORDER

Standard:	An automatic New Line (NL) is executed after the form feed is completed. The next print position will be the first print position of the second line on the next form.
#9611	The automatic New Line (NL) is suppressed at the completion of the form feed. The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219-SC3749.

5. NULL SUPPRESSION

Standard:	If an entire print Line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is the first print position of current line.
#9612	Prints all null lines as a blank line and performs a new Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ ML0442-SC 3741 or 3287 RPS MK3988 - SC3741.

6. FORM FEED (FF) COMMAND POSITION

Standard:	Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at

* DCA-L2 is supported by the 3274 only.

5210 Printer Mdls G01, G02 (cont'd)

MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

#9613 Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

7. AUTOMATIC FUNCTION AT END OF PRINT BUFFER

Standard: An automatic New Line (NL) is executed following a print order. Next print position is first print position of the next line.

#9614 An automatic Form Feed (FF) is executed following a print order (unless a form feed was the last function executed). Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740. This feature is ignored if feature #9604 is selected.

8. SUPPRESS TIMEOUT - NO DATA LOSS I.R.

Standard: A 1 minute or 10 minute timeout with message to host following an intervention required condition.

#9605 Suppress 1 minute and 10 minute timeouts with message to host of intervention required.

9. AUTO FORM FEED AT END OF LOCAL COPY

Standard: Execute form feed command as encountered in data stream or setting.

#9604 Execute auto form feed at end of operator initiated local copy operation (unless a form feed was the last function executed). The next print position is the first print position of line one of the next form (overrides #9614).

- Character Print Operation: The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below.

  #9521 (960 character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  #9523 (2,560 character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

  #9524 (3,440 character print operation) for use with a program which requires a print buffer size of 3,440 bytes while using Erase/Write Alternate Command.

  #9525* (3,564 character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command.

  * 3274 only

SPECIAL FEATURES

Metric Platen (#0300): An optional platen; the attaching system is required to support one line per centimeter index spacing (Set Single Line Density (SSLD in DCA-L2)). This option is effective only with friction feed. Tractor feeding is unaffected by this option. English index increments are nominally short by approximately .005mm per mm of platen movement. Available at time of order only (not field installable).

Continuous Forms Feed Device (#7850): Provides a variable width tractor for feeding continuous forms.

Cut Sheet Feed Device (#7860): Provides for feeding cut sheets of paper from two source trays under System Control. Consists of paper transport and output tray. Paper is stacked face down. See Limitations #3 for drawer selector and Paper Specifications.

MODEL CONVERSIONS

Model changes G01 to G02 are field installable.

ACCESSORIES

Cables: Cables and or associated parts to attach the 5210 to the 3274 Control Unit and 3276 Control Unit Display Station may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 1)
P/N	1836418	Connector Kit (Note 1)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 2)
P/N	1836419	Connector Kit (Note 2)
P/N	2621414	Modification Kit (Note 3)
P/N	1833106	Station Protector Attachment Kit (Note 5)
P/N	5252643	Adapter (Note 7)
P/N	1830818	Station Protection Kit, Gas (Note 4)
P/N	5252899	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Cut Sheet Feed Device (#7860). Eliminates paper removal/ installation from trays when customer uses a wide variety of paper.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1495352): Provides paper support and a moveable guide to assist manual cut sheet insertion when Cut Sheet Feed Device (#7860) is not ordered.

5210 Print Wheel Assemblies - Word Processing: Additional print wheels are available in a variety of print styles and character sets. These are supply items and are interchangeable with the print wheel supplied with the machine. Replacement and installation of the print wheel is the customer's responsibility. Additional print wheels for the 5210 may be ordered from IBM. Specify quantity required, quoting following P/Ns as appropriate:

5210 Printer Mdls G01, G02 (cont'd)

Descriptions Specify Codes	Modern PSM	Boldface PSM	Essay PSM	Courier 10	Artisan 10	Prestige Pica 10
US/Australia KB ID 001-	1439517	1439504	1439526	1439511	1439520	1439503
Swiss-German/ Swiss-French KB ID 049&051-	1439518	1439509	1439527	1439512	1439521	1439505
Germany/Austria KB ID 029-	1439597	1439589	1439629	1439565	1439613	1439581
France KB ID 251-	1439598	1439590	1439630	1439566	1439614	1439582
UK/Israel/Latin KB ID 067-	1439599	1439591	1439631	1439567	1439615	1439583
Sweden/Finland KB ID 053-	1439602	1439594	1439634	1439570	1439618	1439586
French/Belgium KB ID 031-				1439650*		
Denmark/Norway KB ID 057&055-	1439519	1439510	1439528	1439513	1439522	1439506
US Accounting KB ID 017-				1439654*		
EBCDIC KB ID 101-				1439653*		
ASCII KB ID 103-				1439652*		
Canada/English KB ID 037-	1439550	1439538	1439562	1439546	1439558	1439534
Canada Bilingual KB ID 039-	1439551	1439539	1439563	1439547	1439559	1439535
Latin America/P/R. KB ID 025-	1439547	1439537	1439561	1439545	1439557	1439533
Italy KB ID 041-	1439600	1439592	1439632	1439568	1439616	1439584
Netherlands/So. Africa KB ID 043-	1439601	1439593	1439633	1439569	1439617	1439585
Spain KB ID 045-	1439603	1439595	1439635	1439571	1439619	1439587
UK/Israel/Latin 88 KB ID 066-				1439638*		
Canada/Bilingual 88 KB ID 038-				1439639*		
Sweden/Finland 88 KB ID 052-				1439640*		
Swiss/French 88 KB ID 048-				1439641*		
Swiss/German 88 KB ID 050-				1439642*		
Japan/English	1439552	1439540		1439548		1439536

5210 Printer Mdls G01, G02 (cont'd)

Descriptions and Specify Codes	Prest'g Elite 12	Courier 12	Letter Gothic 12	Prest'g 15	Symbol 12*	Rhetoric *
US/Australia KB ID001-	1439502	1439523	1439514	1439655	* 1439639	1439736
Swiss-German/ Swiss-French KB ID 049&051-	1439507	1439524	1439515	1439689		1439745
Germany/Austria KB ID 029-	1439573	1439605	1439621	1439681		1439738
France KB ID 251-	1439574	1439606	1439622	1439694		1439749
UK/Israel/Latin KB ID 067-	1439575	1439607	1439623	1439683		1439739
Sweden/Finland KB ID 053-	1439578	1439610	1439626	1439688		1439744
French/Belgium KB ID 031-	1439651			1439682		
Denmark/Norway KB ID 057&055-	1439508	1439525	1439516	1439690		1439746
Canada/English KB ID 037-	1439530	1439554	1439542	1439684		1439740
Canada Bilingual KB ID 039-	1439531	1439555	1439543	1439685		1439741
Japan/English	1439532		1439544			

* Only available as additional print wheels

SUPPLIES

Ribbons: The IBM 463 Ribbon (P/N 1299463).

5211 PRINTER

PURPOSE

The 5211 is a stand-alone printer for System/34 and System/38.

MODELS

Model 1	001	System/34 only	160 lpm
Model 2	002	System/34 and System/38	300 lpm

Limitations:

- Only pin-fed, continuous forms can be used.
- Both edges of the forms must be fastened in the forms tractors.
- No staples are permitted in the areas exposed to the interchangeable print belt.
- Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts should be tested in operating conditions to verify that results are satisfactory.
- Due to the complexity of certain characters on the 188-character Multinational print belt, all multiple part forms should be tested in operating conditions to ensure that results are satisfactory.

Maximum: Only one 5211 Printer mdl 1 or 2 may be attached to a System/34. Two 5211-2 printers may be attached to System/38.

Prerequisites: A 5211 Attachment (#5811) and 5211/3262 Base Printer Attachment (#1110) on the 5340 System Unit. Specify **#9301** or **#9302** on 5340. See M5340 "Specify". OCR print available only with 5211-2 machines with serial numbers above 51200. A 5211 Attachment feature on the 5381 System Unit (#1100 for the first 5211 Attachment; #1110 for the second 5211 Attachment). See M5381 "Special Features".

Nominal rated speeds are based on 48-character set. Specialized accessory belts allowing increased speeds are available. See "Highlights".

HIGHLIGHTS

A universal character set buffer of 192 positions. The 5211 attachment allows the use of graphic sets of up to 192 characters. Print speeds vary depending on character set size and frequency of character repetition on the belt. General purpose belts of 48, 64, 96, and 188 characters are available with the following rated speeds:

	Mdl 1	Mdl 2
48-character set	160 lpm	300 lpm
64-character set	123 lpm	235 lpm
96-character set	84 lpm	164 lpm
188-character set	44 lpm	86 lpm

Specialized print belts which can provide greater speeds up to 225 lpm for mdl 1 and up to 395 lpm for mdl 2, for numeric printing, are available as accessories. See "Type Catalog". 132 print positions are standard. Horizontal spacing is 10 characters per inch. Vertical spacing is six or eight lines per inch under operator control (System/34) and CL control (System/38). Continuous marginally punched forms from 89mm (3.5 inches) to 387mm (15.25 inches) in overall width are fed by an automatic carriage. Forms skipping and spacing are program-controlled. The carriage is a single speed unit allowing skipping up to 20 inches per second. Continuous forms are fed by a forms tractor. See *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations.

OCR capability is provided for the mdl 2 only. 48-character print belts containing numeric A or B font (13 characters) are available as accessories. The mdl 2 can prepare OCR documents on 20 to 24 lb. (75-90 g/sq.m) OCR bond single-part paper, using an OCR ribbon, that can be read by the 3886 Optical Character Reader with 3211/5211 Compatibility (**#9701**). No representation or commitment as to readability of 5211 mdl 2 printing by OCR equipment other than the 3886 reader with specify code **#9701** shall be made.

The translation capability within the 5211 Attachment Feature (#5811) on the 5340 provides for character substitution when using a print belt which does not contain all the characters in the printer data stream.

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V.
- Color: One color accent panel must be specified. Specify **#9060** for Willow Green, **#9061** for Garnet Rose, **#9062** for Sunrise Yellow, **#9063** for Classic Blue, **#9064** for Charcoal Brown, or **#9065** for Pebble Gray. Printer background color is Pearl White.
- Interchangeable Print Belt (available at time of manufacture only): See "Type Catalog" for print belt arrays. When ordering, indicate one specify code for character set and one specify code for character height. When printing eight lines per inch, .079 inch character height is recommended.

Character Set	Specify Code
48-Character EBCDIC	**#9497**
48-Character FORTRAN *	**#9492**
60-Character S/38 Special	**#9509**
64-Character EBCDIC	**#9498**
64-Character ASCII	**#9496**
64-Multinational **	**#9505**
96-Character EBCDIC **	**#9501**
96-Character ASCII **	**#9502**
96-Multinational **	**#9504**
188-Multinational **	**#9503**

* Available only on System/34 with 2.4mm (.095 inch) character height (**#9950**).

Available only with 2.4mm (.095 inch) character height (#9950**).

The 60-character System/38 special belt is a specially designed belt which will enable the user to print the System/38 Control Language characters.

If Spanish N printing capability is desired on the print belt provided with the 5211, order specify code **#2961** plus two additional specify codes selected from the following offerings of character set size and height:

Character Set Size	Specify Code
48	**#2767**
64	**#2768**
96 *	**#2770**

* Available only with 2.4mm (.095 inch) character set height.

Only one "Specify" print belt may be ordered with each 5211.

Character Height	Specify Code
2.0mm (.079 inches) *	**#9951**
2.4mm (.095 inches)	**#9950**

* Recommended for eight lines per inch.

- System Attachment: For System/38 attachment, specify **#9010** (mdl 2 only). For System/34 attachment, specify **#9020**. When changing from System/34 to System/38, **#9020** must be removed and **#9010** must be added.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model changes are field installable.

ACCESSORIES

Additional print belts permit the customer to print more than one character set for various applications. These can be interchangeably used with the belt provided with the machine. See "Type Catalog" for print belt arrays. When ordering, indicate one feature number for character set and one feature number for character height. When printing eight lpi, 2.0mm (.079 inch) character height is recommended. Order by MES. Only one print belt per MES.

Character Set	Feature Number
38-Character	**#5915**
42-Character Numeric	**#5916**
48-Character	**#5911**
48-Character FORTRAN *	**#5552**
48-Character OCR A	**#5919** (mdl 2 only)
48-Character OCR B	**#5920** (mdl 2 only)
60-Character S/38 Special	**#5956**
64-Character EBCDIC	**#5910**
64-Character ASCII	**#5912**
64-Multinational **	**#5925**
96-Character EBCDIC **	**#5917**
96-Character ASCII **	**#5918**
96 Multinational **	**#5924**
188 Multinational **	**#5923**

* Available on System/34 only with 2.4mm (.095 inch) character height (**#5950**).

Available only with 2.4mm (.095 inch) character height (#5950**).

The 60-character System/38 special belt is a specially designed belt which will enable the user to print the System/38 Control Language characters.

Note: Accessory features **#5910**, **#5911**, and **#5912** are the same as System/32 accessory belts **#5910**, **#5911**, and **#5912**, respectively.

For Spanish N printing capability on an additional 5211 print belt, order **#2761** plus two additional feature codes selected from the following offerings of character set size and height:

5211 Printer (cont'd)

Character Set Size	Feature Number
48	**#2867**
64	**#2868**
96 *	**#2870**

* Available only with 2.4mm (.095 inch) character set height (**#5950**

Character Height	Feature Number
2.0mm (.079 inches) *	**#5951**
2.4mm (.095 inches)	**#5950**

* Recommended for eight lines per inch.

SUPPLIES

Ribbons: A black ribbon, P/N 1299115 or equivalent, is required. For OCR applications an OCR ribbon, P/N 1299243 or equivalent, is required. Contact IBM.

5215 SELECTRIC ELEMENT PRINTER

PURPOSE

The Selectric® Element Printer is an impact printer to satisfy many establishments' general text processing needs, especially if their work is keyboard-intensive rather than print-intensive.

Note: The 5215 is not approved for use in an environment requiring TEMPEST Modification features. The use of unmodified components with TEMPEST Modification features will result in increased emanation levels.

MODELS

Model 001

HIGHLIGHTS

- Rated burst speed of up to 15.5 cps.
- Well suited for stand-alone workstation configuration.
- Compatible with many IBM Selectric Typewriter 10- and 12-pitch elements.
- System software provides "Trail Printing" capability allowing playout of one job, while another is being keyed.
- The Selectric Element Printer is a "Reconditioned" product and may not qualify for new investment tax credit. This statement should be included in all proposals.
- Dimensions:
  Width: 686mm (27 inches)
  Depth: 470mm (18.5 inches)
  Height: 191mm (7.5 inches)
  Weight: 25kg (55 pounds)
  Cable length: 4m (13.1 feet)

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Ribbon Mechanism:
  Selective Ribbon Mechanism **#9560**
  Fabric Ribbon Mechanism **#9565**
- Line Spacing Group:
  46-Tooth Line Spacing Group **#9746**
  48-Tooth Line Spacing Group **#9748**
  54-Tooth Line Spacing Group **#9754**
- Acoustic Hood Group: **#9000** for metric, **#9005** for inch.

Bibliography: G544-0851

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

A Prestige Elite Element **(P/N 1167033)** and one Tech III Ribbon are shipped with the 5215 Printer.

5217 PRINTER

PURPOSE

A bidirectional, impact printer providing letter quality printed output for the System/23 and the 5280 Distributed Data System. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style and graphic variations.

MODELS

Model C02 60 cps

Limitations:

1. Character Sets:

   The 5217 Printer may utilize any one of a variety of 96-character type wheels on any particular printing operation. However, because a 5322 or 5324 computer and the 5280 Distributed Data System can display significantly more than 96 different characters, it is possible that all characters being displayed cannot be printed with the type wheel mounted on the printer.

   It is the customer's responsibility to match the type wheel selected to the printing requirements.

   For available character set details, refer to *Using Your 5217 Printer* (SA34-1593) for System/23, or *IBM 5280-5217 Printer Setup and Operator's Guide* (GA23-1016) for the 5280.

2. Continuous Forms:

   Pin-fed continuous forms can be used. (See Special Features for Continuous Forms Feed device).

   Both edges of the pin-fed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable print wheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

   Paper Specifications

   Maximum carbons is five

   Maximum paper width is 392mm (15.4 in.)

   Maximum pin-to-pin width on forms tractor is 368mm (14.5 in.)

   Maximum print-line width is 335mm (13.2 in.)

3. Single sheet feed is by hand insertion, unless the optional Cut Sheet Feed Device (#7860) is used. Multi-page printing with single sheet feeding requires operator intervention or special application programming support to avoid paperless printing. For further details, see *Using Your 5217 Printer* (SA34-1593) for System/23, or the appropriate 5280 language reference manual.

4. Cut Sheet Feed Device Paper Recommendations:

   Suitable Paper

   All of the papers placed in the IBM Cut Sheet Feed Device Handler should be new, unused and without packaging damage. To ensure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the IBM Cut Sheet Feed Device.

   Type and Composition: Plain bond paper of one of the following compositions.

   - No. 1 sulfite (100% chemical wood pulp).
   - 25% cotton content.
   - 50% cotton content.
   - 100% cotton content.
   - Paper made from recycled office paper.

   Size: The following paper sizes can be fed either lengthwise or sidewise unless otherwise noted.

   - 178mm x 267mm * (7.0 in. x 10.5 in.)
   - 185mm x 267mm * (7.25 in. x 10.5 in.)
   - 191mm x 267mm * (7.5 in. x 10.5 in.)
   - 203mm x 267mm (8.0 in. x 10.5 in.)
   - 203mm x 330mm * (8.0 in. x 13.0 in.)
   - 216mm x 279mm (8.5 in. x 11.0 in.)
   - 216mm x 330mm * (8.5 in. x 13.0 in.)
   - 216mm x 356mm * (8.5 in. x 14.0 in.)

   * Feed lengthwise only.

   Basic weights:

   - 60g/sq.m to 90g/sq.m (16 lb to 24 lb)
   - Optimum: 75g/sq.m to 90g/sq.m (20-24 lb bond) 25% or 50% cotton content.

   Unsuitable Paper for the cut sheet feeder

   Following is a list of paper supplies that may be found in an office that will *not* feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive).

   - Coated paper.
   - Vellum paper.
   - Coated erasable bond paper.
   - Synthetic papers (rice paper, parchment, etc.).
   - Translucent paper.
   - Multi-sheet forms and documents (bound or unbound).
   - Peel-off, pressure sensitive labels.
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper).
   - Preprinted forms requiring a high degree of character placement accuracy.
   - Dark colored paper.
   - Envelopes.
   - Card stock.
   - Folded or creased documents.
   - Paper with exposed gummed surfaces, holes, perforations, cutouts, or windows.
   - Highly embossed paper (embossment height exceeding 0.508mm (0.02 in.).

     Note: Embossments should not be located within 15mm (0.59 in.) of any edge of the sheet.
   - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Device or printer components
   - A mix of different sizes and types of paper in a paper tray.
   - Paper in unsatisfactory conditions:
     - Paper with excessive curl or waviness (exceeding 3mm (0.118 in.).
     - Reams of paper with edges or corners folded or bonded together (Fluffing may correct this condition).
     - Paper with poorly cut (rough) edges.

     Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

Prerequisites:

For System/23, each 5322 or 5324 Computer which will utilize the 5217 Printer must have the Second Printer Attachment (#6350) installed. However, when this feature is installed, the 5217 may be attached to either printer attachment.

For 5280, the 5285 Programmable Data Station must have Start/Stop Printer Attachment (#1152) installed. The 5288 Programmable Control Unit must have Multiple Start/Stop-Twinaxial Printer Attachment (#1162) installed. If #1152 or #1162 was shipped before April 1, 1983, the 5285 or 5288 also requires EC #467318.

HIGHLIGHTS

- Rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, or 15 pitch, according to the print wheel selected. Proportional spacing may be accomplished via customer application programming on the System/23 and the 5280.
- For the System/23, vertical spacing is program selectable in increments of 1/96 inch (0.0104 inch). For a single program command, the vertical movement is 4 increments minimum and 24 maximum. This permits line spacing from 4 lines/inch to 24 lines/inch.

  The printer will default to 6 lines/inch if the user does not program select a vertical line spacing.

  The lines per page parameter is also program-selectable.
- Single speed carriage with skipping at up to 6 inches per second.
- Single sheet feeding by hand, or the optional Cut Sheet Feed Device.
- Multiple 96-character print wheel options available by type style and language graphic variations.

5217 Printer (cont'd)

- Ribbon Saver: Provides two modes of ribbon feed via a switch on the printer to allow two levels of print quality. Quality Mode provides approximately one million character yield; Save Mode provides approximately three million character yield.
- Forms tractor for feeding continuous forms is an optional feature that is advantageous for multi-page printing applications and is required for successful printing operations encountered in the system support programs and some application programs.

Customer Setup (CSU) and Responsibilities: The 5217 is designated a customer setup machine. The marketing representative must advise the customer of his/her responsibilities before receipt of the machine. For System/23, *Customer Setup Instructions* (SA34-0197) is shipped with the machine. For the 5280, *IBM 5280-5217 Printer Setup and Operator's Guide* (GA23-1016) is shipped with the machine.

CSU allowance is one day (two days when installed concurrently with a 5280).

Physical Planning Information:

Unit	Height	Width	Depth	Weight	Max KVA	BTU /HR
5217 Prtr	200mm 8 in	660mm 26 in	583mm 23 in	26.5 kg 58.4 lb	.50	900
Cut Sheet Feed #7860	284mm 11 in	540mm 21 in	490mm 19 in	11.4 kg 25.0 lb	NA	NA
Continuous Forms Tractor #7850	130mm 5 in	525mm 21 in	498mm 20 in	4.0 kg 8.8 lb	NA	NA

AAS Ordering Instructions: The 5217 is a system component.

SPECIFY

- Voltage (115 V AC, 1-phase, 60 Hz): No specify for a standard non-locking plug (uses customer standard type receptacle). Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if the 1.8 meter cord is required, specify **#9986**.
- Color: Pearl White only (no specify required).
- Language: English (no specify required).
- One Print Wheel Type Style: One ASCII Courier 10 (P/N **1439652**) print wheel is provided with the machine. Additional print wheels may be ordered as supplies by part number.

- 5280 Cable: Specify **#9050** for special attachment cable for use with the 5280.

SPECIAL FEATURES

Printer Switch and Cable Assembly (#5600): Provides a 2-position manually operated switch and cables which permit the connection of any 5217 Printer between any two 5322 or 5324 Computers on an either-or-basis. The Printer Switch Box has two cables, 6 meters (19.8 feet) in length that attach to the computers. The box is marked 1 and 2 and the switch is accessible at the recessed top. The box is 76.2mm x 101.6mm x 38.1mm (3 in. x 4 in. x 1-1/2 in.). For shipment to the field, order by feature number. **Limitations:** Cannot be installed on a 5217 which is attached to a 5280. **Field Installation:** Yes. **CSU:** Yes.

Continuous Forms Feed Device (#7850): Provides a variable-width tractor for feeding continous forms. This feature is required for successful multi-page printing operations encountered in the system support programs and some application programs. See "Limitations" for Forms Requirements. **Field Installation:** Yes. **CSU:** Yes.

Cut Sheet Feed Device (#7860): Provides for feeding cut sheets of paper from two source trays under System Control. Consists of paper transport and output tray. Paper is stacked face down. See "Limitations" for Paper Specifications. **Field Installation:** Yes. **CSU:** Yes.

MODEL CONVERSIONS: None

ACCESSORIES

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1495352): Provides paper support and a movable guide for manual cut sheet insertion when no sheet or tractor feed is installed.

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Cut Sheet Feed Device (#7860). Eliminates paper removal/installation from trays when customer uses a wide variety of papers.

Contact IBM for accessory ordering details.

SUPPLIES

Ribbons: The IBM 463 ribbon (P/N **1299463**) or equivalent. None required with machine order. Contact IBM for details.

Print Wheels: None required with machine order. Additional print wheels are available in a variety of print styles (see TC 5210 pages in "Type Catalog") and character sets and are interchangeable with the print wheel supplied with the machine. See IBM for details. When ordering, consideration should be given to ordering a second identical wheel for backup. Replacement and installation of the print wheel is the customer's responsibility.

5218 PRINTWHEEL PRINTER

PURPOSE

A bidirectional, impact printer providing letter quality printed output for the 6580 Displaywriter System. Printwheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style variations. With the proper hardware and software, each printer can also be used in a clustered system, supporting up to three workstations.

MODELS

Model	A01	40 cps	
Model	A02	60 cps	
Model	A03	40 cps	Includes support for Front Exit Sheet and Envelope devices.
Model	A04	60 cps	Includes support for Front Exit Sheet and Envelope devices.

Prerequisite: In order for 2 or 3 workstations to share a printer, the primary workstation must have the Printer Sharing Prerequisite installed, and each workstation must have Textpack 2, 4, or 6 with the respective memory requirement.

Note: The 5218 will require an enclosure for use in an environment requiring Modification Features. See "Accessories" below.

The Automatic Paper Handling Prerequisite feature (#1200) is standard on 5218 machines shipped from the plant on or after June 9, 1983.

Physical Planning Information:

Unit	Height	Width	Depth	Weight	Max KVA	BTU /HR
5218 Printer	200mm 8 in.	660mm 26 in.	583mm 23 in.	26.5kg 58.4 lb.	0.50	900
With Sheet Feed Paper Handler	484mm 19 in.	660mm 26 in.	725mm 29 in.	11.4kg 25.0 lb.	NA	NA
With Front Exit Sheet Feed	522mm 20.7 in.	660mm 26 in.	902mm 35.5 in.	38.6kg 85.4 lb.	NA	NA
With Front Exit Sheet and Envelop Feed	522mm 20.7 in.	660mm 26 in.	902mm 35.5 in.	40.6kg 88.4 lb.	NA	NA
With Tractor Feed	330mm 13 in.	660mm 26 in.	735mm 29 in.	4.0kg 8.8 lb.	NA	NA

HIGHLIGHTS

- Rated burst print speed of up to 40 cps (mdl A01) or 60 cps (mdl A02) (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, or 15 pitch, and proportional spacing according to the printwheel selected.
- Vertical spacing is program selectable in increments of 0.26mm (1/96 in. (0.0104 in.)). For a single program command, the vertical movement is 4 increments minimum and 24 maximum. This permits line spacing from 4 lines/inch to 24 lines/inch.

  The printer will default to 6 lines/inch if the user does not program select a vertical line spacing.

  The lines per page parameter is also program selectable, the default being 66 lines per page.
- Single speed carriage with skipping at up to 6 inches per second.
- Single sheet feeding by hand, or the optional Sheet Feed Paper Handler.
- Automatic Envelope Feeding by the optional Front Exit Sheet and Envelope Feed Attachment.
- Ribbon switch allowing one million or three million character yield selection. (Mdls A03, A04.)
- Forms tractor for feeding continuous forms is an optional feature.
- Multiple 96-character printwheel options available by type style and language graphic variations. (See "Supplies" below.)

Customer Setup (CSU) and Responsibilities: The 5218 is designated a customer setup machine. The marketing representative must advise the customer of his/her responsibilities before receipt of the machine. *Customer Setup Instructions* are shipped with the machine.

CSU allowance is *one* day.

Limitations:

1. Character Sets:

   The 5218 Printer may utilize any one of a variety of 96-character type wheels on any particular printing operation.

   It is the customer's responsibility to match the type wheel selected to the printing requirements.

2. Continuous Forms:

   Pinfed continuous forms can be used. (See "Special Features" for Tractor Feed device.)

   Both edges of the pinfed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable printwheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

   Paper Specifications:

   Maximum carbons is five Maximum paper width is 392mm (15.4 in.) Maximum pin-to-pin width on forms tractor is 368mm (14.5 in.) Maximum print-line width is 335mm (13.2 in.)

3. Single sheet feed is by hand insertion, unless the optional Sheet Feed Paper Handler **(#7860)**, or Front Exit Sheet Feed **(#7870)**, or Front Exit Sheet and Envelope Feed **(#7875)** is used. Multi-page printing with single sheet feeding requires operator intervention.

4. Paper Recommendations:

   Suitable Paper

   All of the papers placed in the Sheet Feed Paper and Front Exit Sheet and Envelope Feed should be new, unused and without packaging damage. To ensure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the Sheet Feed Paper and Front Exit Sheet and Envelope Feed.

   Type and Composition: Plain bond paper of one of the following compositions.

   - No. 1 sulfite (100% chemical wood pulp).
   - 25% cotton content.
   - 50% cotton content.
   - 100% cotton content.
   - Paper made from recycled office paper.

   Size: The following paper sizes can be fed either lengthwise or sidewise unless otherwise noted.

   - 178mm x 267mm * (7.0 in. x 10.5 in.)
   - 185mm x 267mm * (7.25 in. x 10.5 in.)
   - 191mm x 267mm * (7.5 in. x 10.5 in.)
   - 203mm x 267mm (8.0 in. x 10.5 in.)
   - 203mm x 330mm * (8.0 in. x 13.0 in.)
   - 216mm x 279mm (8.5 in. x 11.0 in.)
   - 216mm x 330mm * (8.5 in. x 13.0 in.)
   - 216mm x 356mm * (8.5 in. x 14.0 in.)

     * Feed lengthwise only.

   Basic weights:

   - 60g/sq.m to 90g/sq.m (16 lb. to 24 lb.)
   - Optimum: 75g/sq.m to 90g/sq.m (20-24 lb. bond) 25% or 50% cotton content.

   Unsuitable Paper for the cut sheet feeders

   Following is a list of paper supplies that may be found in an office that will *not* feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive.)

   - Coated paper.
   - Vellum paper.
   - Coated erasable bond paper.
   - Synthetic papers (rice paper, parchment, etc.).
   - Translucent paper.
   - Multi-sheet forms and documents (bound or unbound).
   - Peel-off, pressure-sensitive labels.
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper).
   - Preprinted forms requiring a high degree of character placement accuracy.
   - Dark colored paper.
   - Envelopes.
   - Card stock.
   - Folded or creased documents.

5218 Printwheel Printer (cont'd)

- Paper with exposed gummed surfaces, holes, perforations, cutouts, or windows.
- Highly embossed paper (embossment height exceeding 0.508mm (0.02 in.).

  Note: Embossments should not be located within 15mm (0.59 in.) of any edge of the sheet.
- Preprinted papers containing chemicals or substances that leave a residue on the Sheet Feed Paper Handler or printer components.
- A mix of different sizes and types of paper in a paper tray.
- Paper in unsatisfactory conditions:
  - Paper with excessive curl or waviness (exceeding 3mm (0.118 in.).
  - Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition).
  - Paper with poorly cut (rough) edges.

  Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

5. Envelope Recommendations:

Suitable Envelopes

Envelope feeding characteristics vary with the type, sizes, and weight of envelopes used. All of the envelopes placed in the Front Exit Sheet and Envelope Feed should be new, unused and without packaging damage. The envelopes defined in this section are the only ones considered acceptable for use in the Front Exit Sheet and Envelope Feed.

Type and Composition: US plain bond envelopes of one of the following compositions.

- No. 1 sulfite (100% chemical wood pulp).
- 25% cotton content.
- 50% cotton content.
- 100% cotton content.
- Paper made from recycled office paper.
- White envelopes.

World Trade Envelopes:

- Well sized boxed paper with non-coated surface.

Size: The following US standard envelopes sizes can be fed:

- No. 7-3/4 98.4mm x 190.5mm (3.875 x 7.5 in.)
- No. 9 98.4mm x 225.4mm (3.875 x 8.875 in.)
- No. 10 114.8mm x 241.3mm (4.5 x 9.5 in.)

The size of World Trade envelopes which can be fed range from 98.4mm to 114.8mm (3.875 in. to 4.5 in.) in width and 190.5mm to 241.3mm (7.5 in. to 9.5 in) in length.

Basic weights:

- Optimum: 70g/sq.m (20 lb.) sulfite or 25% cotton content plain bond envelopes.

Unsuitable Envelopes:

Following is a list of envelopes supplies that may be found in an office that will not feed reliably and may cause misfeeds and envelopes jams. (This list is not intended to be all-inclusive.)

- Window envelopes.
- Envelopes with holes, perforations, cut out or deep embossing.
- Envelopes with side flaps, i.e., flaps that fold along the the short dimension of the envelope.
- Envelopes with flaps that extend more than 60mm (2.36 in.) beyond the line of the fold.
- Envelopes that are stuck together.
- Envelopes that will not stack flat.
- Envelopes that are damaged or bent so that they are interlocked.

AAS **Ordering Instructions**: The 5218 is a system component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard non-locking plug (uses customer standard type receptacle). Standard power cord is 3m (9.8 ft.), no specify required. Some locations restrict power cord length to 1.8m (6 ft.), if the 1.8m cord is required, specify **#9986**.
- **Cable Lengths (required cable for 5218 to Workstation)**: Cables in lengths of 3, 6, 30, and 60 meters (9.9, 19.7, 98.4 and 196.8 ft.) can be ordered to cable connect the 5218 to a workstation. One cable is required for either a stand-alone or printer-sharing configuration. 3m (9.9 ft.) cable **(#2030)**, 6m (19.7 ft.) cable **(#2000)**, 30m (98.4 ft.) cable **(#2010)**, 60m (196.8 ft.) cable **(#2020)**. The 6m (19.7 ft.) cable is standard unless otherwise specified. If *no* cable is desired, use **#3999**.
- Color: Pearl White only (no specify required).
- Language: English (no specify required).
- Printwheel Type Style: One standard printwheel is shipped with the machine except as outlined below:
  Prestige Elite 12, no specify required

  Additional printwheels may be ordered as supplies by part number. See "Supplies" below.

SPECIAL FEATURES

Tractor Feed Device (#7850): Provides a variable-width tractor for feeding continuous forms. This feature is advantageous for successful multi-page forms printing operations. See "Limitations" for Forms Requirements. **Field Installation**: Yes. **CSU**: Yes.

Sheet Feed Paper Handler (#7860): Provides for feeding cut sheets of paper from two source trays. Consists of paper transport and output tray. Paper is stacked face down. See "Limitations" for Paper Specifications. **Field Installation**: Yes. **CSU**: Yes.

Front Exit Sheet Feed (#7870): Provides for feeding cut sheets of paper from two source trays under system control. Consists of paper transport and output tray. Paper is stacked face down. **Field Installation**: Yes. **CSU**: Yes. See "Limitations" for paper specifications. Must have cable adapter for use with mdls A01 and A02. Cable adapter is shipped with printer or with Front Exit Sheet Feed if ordered for field installation.

Front Exit Sheet And Envelope Feed (#7875): Provides for feeding cut sheets of paper from two paper source trays and envelopes from separate source tray under system control. Consists of paper transport and separate output trays for sheets and envelopes. Paper is stacked face down. **Field Installation**: Yes. **CSU**: Yes, mdls A03 and A04 only. **Prerequisites**: Level G update of Textpack 4 or Textpack 6.

Field Conversion to add Envelope Feed capability to Front Exit Sheet Feed (#7876): [Mdls A03, A04] **Field Installation**: Only. **Prerequisites**: Must have #7870 installed and Level G update of Textpack 4 or Textpack 6.

Field Conversion to add Envelope Feed capability to Front Exit Sheet Feed (#7877): [Mdls A01, A02] **Field Installation**: Only. **Prerequisites**: Must have #7870 installed and Level G update of Textpack 4 or Textpack 6.

Front Exit Sheet And Envelope Feed (#7878): [Mdls A01, A02] Provides for feeding cut sheets of paper from two paper source trays and envelopes from separate source tray under system control. Consists of paper transport and separate output trays for sheets and envelopes. Paper is stacked face down. **Field Installation**: Only. **CSU**: No. **Prerequisites**: Must have cable adapter which is shipped with this feature and Level G update of Textpack 4 or Textpack 6.

MODEL CONVERSIONS

40 cps to 60 cps (A01 to A02). A03 to A04 not offered.

ACCESSORIES

Cable Adapter (P/N 4749559): Provides capability to connect Sheet Feed Paper Handler (#7860) to the 5218 mdls A03 and A04.

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Sheet Feed Paper Handler (#7860) or Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875). Eliminates paper removal/installation from trays when customer uses a wide variety of papers.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1495352): Provides paper support and a movable guide to assist manual cut sheet insertion where no sheet or tractor feed is installed. Contact IBM for accessories ordering details.

5218 Printwheel Printer (cont'd)

5218 Printer Tempest Enclosure (P/N 4782695): Designed to help protect information being printed by a Tempest-modified Displaywriter with the 5218 mdl A02 printer with serial numbers between 26-31628 and 26-62013, with or without an optional Sheet-Feed Paper Handler (#7860). It is a floor-standing steel module. The Enclosure is approximately 1.72m (50 inches) high, 86.4cm (34 inches) wide, 99.1cm (39 inches) deep. It weighs approximately 272kg (600 lbs.) and is equipped with casters to assist in moving. A front-mounted door provides access for printer service. Data security requires that the Enclosure door be completely closed during printer operation. Door closing is the customer's responsibility. A data signal cable and power cable are included for internal attachment of the printer to the Enclosure. A 6-meter printer cable is provided for external connection of the Enclosure to the Displaywriter System. Electrical support is limited to printwheel printers with 110V, 60 Hz power supply. The Enclosure is not designed to accommodate the Tractor Feed Paper Handler or the 5228 Wide-Carriage Printwheel Printer. **Warranty:** These Enclosures are available only on a purchase basis. Installation, check-out, and and maintenance will not be provided by IBM and expenses involved will be paid by the customer. For 90 days commencing on the date of installation or 120 days after shipment, whichever comes first, the Enclosure is warranted free from defect in materials and workmanship. IBM's obligation is limited to providing replacement parts on an exchange basis. Service information including aids, diagnostics, and part numbers are included with the Enclosure. **Limitations:** The Enclosure is approved for operation only with 5218 mdl A02 printers with serial numbers between 26-31628 and 26-62013. **Ordering Instructions:** Contact IBM. **Delivery Instructions:** The Enclosure is shipped via padded van F.O.B. at the vendor (shipping charges collect) to the delivery point designated by the customer. Shipment can not be designated to an APO or FPO. Damage claims against the carrier are the customer's responsibility.

SUPPLIES

Ribbons: The IBM 463 ribbon (P/N 1299463) or equivalent. None required with machine order. Contact IBM.

Printwheels: None required with machine order. Additional printwheels are available in a variety of print styles, and character sets see "Type Catalog" - 5210, and are interchangeable with the printwheel supplied with the machine. When ordering, consideration should be given to ordering a second identical wheel for backup. Replacement and installation of the printwheel is the customer's responsibility. Contact IBM for ordering instructions.

5219 PRINTER

PURPOSE

A bidirectional impact printer providing letter quality output for the 5520 Administrative System, Series/1, System/34, System/36, System/38, and 5251 models 2 or 12 Information Display Station. Print wheels in 10 pitch, 12 pitch, 15 pitch, or proportional spacing are available to provide a selection of type style and graphic variations.

MODELS

Model B01	40 cps	Attaches to the 5520 Administrative System
Model B02	60 cps	Attaches to the 5520 Administrative System
Model D01	40 cps	Attaches to the Series/1, System/34, System/36, System/38, and the 5251 models 2 or 12 Information Display Station
Model D02	60 cps	Attaches to the Series/1, System/34, System/36, System/38, and the 5251 models 2 or 12 Information Display Station

Limitations:

- Continuous forms:

  Pin-fed continuous forms can be used. (See "Special Features" for forms stand and Continuous Forms Feed Device.) Both edges of the pin-fed forms must be fastened in the forms tractors. No staples are permitted in the areas exposed to the interchangeable print wheel.

- Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

- Single sheet feed is by hand insertion, unless the optional Cut Sheet Feed Attachment (#7860) or Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875) is used. Mdls B01 and B02 require attachment via the Auto Paper Handling Prerequisite (#1200).

- There is a limit on the number of permissible cable "junctions" on the twinaxial cable used to attach multiple 5219 and 5258 Printers to the 5525 System Unit. See the *5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for details. The manual also describes the limits on total number of printers attachable to the 5525, and multidrop limits on a single line. For 5219 mdls D01 or D02, see *IBM 5250 Information Display Systems Planning and Site Preparation Guide* (GA21-9337), and *Series/1 Customer Site Preparation Manual* (GA34-0050).

- Paper specifications:

  Maximum paper width 392mm (15.4 inches)
  Maximum pin-to-pin width on forms tractor 368mm (14.5 inches)
  Maximum print-line width 335mm (13.2 inches)
  Maximum print-line depth 533mm (21 inches)

- Cut Sheet Feed, and Front Exit Sheet and Envelope Feed Attachment paper recommendations:

  Suitable paper:

  All of the papers placed in the Cut Sheet Feed, and Front Exit Sheet and Envelope Feed Attachments should be new, unused, and without packaging damage. To ensure feed reliability, all papers should be riffled or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the sheet feed attachments.

  Type and composition: Plain bond paper of one of the following compositions:

  - No. 1 sulfite (100% chemical wood pulp)
  - 25% cotton content
  - 50% cotton content
  - 100% cotton content
  - Paper made from recycled office paper

  Size: The following paper sizes can be fed only lengthwise unless otherwise noted:

  - 178mm x 267mm (7.0 inches x 10.5 inches)
  - 185mm x 267mm (7.25 inches x 10.5 inches)
  - 191mm x 267mm (7.5 inches x 10.5 inches)
  - 203mm x 267mm (8.0 inches x 10.5 inches) *
  - 203mm x 330mm (8.0 inches x 13.0 inches)
  - 216mm x 279mm (8.5 inches x 11.0 inches) *
  - 216mm x 330mm (8.5 inches x 13.0 inches)
  - 216mm x 356mm (8.5 inches x 14.0 inches)

  * Can be fed lengthwise or sidewise.

  Basis weights:

  - 60g/sq.m to 90g/sq.m (16 pound to 24 pound)
  - Optimum: 75g/sq.m to 90g/sq.m (20-24 pound bond) 25% or 50% cotton content

  Unsuitable paper:

  Following is a list of paper supplies that may be found in an office that will *not* feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive.)

  - Coated paper
  - Vellum paper
  - Coated erasable bond paper
  - Synthetic papers (rice paper, parchment, etc.)
  - Translucent paper
  - Multi-sheet forms and documents (bound or unbound)
  - Peel-off, pressure-sensitive labels
  - Some types of chemically treated papers (such as paper used to make copies without carbon paper)
  - Preprinted forms requiring a high degree of character placement accuracy
  - Dark colored paper
  - Envelopes
  - Card stock
  - Folded or creased documents
  - Paper with exposed gummed surfaces, holes, perforations, cutouts, or windows
  - Highly embossed paper - embossment height exceeding 0.508mm (0.02 inches). **Note:** Embossments should not be located within 15mm (0.59 inches) of any edge of the sheet.
  - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Attachment or printer components
  - A mix of different sizes and types of paper in a paper tray
  - Paper in unsatisfactory condition: Paper with excessive curl or waviness, exceeding 3mm (0.118 inches); reams of paper with edges or corners folded or bonded together (fluffing may correct this condition); and paper with poorly cut (rough) edges. **Note:** Paper should not be exposed to adverse temperature or humidity conditions. (Consult the paper manufacturer for recommended storage environment.)

- Character Sets:

  The 5219 Printer may utilize any one of a variety of 96-character type wheels on any particular printing operation. It is possible that some characters which appear on a display or display keyboard cannot be printed with the type wheel mounted on the printer. For example, special characters may differ between word processing printwheels and data processing printwheels, or the same character may appear in different printwheel positions. It is the customer's responsibility to match the type wheel selected to the printing requirements.

- Envelope Recommendations:

  Suitable Envelopes:

  Envelope feeding characteristics vary with the type, size, and weight of envelopes used. All of the envelopes placed in the Front Exit Sheet and Envelope Feed should be new, unused and without packaging damage. The envelopes defined in this section are the only ones considered acceptable for use in the Front Exit Sheet and Envelope Feed.

  Type and Composition: Plain bond envelopes of one of the following compositions:

  - No. 1 sulfite (100% chemical wood pulp)
  - 25% cotton content
  - 50% cotton content
  - 100% cotton content
  - Paper made from recycled office paper
  - White wove envelopes

  Size: The following standard envelope sizes can be fed:

- No. 7-3/4	98.4 X 190.5mm (3.875 X 7.5 inches)
- No. 9	98.4 X 225.4mm (3.875 X 8.875 inches)
- No. 10	114.8 X 241.3mm (4.5 X 9.5 inches)

  Basis Weight:

  - Optimum: 75g/sq.m (20 pound) sulfite or 25% cotton content plain bond envelopes.

  Unsuitable Envelopes:

  Following is a list of envelope supplies that may be found in an office that will not feed reliably and may cause misfeed and and envelope jams. This list is not intended to be all inclusive.

  - Window envelopes
  - Envelopes with holes, perforations, cutouts or deep embossing
  - Envelopes with side flaps, i.e., flaps that fold along the short dimension of the envelope

5219 Printer (cont'd)

- Envelopes with flaps that extend more than 60mm (2.36 inches) beyond the line of the fold

Unsuitable Envelope Conditions:

- Envelopes that are stuck together
- Envelopes that will not stack flat
- Envelopes that are damaged or bent such that they are interlocked.

Prerequisites: In the 5525 System Unit, Local Device Control (#4710, #4711, #4712); LDC Attachment (#4715); and either #1105, #1700, #1701, #1702, or #1704. See M5525 pages for details. In the Series/1 system, #5640 and an available position in a 4952, 4954, 4955, or 4956 Processor, the 4959 Input/Output Expansion Unit or the 4965 Diskette Drive and Input/Output Expansion Unit.

Customer Setup (CSU): The 5219 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. The marketing representative must advise the customers of their responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

- Mdls B01 and D01 have a rated burst print speed of up to 40 cps (assumes 96-character set with 10 pitch). Mdls B02 and D02 have a rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, 15 pitch (maximum 172-character line), or proportional spacing, according to the print wheel selected. System/34 and System/36 SSP support 10 pitch character spacing only. System/38 CPF supports 10, 12, and 15 pitch character spacing. The System/38 CPF does not support proportional spacing.
- Vertical spacing of 5-1/3, 6, or 8 lines per inch. System/34 SSP and System/36 SSP support six lines per inch only. System/38 CPF supports six or eight lines per inch only.
- Half-line spacing for superscripts and subscripts to a single level. System/34 and System/36 SSP and System/38 CPF do not support these functions.
- First line registration, form skipping, and spacing chosen by the user and then controlled by the licensed program.
- Single speed carriage with skipping at up to six inches per second.
- Noise level consistent with an office environment.
- Ribbon saver facility permits two modes of ribbon feed, to extend ribbon life where appropriate.
- Single sheet feeding by hand, or the optional Cut Sheet Feed or Front Exit Sheet Feed or Front Exit Sheet and Envelope Feed Attachments. Mdls B01 and B02 require Auto Paper Handling Prerequisite (#1200).
- Forms tractor for feeding continuous forms is optional. Mdls B01 and B02 require Auto Paper Handling Prerequisite (#1200).
- Multiple 96-character print wheel options available by type style and language graphic variations. See the "Supplies" section.
- Optional Paper Stacker Tray.
- Standard Cable-Thru capability to allow multiple printers on a single twinaxial cable at up to a cumulative total of 1,524 cable-meters (5,000 cable-feet) radially from the system unit or workstation.
- Customer Setup for early availability and relocation flexibility.

Problem Determination Procedures: Problem determination (and recovery) procedures are provided by IBM with the 5219 Printer. When attached to the 5525 System Unit using Licensed Program 5611-SS1, these procedures will be described in the HELPs and Messages facilities in the licensed program and in *IBM 5219 Printer Operators Guide* (GA23-1009) and *IBM 5520 Administrative System Messages and Recovery Aids* (SC23-0733 or SC23-0749).

These procedures are designed to be easy to follow and use by the customer, and it is the customer's responsibility to follow them prior to calling for IBM service.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking, and placement of the 5219.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5219.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5219, if required, to allow IBM service access.
- Installation and maintenance of signal cables and associated cable adapters for attaching the 5219 to the system unit or workstation.
- When adding or moving 5219 or 5258 Printers on the 5520 Administrative System, the customer may have to modify the system configuration specifications. See the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Publications: *IBM 5520 Administrative System Introduction* (GC23-0702), *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011), *IBM System/34 Introduction* (GC21-5153), *IBM System/34 Installation Manual - Physical Planning* (GA21-9242), *IBM System/34 Planning Guide* (GC21-5154), *IBM System/34 Installation and Modification Reference Manual* (SG21-7689), *IBM System/36 Setting Up Your Computer* (SA21-9430), *IBM System/36 Planning for System Configuration* (SA21-9440), *IBM System/36 - Preparing a Place for Your Computer* (SA21-9444), *Planning for System Configuration* (SA21-9440), *Changing Your System Configuration* (SA21-9052), *IBM System/38 Introduction* (GC21-7728), *IBM 5250 Information Display System Introduction* (GA21-9246), and *IBM Information Display System Planning and Site Preparation Guide* (GA21-9337). *Series/1 Printer Attachment - 5200 Series/1 Description* (GA34-0242), *Series/1 Customer Site Preparation Manual* (GA34-0050), *Series/1 Pocket Digest* (GX34-0104), *Series/1 Digest* (GA60-0061), and *IBM 5219 Printer Model D01 and D02 Programmer's Reference Guide* (GA23-1025).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard nonlocking plug (uses customer standard type receptacle). Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if the 1.8 meter cord is required, specify **#9986**.
- Color: Pearl White only (no specify required).
- Language: English (no specify required).
- Print Wheels: [Mdls B01, B02] One standard print wheel is shipped with the machine.

  Prestige Elite 12, no specify required.

  Additional print wheels may be ordered as supplies by part number. See "Supplies" below.
- Print Wheels: [Mdls D01, D02] One Courier 10 print wheel will be shipped with each unit. The printer will be preset at the manufacturing plant for the selected character set (field changes must be made by a CE). Additional print wheels may be ordered by P/N ... see "Supplies". Specify either ASCII (**#2950**) or EBCDIC (**#2956**).
- Cables: Customer-supplied (mdls B01, B02); see "Accessories" and the *IBM 5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for ordering information. Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another supplier. For mdls D01 and D02, see *IBM Information Display System Planning and Site Preparation Guide* (GA21-9337) for ordering information and *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). A 6 meter (20 foot) twinaxial cable (#5780) is available for Series/1 attachment.
- Data Rate: [Mdls B01, B02] The data transfer rate is determined by the Local Device Control feature and the 5525 System Unit mdl. Specify **#9300** for printers attaching through feature #4710 on the 5525 on mdl 020 or 021; **#9305** for printers attaching through feature #4710 on the 5525 mdl 030, 031, or 032; **#9315** for printers attaching through feature #4711 or #4712 on any mdl 5525.
- Printers: [Mdls D01, D02] **#9561** for printers attached to System/34, **#9563** for printers attached to System/38, **#9565** for printers attached to System/36.

SPECIAL FEATURES

Auto Paper Handling Prerequisite (#1200): [Required for mdl B01 and B02 only shipments starting December 1, 1983] Provides paper path sensors and electrical connector for Continuous Forms Feed Device (#7850) or Cut Sheet Feed Attachment (#7860) or Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875). **Field Installation:** Yes.

Continuous Forms Feed Device (#7850): Provides a variable-width tractor for feeding continuous forms. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** Mdls B01 and B02 must have #1200 installed.

Cut Sheet Feed Attachment (#7860): Provides cut sheet paper from two source trays under system control, paper transport, and output tray. **Note:** The System/34 SSP and the System/38 CPF support one source tray only. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** Mdls B01 and B02 must have #1200 installed.

5219 Printer (cont'd)

Front Exit Sheet Feed (#7870): Provides cut sheet paper from two source trays under system control, paper transport, and output tray. **Note:** The System/34 SSP, The System/36 SSP and the System/38 CPF support one source tray only. The System/36 Text Management System (TMS/36) licensed program supports paper selection from both drawers. **Field Installation:** Yes. **Customer Setup:** Yes. **Prerequisites:** Must have cable adapter for use with mdls B01, B02, D01, and D02. Cable adapter shipped with printers or with Front Exit Sheet Feed if ordered for field installation.

Front Exit Sheet and Envelope Feed (#7875): Provides cut sheet paper from two source trays and envelopes from a separate source tray under system control, paper transport, and separate output tray for cut sheets and envelopes. **Note:** The System/34 SSP and the System/36 SSP support one source tray only. The System/36 Text Management System (TMS/36) licensed program supports paper selection from both drawers and envelope hopper. Envelope feed support is not currently available for System/38. **Field Installation:** Yes. **Customer Setup:** Yes for mdls D02 and D02; yes for mdls B01 and B02 above serial number 07399. **Prerequisites:** Must have cable adapter for use with mdls B01, B02, D01, and D02. Cable adapter shipped with printers or with Front Exit Sheet and Envelope Feed attachment if ordered for field installation.

Field Conversion to Add Envelope Feed Capability to the Front Exit Sheet Feed (#7876): Field Installation: Yes. No plant installation. **Prerequisites:** Mdls B01, B02, D01, and D02 must have #7870 installed. Mdls B01 and B02 must be above serial number 07399.

Field Conversion to Add Envelope Feed Capability to the Front Exit Sheet Feed (#7877): Field Installation: Yes. No plant installation. **Prerequisites:** Mdls B01, B02, only; must have #7870 installed and serial number must be below 07400.

Front Exit Sheet and Envelope Feed (#7878): Provides cut sheet paper from two source trays and envelopes from a separate source tray under system control, paper transport, and separate output tray for cut sheets and envelopes. **Field Installation:** Yes, for mdls B01 and B02 only below serial number 07400. **Prerequisites:** Must have cable adapter which is shipped with this feature.

MODEL CONVERSIONS

Model conversions between B01 and B02 and between D01 and D02 are permitted and field installable. Model conversions between Bs and Ds are not possible.

ACCESSORIES

(Available on Purchase-Only Basis)

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1495352): Provides paper support and a movable guide for manual cut sheet insertion where no sheet or tractor feed is installed.

Paper Trays (Top - P/N 6819687, Bottom - P/N 6819442): Provides additional trays for Cut Sheet Feed Attachment (#7860) or Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875). Eliminates paper removal and installation from trays.

Contact IBM for ordering details on above accessories.

Cables: The cables and/or associated parts to attach the 5219 to the 5525 may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5219.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one connector kit are required for each attachment cable. (Individual connectors P/N **7362229** are available for replacement.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Order cables via part number. Allow lead time of 120 days.

Twinaxial Station Protector (P/N **6819750**): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from those used with displays.

Order station protector via part number.
Allow lead time of 120 days.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Series/1 Attachment Cables: For a description of cable and/or associated parts to attach the 5219 Printer to the Series/1 (feature #5640), see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). Twinaxial cabling for attachment to the 4952, 4954, 4955, 4959, or 4965 (feature #5640):

Device (5219) connector	P/N **7362229**
2X4 Berg Connector Kit	P/N **6095524**
Twinaxial Cable	P/N **7362211**

SUPPLIES

Ribbons: The IBM 463 ribbon (P/N **1299463**) or equivalent. None required with machine order. Contact IBM, for detail listing. Replacement and installation of the print wheel is the customer's responsibility.

5219 Print Wheel Assemblies (Data Processing Character Sets)
(Supported by System/34, System/36, and System/38)

Descriptions/ Part Numbers	Courier 10	Artisan 10
ASCII	1439909	1439941
EBCDIC	1439900	1439932
Spanish Speaking	1439915	1439947

5222 PRINTER

PURPOSE

The 5222 produces printed output for a 5280 Distributed Data System.

MODELS

Model 1 001

Prerequisites: #1152 on the 5285. #1157 or #1162 on the 5288.

Customer Setup: The 5222 is designated as a Customer Setup (CSU) machine, thereby offering the customer early availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customers - Customer Setup* (G120-2743). CSU allowance is one day ordinarily but is extended to two days if the printer is installed concurrently with a 5280 system.

HIGHLIGHTS

This wire matrix, table-top printer provides bidirectional printing at a maximum rate of 80 cps at 10 or 15 cpi horizontal print density. Horizontal print density is operator-selectable. Vertical spacing of six or eight lpi is also operator-selectable. Page length is program-selectable with a maximum length of 255 lines per page. Character formation is created in an 8 x 7 matrix. The length of the print line is 33.5cm (13.2 inches) providing 132 characters at 10 cpi or 198 characters at 15 cpi. A variable-width forms tractor provides for the feeding of continuous forms.

For optimum handling of continuous forms, the Forms Stand (**#4450**) is recommended. An optional Rear Document Insertion Device (#6100) accommodates single-cut forms. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations.

One character set may be selected from several options. Character set size has no effect on throughput. See "Type Catalog" for character set arrays.

A cartridge ribbon offers ease in replacing the ribbon. One cartridge ribbon is provided with the 5222.

Attachment to a 5280 System: One 5222 Printer can be attached to the 5285 Programmable Data Station via the Start/Stop Printer Attachment (#1152). One 5222 Printer can be attached to the 5288 Programmable Control Unit via the Single 5222 Printer Attachment (#1157). Up to four 5222 Printers can be attached to the 5288 Programmable Control Unit via the Multiple Start/Stop-Twinax® Printer Attachment (#1162). This attachment also provides a single twinaxial port for attachment of 5224, 5225, and/or 5256 Printers. The attachment cable (4-conductor, twisted-pair) provided with each 5222 is 6 meters (20 feet) long. See "Accessories" for extension cabling.

When adding printers to the 5280 Distributed Data System, the customer must modify the system configuration specifications. See *IBM 5280 System Control Programming Reference Manual* (GC21-7824).

Publications: *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): Specify **#9890** for a locking plug (requires a locking type receptacle) or **#9891** for a nonlocking plug (requires a standard type receptacle).
- Power Cord: Cord is 2.4 meters (8 feet) long. No specify required.
- Color: Pearl White only (no specify required).
- Character Sets: Specify one of the following:

  #9501 for 95-character EBCDIC
  #9570 for 95-character Spanish Speaking (N and n capability)
  #9470 for 185-character Multinational

  See "Type Catalog" for character set arrays.

SPECIAL FEATURES

Rear Document Insertion Device (#6100): The Rear Document Insertion Device (RDID) provides the capability for manually inserting individual cut forms or cut forms sets. The forms tractor is removed by the operator and the RDID installed. Adjustable guides permit forms from 14.6cm (5 3/4 inches) to 30.5cm (12 inches) wide to be utilized. Form length can be from 7.6cm (3 inches) to 35.6cm (14 inches). Up to 4-part forms may be used. Forms should always be tested to ensure customer acceptance. The leading edge (top edge) of form sets must be glued. Scribed lines on the forms guide assist in form alignment. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Forms Stand (#4450): A one-shelf floor-standing forms stand provides for stacking of continuous forms after printing.

Cables: Additional attachment cabling with appropriate connectors to attach the 5222 to a 5285 or a 5288 may be purchased from IBM or a customer-selected source. For cable specifications and assembly procedures, see *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for installation and maintenance of these cables and their associated parts. Specify cable assembly number, external cable, and length of cable.

Extension Cable (P/N 6846671): Order must specify desired length. Maximum length is 55 meters (180 feet). Includes two connectors attached to bulk wire. For operator convenience, the 5222 should be located close to a display station.

SUPPLIES

Ribbons: A black ribbon in cartridge form, P/N 7034535 or equivalent, is required. For details see IBM.

5224 PRINTER MDLS 1, 2

PURPOSE

A table-top impact matrix line printer for the 5280 Distributed Data System, Series/1, System/34, System/36, and System/38.

MODELS

Models		Maximum Rated Speeds* 10 Characters per inch	15 Characters per inch
Mdl 1	001	140 lpm	95 lpm
Mdl 2	002	240 lpm	170 lpm

* For a 18.8cm (7.4 inch) print line.

See "Throughput Considerations" below for print speed factors.

Customer Setup (CSU): The 5224 is a customer setup machine, thereby offering the customer early availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customers - Customer Setup* (G120-2743). CSU allowance is one day. The CSU allowance is two days if installed concurrently with a 5280 system. CSU instructions are included with the 5224.

HIGHLIGHTS

The 5224 is an impact matrix line printer of table-top design with characteristics simliar to the 5225 printer. A table is not provided with the 5224 (see "Accessories"). The character matrix is eight dots high and seven dots wide. Maximum character height is 2.92mm (0.115 inches). Three character sets are available. Character set selection has no effect on print speed. Upper and lower case is provided in all character sets. See "Type Catalog" for character set arrays. Horizontal print density of 10 or 15 characters per inch (cpi) is operator-selectable. Line spacing of six or eight lines per inch (lpi) is similarly selectable. System/34, System/36, and System/38 Programming supports programmable control of print density and line spacing. Operator selection of density and spacing can optionally be exercised. See "System Attachment" below. The 33.5cm (13.2 inch) print line provides for a maximum of 132 characters at 10 cpi and 198 characters at 15 cpi. Oversize and special characters, logos, business graphics, OCR-A, and bar-code printing can be printed dependent upon host program support. An audible alarm provides an indication to the operator when manual intervention is required due to one of nine printer error conditions. Cable-thru provides the capability of connecting a total of seven multiple 5219s, 5224s, 5225s, 5251 mdl 1 or 11, 5252s, and to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. Only one additional printer may be attached via Cable-Thru if coax cable is used. A cartridge ribbon provides for fast, easy and clean ribbon changes. One cartridge ribbon and a ribbon shield, to prevent smudging, are provided with the 5224. A fully adjustable forms tractor provides for feeding margin-punched continuous forms. Up to 4-part forms may be utilized. Forms greater than four parts should be tested for customer acceptance. See *Forms Design Reference Guide for Printers* (GA24-3488) for forms design considerations. Forms skipping and vertical spacing are under program control.

Throughput Considerations: Six factors determine print speed:

1. The mdl of the 5224.
2. The print position of the right-most character in the line being printed.
3. The print density (10 cpi or 15 cpi).
4. Vertical spacing and skipping.
5. Communications and programming considerations.
6. Density (quantity of dots) in each line printed.

The 5224 maximizes throughput by taking advantage of short line lengths prevalent in most printing. Throughput of mdl 1 is line-length dependent as indicated by the position of the right-most character printed. The mdl 2 is similarly line-length dependent except for the left-most 18.8cm (7.4 inches) of the print line. Any print line 18.8cm (7.4 inches) long or less, as measured from the left, will print at the rate of 240 lines per minute at 10 cpi or 170 lines per minute at 15 cpi. Lines longer than 18.8cm (7.4 inches) will print at a rate reduced in proportion to the number of characters printed beyond 18.8cm (7.4 inches). The mdl 2 has a "design point" of 18.8cm (7.4 inches). A "design point" is not applicable to the mdl 1.

Care in forms design can significantly improve printer throughput. Unnecessary blanks between vertical columns should be avoided. Columns with low data content should be placed to the right of the form. Consideration should be given to print density; 10 or 15 cpi. By redesigning the form for 15 cpi, two-up output may be achieved, thereby improving final throughput.

The 5224 Printer uses an internal print management feature to guard against damaging the printer due to the quanitity of dots in a print line. When printing a dense line (a line with a large number of dots), this safeguard may cause the print mechanism to print the line by using multiple passes of the print head. When the printer operates in multi-pass mode, each print line requiring multiple passes is considered to be full length 33.5 cm (13.2 inches). The nominal print speed in multi-pass mode for the mdl 1 is 20 lpm at 10 cpi and 15 lpm at 15 cpi. The mdl 2 in multi-pass mode operates at 25 lpm at 10 cpi and 20 lpm at 15 cpi. The additional time required for multi-pass printing lowers the overall throughput proportionally to the frequency of the dense lines printed.

Although some print lines may contain large quantities of dots (forcing multi-pass printing), usually only repetitive printing of the same character causes multi-pass printing. For example, a series of asterisks or dashes, normally used for highlighting are printed at a lower speed. In printing operations where speed is a primary concern, special techniques can be used to avoid multi-pass printing. For example:

Instead of using	Use
**********	* * * * * * * * * *
##########	# # # # # # # # # #
----------	_ _ _ _ _ _ _ _ _ _

Use of the Load Alternate Charater (LAC) command on System/34 or System/36 via the Advanced Printer Function PRPQ, Bar Code Print FDP or other user-generated programs may result in the use of graphics which will result in multi-pass printing. Since print time may vary with each line printed, as line length varies, or due to skipping and spacing, typical customer documents should be benchmarked if specific throughput rates are desired.

The following charts show the relationship of these variable factors in determining print speed.

10 Character Per Inch Print Density

	Mdl 1	Mdl 2
Design Point	N/A	74 Characters 18.8cm (7.4 inches)
Throughput (74-character Lines)	140 lpm	240 lpm
Maximum (Characters per line)	132	132
Throughput (132-character Print Line)	90 lpm	120 lpm

15 Characters Per Inch Print Density

	Mdl 1	Mdl 2
Design Point	N/A	111 Characters 18.8cm (7.4 inches)
Throughput (111-character Lines)	95 lpm	170 lpm
Maximum (characters per line)	198	198
Throughput (198-character Print Line)	60 lpm	85 lpm
Throughput (132-character Print Line)	80 lpm	135 lpm

Problem Determination Procedures: Problem determination is aided by significant offline verification tests which have been designed into the printer control unit to provide greater printer availability to the customer. See *IBM 5224 Printer Operator's Guide* (GA34-0092) for procedures.

System Attachment

The 5224 attaches to System/34, System/36, System 38, and the 5280 System in a manner identical to the 5219, 5225, and 5256 printers.

For Direct Attachment to System/34: The 5224 Printer may be attached to System/34 in the following manner:

- When designated as the system printer, the 5224 connects to the workstation controller via one of the four twinaxial cable connectors (ports) on the 5340 System Unit. A 6 meter (20 foot) cable is provided with the 5340. Specify **#9308** on the 5340.
- When designated as a local workstation printer, the 5224 attaches in a manner similar to 5250 Information Display System devices.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Direct Attachment to System/36: The 5224 Printer may be attached to System/36 in a manner similar to 5250 Information Display Station

5224 Printer Mdls 1, 2 (cont'd)

devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), for cabling information.

Direct Attachment to System/38: For use as a local workstation printer, the 5224 Printer may be directly attached to the System/38 via the workstation controller features on the 5381. Attachment is by twinaxial cable in a manner similar to the 5225 and 5256 printers. See M5381 pages for workstation controller information.

For Remote Printing in a Communications Environment on System/34, System/36, and System/38: The 5224 may be attached to the 5251 mdl 2 or 12 with the Cluster Feature (#2550) or the Dual Cluster Feature (#2551) on the 5251.

For Attachment to the 5280 Distributed Data System: The 5285 Programmable Data Station and the 5288 Programmable Control Unit provide for the attachment of the 5224 Printer via twinaxial cable, 1,525 meters (5,000 feet) maximum to the appropriate printer attachment. The prerequisite attachment feature on the 5285 is the Twinax® Printer Attachment (#1150). The prerequisite attachment feature on the 5288 can be the Single Twinax Printer Attachment (#1155); the Multiple Twinax Printer Attachment (#1160); or the Multiple Start/Stop-Twinax Printer Attachment (#1162). See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information. A maximum of eight printers can be attached to the 5288.

Attachment to Series/1: The 4952, 4954, 4955, 4956, 4959 Input/Output Expansion Unit, and 4965 Diskette Drive and I/O Expansion Unit provide for the attachment of the 5224 via the Printer Attachment - 5200 Series (#5640). A 6 meter (20 foot) twinaxial Attachment Cable (#5780), is available. The printer may be attached up to a maximum distance of 1,525 meters (5,000 feet) using twinaxial cable. See *Series/1 Customer Site Preparation Manual* (GA34-0050) for cabling information.

Publications: The following manuals are included with the 5224 when it is shipped to the customer: *IBM 5224 Printer Operator's Guide* (GA34-0092), *IBM 5224 Printer Customer Setup Guide* (GA34-0093).

AAS Ordering Instructions: The 5224 is a System Component.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): With a nonlocking plug on a 2.4 meter (8 foot) power cord. No specify is required.
- Color: Pearl White (no specify is required).
- Cables: See "Accessories". For cable specifications, see the *IBM 5250 Information Display Systems Planning and Site Preparation Guide* (GA21-9337), or *IBM 5280 Cable Assembly Manual* (GA21-9341).
- System Attachment: Specify one of the following:

Series/1	**#9566**
System/34	**#9561** for system printer **#9560** for local workstation printer **#9559** for remote workstation printer
System/36	**#9567** for system printer **#9568** for local workstation printer **#9569** for remote workstation printer
System/38	**#9563** for system printer **#9564** for local workstation printer **#9565** for remote workstation printer
5280 System	**#9562**

- Character Set: Specify one of the following: See "Type Catalog" for character set arrays. All workstations and printers attached to a System/34, System/36, and a 5251 mdl 2 or 12 must have the same character set.

  #9501 for 95-character EBCDIC
  #9470 for 184-character Multinational (includes ASCII graphics)
  #9570 for 95-character Spanish Speaking (N and n capability)

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Field installation available. The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a 5224 Printer. Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Forms Stand (#4450): A one-shelf, floor-standing forms stand provides for stacking of continuous forms after printing. For field installation, order by feature number on MES.

Printer Table: SSD offers a table especially designed for the 5224 providing such features as a slot in the surface for paper feeding, a shelf for manuals, a paper stacking rack and a design that compliments the 5224 in style and color. Interested customers may order from IBM directly, toll-free at 800-631-5582 (in New Jersey use 800-352-4960 and in Hawaii and Alaska use 800-526-2484). For further information contact an IBM Marketing Representative.

Cables: Cables and/or associated parts to attach the 5224 Printer to the 5251 mdl 2 or 12, 5340, 5360, 5381, 5285, or 5288 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), or the *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5224.

Twinaxial Cabling: Order via MSORDER (Category = Bulk Cable) , specifying part number. Allow a lead time of 120 days.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors P/N **7362229** are available for replacements.

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a Connector Kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M 7361807): A kit includes two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. Order via MSORDER (Category = Accessory/Supplies) specifying bill of material number. Allow a lead time of 120 days. **Customer Setup:** Yes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Series/1 Attachment Cables: For a description of cables and/or associated parts to attach the 5224 Printer to the Series/1 (feature #5640), see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). Twinaxial cabling for attachment to the 4952, 4954, 4955, 4959, or 4965 (feature #5640):

Device (5224) connector	**P/N 7362229**
2x4 Berg Connector Kit	**P/N 6095524**
Twinaxial cable	**P/N 7362211**

SUPPLIES

Ribbons: A black cartridge ribbon, P/N **6845100**, or equivalent, is required. Contact IBM.

Ribbon Shields: One ribbon shield is included with each quantity of five ribbons purchased from IBM. Ribbon shields are also available separately. For additional information, call 800-631-5582.

5225 PRINTER MDLS 1, 2, 3, 4

PURPOSE

An impact matrix line printer for the 5280 Distributed Data System, Series/1, System/34, System/36, and System/38.

MODELS

Maximum Rated Speeds

		10 Characters Per Inch	15 Characters Per Inch
Model 1	001	280 lpm	195 lpm
Model 2	002	400 lpm	290 lpm
Model 3	003	490 lpm	355 lpm
Model 4	004	560 lpm	420 lpm

See "Throughput Considerations" below for print speed factors.

Prerequisites: All 5225 Printers used in applications printing characters more dense than normal must have E/C 323150 factory installed or field B/M 6844756 installed. 5225 mdl 1 Printers printing OCR-A or bar-code must have E/C 987958 factory installed or field B/M 6840638 installed.

Customer Setup (CSU): The 5225 is a Customer Setup machine. The CSU allowance is one day. The CSU allowance is two days if installed concurrently with a 5280 System. For additional information on CSU, see the GI section.

HIGHLIGHTS

An impact matrix printer utilizing refinements in technology to achieve line printer speeds. The character matrix is eight dots high and seven dots wide. Maximum character height is 2.92mm (0.115 inches). A variety of character sets are available. Character set size has no effect on print speed. Upper and lower case is provided in all character sets. See "Type Catalog" for character set arrays. Horizontal print density of 10 or 15 characters per inch (cpi) is operator-selectable. Line spacing of six or eight lines per inch (lpi) is also selectable. The 33.5cm (13.2 inch) print line provides for a maximum of 132 characters at 10 cpi and 198 characters at 15 cpi. Oversize and special characters, logos, business graphics, OCR-A, and bar-code printing can be printed dependent upon host programming support. See "Prerequisites" above. One ribbon and a ribbon shield, to prevent ink smudging, are provided with the 5225. A forms tractor provides for feeding margin punched continuous forms. See *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations. Forms skipping and vertical spacing are under program control.

Throughput Considerations: Five factors determine print speed:

1. The mdl of the 5225.
2. The print position of the right-most character in the line being printed.
3. The print density (10 cpi or 15 cpi).
4. Spacing and skipping.
5. Communications considerations.

Each mdl of the 5225 is designed to achieve maximum print speed for lines having up to a predetermined number of characters (design point). For each line exceeding the design point in length, print speed (lpm) will be reduced in proportion to the number of additional characters. Line lengths are determined by the print position of the right-most character in the line being printed, not by the number of characters actually printed in the line. The following charts show the relationship of these variable factors in determining print speed.

10 Characters Per Inch Print Density

	Mdl 1	Mdl 2	Mdl 3	Mdl 4
Design Point (Characters)	74	98	118	130
Throughput for Lines up to the Design Point in Length	280 lpm	400 lpm	490 lpm	560 lpm
Maximum Characters Per Line	132	132	132	132
Throughput for a 132-Character Print Line	130 lpm	205 lpm	330 lpm	520 lpm

15 Characters Per Inch Print Density

	Mdl 1	Mdl 2	Mdl 3	Mdl 4
Design Point (Characters)	111	147	177	195
Throughput for Lines up to the Design Point in Length	195 lpm	290 lpm	355 lpm	420 lpm
Maximum Characters Per Line	198	198	198	198
Throughput for a 198-Character Print Line	90 lpm	145 lpm	235 lpm	385 lpm
Throughput for a 132-Character Print Line	150 lpm	290 lpm	355 lpm	420 lpm

Form design, which reduces the number of lines exceeding the design point, can optimize printer throughput. Since print time may vary with each line printed, typical customer documents should be benchmarked if specific throughput rates are required. Multiple printer and display station operational loads may also affect performance.

Problem Determination Procedures: Problem determination is aided by significant offline verification tests which have been designed into the control unit to provide greater printer availability to the customer. See *IBM 5225 Printer Operator's Guide* (GA34-0054) for procedures.

For Direct Attachment to System/34: The 5225 Printer may be attached to System/34 in the following manner:

- When designated as the system printer, the 5225 connects to the Workstation Controller via one of the four twinaxial cable connectors on the 5340 System Unit. A 6 meter (20 foot) cable is provided with the 5340. Specify **#9307** on the 5340.
- When designated as a local workstation printer, the 5225 attaches in a manner similar to other 5250 Information Display System devices.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

For Direct Attachment to System/36: The 5225 Printer may be attached to the System/36 in a manner similar to 5250 Information Display Station devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), for cabling information.

For Direct Attachment to System/38: The 5225 printer may be attached to System/38 in the following manner:

- When designated as the system printer, the 5225 connects to the Workstation Controller feature on the 5381 via user-provided twinaxial cable. Specify **#9817** on the 5381.
- When designated as a local workstation printer, the 5225 attaches via the Workstation Controller feature on the 5381. Attachment is by user-provided twinaxial cable in a manner similar to the 5219, 5224, and 5256 Printers.

See M5381 pages for Workstation Controller information. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

For Remote Printing in a Communications Environment on System/34, System/36, and System/38: The 5225 may be attached to the 5251 mdl 2 or 12 with the Cluster feature (#2550) or the Dual Cluster feature (#2551) on the 5251. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling and configuration information.

Series/1 Attachment: The 4952, 4954, 4955, 4956, 4959 Input/Output Expansion Unit, and the 4965 Diskette Drive and I/O Expansion Unit provide for the attachment of the 5225 via the Printer Attachment - 5200 Series (#5640). A 6 meter (20 foot) twinaxial Attachment Cable (#5780), is available. The printer may be attached up to a maximum distance of 1,525 meters (5,000 feet) using twinaxial cable. See *Series/1 Customer Site Preparation Manual* (GA34-0050) for cabling information.

For Attachment to the 5280 Distributed Data System: The 5285 Programmable Data Station and the 5288 Programmable Control Unit each provide for the attachment of the 5225 Printer, via twinaxial cable 1,525 meter (5,000 foot) maximum, to the appropriate printer attachment. See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information.

Customer Responsibilities: The marketing representative must advise customers of their responsibilities before receipt of the machine. For additional information, see the GI section.

The customer is responsible for:

- Receipt, unpacking, and placement of the 5225.
- Physical setup, connection of cables to IBM devices incorporating

5225 Printer Mdls 1, 2, 3, 4 (cont'd)

protected access areas, switch setting, and checkout in accordance with instructions supplied with the 5225.

- Notifying IBM of intent to relocate and for following IBM instructions for relocation of the 5225.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the IBM Branch Office.
- Relocation of the 5225, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5225 prior to calling IBM for service.
- Installation and maintenance of signal cables and associated parts for attaching the 5225 to the 5251, 5285, 5288, 5340, or 5381.
- When adding additional printers to the System/34, System/36, System/38 or 5280 Distributed Data System, the customer must modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *System/36 - Preparing a Place for Your Computer* (SA21-9444), *Planning for System Configuration* (SA21-9440), *Changing Your System Configuration* (SC21-9052), *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775), or *IBM 5280 System Control Programming Reference Manual* (GC21-7824).

Publications: *IBM 5250 Information Display System Introduction* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5280 Planning and Site Preparation Guide* (GA21-9351), *IBM 5280 Cable Assembly Manual* (GA21-9341) and *IBM 5225 Printer Operator's Guide* (GA34-0054).

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for a locking plug or **#9891** for a standard nonlocking plug. 208V AC, 1-phase, 60 Hz: **#9884** for a locking plug or **#9885** for a nonlocking plug. 240V AC, 1-phase, 60 Hz: **#9894** for a locking plug or **#9895** for a nonlocking plug.
- Color: One color accent must be specified. Specify **#9060** for Willow Green, **#9061** for Garnet Rose, **#9062** for Sunrise Yellow, **#9063** for Classic Blue, **#9064** for Charcoal Brown, or **#9065** for Pebble Gray. Printer background color is Pearl White.
- Character Sets: Specify one of the following:

  #9501 for 95-Character EBCDIC
  #9470 for 184-Character Multinational (includes ASCII graphics)
  #9570 for 95-Character Spanish Speaking (N and n capability)

  See "Type Catalog" for character set arrays. All workstations and printers attached to a System/34, System/38, and 5251 mdl 2 or 12 must have the same character set.
- Cables: See "Accessories" for cable ordering instructions. For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), or *IBM 5280 Cable Assembly Manual* (GA21-9341).
- System Attachment: Specify one of the following:

Series/1:	**#9566**
System/34:	**#9561** for system printer **#9560** for local workstation printer **#9559** for remote workstation printer
System/36:	**#9567** for system printer **#9568** for local workstation printer **#9569** for remote workstation printer
System/38:	**#9563** for system printer **#9564** for local workstation printer **#9565** for remote workstation printer
5280 System:	**#9562**

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Audible Alarm (#1470): Provides an indication to the operator when manual intervention is required due to one of nine printer error conditions or on command from the host. **Maximum:** One. **Field Installation:** Yes .

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdl 1 or 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. (**Note:** For relocation flexibility, the customer should have Cable-Thru on all workstations.) **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a 5225 Printer. Replaced parts from any model conversions become the property of IBM.

ACCESSORIES

Cables: Cables and/or associated parts to attach the 5225 Printer to the 5251 mdl 2 or 12, 5285, 5288, 5340, 5360, or 5381 may be purchased from IBM or from a customer-selected source. For description of these cables and parts, see *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) or *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5225.

Twinaxial Cabling (for attachment to the 5251 mdl 2 and 12, 5285, 5288, 5340, and 5360):

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacements.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a Twinaxial Connector Kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M **7361807**): A kit includes two protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. The station protector is a CSU accessory.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Series/1 Attachment Cables: For a description of cables and/or parts to attach the 5225 printer to the Series/1 (feature #5640)... see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). Twinaxial cabling for attachment to the 4952, 4954, 4955, 4959, or 4965 (feature #5640):

Device (5225) connector	P/N **7362229**
2x4 Berg Connector Kit	P/N **6095524**
Twinaxial cable	P/N **7362211**

SUPPLIES

Ribbons: A black ribbon, P/N **4412372** or equivalent, is required. Contact IBM.

Ribbon Shields: One ribbon shield is included with each quantity of five ribbons purchased from SSD. Ribbon shields are also available separately from SSD. For additional information, contact an IBM Marketing Representative or call 800-631-5582.

5228 PRINTWHEEL PRINTER

(Wide Carriage)

PURPOSE

A bidirectional, impact, wide carriage printer providing letter quality printed output for the 6580 Displaywriter System. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style variations. With the proper hardware and software, each printer can also be used in a clustered system, supporting up to three workstations.

MODELS

Model A12 60 cps

Prerequisites: In order for two or three workstations to share a printer, the primary workstation must have the Printer Sharing Prerequisite installed, and each workstation must have Textpack 2, 4, or 6 with the respective memory requirement.

Note: The 5228 is not approved for use in an environment requiring Modification Features. The use of unmodified components with Modification Features will result in increased emanation levels.

Physical Planning Information:

Unit	Height	Width	Depth	Weight	Max KVA	BTU /HR
5228 Printer	200mm 7.9 in.	760mm 30 in.	583mm 23 in.	31kg 68 lb.	.50	900
With Sheet Feed Paper Handler	484mm 19 in.	760mm 30 in.	725mm 29 in.	12kg 26.4 lb.	NA	NA
With Tractor Feed	330mm 13 in.	760mm 30 in.	735mm 29 in.	4kg 8.8 lb.	NA	NA

HIGHLIGHTS

- Rated burst print speed of 60 cps (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, or 15 pitch, and proportional spacing according to the printwheel selected.
- Vertical spacing is program selectable in increments of 1/96 in. (0.0104 in.). For a single program command, the vertical movement is 4 increments minimum and 24 maximum. This permits line spacing from 4 lines/inch to 24 lines/inch.

  The printer will default to 6 lines/inch if the user does not program select a vertical line spacing.

  The lines per page parameter is also program selectable, the default being 66 lines per page.
- Single speed carriage with skipping at up to 6 inches per second.
- Single sheet feeding by hand, or the optional Sheet Feed Paper Handler.
- Forms tractor for feeding continuous forms is an optional feature.
- Multiple 96-character printwheel options available by type style and language graphic variations.

Customer Setup (CSU) and Responsibilities: The 5228 is designated a customer setup machine. The marketing representative must advise the customer of his/her responsibilities before receipt of the machine. *Customer Setup Instructions* are shipped with the machine.

CSU allowance is *one* day.

Limitations:

1. Character Sets:

   The 5228 Printer may utilize any one of a variety of 96-character type wheels on any particular printing operation.

   It is the customer's responsibility to match the type wheel selected to the printing requirements.

2. Continuous Forms:

   Pinfed continuous forms can be used. (See "Special Features" for Tractor Feed device).

   Both edges of the pinfed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable printwheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

   Paper Specifications:

   Maximum carbons is five

   Maximum paper width is 483mm (19.0 in.)

   Maximum pin-to-pin width on forms tractor is 445mm (17.5 in.)

   Maximum print-line width is 432mm (17.0 in.)

3. Single sheet feed is by hand insertion, unless the optional Sheet Feed Paper Handler (#3295) is used. Multi-page printing with single sheet feeding requires operator intervention or special application programming support to avoid paperless printing.

4. Paper Recommendations:

   Suitable Paper

   All of the papers placed in the Sheet Feed Paper Handler should be new, unused and without packaging damage. To ensure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the Sheet Feed Paper Handler.

   Type and Composition: Plain bond paper of one of the following compositions.

   - No. 1 sulfite (100% chemical wood pulp).
   - 25% cotton content.
   - 50% cotton content.
   - 100% cotton content.
   - Paper made from recycled office paper.

   Size: Using the Sheet Feed Paper Handler, the following paper sizes can be fed either lengthwise or sidewise unless otherwise noted.

178mm x 267mm	*	(7.0 in. x 10.5 in.)
185mm x 267mm	*	(7.25 in. x 10.5 in.)
191mm x 267mm	*	(7.5 in. x 10.5 in.)
203mm x 267mm		(8.0 in. x 10.5 in.)
203mm x 330mm	*	(8.0 in. x 13.0 in.)
216mm x 279mm		(8.5 in. x 11.0 in.)
216mm x 330mm	*	(8.5 in. x 13.0 in.)
216mm x 356mm	*	(8.5 in. x 14.0 in.)

   * Feed lengthwise only.

   Basic weights:

   - 60g/sq.m to 90g/sq.m (16 lb to 24 lb)
   - Optimum: 75g/sq.m to 90g/sq.m (20-24 lb bond) 25% or 50% cotton content.

   Unsuitable Paper for the cut sheet feeder

   Following is a list of paper supplies that may be found in an office that will *not* feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive).

   - Coated paper.
   - Vellum paper.
   - Coated erasable bond paper.
   - Synthetic papers (rice paper, parchment, etc.).
   - Translucent paper.
   - Multi-sheet forms and documents (bound or unbound).
   - Peel-off, pressure sensitive labels.
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper).
   - Preprinted forms requiring a high degree of character placement accuracy.
   - Dark colored paper.
   - Envelopes.
   - Card stock.
   - Folded or creased documents.
   - Paper with exposed gummed surfaces, holes, perforations, cutouts, or windows.
   - Highly embossed paper (embossment height exceeding 0.508mm (0.02 in.).

     Note: Embossments should not be located within 15mm (0.59 in.) of any edge of the sheet.
   - Preprinted papers containing chemicals or substances that leave a residue on the Sheet Feed Paper Handler or printer components.
   - A mix of different sizes and types of paper in a paper tray.

5228 Printwheel Printer (cont'd)

- Paper in unsatisfactory conditions:
  - Paper with excessive curl or waviness (exceeding 3mm (0.118 in.).
  - Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition).
  - Paper with poorly cut (rough) edges.

  Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

AAS Ordering Instructions: The 5228 is a system component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard nonlocking plug (uses customer standard type receptacle). Standard power cord is 3m (9.8 ft.), no specify required. Some localities restrict power cord length to 1.8m (6 ft.). If 1.8m cord is required, specify **#9986**.

- **Cable Lengths (required cable for IBM Printwheel Printer to Workstation):** Cables in lengths of 3, 6, 30, and 60 meters (9.9, 19.7, 98.4 and 196.8 ft.) can be ordered to cable connect the IBM Printwheel Printer to a workstation. One cable is required for either a stand-alone or printer-sharing configuration. 3m (9.9 ft.) cable **(#2030)**, 6m (19.7 ft.) cable **(#2000)**, 30m (98.4 ft.) cable **(#2010)**, 60m (196.8 ft.) cable **(#2020)**. If *no* cable is desired, use **#3999**.
- Color: Pearl White only (no specify required).
- Language: English (no specify required).
- Printwheel Type Style: One standard printwheel is shipped with the machine except as outlined below:
  Prestige Elite 12, no specify required

  Additional printwheels may be ordered as supplies by part number. See "Supplies" below.

SPECIAL FEATURES

Tractor Feed Device (#3290): Provides a variable-width tractor for feeding continuous forms. This feature is advantageous for successful multi-page forms printing operations. See "Limitations" for Forms Requirements. **Field Installation:** Yes. **CSU:** Yes.

Sheet Feed Paper Handler (#3295): Provides for feeding cut sheets of paper from two source trays. Consists of paper transport and output tray. Paper is stacked face down. See "Limitations" for Paper Specifications. **Field Installation:** Yes. **CSU:** Yes.

Note: Paper Handling prerequisite is standard on the 5228 Wide Carriage Printer.

MODEL CONVERSIONS: None

ACCESSORIES

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Sheet Feed Paper Handler (#3295). Eliminates paper removal/installation from trays when customer uses a wide variety of papers.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1308894): Provides paper support and a movable guide for manual cut sheet insertion when no sheet or tractor feed is installed.

Order accessories: : From IBM.

SUPPLIES

Ribbons: The IBM 463 ribbon (P/N **1299463**) or equivalent. None required with machine order. Contact IBM.

Printwheels: None required with machine order. Additional printwheels are available in a variety of print styles (see "Type Catalog -5210") and character sets, which are interchangeable with the printwheel supplied with the machine. When ordering, consideration should be given to ordering a second identical wheel for backup. Replacement and installation of the printwheel is the customer's responsibility. Contact IBM.

5229 PRINTER

PURPOSE

A bidirectional, wide-carriage, impact printer providing high quality printed output for the 5520 Administrative System. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style and graphic variations.

MODELS

Model B12 60 cps

Limitations:

1. Continuous forms:

   Pin fed continuous forms can be used. See "Special Features" for Continuous Forms Feed Device and "Accessories" for Paper Table.

   1 to 3-part continuous forms can be used on the full-width of the 5229 pin feed carriage. 4 or 5-part forms must be limited to a 14.5 inch pin-to-pin width.

   Both edges of the pin fed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable print wheel.

2. Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory.

3. Single-sheet feed is by hand insertion, unless the optional Cut Sheet Feed Attachment (#3295) is used.

4. There is a limit on the number of permissible cable "junctions" on the twinaxial cable used to attach multiple 5219, 5229, 5258, Printers to the 5525 System Unit. See the *5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1011) for details. The manual also describes the limits on total number of printers attachable to the 5525, and multi-drop limits on a single line.

5. Paper Specifications:

   Maximum paper width 483mm (19.0 inches)
   Maximum pin-to-pin width on forms tractor is 445mm (17.5 inches)
   Maximum print-line width 432mm (17.0 inches)
   Maximum print depth 533mm (21.0 inches)

6. Cut Sheet Feed Attachment Paper Recommendations:

   Suitable Paper:
   All of the papers placed in the Cut Sheet Feed Attachment should be new, unused and without packaging damage. To insure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the Cut Sheet Feed Attachment.

   Type and Composition: Plain bond paper of one of the following compositions.

   - No. 1 sulfite (100% chemical wood pulp)
   - 25% cotton content
   - 50% cotton content
   - 100% cotton content
   - Paper made from recycled office paper

   Size: Using the Cut Sheet Feed Attachment, the following paper sizes can be fed lengthwise only unless otherwise noted.

   - 178mm x 267mm (7.0 inches x 10.5 inches)
   - 185mm x 267mm (7.25 inches x 10.5 inches)
   - 191mm x 267mm (7.5 inches x 10.5 inches) *
   - 203mm x 267mm (8.0 inches x 10.5 inches)
   - 203mm x 330mm (8.0 inches x 13.0 inches) *
   - 216mm x 279mm (8.5 inches x 11.0 inches)
   - 216mm x 330mm (8.5 inches x 13.0 inches)
   - 216mm x 356mm (8.5 inches x 14.0 inches)

   * Can be fed lengthwise or sidewise.

   Basis weights:

   - 60 g/sq.m to 90 g/sq.m (16 pounds to 24 pounds).

   - Optimum: 75 g/sq.m to 90 g/sq.m (20 pounds to 24 pounds bond) 25% or 50% cotton content.

   Unsuitable Paper:
   Following is a list of paper supplies that may be found in an office that *will not feed reliably* and may cause misfeeds and paper jams. This list is not intended to be all-inclusive.

   - Coated paper.
   - Vellum paper.
   - Coated erasable bond paper
   - Synthetic papers (rice paper, parchment, etc.).
   - Translucent paper.
   - Multi-sheet forms and documents (bound or unbound)
   - Peel-off, pressure-sensitive labels.
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper).
   - Preprinted forms requiring a high degree of character placement accuracy.
   - Dark colored paper.
   - Envelopes.
   - Card stock.
   - Folded or creased documents.
   - Paper with exposed gummed surfaces, holes, perforations, cutouts, or windows.
   - Highly embossed paper (embossment height exceeding 0.508mm (0.02 inches). **Note:** Embossments should not be located within 15mm (0.59 inches) of any edge of the sheet.
   - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Attachment or printer components.
   - A mix of different sizes and types of paper in a paper tray.
   - Paper in unsatisfactory conditions: Paper with excessive curl or waviness exceeding 3mm (0.118 inches). Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition). Paper with poorly cut (rough) edges.

   Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

Prerequisites: In the 5525 System Unit, #4710, #4711, #4712 or #4715, and either #1105, #1700, #1701, #1702, or #1704 and licensed program 5611-SS2. See M5525 pages for details.

Customer Setup (CSU): The 5229 is designed as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the GI section. The CSU allowance is one day.

HIGHLIGHTS

- Has a rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, 15 pitch or proportional spacing, according to the print wheel selected. Maximum 255-character line.
- Vertical spacing of 5-1/3, 6, or 8 lines-per-inch.
- Half-line spacing for superscripts and subscripts to a single level.
- First line registration, form skipping and spacing chosen by the user and then controlled by the licensed program.
- Single-speed carriage with skipping rate up to six inches-per-second.
- Noise level consistent with an office environment.
- Ribbon saver facility permits two modes of ribbon feed, to extend ribbon life where appropriate.
- Single-sheet feeding by hand, or the optional Cut Sheet Feed Attachment.
- Forms tractor for feeding continuous forms is optional.
- Multiple 96-character print wheel options available by type style and language graphic variations. See "Supplies" section.
- Optional Paper Table.
- Standard cable-thru capability to allow multiple printers on a single twinaxial cable up to an accumulative total distance of 1,524 cable meters (5,000 cable feet) radially from the 5525 System Unit.
- Customer setup for early availability and relocation flexibility.

Problem Determination Procedures: Problem determination and recovery procedures are provided with the 5229 Printer when attached to the 5525 System Unit using licensed program 5611-SS2 to help provide increased availability of the printer, and other parts of the system, to the user. These procedures will be described in the HELPs and Messages facilities in the licensed program and in the following manuals: *IBM 5229 Printer Operators Guide* (GA23-1009), *IBM 5520 Administrative System Messages and Recovery Aids* (SC23-0748).

These procedures are designed to be easy to follow and use by the customer and it is the customers responsibility to follow them prior to calling for IBM service.

Customer Responsibility: The customer is responsible for:

- Receipt, unpacking, and placement of the 5229.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5229.

5229 Printer (cont'd)

- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5229, if required, to allow IBM service access.
- Installation and maintenance of signal cables and associated cable adapters for attaching the 5229 to the 5525 System Unit.
- When adding or moving 5229 Printers on the 5520 Administrative System, the customer may have to modify the system configuration specifications. See the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1011).

Publications: *IBM 5520 Administrative System Introduction* (GC23-0702), and *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1011).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard nonlocking plug (uses customer standard type receptacle). Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet). If the 1.8 meter cord is required, specify **#9986**.
- Language: English (no specify required)
- Print Wheels: [Mdls B01, B02] One standard print wheel is shipped with the machine.

  Prestige Elite 12, no specify required.

  Additional print wheels may be ordered as supplies by part number. See "Supplies" below.
- Cables: Customer-supplied. See "Accessories" and the *IBM 5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1011) for ordering information. Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another supplier.
- Data Rate: The data transfer rate is determined by the Local Device Control feature and the 5525 System Unit mdl. Specify **#9300** for printers attaching through #4710 on the 5525 mdl 021, **#9305** for Printers attaching through #4710 on the 5525 mdl 031 or 032, **#9315** for Printers attaching through #4711 or #4712 on any mdl 5525.

SPECIAL FEATURES

Continuous Forms Feed Device (#3290): Provides a variable-width tractor for feeding continous forms. **Field Installation:** Yes. **Customer Setup:** Yes.

Cut Sheet Feed Attachment (#3295): Provides cut sheet paper from two source trays under system control, paper transport, and output tray. **Field Installation:** Yes. **Customer Setup:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Paper Table (P/N 1308894): Provides paper support and a moveable guide for manual cut sheet insertion when no sheet or tractor feed is installed.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Cut Sheet Feed Attachment (#3295). Eliminates paper removal or installation from trays when customer uses a wide variety of papers.

Contact IBM for ordering details on above accessories.

Cables: The cables and/or associated parts to attach the 5229 to the 5525 may be purchased from IBM or from a customer-selected source. For the proper identification, installation and application of the subject cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5229.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Cable is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Order cables specifying part number. Allow lead time of 120 days.

Twinaxial Station Protector (P/N **6819750**): One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). **Note:** This Station Protector is different from those used with displays.

Order Station Protector specifying part number. Allow lead time of 120 days.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES

Ribbons: The IBM 463 ribbon (P/N **1299463**) or equivalent. None required with machine order. Contact IBM for details.

Print Wheels: None required with machine order. Additional print wheels are available in a variety of print styles (see TC 5210 pages in "Type Catalog") and character sets and are interchangeable with the print wheel supplied with the machine. Contact IBM for Details. When ordering, consideration should be given to ordering a second print wheel for backup. Replacement and installation of the print wheel is a customer responsibility.

5231 CONTROLLER

PURPOSE

Control Unit for the 5230 Data Collection System for central collection of data from 5234 Time Entry Stations and 5235 and 5236 Data Entry Stations. Data is collected at the controller on either card or diskette media for subsequent transfer and processing on a data processing system.

MODELS

Mdl 1 001 — Punches and interprets 96-column card output records from data entered through the Time Entry and Data Entry Stations. Punches and prints at 20 cards per minute. Also provides read capability for loading system definition records for system start-up. Characters punched and interpreted are the standard 64-character set corresponding to the 96-column card code. All other EBCDIC characters will be accepted by the system and converted to blanks. Card hopper and stacker capacity is 350 cards.

Mdl 2 002 — Stores output records entered through the Time Entry and Data Entry Stations on diskette in 128-character records. An additional feature provides binary synchronous communication of data directly to a data processing system (unidirectional transmission only). See "Communications" for special attachment instructions to S/370 and 3741. The mdl 2 also provides read capability for loading system definition records for system start-up.

Mdl 3 003 — Punches and interprets 80-column card output records from data entered through Time Entry and Data Entry Stations. The mdl 3 punches and prints at 21 cards per minute. Printed characters will be represented by the 64 character set EL. All other EBCDIC characters will be accepted by the system and converted to blanks. Card hopper and stacker capacity is 400 cards. The mdl 3 also provides read capability for loading system definition records for system start up.

Prerequisites: 5230 Data Collection System Accessory Package. See "Accessories" for details.

HIGHLIGHTS

- Non-programmable.
- Personalized through easy-to-use fill-in-the-blank forms.
- Application independent.
- Performs self-diagnosis during idle time.
- Choice of output media available.
- Operator guidance at entry stations.
- Optional communication capability via BSCA.
- Audible alarm sounds when operator attention is required.
- All controller mdls can be ordered with loop connection features which allow attachment of up to 15 entry stations in any combination.
- All models provide operator guidance to the user to assist them in responding to conditions requiring operator attention, e.g., output media full and almost full or a loop error.

See "Publications" for Guide form numbers.

Host Support: For System/3, System/32, System/34, and System/38. Host support programs are available for the System/3 (5705-M31), System/32 (5725-M3A), System/34 (5726-M4A) and (5726-M3A), and System/38 (5714-M4A). These programs provide a system to edit, sort, expand, and reformat records collected by the 5230. Output from these programs can be tailored to be accepted by user programs or as input records to IBM application programs. The System/3 host support program is to be used with the System/3 Shop Loading and Control program or IPICS FDP's.

The following three manufacturing application programs under MMAS and MAPICS are supported on the System/32, System/34 and System/38 as a single application or in any combination:

- Payroll
- Inventory Management
- Production Status and Costing

System Features: A non-programmable device utilizing read-only storage (ROS) for operational control with random access memory (RAM) for definitions uniquely specifying output record format and input requirements from entry stations. Definitions are personalized for customer application through up to six simple question and answer forms, key-entered into appropriate media for input into the controller at system start-up.

2-Wire Loop Attachment: Controls 2-wire loop for attachment of Time Entry Stations and Data Entry Stations to controller.

Unattended Operation: Once loaded with definition records the system will operate in an unattended mode (assuming no power or system failures) collecting data from entry devices. Status codes will be displayed and the internal alarm will sound whenever operator attention is required. In addition, the external alarm contacts will activate any external alarm provided by the customer. The alarm will also be activated when the output storage device is *almost* filled to capacity.

Input Media Validation: A check character can be defined for each card or badge entered at the entry stations. If the character does not match, the error will be indicated at the entry station and wait for the correctly coded badge or card to be entered into the station. It is recommended that the check character capability be used for card input to ensure proper orientation of the card when it is inserted into the Data Entry Station.

Self Diagnosis: Whenever there is idle time, the system will continue self diagnosis and display a status message if any problem is found. Alarm contacts will be activated and the internal alarm will sound if operator attention is required.

Controller Console: The console provides user communication with the controller to perform such functions as start/stop controller, set time of day, start/stop individual loops, respond to status messages, etc.

Console Lock: A keylock is provided to enable entry of data through the console. The key is removable in the "locked" or "disabled" position so no entry of data can be made via the console.

Alarm Contacts: Provides the capability for the customer to add an external alarm to indicate a system status message has been displayed at the controller console requiring operator attention. Alarm contacts work in conjunction with the standard alarm. Customers may require both alarms, the standard audible alarm for the immediate vicinity and their own external (audible or visual) alarm for a remote location.

CE Diagnostic Port: The first loop can be used to attach up to three entry stations to the controller. The three remaining loops can support up to four entry stations each. The first loop is limited to three in order to accommodate a CE port in the controller to be used only by the CE (or other maintenance personnel for purchased systems) for entry station diagnosis, checkout, and repair of failing units.

Communications: The 5231 mdl 2 with the optional BSCA feature can communicate with appropriately configured System/3, System/32 (point-to-point only), System/34 (point-to-point only), 3741 mdls 2, 4 (point-to-point only), 5110 (point-to-point only), System/7, or S/370 mdls 115, 125, 135, 138, 145, 148, 155II, 158, 165II, 168, or 3031, 3032, 3033. Communications with S/370 mdls or 3031, 3032, 3033, is via ICA (where applicable), 2701, 2703, 3704 and 3705 operating under DOS/VS BTAM, OS/VS1 BTAM, or OS/VS2 BTAM. In particular, 2703 is not supported in 303X configurations. BSCA attachment is supported by CICS/VS operating under DOS/VS, OS/VS. Transmission to a 3741 is via communications link and must be reestablished for subsequent diskette transmission. Data communication on the mdl 2 controller is supported as a 3741 mdl 2 or 4. Transmission of data is one-way only, from the 5231 mdl 2 to a host. Communications is over multipoint (nonswitched) or point-to-point leased or switched facilities. Certain data communications characteristics such as full-speed or half-speed, security, and identification, are specified through the 5231 definition records and console messages. Refer to *5230 Data Collection System User Guide* (GA34-0040) for complete description.

Customer Responsibilities: For details, see the *5230 Data Collection System User Guide* (GA34-0040). The customer is responsible for the following:

Prior to receipt of the 5230 Data Collection System:
- Sign the IBM Central Facility Maintenance Agreement Amendment (Z120-2476).
- Provide a Central Facility Maintenance location at the controller for entry station maintenance.
- Install and check out loop cables and station connectors.
- Supply proper power outlets to the controller and entry stations.
- Meet all applicable electrical, fire, safety, and other codes required in the area.
- Proper addressing of the station connectors.
- Install entry station mounting brackets.
- Connect the loop cable to the 5231 Controller loop connectors.

After receipt of the 5230 Data Collection System:
- Connect the entry stations to the loop.
- Problem determination of failing Entry Stations, failing loops and the controller to a limited extent.
- Deliver the failing entry station to the Central Maintenance Facility site and return it to the floor location.
- Maintain loops.
- Security of customer data collected by the 5230.

If installing BSCA (#2704) on the 5231 Controller mdl 2, the following apply:
- Responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 and "Teleprocessing Systems" pages.

5231 Controller (cont'd)

Obtain a firm installation date for the start of transmission services (including any required modems) prior to processing the order confirmation card. Refer to installation schedule section of the *IBM 5230 Data Collection System User Guide* (GA34-0040) for customer preinstallation responsibilities and recommended schedule.

IBM Modems: The following IBM modems can be attached to a 5231 mdl 2 Controller:

Modem	Speed (bps)
3863	2400
3868 mdl 1	2400
3872 mdl 1	2400/1200
3864	4800
3868 mdl 3/4	4800
3976 mdl 3	1200/600

Note: The 5231 Controller does not support Auto-Call Originate (#1091) on the 3872.

Environment: The 5230 Data Collection System is designed to operate in the following environment:

	5231* 5236	5234 5235 5239
Temperature	10°C to 40°C (50°F to 105°F)	4°C to 45°C (40°F to 113°F)
Relative Humidity	8 - 80%	8 - 80%
Maximum Wet Bulb	26.7°C (80°F)	26.7°C (80°F)

*The 5231 mdl 2 will operate up to 43°C (110°F)

The system is designed to operate in offices or factories. This assumes a building that is not air conditioned, but with normal winter heat and normal ventilation. For further environmental information, see the GI section, "Use of IBM Equipment in Industrial Environments". For questionable environments, contact Field Engineering for assistance in determining the environmental suitability for the 5230 Data Collection System.

References: See M2700 pages for additional information concerning modems, communication facilities, machine attachment requirements, operating capabilities, and customer responsibilities.

Publications: *5230 Data Collection System User Guide* (GA34-0040), *5230 Data Collection System Console Guide, Mdl 1* (GX34-0041), *5230 Data Collection System Console Guide, Mdl 2* (GX34-0042), *5230 Data Collection System Console Guide, Mdl 3* (GX34-0043), *5230 Data Collection System Data Communications Guide* (GC34-0044), *5230 Data Collection System Badge Specifications* (GA21-9259).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz, 3-wire): With locking plug, **#9880**.
- Power Cords: No special number needed.
- Color:

#9060	Willow Green
#9061	Garnet Rose
#9062	Sunrise Yellow
#9063	Classic Blue
#9064	Charcoal Brown

- Processing system for the data collected by the 5231:

#9270	System/3 mdl 15
#9271	System/3, all mdls except 15
#9273	System/7
#9272	System/32
#9279	System/34, Processing System
#9294	System/34, Planned Device Attachment
#9283	System/38
#9274	S/360
#9277	S/370, below mdl 145
#9278	S/370, mdls 145 - 168
#9281	S/370, 3031, 3032, 3033
#9280	5110
#9276	Non-IBM equipment
#9275	Other IBM equipment

- Cables: See "Accessories" for cable details.

SPECIAL FEATURES

Bi-Sync Comm. Adapter (BSCA) (#2074): This feature permits the 5231 Controller mdl 2 (only) to function on a switched or nonswitched point-to-point line or multipoint nonswitched line as a 3741 mdl 2 or 4 terminal communicating in binary synchronous mode. The transmission is unidirectional from the 5231 mdl 2 to the host system. The 5231 mdl 2 will transmit to:

- A System/3 equipped with BSCA (#2074, #2084), LCA (#4765) or ICA (#4645 and #4802).
- A System/7 with TPMM (RPQ D08011) or TPMF (RPQ D08010).
- A System/32 with #2074 (point-to-point only).
- A System/34 with Communications Adapter (#2500).
- A System/38 with appropriately configured BSC adapter and subfeatures (point-to-point only).
- A 3741 Data Station mdl 2 or 3741 Programmable Workstation mdl 4. Transmission to the 3741 is restricted to single diskette transfer (point-to-point only).
- A 5110 with BSCA (#2074). Transmission to the 5110 is restricted to single diskette transfer (point-to-point only).
- A S/370 mdl 115, 125, 135, 138, 145, 148, 155 II, 158, 165 II, 168 or 3031, 3032, 3033. Communications with a S/370 is via ICA (where applicable), 2701, 2703, 3704 or 3705 operating under DOS/VS BTAM, OS/VS1 BTAM, or OS/VS2 BTAM. BSCA attachment is supported by CICS/VS (operating under DOS/VS, OS/VS).

BSCA Optional Specifications (Mdl 2): When ordering, one selection must be specified from each of the first three categories below. Selection from category (4.) must be based on the notes following:

1. Transfer Rate:

1200 bps	**#9751**
2000 bps	**#9752**
2400 bps	**#9753**
4800 bps	**#9754**

2. Network Attachment:

Point-to-Point (Nonswitched)	**#9481**
Multipoint Tributary	**#9482**
Point-to-Point (Switched)	**#9483**

3. Planned Device Attachment:

System/3	**#9580**
System/7	**#9590**
System/32	**#9591**
System/34	**#9594**
System/38	**#9599**
S/370	**#9570**
S/370, 3031, 3032, 3033	**#9596**
3741 mdl 2, or 4	**#9579**
5110	**#9595**
Other IBM Equipment	**#9592**
Non-IBM Equipment	**#9593**

4. Line Facility Attachment: *

Duplex (4-wire only) **	**#9391**
Half-duplex (2-wire only) ***	**#9392**

Notes:

* If Interface (#4780) is ordered with a 2-wire telephone connection or if a 1200 bps Integrated Modem (#5501) switched is ordered, no specify code is required.

** Specify **#9391** only as follows: If Multipoint Tributary (#9482) is ordered, or
If 1200 bps Integrated Modem (#5500) nonswitched is ordered, or
If Interface (#4780) is ordered, and external modem attachment is to a 4-wire telephone line.

*** Specify **#9392** only if Integrated Modem (#5500) is ordered based on 2-wire or 4-wire telephone line.

BSCA Feature Configuration: When the BSCA feature is ordered, either the Integrated Modem or External Modem Interface must be selected. Select either Item (1.) or (2.) and the required or optional special features.

	Modem Interface	Internal Clock (#9334)
1.	Interface (#4780)	Optional
2.	1200 bps Integrated Modem:	
	- Nonswitched (#5500)	Required
	- Switched with Auto-Answer (#5501)	Required

The BSCA feature is designed to operate at speeds between 1200 and 4800 bps over common carrier switched or nonswitched facilities or

5231 Controller (cont'd)

equivalent privately owned communication facilities. See M2700 pages for information on communications facilities. #2074 will operate in half-duplex mode over nonswitched communications lines which may be duplex or half-duplex facilities. Switched network versions include, as a basic capability, support of manual dial and manual or auto-answer operations (assumes the attached modems will support this mode of operation). Transmission code is EBCDIC. **Limitations:** For mdl 2 only. **Maximum:** One. **Prerequisites:** #5500, #5501, or #4780.

Secondary Output Punch Attachment (#3210): [Mdls 1 and 3 only] When ordered with the 5231 mdl 1 provides attachment of a 5496 Data Recorder equipped with System/3 mdl 6 or 5230 Attachment (#7501). When ordered with mdl 3 provides attachment of a 129 Card Data Recorder equipped with Card Input/Output Attachment (#7503). The attachment allows the 5496 Data Recorder or the 129 Card Data Recorder to be connected as a backup card punch/print for the 5231 Primary Punch. **Limitations:** For mdls 1 and 3 only. **Maximum:** One. **Field Installation:** Yes.

Loop 2 Attachment (#4700): Provides capability to attach four additional Data Entry or Time Entry Stations to the 5231 Controller. This expands total system capability to seven entry stations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 5230 Data Collection System Accessory Package (B/M **2461786**).

Loop 3 Attachment (#4701): Provides capability to attach four additional data entry or time entry stations to the 5231 controller. This expands the total system capability to eleven entry stations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4700 and 5230 Data Collection System Accessory Package (B/M **2461786**).

Loop 4 Attachment (#4702): Provides capability to attach four additional Data Entry or Time Entry Stations to the 5231 controller. This expands the total system capability to its full capacity of fifteen entry stations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4701 and 5230 Data Collection System Accessory Package (B/M **2461786**).

EIA Interface (#4780): Provides a cable and interface which meets RS-232-C characteristics for attachment of an IBM modem or Non-IBM modem. Non-IBM modems may be attached subject to Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500, #5501). For mdl 2 only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074. **Note:** This feature may also require Internal Clock. Internal clock is available at 1200 bps only. **Specify:** If the internal clock is desired with the interface, specify **#9334**, or **#9483** for attachment to switched lines.

1200 bps Integrated Modem (#5500, #5501): [Mdl 2 only] A modem for BSC data transmission at 1200 bps over nonswitched facilities or switched facilities. Available in two versions: #5500 for nonswitched and #5501 for switched with auto-answer. Attachment to the nonswitched facilities is via an IBM-provided cable directly to the telephone line. Attachment to the switched network is via FCC registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with the 5231 Controller must also be equipped with a 1200 bps Integrated Modem/Line Adapter. **Limitations:** Cannot be installed with Interface (#4780). #5500 and #5501 cannot be installed together. For mdl 2 only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074. **Specify:** **#9334** for Internal Clock, and **#9483** if #5501 was selected.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Except for loop cables (see below), no special order required for 5230 Data Collection System. Cables are shipped automatically with the type mdl and the associated features. A 9.1 meter (30 foot) modem cable will be furnished with the Control Unit. No cable order is required for 5231 mdl 2.

5230 Data Collection System Accessory Package: Contains the parts necessary for the customers to complete their preinstallation responsibilities. All items in the Accessory Package are prerequisites, except the Alarm Connector (B/M **2461785**), to some machines of the 5230 System. The Contacts Closure Accessory is a prerequisite only for feature code #1480. The accessory items are ordered via the *MES Order Guide* (Z120-2665). Normal schedule ship date for the accessory package items or customer supplied equivalents should be scheduled to precede the 5230 system by a minimum of seven weeks. This is to allow the customers time to complete their preinstallation responsibilities prior to receiving the 5230 system. Items ordered are purchase only and no maintenance is available. Normal parts warranty of three months is applicable.

The Accessory Package provides the capability for the customer to order and install those physical installation accessories not readily available from the customer's normal supplier. See the *5230 Data Collection System User Guide* (GA34-0040) chapter titled "Installation - Schedule of Events" for scheduled and preinstallation instructions.

Station Connector (B/M **2461780**): Provides the interface between each Entry Station (5234, 5235 and 5236) and the loop cable. Addressing switches for entry station identification and a bypass relay are included as part of the connector. One station connector is required for each 5234, 5235 and 5236. It is recommended that at least one spare station connector should be ordered per 5230 system. The customer is responsible for supplying the receptacle housing for the station connector. Refer to *IBM 5230 Data Collection System User Guide* (GA34-0040) for details.

Mounting Bracket (B/M **2461781**): Provides a metal bracket for either wall, pedestal or table mounting of a 5235 or a 5234. One mounting bracket is a prerequisite for each 5235 and 5234.

Loop Cable: Cable available from IBM to meet the loop requirements. Available in either a 152 meter (500 foot) spool (B/M **2461783**) or 304 meter (1000 foot) spool (B/M **2461784**). Loop cable B/M **2461783** or B/M **2461784** or equivalent must be used for system preinstallation. Specifications of this cable must be met if other cable is used. **Note:** Specifications for the 5230 Data Collection System loop cable are available from IBM.

Alarm Connector (B/M **2461785**): Provides a 3-pin connector to attach an external alarm to the 5231 Controller. The customer provides the external alarm and the wiring to the alarm connector (B/M **2461785**). The customer provided wire must be stranded 20 AWG. Voltage and current on the wire must not exceed 48V and 1.5A respectively. The connector is plugged into the 5231 Controller at installation time. The customer supplied alarm is used, if desired, to provide an audible or visual signal to the customer when the 5231 Controller requires operator attention. This no-charge feature may be desirable even though the 5231 has an internal audible alarm as a standard feature.

Loop Connectors (B/M **2461786**): Provides the connection between the 5231 Controller and the loop cable. One loop connector is a prerequisite for each 5231 Controller, and one for each additional loop (#4700, #4701, #4702) attached to the controller.

Contacts Closure Accessory (B/M **4413082**): Is prerequisite for installing the Contacts Closure Feature (#1480) on the 5234 or 5235/5236. Contact Closure Accessory contains associated connectors, printed circuit card, and relay. It is recommended that at least one spare be ordered per 5230 System. More may be required if several features are installed per system. Customer must provide the external devices with required power and, if necessary, any circuity to activate external devices that may require a longer time than the contact closure time of 0.5 seconds minimum. Contact maximum ratings are 28V AC/DC at 1.5A. The IBM-supplied crimp-on terminals for connecting external devices are designed for 18 to 22 AWG wire. Two sets of contacts are provided that can be used in a normally open or normally closed mode. The customer is responsible for supplying the receptacle housing for the Contact Closure Accessory. Refer to *5230 Data Collection System User Guide* (GA34-0040) for details.

Berg Connector (B/M 8327397): Provides for the connection between the Series/1 and the loop cable. One Berg connector is required for each RPQ D02312, D02313, or D02314 attached to the Series/1.

SUPPLIES

The following items may be ordered for initial and replacement quantities as appropriate. The *5230 Data Collection System User Guide* (GA34-0040) contains order forms for supplies. The User Guide instructs the customer to give the completed order form to the marketing representative. It must be forwarded to the appropriate marketing representative.

Badges: See *5230 Data Collection System User Guide* (GA34-0040) for standard format and other supplies data. For each badge order placed with SSD, there is a minimum order quantity for each badge setup and a minimum total-quantity-per-customer order.

Cards:
Mdl 1 ... 96-column (P/N **3700**).
Mdl 3 ... 80-column (P/N **5081**).
Manufacturing Applications... Four cards commonly used in manufacturing related data collection applications can be ordered as standard supplies. Each type of card may be individually ordered.

	SSD Part Number	
Card Type	80-Column	96-Column
Order/Material Receipt	**W41071**	**W41067**
Material Issue	**W41072**	**W41068**
Move	**W41073**	**W41069**
Operation	**W41074**	**W41070**

For format of these cards see the *Data Collection Application Workbook* (GH30-0203).

Diskette: Mdl 2 (P/N **2305830**) 128 byte.

Ink Roll Assembly: Mdl 3 (P/N **432695**).

Ribbon: Mdl 1 (P/N **1136849**). One supplied with the controller.

5234 TIME ENTRY STATION

PURPOSE

The 5234 is an input device for the 5230 Data Collection System. The 5234 also attaches to Series/1 via RPQ DO2312, DO2313, or DO2314. Contact IBM for information concerning these RPQs.

MODELS

Model 1	001	With Hole Badge Reader
Model 2	002	With Magnetic Stripe Badge Reader

Limitations: Loop operations will not continue properly in the event of a 5234, 5235, or 5236 power off situation if the total resultant distance between operating units (5231, 5234, 5235, 5236) exceeds 690 meters (2,000 feet).

Prerequisites:

An available position on a loop multiplexer on the 5231 Controller.

The following items from the 5230 Data Collection System Accessory Package. See M5231 pages for details.

- Contacts Closure Accessory (B/M 4413082) required for Contacts Closure (#1480).
- Mounting Bracket (B/M 2461781).
- Station Connector (B/M 2461780).

Note: The 5230 Data Collection System Accessory Package items must have a scheduled ship date at least seven weeks prior to the ship date of the 5234 Time Entry Station. See the *5230 Data Collection System User's Guide* (GA34-0040) for the pre-installation schedule.

HIGHLIGHTS

The 5234 is industrially packaged and attaches to the 5231 Controller via a twisted pair shielded loop. Both mdls provide a 4-position continental time-of-day display. Additionally, a key-operated 3-position mode switch (supervisor, test, and normal mode) is provided. Two keys operate the mode switch, one for supervisor mode and a separate key for test mode.

Mdl 1 with Hole Badge Reader: Reads identification badges (22-column card sized) prepunched in IBM code with a maximum of 10 numeric digits. Badges with or without a pocket clip may be used. Size-compatible hole badges used with other IBM products are accepted by the 5234 if they meet other specifications for the 5234. Badges may be purchased from IBM. All badges used must meet the specifications for the 5234 Time Entry Station. See "Information Records" in the GI section.

Mdl 2 with Magnetic Stripe Badge Reader: Reads identification badges (22-column card sized) magnetically encoded with a maximum of 17 numeric digits. Badges with or without a pocket clip may be used. Size-compatible magnetic stripe badges used with other IBM products are accepted by the 5234. Badges may be purchased from IBM. All badges used must meet the specifications for the 5234 Time Entry Stations. See "Information Records" in the GI section.

Customer Responsibilities: Maintenance of the 5234 will take place at the 5231 Controller location or Series/1 location as appropriate. The dedicated maintenance port (first entry station position on the standard loop multiplexer) will be used for maintenance only.

For specific customer responsibilities, see "Customer Responsibilities" in the M5231 pages.

Note: The customer must sign the IBM Central Facility Maintenance Machine Amendment I (Z120-2476). For details, consult "Central Facility Maintenance" in the GI section.

Environment: The 5234 is designed to operate in an environment of 4-45 degrees Celsius (40-113 degrees Fahrenheit), 8-80% relative humidity, and a maximum wet bulb of 26.7 degrees Celsius (80 degrees Fahrenheit).

The 5230 system is designed to operate in offices or factories. This assumes a building which is not air conditioned, but with normal winter heat and normal ventilation. For further environmental information, see "Use of IBM Equipment in Industrial Environments" in the GI section. For questionable environments, contact Field Engineering for assistance in determining the environmental suitability for the 5234.

Publications: *5230 Data Collection System User's Guide* (GA34-0040).

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz, locking plug): Specify **#9880**.

SPECIAL FEATURES

Audible Indicator (#1470): Provides an audible indication to the operator at the successful completion of a badge read operation. **Field Installation:** Yes.

Contacts Closure (#1480): Provides the capability for the activation of customer-provided external devices. These devices, for example, may be audible alarms, visual indicators, or devices that provide limited access to restricted areas. Activation of the external contacts will occur on 5234 Time Entry Station successful badge read. This feature, which is in addition to the normal visual indicators, can be ordered instead of or in addition to the Audible Indicator (#1470). A set of DPDT contacts is available (two sets of contacts that can be used in either a normally open or normally closed mode). **Limitations:** Customer must provide power supply for driving external devices. Contact maximum rating is 28V AC/DC at 1.5 amperes. Contact activation time is 0.5 seconds minimum. **Field Installation:** Yes. **Prerequisites:** Contacts Closure Accessory (B/M 4413082). See M5231 pages. **Installation:** Refer to *5230 Data Collection System User's Guide* (GA34-0040). Installation of Contacts Closure Accessory is similar to installation of Station Connector assembly.

MODEL CONVERSIONS

All model changes are field installable.

ACCESSORIES

Cables: No cable order required for the 5234. Loop cable is required for the 5230 system. See M5231 pages for details and ordering information.

SUPPLIES

See "Supplies" in the M5231 pages.

5235 DATA ENTRY STATION

PURPOSE

The 5235 is an input device for the 5230 Data Collection System. The 5235 also attaches to Series/1 via RPQ DO2312, DO2313, or DO2314. Contact IBM for further information concerning these RPQs.

MODELS

Model 1 001

Limitations: Loop operations will not continue properly in the event of a 5234, 5235, or 5236 power off situation if the total resultant distance between operating units (5231, 5234, 5235, 5236) exceeds 609 meters (2,000 feet).

Prerequisites:

An available position on a loop multiplexer on the 5231 Controller.

The following items from the 5230 Data Collection System Accessory Package. See M5231 pages for details.

- Contacts Closure Accessory (B/M 4413082) required for Contacts Closure (#1480).
- Mounting Bracket (B/M 2461781).
- Station Connector (B/M 2461780).

Note: The 5230 Data Collection System Accessory Package items must have a scheduled ship date at least seven weeks prior to the ship date of the 5235 Data Entry Station. See the *5230 Data Collection System User's Guide* (GA34-0040) for the pre-installation schedule.

HIGHLIGHTS

The 5235 is industrially packaged and attaches to the 5231 Controller via a twisted-pair shielded loop.

The basic unit provides variable numeric data entry capability, customer-defined action keys, numeric display ability, continental time-of-day display, mode switch (key-operated), control keys, and status indicators.

Action Keys: Eight customer-defined keys used for individual action definitions.

Numeric Keyboard: Ten numeric keys arranged in a pattern similar to a telephone keypad.

Display: An 8-position display used for continental time-of-day, operator guidance, and display of key-entered data. Data entered through the Value Read Attachment (#3400) is also displayed.

Mode Switch (Key-Operated): A 3-position keylock (supervisor, test, and normal mode). One key is supplied for supervisor use and a second different key for test mode use.

Control Keys: The "Enter" (E) key is used to indicate completion of a field of keyed data. The "Clear" (C) key is used to delete a field of keyed data.

Status Indicators: These advise the operator that the station is ready, in process, or in an error condition.

Optional Features: Either an 80- or 96-column card reader may be attached as a feature. Either a punched hole or magnetic stripe badge reader may be attached as a feature. See "Special Features".

Customer Responsibilities: Maintenance of the 5235 will take place at the 5231 Controller loation or Series/1 location as appropriate. The dedicated maintenance port (first entry station position on the standard loop multiplexer) will be used for maintenance only.

For specific customer responsibilities, see "Customer Responsibilities" in the M5231 pages.

Note: The customer must sign the IBM Central Facility Maintenance Machine Amendment I (Z120-2476). For details, consult "Central Facility Maintenance" in the GI section.

Environment: The 5235 is designed to operate in an environment of 4-45 degrees Celsius (40-113 degrees Fahrenheit), 8-80% relative humidity, and a maximum wet bulb of 26.7 degrees Celsius (80 degrees Fahrenheit).

The 5230 system is designed to operate in offices or factories. This assumes a building which is not air conditioned, but with normal winter heat and normal ventilation. For further environmental information, see "Use of IBM Equipment in Industrial Environments" in the GI section. For questionable environments, contact Field Engineering for assistance in determining the environmental suitability for the 5235.

Publications: *5230 Data Collection System User's Guide* (GA34-0040).

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz, locking plug): Specify **#9880**.

SPECIAL FEATURES

Badge Reader - Punched Hole (#1401): Provides the ability to read identification badges (22-column card sized) pre-punched in IBM code with a maximum of 10 numeric digits. Badges with or without a pocket clip may be used. Size-compatible hole badges used with other IBM products are accepted by the 5235 if they meet other specifications for the 5235. Badges may be purchased from IBM. Badges must meet the specifications for the 5235 Data Entry Station. See "Information Records" in the GI section. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Badge Reader - Magnetic Stripe (#1402). **Field Installation:** Yes.

Badge Reader - Magnetic Stripe (#1402): Provides the ability to read identification badges (22-column card sized) magnetically encoded with a maximum of 17 numeric characters. Badges with or without a pocket clip may be used. Size-compatible magnetic badges used with other IBM products are accepted by the 5235. Badges may be purchased from IBM. Badges used must meet the specifications for the 5235 Data Entry Station. See "Information Records" in the GI section. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Badge Reader - Punched Hole (#1401). **Field Installation:** Yes.

Audible Indicator (#1470): Provides an audible indication to the operator at the successful completion of a badge read operation or upon completion of a transaction when the Transaction Indicator RPQ DO7009 is installed on the associated 5231. Either badge reader or RPQ DO7009 is required for this feature. **Field Installation:** Yes.

Contacts Closure (#1480): Provides the capability for the activation of customer-provided external devices. These devices, for example, may be audible alarms, visual indicators, or devices that provide limited access to restricted areas. Activation of the external contacts will occur on 5235 Data Entry Station successful badge read or upon completion of a transaction when the Transaction Indicator RPQ DO7009 is installed on the associated 5231. Either badge reader or RPQ DO7009 is required for this feature. This feature, which is in addition to the normal visual indicators, can be ordered instead of or in addition to the Audible Indicator (#1470). The customer may order spare Contacts Closure Accessory (B/M 4413082). A set of DPDT contacts is available (two sets of contacts that can be used in either a normally open or normally closed mode). **Limitations:** Customer must provide power supply for driving external devices. Contact maximum rating is 28V AC/DC at 1.5 amperes. Contact activation time is 0.5 seconds minimum. **Field Installation:** Yes. **Prerequisites:** Contacts Closure Accessory (B/M 4413082). See M5231 pages. **Installation:** Refer to *5230 Data Collection System User's Guide* (GA34-0040). Installation of Contacts Closure Accessory is similar to installation of Station Connector assembly.

Card Reader - 96-Column (#1510): Provides a single card reader capable of reading columns 1-32 of a 96-column card (first tier) at a rated speed of 30 columns per second. A 64-character set including blanks is recognized. All other EBCDIC characters will be accepted by the entry station and converted to blanks. Cards are inserted face up, column one edge first. Upper left and upper right corner cuts are permitted. External scores System/3-1 (bottom edge) and System/3-3 (column 32 edge) are permitted as well as left and right edge continuous forms scores. Standard DP-7 point, heavy duty card stock, DP-9 point, super stock, and merchandise tags with or without upper right score or hole may be used. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Card Reader - 80-Column (#1520). **Field Installation:** Yes.

Card Reader - 80-Column (#1520): Provides a single card reader capable of reading columns 1-64 of an 80-column card at a rated speed of 30 columns per second. A 64-character set including blanks is recognized. All other EBCDIC characters will be accepted by the entry station and converted to blanks. Upper left and upper right corner cuts (C1, C2, C3) are permitted. Cards are inserted face up, 80-column edge first. External scores (column 1 end only), M-3, M-4, M-5, M-6, M-7, OM-2, CF-4, and CF-11 are permitted. Internal scores may be M-3, M-4, and inverse M-5. Standard DP-7 point, heavy duty card stock, DP-9 point, super stock, and port-a-punch cards may be used. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Card Reader - 96-Column (#1510). **Field Installation:** Yes.

Value Read Attachment (#3400): Provides the capability to enter values from scales, counters, keyboards, switches, and other similar devices directly into the 5235 or 5236 Data Entry Station. Connection of the device to the Value Read Attachment is accomplished through the 5239 Value Read Module. The Value Read Attachment is mutually exclusive with the badge or card reader on the 5235 or 5236 Data Entry Station. **Note:** The user is responsible for setting up the 5239 and performing all connections to the value input device. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: No cable order required for the 5235. Loop cable is required for the 5230 system. See the M5231 pages for details and ordering

5235 Data Entry Station (cont'd)

information.

SUPPLIES

See "Supplies" in the M5231 pages.

5236 DATA ENTRY STATION

PURPOSE

The 5236 is an input device for the 5230 Data Collection System. The 5236 also attaches to Series/1 via RPQ DO2313 or DO2314. Contact IBM for further information concerning these RPQs.

MODELS

Model 1 001

Limitations: Loop operations will not continue properly in the event of a 5234, 5235, or 5236 power off situation if the total resultant distance between operating units (5231, 5234, 5235, 5236) exceeds 609 meters (2,000 feet).

Prerequisites:

An available position on a loop multiplexer on the 5231 Controller.

The following items from the 5230 Data Collection System Accessory Package. See M5231 pages for details.

- Contacts Closure Accessory (B/M 4413082) required for Contacts Closure (#1480).
- Station Connector (B/M 2461780).

Note: The 5230 Data Collection System Accessory Package items must have a scheduled ship date at least seven weeks prior to the ship date of the 5236 Data Entry Station. See the *5230 Data Collection System User's Guide* (GA34-0040) for the pre-installation schedule.

HIGHLIGHTS

The 5236 is packaged in an attractive desk-top configuration and attaches to the 5231 Controller via a twisted-pair shielded loop.

The basic unit provides variable numeric data entry capability, customer-defined action keys, numeric display ability, continental time-of-day display, mode switch (key-operated), control keys, and status indicators.

Action Keys: Eight customer-defined keys used for individual action definitions.

Numeric Keyboard: Ten numeric keys arranged in a pattern similar to a telephone keypad.

Display: An 8-position display used for continental time-of-day, operator guidance, and display of key-entered data. Data entered through the Value Read Attachment (#3400) is also displayed.

Mode Switch (Key-Operated): A 3-position keylock (supervisor, test, and normal mode). One key is supplied for supervisor use and a second different key for test mode use.

Control Keys: The "Enter" (E) key is used to indicate completion of a field of keyed data. The "Clear" (C) key is used to delete a field of keyed data.

Status Indicators: These advise the operator that the station is ready, in process, or in an error condition.

Optional Features: Either an 80- or 96-column card reader may be attached as a feature. Either a punched hole or magnetic stripe badge reader may be attached as a feature. See "Special Features".

Customer Responsibilities: Maintenance of the 5236 will take place at the 5231 Controller loation or Series/1 location as appropriate. The dedicated maintenance port (first entry station position on the standard loop multiplexer) will be used for maintenance only.

For specific customer responsibilities, see "Customer Responsibilities" in the M5231 pages. Note: The customer must sign the IBM Central Facility Maintenance Machine Amendment I (Z120-2476). For details, consult "Central Facility Maintenance" in the GI section.

Environment: The 5236 is designed to operate in an environment of 10-40 degrees Celsius (50-105 degrees Fahrenheit), 8-80% relative humidity, and a maximum wet bulb of 26.7 degrees Celsius (80 degrees Fahrenheit).

The 5230 system is designed to operate in offices or factories. This assumes a building which is not air conditioned, but with normal winter heat and normal ventilation. For further environmental information, see "Use of IBM Equipment in Industrial Environments" in the GI section. For questionable environments, contact Field Engineering for assistance in determining the environmental suitability for the 5236.

Publications: *5230 Data Collection System User's Guide* (GA34-0040).

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz, locking plug): Specify **#9880**.

SPECIAL FEATURES

Badge Reader - Punched Hole (#1401): Provides the ability to read identification badges (22-column card sized) pre-punched in IBM code with a maximum of 10 numeric digits. Badges with or without a pocket clip may be used. Size-compatible hole badges used with other IBM products are accepted by the 5236 if they meet other specifications for the 5236. Badges may be purchased from IBM. Badges must meet the specifications for the 5236 Data Entry Station. See "Information Records" in the GI section. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Badge Reader - Magnetic Stripe (#1402). **Field Installation:** Yes.

Badge Reader - Magnetic Stripe (#1402): Provides the ability to read identification badges (22-column card sized) magnetically encoded with a maximum of 17 numeric characters. Badges with or without a pocket clip may be used. Size-compatible magnetic badges used with other IBM products are accepted by the 5236. Badges may be purchased from IBM. Badges used must meet the specifications for the 5236 Data Entry Station. See "Information Records" in the GI section. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Badge Reader - Punched Hole (#1401). **Field Installation:** Yes.

Audible Indicator (#1470): Provides an audible indication to the operator at the successful completion of a badge read operation or upon completion of a transaction when the Transaction Indicator RPQ DO7009 is installed on the associated 5231. Either badge reader or RPQ DO7009 is required for this feature. **Field Installation:** Yes.

Contacts Closure (#1480): Provides the capability for the activation of customer-provided external devices. These devices, for example, may be audible alarms, visual indicators, or devices that provide limited access to restricted areas. Activation of the external contacts will occur on 5235 Data Entry Station successful badge read or upon completion of a transaction when the Transaction Indicator RPQ DO7009 is installed on the associated 5231. Either badge reader or RPQ DO7009 is required for this feature. This feature, which is in addition to the normal visual indicators, can be ordered instead of or in addition to the Audible Indicator (#1470). The customer may order spare Contacts Closure Accessory (B/M 4413082). A set of DPDT contacts is available (two sets of contacts that can be used in either a normally open or normally closed mode). **Limitations:** Customer must provide power supply for driving external devices. Contact maximum rating is 28V AC/DC at 1.5 amperes. Contact activation time is 0.5 seconds minimum. **Field Installation:** Yes. **Prerequisites:** Contacts Closure Accessory (B/M 4413082). See M5231 pages. **Installation:** Refer to *5230 Data Collection System User's Guide* (GA34-0040). Installation of Contacts Closure Accessory is similar to installation of Station Connector assembly.

Card Reader - 96-Column (#1510): Provides a single card reader capable of reading columns 1-32 of a 96-column card (first tier) at a rated speed of 30 columns per second. A 64-character set including blanks is recognized. All other EBCDIC characters will be accepted by the entry station and converted to blanks. Cards are inserted face up, column one edge first. Upper left and upper right corner cuts are permitted. External scores System/3-1 (bottom edge) and System/3-3 (column 32 edge) are permitted as well as left and right edge continuous forms scores. Standard DP-7 point, heavy duty card stock, DP-9 point, super stock, and merchandise tags with or without upper right score or hole may be used. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Card Reader - 80-Column (#1520). **Field Installation:** Yes.

Card Reader - 80-Column (#1520): Provides a single card reader capable of reading columns 1-64 of an 80-column card at a rated speed of 30 columns per second. A 64-character set including blanks is recognized. All other EBCDIC characters will be accepted by the entry station and converted to blanks. Upper left and upper right corner cuts (C1, C2, C3) are permitted. Cards are inserted face up, 80-column edge first. External scores (column 1 end only), M-3, M-4, M-5, M-6, M-7, OM-2, CF-4, and CF-11 are permitted. Internal scores may be M-3, M-4, and inverse M-5. Standard DP-7 point, heavy duty card stock, DP-9 point, super stock, and port-a-punch cards may be used. **Limitations:** This feature is mutually exclusive on the same Data Entry Station with Card Reader - 96-Column (#1510). **Field Installation:** Yes.

Value Read Attachment (#3400): Provides the capability to enter values from scales, counters, keyboards, switches, and other similar devices directly into the 5235 or 5236 Data Entry Station. Connection of the device to the Value Read Attachment is accomplished through the 5239 Value Read Module. The Value Read Attachment is mutually exclusive with the badge or card reader on the 5235 or 5236 Data Entry Station. Note: The user is responsible for setting up the 5239 and performing all connections to the value input device. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: No cable order required for the 5236. Loop cable is required for the 5230 system. See M5231 pages for details and ordering information.

SUPPLIES

See "Supplies" in the M5231 pages.

5239 VALUE READ MODULE

PURPOSE

The 5239 is an input device for the 5230 Data Collection System that provides an interface between external devices (such as scales, counters, keyboards, and switches) and the Value Read Attachment (#3400) of the 5235 and 5236 Data Entry Stations.

MODELS

Model 1 001

Prerequisites: Value Read Attachment (#3400) on a 5235 or 5236 Data Entry Station.

HIGHLIGHTS

The 5239 provides four selectable modes of operation from manual to automatic:

- Manual: Operator-controlled reading and entry. Keyboard or device input available.
- Protected: Keyboard locked during data reading. Operator-controlled reading and entry from device.
- Semi-Automatic: Reading of data is controlled from external device. Entry of data is performed by operator.
- Automatic: Reading and entry of data is controlled from external device. Permits unattended data collection of externally provided data.

Customer selection of reading mode for each terminal. Up to eight numeric digits can be entered from one or more devices.

Operates with either BCD/TTL parallel or one-of-ten dry contact external devices.

Customer Responsibilities: Maintenance of the 5239 will take place at the 5231 Controller location or Series/1 location as appropriate.

For specific customer responsibilities, see "Customer Responsibilities" in the M5231 pages.

Note: The customer must sign the IBM Central Facility Maintenance Machine Amendment I (Z120-2476). For details, consult "Central Facility Maintenance" in the GI section.

Environment: The 5239 is designed to operate in an environment of 4-45 degrees Celsius (40-113 degrees Fahrenheit), 8-80% relative humidity, and a maximum wet bulb of 26.7 degrees Celsius (80 degrees Fahrenheit).

The 5230 system is designed to operate in offices or factories. This assumes a building which is not air conditioned, but with normal winter heat and normal ventilation. For further environmental information, see "Use of IBM equipment in Industrial Environments" in the GI section. For questionable environments, contact Field Engineering for assistance in determining the environmental suitability for the 5239.

Publications: *5230 Data Collection System User's Guide* (GA34-0040).

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz, locking plug): Specify **#9880.**
- Color: Specify **#9065** for Pebble Gray if used with the 5235 Data Entry Station, or **#9066** for Pearl White if used with the 5236 Data Entry Station.
- Value Read: Specify **#9950** for BCD. Electronic device input provides for connection of BCD/TTL parallel external devices to the Value Read Attachment. Provides manual and automatic selectable modes of operation. **Prerequisites:** #3400 on the 5235 and 5236.

  Specify **#9951** for one-of-ten. Electromechanical device input provides for connection of one-of-ten or BCD dry contact external devices to the Value Read Attachment. Provides manual and automatic selectable modes of operation. **Prerequisites:** #3400 on the 5235 and 5236.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: No cable order required.

SUPPLIES (None)

5241 PRINTER

PURPOSE:

Serial impact matrix printer which provides hard copy output for the System/23 Datamaster (5322 or 5324).

MODELS:

Model 001 Speed, 80 cps Print Type, Matrix

Customer Setup (CSU): The printer is designated as Customer Setup. All features are CSU. Refer to the GI section for particulars. There is no setup publication shipped with the printer. That information is included in *Setting Up Your System/23* (SA34-0107) shipped with the 5322 or *System/23 Setup Instructions* (SA34-0186) shipped with the 5324. The CSU allowance is one day.

HIGHLIGHTS:

Prints bidirectionally. Horizontal character spacing is program-selectable, as follows:

Characters Per Inch	Maximum Characters Per Line
10	132
15	198

If no horizontal character spacing is specified, 10 characters per inch will be printed.

Matrix characters are formed by eight vertical wires printing dots in up to four of seven possible horizontal positions. The 5241 Printer can print any character (except 1/4, 1/2, or 3/4) that can be displayed on the 5322 or 5324. See *BASIC Language Reference* (SA34-0109) for details.

Vertical spacing is program-selectable in increments of 1/96 inches (.0104 inches). For a single program command, the vertical movement is eight increments minimum and 96 maximum. This permits line spacing from one line per inch to 12 lines per inch. The printer will default to six lines per inch if the user does not program-select a vertical line spacing. The lines per page parameter is also program-selectable, the default being 66 lines per page.

A forms tractor feed is standard. The left tractor feed guide can be operator-adjusted laterally over a 2.5 character distance to provide for character/form alignment. The right-hand tractor feed guide is fully adjustable for variable form widths.

The tractor feed mechanism and the Document Insertion Device feature mount simply and quickly. No cables or bolts need be attached since mere physical placement with a downward force of the tractor feed engages the necessary drive mechanism. See "Special Features" for more information on the Document Insertion Device (#3250).

The 5241 Printer is packaged in its own tabletop covers and measures 655mm x 420mm x 220mm (26 inches x 17 inches x 9 inches) and weighs 31kg (68 pounds). The standard forms tractor allows multi-part fan-folded paper. Overall forms width ranges from 76mm to 381mm (3 inches to 15 inches). Continuous forms fold-to-fold length may vary from 76mm to 355mm (3 inches to 14 inches). Up to four-part forms can be printed with a maximum thickness of .30mm (.012 inches). Forms less than 127mm (5 inches) in width should be tried for satisfactory feeding, registration, and print quality. Forms that exceed .30mm (.012 inches) thickness can create printer feeding, registration, and print quality problems. Card stock continuous forms are not recommended. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations.

Customer Responsibilities: The marketing representative must advise the customers of their responsibilities before receipt of the machine. Refer to the GI section for particulars. The customer is responsible for providing a desk or tabletop to support the printer.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): With nonlocking plug. Standard power cord is 2.4 meters (8 feet).
- Color: Pearl White.
- Signal Cable (standard): One 6 meter (19.8 foot) cable is provided which is permanently attached. For a 1.8 meter (6 foot) cable, specify **#9987**.

SPECIAL FEATURES

Document Insertion Device (#3250): The Document Insertion Device allows operator insertion of single sheets or multiple copy forms (up to four-part sets) meeting the following criteria:

	Maximum	Minimum
Width	304.8mm (12 inches)	146mm (5.75 inches)
Length	355.6mm (14 inches)	76.2mm (3 inches)
Thickness:		
Single-Part	.13mm (.005 inches)	.08mm (.003 inches)
Four-Part	.30mm (.012 inches)	

The left-hand feed guide is adjustable horizontally, approximately one character width for alignment of preprinted forms. The right-hand feed guide is fully adjustable for variable form widths. For shipment to the field, order by feature number. **Field Installation:** Yes. **Customer Setup:** Yes.

Printer Switch And Cable Assembly (#5600): Provides a two-position manually operated switch and cables, which permits the connection of any 5241 Printer between any two 5322 or 5324 Computers.

The printer switch box clips to the printer and has two cables, 6 meters (19.8 feet) in length, that attach to the computers. For a 1.8 meter (6 foot) cable, specify **#9987**. The box is marked 1 and 2 and the switch is accessible at the recessed top. The box is 76.2mm x 101.6mm x 38.1mm (3 inches x 4 inches x 1.5 inches). For shipment to the field, order by feature number. **Field Installation:** Yes. **Customer Setup:** Yes.

MODEL CONVERSIONS: (None)

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms and provides for forms stacking after printing. This accessory is a one shelf forms stand. For shipment to the field, order by feature number.

SUPPLIES:

Ribbons: A cartridge ribbon, P/N 7034535 or equivalent, is required. One cartridge is supplied with the printer.

5242 PRINTER

PURPOSE

Serial impact matrix printer which provides hard copy output for the System/23 Datamaster (5322 or 5324) and the 5280 Distributed Data System.

MODELS

Model 002	Speed, 40 cps	Print Type, High-Density Matrix
	or	
	Speed, 160 cps	Print Type, Matrix

Customer Setup (CSU): The printer is designated as Customer Setup. All features are CSU. Refer to the GI section for particulars. For the System/23, no setup publication is shipped with the printer. That information is included in *Setting Up Your System/23* (SA34-0107) shipped with the 5322, or *System/23 Setup Instructions* (SA34-0186) with the 5324. For the 5280, *IBM 5280-5242 Printer Unpacking and Setup* (GA23-1022) is shipped with the 5242. The CSU allowance is one day (two days when installed concurrently with a 5280).

HIGHLIGHTS

Prints bidirectionally. Horizontal character spacing is program-selectable, as follows:

Characters Per Inch	Maximum Characters Per Line
10	132
15	198

If no horizontal character spacing is specified, 10 characters per inch will be printed. Horizontal spacing using the mdl 2 in high-density mode is 10 characters per inch only.

Matrix characters are formed by eight vertical wires printing dots in up to four of seven possible horizontal positions. When the printer is used to create higher quality impact printing, both the columns and rows have the intra-character spaces filled in with dots. The 5242 Printer can print any character that can be displayed on the 5322 or 5324. See *BASIC Language Reference* (SA34-0109) for details.

Vertical spacing is program-selectable in increments of 1/96 inches (0.0104 inches). For a single program command, the vertical movement is eight increments minimum and 96 maximum. This permits line spacing from one line per inch to 12 lines per inch. The printer will default to six lines per inch if the user does not program-select a vertical line spacing. The lines per page parameter is also program-selectable.

A forms tractor is standard. The left tractor feed guide can be operator-adjusted over a 2.5 character distance to provide for character/form alignment. The right-hand tractor feed guide is fully adjustable for variable form widths.

The tractor feed mechanism and the Document Insertion Device mount simply and quickly. No cables or bolts need be attached since mere physical placement with a downward force of the tractor feed engages the necessary drive mechanism. See "Special Features" for more details on the Document Insertion Device (#3250).

A horizontal vernier adjustment knob is standard permitting centering within a one character width.

Offers the ability to create high-density, high-quality matrix impact printing on cut forms through a second head pass over the same printed line. High-density printing is invoked by a program command (Set Font command) and will operate at 40 cps with a character spacing of 10 characters per inch.

Note: High-density print is specified to provide high-quality print with platen-fed cut forms such as typing paper. Tractor-fed continuous forms may not provide the same quality print and should be tested for satisfactory registration.

The 5242 is a table-top printer 655mm x 420mm x 220mm (26 inches x 17 inches x 9 inches) and weighs 35kg (77 pounds). The standard forms tractor allows multi-part fan-folded paper. Overall forms width ranges from 76mm to 381mm (3 inches to 15 inches). Continuous forms fold-to-fold length may vary from 76mm to 355mm (3 inches to 14 inches). Up to 4-part forms can be printed with a maximum thickness of 0.30mm (0.012 inches). Forms less than 127mm (5 inches) in width should be tried for satisfactory feeding, registration, and print quality. Forms that exceed 0.30mm (0.012 inches) thickness can create printer feeding, registration, and print quality problems. Card stock continuous forms are not recommended. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations.

Customer Responsibilities: The marketing representative must advise the customers of their responsibilities before receipt of the machine. Refer to the GI section for particulars. The customer is responsible for providing a desk or tabletop to support the printer.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): With nonlocking plug. Standard power cord is 2.4 meters (8 feet).
- Color: Pearl White.
- Signal Cable (standard): For System/23, one 6 meter (19.8 foot) cable is provided which is permanently attached. For a 1.8 meter (6 foot) cable, specify **#9987**. For 5280, **#9050** *must* be specified for a 6 meter (19.8 foot) permanently attached signal cable.

SPECIAL FEATURES

Document Insertion Device (#3250): The Document Insertion Device allows operator insertion of single sheets or multiple copy forms (up to 4-part sets) meeting the following size criteria:

	Maximum	Minimum
Width	304.8mm (12 inches)	146.mm (5.75 inches)
Length	355.6mm (14 inches)	76.2mm (3 inches)
Thickness:		
Single-Part	0.13mm (0.005 inches)	0.08mm (0.003 inches)
Four-Part	0.30mm (0.012 inches)	

The left-hand feed guide is adjustable horizontally, approximately one character width for alignment of preprinted forms. For shipment to the field, order by feature number. **Field Installation:** Yes. **Customer Setup:** Yes.

Printer Switch And Cable Assembly (#5600): Provides a 2-position manually operated switch and cables, which permit the connection of any 5242 Printer between any two 5322 or 5324 Computers.

The printer switch box clips to the printer and has two cables, 6 meters (19.8 feet) in length, that attach to the 5322 or 5324 Computers. For a 1.8 meter (6 foot) cable, specify **#9987**. The box is marked 1 and 2 and the switch is accessible at the recessed top. The box is 76.2mm x 101.6mm x 38.1m (3 inches x 4 inches x 1.5 inches). For shipment to the field, order by feature number. **Limitations:** Cannot be installed on a 5242 that is attached to a 5280 system. **Field Installation:** Yes. **Customer Setup:** Yes.

MODEL CONVERSIONS

Model upgrade is permitted and field installable.

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms and provides for forms stacking after printing. This accessory is a one shelf forms stand. For shipment to the field, order by feature number.

SUPPLIES

Ribbons: A cartridge ribbon, P/N 7032550, is available from IBM. P/N 7032550 or equivalent, is required. One cartridge is supplied with the printer.

5246 DISKETTE UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides additional diskette storage for the System/23 Datamaster (5322 or 5324).

MODELS

Model	Drives	Capacity	Function
011	1	1.1MB	Dedicated
012	2	2.2MB	Dedicated
021	1	1.1MB	Shared
022	2	2.2MB	Shared

Customer Setup (CSU): The 5246 is designated as Customer Setup. There is no setup publication shipped with the Diskette Unit. That information is included in *Setting Up Your System/23* (SA34-0107) shipped with the 5322 Computer, or *System/23 Setup Instructions* (SA34-0186) shipped with the 5324. The CSU allowance is one day.

Prerequisites: The 5322 or 5324 Computer(s) which will utilize the 5246 Diskette Unit must have 5246 Diskette Unit Controller (#3775) or Extended 5246 Controller (RPQ 8N5008) installed.

HIGHLIGHTS

- One or two diskette drives, up to 2.2MB total storage capacity.
- Either attached and dedicated to a single 5322 or 5324 Computer or shared between two computers under program control at either or both workstations.
- Direct access capability.
- Media exchange capability with other diskette devices that conform to basic interchange conventions.
- Self-contained tabletop unit.

Housed in its own covers, the 5246 measures 300mm x 330mm x 390mm (12 inches x 13 inches x 15 inches) and weighs 25kg (56 pounds).

Diskettes: The 5246 Diskette Units can read/write Diskette 1, 2, and 2D. The possible formats for the diskettes are shown below. The System/23 uses the 512 byte format; however, other formats may be selected for data interchange purposes.

Diskette 1

Format	Bytes/Sector	Capacity
1	128	243KB *
2	512	303KB

Diskette 2

3	128	486KB *
4	512	606KB

Diskette 2D

5	256	985KB
6	512	1136KB

* Basic Exchange format

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 3 above) and H Exchange (Format 5 above). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Examples are the System/3, System/32, System/34, System/38, Series/1, S/370, 303X, 3540, 3740, 3747, 3790, 4300, 5110, 5120, 5230, 5260, and 8100.

The instantaneous data transfer rate using Diskette 1 or 2 is 31.2K bytes/second; for Diskette 2D, 62.5K bytes/second. Rotational speed of both types of drives is 360 rpm.

For further information on System/23 diskette operations, see *System/23 Customer Support Functions, Volume I* (SA34-0175).

File Sharing: The presence of two users is managed in such a way as to retain maximum usability of the system while still maintaining the integrity of shared data files. Applications written for a single 5322 or 5324 Computer can be shared in a dual configuration with no changes to the program. Transparent data file sharing between dual workstations is managed in the Read Only Storage (ROS) of each computer. Application transparency will also allow programs written for a dual system to operate on a single 5322 or 5324 with no modification required. The matrix for file sharing for files opened without prohibiting sharing is shown below.

		Data File Currently Open to: Read	or	Read/Write
Request to Open a Data File and:	Read	Yes		Yes
	Read/Write	Yes		No

See *System/23 Operator Reference* (SA34-0108) or *Learning System/23 BASIC* (SA34-0121 to SA34-0127) for further detail.

Customer Responsibilities: The marketing representative must advise customers of their responsibilities before receipt of the machine. Refer to the GI section for particulars.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): With nonlocking plug. Standard power cord is 2.4 meters (8 feet).
- Signal Cable (standard): Mdls 11 and 12 - one 4 meter (13 foot) cable is provided. Mdls 21 and 22 - two 4 meter (13 foot) cables are provided. For 1.8 meter (6 foot) cables for mdls 11, 12, 21, and 22, specify **#9987**.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model upgrades are permitted and are field installable.

The upgrade purchase price for model conversion may be greater than the base machine purchase price differentials. Customers should carefully evaluate their requirements prior to purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Diskettes: Diskettes for the 5246 Diskette Unit are available from the Branch Office. See *Customer Support Functions, Volume I* (SA34-0175) to determine diskette type (1, 2, or 2D) required.

SUPPLIES (None)

RPQs

Extended Distance: [Mdls 21 or 22]

8N5009 - Plant Installation
8N5023 - Field Installation

This RPQ permits one of the 5322 or 5324 Computers in a multiple configuration to be located at a distance up to 60 meters (200 feet) from 5246 mdls 21 or 22. Individual IBM-supplied extension cables are available (see below). **Maximum:** One. **Field Installation:** Yes (**RPQ 8N5023**). **Prerequisites:** Extended 5246 Controller (**RPQ 8N5008**) required on the 5322 or 5324.

Individual IBM-supplied extension cables are:

RPQ	Name
SW2901	Extended Cable 15 meters (50 feet)
SW2902	Extended Cable 30 meters (100 feet)
SW2903	Extended Cable 60 meters (200 feet)

The 5246 is designated as Customer Setup; therefore, all cable installation and routing is the responsibility of the customer.

5247 DISK STORAGE UNIT

PURPOSE

Provides a high performance, shareable, fixed disk storage facility for the 5322 or 5324 Computer Processor Units.

MODELS

Model 11 011 15.4MB capacity.

Model 12 012 30.8MB capacity.

Prerequisite: Each 5322 or 5324 Computer which will utilize the 5247 Disk Storage Unit must have a 5247 Disk Unit Adapter (#3770) installed. The Computer attached to the standard 4 meter signal cable must have a diskette capability.

Standard Feature: The standard 5247, Model 11 and 12, may attach one or two 5322 or 5324 Computers. If you wish more than two computers to be attached, see "Special Features" below.

HIGHLIGHTS

- Compact, self-powered, floor-standing unit designed to operate in normal office environments.
- Average access time of 40ms.
- May be shared by up to four 5322 or 5324 Computers -- three may be up to 300m (1,000 feet) distant. One computer must be adjacent to the 5247 for servicing use.
- High-speed serial data link attachment.
- Transparent data file sharing managed by micro-processor control logic.
- File format compatibility with System/23 diskettes provides application flexibility.

Logical Organization:

Block Size -- 512 bytes

Number of Blocks -- Mdl 11 - 30,123

Number of Blocks -- Mdl 12 - 60,247

The first 2,040 blocks of the disk are reserved for system use, diagnostics, and Customer Support Functions.

File Sharing: The presence of multiple users is managed in a way to retain maximum usability of the system and still maintain the integrity of shared data files. Specification of the degree of file sharing is under control of the application program. Applications written for a single System/23 Computer can be shared in a multiple computer configuration with no changes to the program. For more detailed information on the file sharing capabilities of the 5247, see *Using Your 5247 Disk,* (SA34-0188). This publication is shipped with each 5247 Disk Unit Adapter (#3770) ordered for a 5322 or 5324 Computer.

Customer Setup (CSU): The 5247 is designated as customer setup. The marketing representative must advise the customer of their responsibilities before receipt of the machine. *5247 Customer Setup Instructions* (SA34-0187) are shipped with the machine.

CSU allowance is one day.

Physical Planning Information: Dimensions -- 660mm (26 in) H x 310mm (12 in) W x 493mm (20 in) D; Weight -- 47 kg (105 lb); Maximum KVA -- .3; Heat Output -- 1,025 BTU/Hour. Service clearances required -- 610mm (24 in) front and rear; 150mm (6 in) on both sides.

AAS Ordering Instructions: The 5247 is a Systems Component.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): Nonlock plug. Standard power cord is 2.4m (8 feet). Specify **#9986** for 1.8m (6 foot) power cord.
- Signal cable (standard) -- one 4m (13 foot) cable is provided. Specify **#9987** for 1.8m (6 foot) signal cable.
- Additional signal cables must be ordered if more than one Datamaster is to be attached to the 5247. See Cable Assemblies below.

SPECIAL FEATURES

Adapter Expansion (#3700): Provides the capability to attach a third and fourth 5322 or 5324 computer to the 5247. **Prerequisites:** Each 5322 or 5324 to be attached must have a 5247 Disk Unit Adapter (#3770) installed. Signal cables must be ordered for each 5322 or 5324 to be attached; see "Cable Assemblies" below. **Limitations:** One per 5247. **Field Installation:** Yes.

Cable Assemblies: One of the following cable assemblies is required for each 5322 or 5324 computer, after the first, to be attached to a 5247 Disk Storage Unit:

Feature Code	Cable Length
#3710	4m(13 feet)
#3715	15m (50 feet)
#3720	30m (100 feet)
#3725	150m (500 feet)
#3730	300m (1000 feet)

The 5247 is designated as customer setup; therefore all cable installation and routing is the responsibility of the customer. See *5247 Customer Setup Instructions* (SA34-0187) for cable connection instructions and procedures. These cables are designed only for use inside a building or structure and are not to be used in an exterior environment.

TERMS and CONDITIONS

Machine Group: D
Warranty: B
Per Call: 2
Educational Allowance: Yes
Customer Set-up: Yes
Pre-Installation Test Allowance: None
Volume Purchase Plan: Available
Pilot Test Plan: Available

Installation License: All IBM Licensed Programs for System/23 are determined as "Installation License" as specified in the Agreement for IBM Licensed Programs.

All System/23 computers (types 5322 and 5324) which are cable-connected to one 5247 in one customer location can share one Licensed Program for which a single installation license has been obtained.

One 5322 or 5324 must be designated as the machine to which the Licensed Program is assigned.

MODEL CONVERSIONS

Model upgrades are permitted. All model upgrades and features are field installable by Field Engineering.

The upgrade purchase price for model changes may be greater than the base machine purchase price differentials. Customers should carefully evaluate their requirements prior to purchasing a model that may require an upgrade.

Removed parts from any model upgrade become the property of IBM.

5251 DISPLAY STATION

PURPOSE

The 5251 is an advanced function display station for Series/1, System/34, System/36, and System/38 for entering, editing, and displaying alphameric data. A movable keyboard permits the operator to display, enter, and manipulate data on the screen in a highly flexible and efficient manner.

MODELS

Model 1 001 [NO LONGER AVAILABLE.] For special features, see below. Displays up to 960 characters with 12 lines of 80 characters each. Attaches to the 5251 models 2 or 12, 5340, 5381, or Series/1. Used as the system console with System/34.

Model 2 002 [NO LONGER AVAILABLE.] For special features, see below. Displays up to 960 characters with 12 lines of 80 characters each. Provides communication capability with System/34 and System/38 in SNA/SDLC mode. Optional features allow up to eight additional workstations.

Model 11 011 Displays up to 1,920 characters with 24 lines of 80 characters each. Attaches to the 5251 models 2 or 12, 5340, 5360, 5381, or Series/1. Used as the system console with System/34, and System/36. See model 999.

Model 12 012 Displays up to 1,920 characters with 24 lines of 80 characters each. Provides communication capability with System/34, System/36, and System/38 in SNA/SDLC mode. Optional features allow up to eight workstations to be attached.

Model 999 999 Available for ease of order entry. Identical functions to model 11. Includes as standard the following:

Specify **#9881** - Nonlocking line cord plug
Feature #4600 - Typewriter-style keyboard
Feature #2680 - Cable-Thru

No other specify or features are available on the model 999.

Prerequisites: For mdls 1 and 11: A 5251 mdl 2 or 12 with Cluster feature (#2550) or Dual Cluster feature (#2551), a 5340, 5360, 5381, or Series/1 with 5250 Information Display System Attachment feature (#1210).

For mdl 2: Transmission via common carrier facility to a 5340 or 5381 with a communications adapter, requires a modem or a DDS Adapter. See "Special Features" for communications adapters.

For mdl 12: Transmission via common carrier facility to a 5340, 5360, or 5381 with a communications adapter, requires a modem or a DDS Adapter. See "Special Features" for communications adapters.

Customer Setup (CSU): The 5251 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The IBM Marketing Representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day. Special features are not CSU.

HIGHLIGHTS

The standard character set includes 96 8x16 dot matrix characters including: 52 upper/lower case alphabetic, 10 numeric, and 34 special characters in addition to the space character. A 188-character Multinational Character Set (see "Special Features") is available, providing 112 alphabetic, 10 numeric, and 66 special displayable characters in addition to the space. See "Type Catalog" for character set and keyboard layout. Display functions in addition to normal intensity are high intensity, non-display, blink, underscore, column separator, and reverse image (dark characters on a light background) on a field basis. The operator can also reverse the image of the entire screen. An audible alarm, under program control, is provided to alert the operator to special conditions. The keyboard with 24 application-assigned command functions provides input and control flexibility. See "Special Features".

Security Enhancements: Data fields may be defined so data entered is accepted without being displayed on the screen. A Keylock (#4655) prevents operator usage of the display and keyboard when the key is in the locked position. The display is blanked and keyboard data entry is inhibited when the Keylock is locked. A Magnetic Stripe Reader (#4910) is available for entering user identification.

Field Editing: Individual data input fields may be edited as Alphameric, Alpha Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase, and Self-Check Modulus 10 and 11 (Self-Check is optional on the 5251 mdls 2 and 12).

Cabling: The cable attachments between 5250 Display System components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via a Cable-Thru feature (#2680) on each workstation.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: Additional workstations may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. See "Special Features".

Communications: The 5251 mdls 2 and 12 communicate with a System/34 or a System/38 equipped with compatible communications adapters operating in SDLC mode only. The 5251 mdl 12 can also communicate with System/36 equipped with a compatible communications adpter operating in SDLC mode. The mdls 2 and 12 communicate in half-duplex mode on nonswitched (leased) point-to-point and multipoint communication lines which may be duplex or half-duplex facilities (depending upon communication feature selected) at speeds up to 9600 bps, and on switched (dial) point-to-point communication lines at speeds up to 4800 bps. See M2700 pages for information on communications facilities. **Limitations:** The mdls 2 and 12 are not supported on the Series/1. Mdl 2 is not supported on System/36. A 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), 4800 bps Integrated Modem (#5740, #5741), DDS Adapter (#5650, #5651), or Interface (#3701) is required. See "Specify" and "Special Features" for the required communication cable.

IBM Modems: One IBM modem may be attached to a 5251 mdl 2 or 12.

Modem	Speed (bps)
3863	2400
3868 mdl 1	2400
3872	2400/1200
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3/4	9600

Note: 5251 mdls 2 and 12 do not support Auto-Call Originate (#1091) on the 3872. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages.

Prerequisites: EIA Interface (#3701).

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the 5251 mdl 2 or 12 and the external modem.

Note: Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communications capability. 3845 or 3846 devices operating with SDLC protocol will not operate with NRZI transmission mode.

Prerequisites: EIA Interface (#3701).

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5251 Operator's Guide* (GA21-9248). Also, see "Customer Responsibilities".

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5251.
- Physical setup, connection of cables to TP lines/modems and IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions supplied by IBM. Under certain conditions, when using integrated modems, an IBM CE may be required. Details of these conditions are described in the Customer Setup instructions.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5251.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (if required) will be ordered by the branch office.
- Relocation of the 5251, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5251 prior to calling for IBM service.
- Providing a desk or tabletop to support the 5251.
- Installation and maintenance of signal cables and associated parts for attaching the 5251 mdl 1 or 11 to the 5251 mdl 2 or 12, 5340, 5381, or Series/1.

5251 Display Station (cont'd)

- The installation and maintenance of common carrier facilities/services. For further information, see M2700 pages and "Teleprocessing Systems" in the GI section.
- Obtaining a firm installation date for the start of transmission services (including any required modems). The IBM Marketing Representative must assure that a firm installation date is established prior to Order Confirmation.
- When adding additional display stations to Series/1, System/34, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775), or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle). **#9881** will be supplied on the mdl 999.
- Color: Pearl White only (no specify required).
- Keyboard: A keyboard must be selected (see "Special Features").
- Cables: See "Accessories" for 5251 mdls 1 and 11 cable ordering instructions. For cable specifications, see the *5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).
- Power Cord: The standard power cord is 2.4 meters (8 feet) and no specify is required.
- Communication Cable (mdls 2 and 12 only): A 6 meter (20 foot) communication cable is provided as standard for attachment to an external modem, DDSA, or to a communication facility when an integrated modem is used. If a 12 meter (40 foot) cable is desired, specify **#9461**. (**#9461** is not available with #5641 or #5741.)
- DDSA (#5650, #5651) Transmission Speed: **#9822** for 2400 bps, **#9823** for 4800 bps, or **#9825** for 9600 bps.
- Default Order Entry: A default order entry procedure is available. Mdl 999 may be ordered in lieu of a mdl 11 and will automatically include a nonlocking line cord plug (**#9881**), a typewriter-style Keyboard (#4600), and Cable-Thru (#2680). No other specify nor special features may be ordered for a mdl 999. If a different configuration is desired, it must be ordered as a mdl 11 with the desired specify and special features.

  Field installation or removal of any specify or special feature on mdl 999 can be accomplished only as follows:

SPECIAL FEATURES

Cluster (#2550): Allows attachment of up to four workstations (5219, 5224, 5225, 5251 mdls 1 or 11, 5252, 5256, 5291, or 5292). Provides four cable connections. The maximum allowable length of each twinaxial cable is 1,525 meters (5,000 feet). To attach multiple workstations (up to four) to one twinaxial cable, see Cable-Thru feature (#2680) for the 5225, 5251 mdls 1 and 11, 5252, and 5256. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Dual Cluster feature (#2551). A 5252 represents two workstations. **Maximum:** One. **Field Installation:** Yes.

Dual Cluster (#2551): Allows attachment of up to eight workstations (5219s, 5224s, 5225s, 5251 mdls 1 or 11, 5252s, 5256s, 5291s, and 5292s). Two sets of four cable connectors are provided and up to four workstations may be attached to each set. The maximum allowable length of each twinaxial cable is 1,525 meters (5,000 feet). To attach multiple workstations (up to four) to one twinaxial cable, see Cable-Thru feature (#2680) for the 5225s, 5251 mdls 1 and 11, 5252s, and 5256s. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Cluster feature (#2550). A 5252 represents two workstations. **Maximum:** One. **Field Installation:** Yes.

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdls 1 and 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **Notes:** For relocation flexibility, the customer should have Cable-Thru on all workstations. #2680 will be supplied as standard on mdl 999. **Limitations:** Available for mdls 1, 11, and 999 only. **Maximum:** One. **Field Installation:** Yes.

Expanded Function (#3600): Copy provides for the direct transfer and printing of a screen image from the 5251 mdl 2 or 12 or an attached 5251 mdl 1 or 11, 5252, 5291, or 5292 to a printer attached to the 5251 mdl 2 or 12. The selection and allocation of the printer is controlled by the system program. Not supported by System/34 or System/36.

Magnetic Stripe Reader Control provides control for Magnetic Stripe Readers feature (#4910) on the 5251 mdls 2 or 12 and on attached 5251 mdls 1 and 11 and 5252s.

Selector Light-Pen Control provides control for Selector Light-Pen feature (#6300) on the 5251 mdl 2 or 12 and on attached 5251 mdls 1 and 11. Not supported by System/34 or System/36.

Self-Check Number provides Modulus 10 and 11 checking to assure that all digits of a number have been correctly keyed from the 5251 mdl 2 or 12 keyboard or the attached 5251 mdl 1 or 11, 5252, 5291, or 5292 keyboards.

Limitations: Available for mdls 2 and 12 only. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with DDS Adapter (#5650, #5651), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Specify **#9492**(Comm. Line Switch) when external modem has SNBU capability. **Notes:** **#9492** is not required if external modem is a 3863, 3864, or 3865. Internal Clock (#4703) is also required when the external modem does not provide its own clocking.

Keyboard (#4600, #4601, #4602): One of the following must be selected:

#4600 - An 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 control keys, and 10-key numeric pad. **Note:** #4600 will be supplied as standard on mdl 999.

#4601 - A 66-key data entry style keyboard, movable, with 36 alphameric keys, 23 control keys, and seven blank keys.

#4602 - A 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, 23 control keys, and seven blank keys. The numeric keys are arranged similarly to those of an adding machine.

Limitations: #4601 and #4602 are not supported when 5251 is directly or remotely attached to the 5340, 5360, or Series/1, and are not available for mdl 999. **Maximum:** One of the above. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys, which prevents operator entry and display of data when in a locked position. **Limitations:** Not available for mdl 999. **Maximum:** One. **Field Installation:** Yes.

Internal Clock (#4703): Generates synchronizing and timing signals at 600 bps or 1200 bps when they are not provided by the modem.

Contact IBM for determination of this feature's requirement with planned modems. **Limitations:** Available for mdls 2 and 12 only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, or #5502.

Multinational Character Set (#4905): Provides the capability of displaying the 188-character Multinational Character Set to facilitate the interchange of information between systems with different language groups. **Limitations:** The keyboards do not include the additional characters of the Multinational Character Set. All characters may be entered via a single or multiple key sequence. Not available for mdl 999. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** #4905 on the 5340 or 5360. All workstations attached to the System/34, System/36, and 5251 mdl 2 or 12 must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.

Magnetic Stripe Reader (#4910): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards, and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Not available for mdl 999. Valid for numeric-only data and single data fields. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3600 on 5251 mdls 2 and 12 or #4900 on the 5340 and 5360 when displays are directly attached.

1200 bps Integrated Modem (#5500, #5502): A modem for operating at 1200 bps over a nonswitched or switched network. Available in two versions: #5500 - nonswitched, and #5502 - switched with manual answer. Attachment to the nonswitched (4-wire only) facilities is via an IBM-provided cable directly to the line, type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CDT type (or equivalent) provided by the user.

5251 Display Station (cont'd)

The system communicating with the 5251 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Interface (#3701), 2400 bps Integrated Modem (#5640, #5641), DDS Adapter (#5650, #5651), or 4800 bps Integrated Modem (#5740, #5741). #5500 and #5502 cannot be installed together. **Note:** 5251s with a #5500 or #5502 cannot be field upgraded to a 2400 bps Integrated Modem (#5640, #5641) or a 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4703.

2400 bps Integrated Modem (#5640, #5641): A self-clocked integrated modem that operates in half-duplex mode at speeds of 2400/1200 bps. Speed selection is under host control. Equalization is automatic and continuously performed. Available in two versions: #5640 - nonswitched, operates over 4-wire nonswitched communication facilities in point-to-point or multipoint mode, and #5641 - switched, operates over 2-wire switched communication facilities. Manual originate and auto-answer procedures are used to establish connections. The protective coupler required for FCC registration (required for direct connection to the Public Switched Network) is included with this feature. (Conditional upon FCC approval and registration.) The system communicating with the 5251 must also be equipped with a compatible 2400 bps Integrated Modem, a 3863 or a 3868 mdl 1 modem. **Limitations:** Available for mdls 2 and 12 only. Not compatible with Integrated Modems (#5600, #5601, #5602, #5610, #6600, #6601, #6602, or #6610) on the 5340. Cannot be installed with EIA Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), DDS Adapter (#5650, #5651), or 4800 bps Integrated Modem (#5740, #5741). #5640 and #5641 cannot be installed together. **Maximum:** One. **Field Installation:** No. Field conversion from #5640/#5641 to #5740/#5741 is available via RPQ. Field conversion to EIA Interface (#3701) is not available.

Digital Data Service Adapter (#5650, #5651): An integrated adapter for point-to-point data transmission at speeds of 2400, 4800, or 9600 bps over the AT&T nonswitched Data-Phone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. For point-to-point (#5650), for multipoint tributary (#5651), see "Specify" for speed selection. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with EIA Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes.

4800 bps Integrated Modem (#5740, #5741): A self-clocked integrated modem that operates in half-duplex mode at speeds of 4800/2400 bps. Speed selection is under host control. Equalization is automatic and continuously performed. Available in two versions: #5740 - nonswitched, operates over 4-wire nonswitched communication facilities in point-to-point or multipoint mode ... #5741 - switched, operates over 2-wire switched communication facilities. Manual originate and auto-answer procedures are used to establish connections. The protective coupler required for FCC registration (required for direct connection to the Public Switched Network) is included with this feature. (Conditional upon FCC approval and registration.)

The system communicating with the 5251 must also be equipped with a 3684 compatible 4800 bps Integrated Modem, a 3864 or a 3868 mdl 2 Modem. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or DDS Adapter (#5650, #5651). #5740 and #5741 cannot be installed together. **Maximum:** One. **Field Installation:** No. Field conversion from #5740/5741 to #5640/5641 is available via RPQ. Field conversion to EIA Interface (#3701) is not available.

Selector Light-Pen (#6300): A hand-held, pen-like device that permits the operator to select fields of data from the display screen for system input. **Limitations:** Not available for mdl 999. Not supported when the 5251 is directly or remotely attached to the 5340, 5360, or directly attached to the Series/1. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** #3600 on 5251 mdls 2 or 12.

MODEL CONVERSIONS

A mdl 999 may be changed to a mdl 11 in the field (see "Default Order Entry"). No other mdl changes are available.

ACCESSORIES

Keylock, Keys: The 5251 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser.) Order additional keys on MES (your plant of manufacture). A letter of authorization with key identification number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Display Screen Filter (#3225, #3226): #3225 for mdls 11 and 12, #3226 for mdls 1 and 2. A specially designed filter which attaches to the display screen, reducing reflected glare in those installations with adverse lighting conditions. Character contrast may also be enhanced. The filter is a CSU accessory. For 5251 mdls 11 and 12, B/M = 7361262. For 5251 mdls 1 and 2, B/M = 7361280.

Cables: The twinaxial cables and/or associated parts to interconnect the 5250 Information Display System components and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinax® Connector Kit (P/N 7362268): Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (Individual connectors P/N 7362229 are available for replacement.)

Twinax Wire (P/N 7362211): Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (P/N 3762230): Permits two Twinax Cables Assemblies to be joined together.

Twinax Station Protector Kit (B/M 7361807): Two protectors. One is required at each end of each Twinax Attachment Cable installed outdoors (either above or below ground level). Individual Twinax Station Protectors, P/N 7362426, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

Magnetic-Stripe Cards: For magnetically striped and encoded cards for Magnetic Stripe Reader (#4910) see IBM.

5252 DUAL DISPLAY STATION

[NO LONGER AVAILABLE]

PURPOSE

The 5252 is an advanced function dual display station which attaches to the 5251 models 2 and 12, Series/1, 5340 System Unit or 5381 System Unit for entering, editing and displaying alphameric data. It may be used as the system console with System/34. The 5252 displays up to 960 characters on each display with 12 lines of 80 characters each. Two movable keyboards permit both operators to display, enter and manipulate data in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5252 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The 5252 functions as two independent display stations. The standard character set includes ninety-six 8x16 dot matrix characters - 52 upper/lower case alphabetic, 10 numeric, 34 special characters in addition to "space". A 188-character Multinational Character Set (see "Special Features") is available, providing 112 alphabetic, 10 numeric and 66 special displayable characters in addition to "space". See "Type Catalog" for character set and keyboard layouts. Each display provides functional characteristics which permit normal intensity, high intensity, non-display, blinking, underscore column separator, and reverse image (dark characters on a light background) on a field basis. The image of each display can be reversed independently. Audible alarms, under program control, are provided to alert each operator to special conditions. The keyboards with 24 application-assigned command functions provide input and control flexibility. See "Special Features".

Security Enhancements: Data fields can be defined allowing entered data to be accepted without being displayed on the screen. A Keylock (#4655) prevents operator usage of both displays and both keyboards when the key is in the locked position. The displays are blanked and keyboard data entry is inhibited when the keylock is locked. Two Magnetic Stripe Readers (#4910) are available for entering user identification.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachments between the 5250 Display System components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via a Cable-Thru feature (#2680) on each workstation. A second workstation may be attached via the Cable-Thru feature (#2680). Twinaxial cable must be used between the first and second workstation and the maximum allowable distance between these two workstations is 30 meters (100 feet). See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5252 may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. The 5252 represents two workstations.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operators. The procedures are provided in the *IBM 5252 Operator's Guide* (GA21-9248). Also, see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5252.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5252.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (if required) will be ordered by the branch office.
- Relocation of the 5252, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5252 prior to calling for IBM service.
- Providing a desk or table-top to support the 5252.
- Installation and maintenance of signal cables and associated parts for attaching the 5252 to the 5251 mdl 2 or 12, 5340, 5381 or Series/1.
- When adding additional display stations to Series/1, System/34 or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689) or *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775) or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

AAS Ordering Instructions: The 5252 is a System Component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for locking plug (requires customer locking type receptacle). The standard power cord is 2.4 meters (8 feet)
- Color: Pearl white only (no specify required).
- Keyboards: Two must be selected. See "Special Features".
- Cables: See "Accessories". For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5225s, 5224s, 5219s, 5252s, 5251 mdls 1 and 11, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **Note:** For relocation flexibility, the customer should have Cable-Thru on all workstations. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4600, #4601, #4602): Two of the following must be selected:

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 control keys and 10-Key numeric pad.

#4601: 66-key data entry style keyboard, movable with 36 alphameric keys, 23 control keys and seven blank keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, 23 control keys and seven blank keys. The numeric keys are arranged similar to those of an adding machine.

Limitations: #4601 and #4602 are not supported when the 5252 is directly attached to the 5340 or Series/1. **Maximum:** Two of the above. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which prevents operator entry and display of data on either workstation when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Multinational Character Set (#4905): Provides the capability of displaying the 188-character Multinational Character Set to facilitate the interchange of information between systems with different language groups. **Limitations:** The keyboards do not include the additional characters of the Multinational Character Set. All characters may be entered via a single or multiple key sequence. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** Multinational Control (#4905) on 5340. All workstations attached to the System/34 and 5251 mdl 2 or 12, must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.

Magnetic Stripe Reader (#4910): Provides the capability of reading numerically encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature may be used to enhance system data security by providing the ability to read an operator identification card without being displayed. Contact IBM for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data and single data field. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #3600 on 5251 mdls 2 or 12, or #4900 on 5340 when 5252 is directly attached.

MODEL CONVERSIONS (None)

5252 Dual Display Station (cont'd)

ACCESSORIES

Keylock and Keys: The 5252 with Keylock #4655 is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser). A letter of authorization with key identification number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Cables: Twinaxial cables and/or associated parts to attach the 5252 to other components or systems of the 5250 Information Display System, may be purchased from IBM or a from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts refer to *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) or *IBM 5280 Cable Assembly Manual* (GH21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinax® Adapter (P/N 7362230): For connecting two cable assemblies.

Twinax Cable Assembly (P/N 7363367): Cable with two connectors attached to bulk wire. The required length must be specified on the order.

Twinax Connector Kit (P/N 7362268): Two loose connectors. Individual connectors (P/N 7362229) are available for replacement. One Twinax Connector Kit and Twinax Wire are required for each attachment cable.

Twinax Wire (P/N 7362211): Bulk wire. Length must be specified. This is an indoor/outdoor cable.

Twinax Station Protector Kit (P/N 7361807): A kit Includes two protectors. One is required at each end of each Twinax attachment cable installed outdoors (either above or below ground level). Individual Twinax station protectors (P/N 7362426) are available for replacement purposes.

SUPPLIES (None)

5253 DISPLAY STATION

PURPOSE

The 5253 Display Station is an advanced function display station for the 5520 Administrative System which provides for entering, editing, and displaying word processing information. The 5253 displays up to 1,920 characters with 24 lines of 80 characters each. Dual text and attribute buffers allow vertical scrolling and horizontal segmenting of stored pages. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. A movable keyboard permits the operator to display, enter, and manipulate information on the screen in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5253 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The marketing representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The displayable character set includes 187 8 x 16 dot matrix characters. See "Type Catalog" for character set and keyboard layouts. Display functions include: non-display, blinking, underscore, and reverse image (dark characters on a light background). Each of the above highlights may occur on a character, word, or line basis. In addition, individual character positions may be superimposed with a slash, dash, or double underscore. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program.

Contextual cursor control is provided by four outboard keys on the keyboard. The cursor is positioned forward or backward on a character, word, line, page, etc., by the depression of a single key when using the contextual cursor. An additional ten outboard keys provide special function control.

Security Enhancements: Character positions may be defined so that entered data is accepted without being displayed on the screen. A Keylock (#4655) helps prevent operator usage of the display and keyboard when the key is in the locked position. The display is blanked and keyboard text entry is inhibited when the keylock is locked.

Attachment to the 5520 Administrative System: Twinaxial cable connectors are provided on the 5525 System Unit for attachment of the 5253 Display Stations (and the 5254 Dual Display Stations). The cumulative maximum length of any one twinaxial cable is 1,524 meters (5,000 feet). Up to seven display stations can be attached to any one cable via the Cable-Thru feature (#2680). The 5254 represents two display stations. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for additional cabling information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided with each 5253. Also see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking, and placement of the 5253.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5253.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5253, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5253 prior to calling for IBM service.
- Providing a desk or table-top to support the 5253.
- Installation and maintenance of signal cables and associated parts for attaching the 5253 to the 5525 System Unit.
- When adding additional display stations on the 5520 Administrative System, the customer may have to modify the system configuration specifications; refer to the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Publications: Refer to M5525 pages for the available publications.

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Color: Pearl White only (no specify required).
- Power Cord and Plug: Standard power cord is 2.4 meters (8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if this is required, specify **#9986**. Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Keyboard: A keyboard must be selected (see "Special Features").
- Cables: See "Accessories" for 5253 cable ordering instructions. For cable specifications, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another source.

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5253s and 5254s to a single cable. Each unit on the cable, except the last, requires this feature. **Note:** For relocation flexibility, the customer should consider including #2680 on all display stations. **Maximum:** One. **Field Installation:** Yes.

Function Extension Feature (#3270): This feature is a prerequisite for the 5520 Administrative System 3270 Emulation Capability. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. Refer to 5520 in "Programming" and M5525 pages for additional information. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4610, #4611): One of the following keyboards must be selected:

#4610: 92-character text keyboard with a typewriter-like layout, movable, with 46 alphameric keys and 36 control keys. **Maximum:** One. **Field Installation:** Yes.

#4611: 96-character text keyboard with a typewriter-like layout, movable, with 48 alphameric keys and 36 control keys. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which helps prevent operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Symbol Display (EC #835667): Standard on all 5253s shipped from the plant after February, 1984. Without this EC symbols emanating from keyboard #202 and #204 are displayed on the screen as equivalent non-symbol characters, video-reversed. With this EC all symbols are displayed as fully-formed graphics. See 5520 programming for further details. **Maximum:** One. **Field Installation:** No.

MODEL CONVERSIONS (None)

ACCESSORIES

Keylock Keys: The 5253 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser of the keys only.) Key Identification Number must accompany each order. Specify P/N **2546418**. Allow six to eight weeks for delivery.

Display Screen Filter (#3225): A specially designed filter which attaches to the display screen reducing reflected glare in those installations with adverse lighting conditions. Character contrast may also be enhanced. The filter is a Customer Setup accessory. For shipment with the 5253, order by feature number. For shipment to the field, order by bill of material number. Specify B/M **7361433**.

Palm Rest (#7796): This accessory is an extension to the keyboard providing increased operator comfort. Customers must be advised that it is a customer-attachable option only. All attachment hardware is provided and no tools are required. **Limitations:** Not available for 5253s with serial numbers 03550 and below.

Cables: The cables and/or associated parts to attach the 5253 to the 5525 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5253.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one connector kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacement.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be

5253 Display Station (cont'd)

added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector (P/N **7362426**): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from that used for printers or a System Unit attached via a printer line.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES (None)

5254 DUAL DISPLAY STATION

[NO LONGER AVAILABLE]

PURPOSE

The 5254 Dual Display Station is an advanced function dual display station for the 5520 Administrative System which provides for entering, displaying, and editing word processing information. The 5254 displays up to 960 characters on each display with 12 lines of 80 characters each. Dual 8,000-character text and attribute buffer for each station allow vertical scrolling and horizontal segmenting of stored pages. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. Two movable keyboards permit both operators to display, enter, and manipulate information in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5254 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The marketing representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The 5254 functions as two independent display stations. The displayable character set includes 187 8 x 16 dot matrix characters. See "Type Catalog" for character set and keyboard layouts. Display functions include: non-display, blinking, underscore, and reverse image (dark characters on a light background). Each of the above highlights may occur on a character, word, or line basis. In addition, positions may be superimposed with a slash, dash, or double underscore. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program.

Contextual cursor control and directional cursor are provided by four outboard keys on the keyboard. The cursor is positioned forward or backward on a line, page, word, character, etc., by the depression of a single key when using contextual cursor. An additional ten outboard keys provide special function control.

Security Enhancements: Character positions may be defined so that entered data is accepted without being displayed on the screen. A Keylock (#4655) helps prevent operator usage of both displays and both keyboards when the key is in the locked position. The displays are blanked and keyboard text entry is inhibited when the keylock is locked.

Attachment to the 5520 Administrative System: Connectors are provided on the 5525 System Unit for attachment of the 5254 Dual Display Stations (and the 5253 Display Stations). The cumulative maximum length of any one twinaxial cable is 1,524 meters (5,000 feet). Up to seven 5253/5254 display stations can be attached to any one cable via the Cable-Thru feature (#2680). The 5254 represents two display stations. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for additional cabling information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operators. The procedures are provided with each 5254. Also see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking, and placement of the 5254.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5254.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5254, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5254 prior to calling for IBM service.
- Providing a desk or table-top to support the 5254.
- Installation and maintenance of signal cables and associated parts for attaching the 5254 to the 5525 System Unit.
- When adding additional display stations on the 5520 Administrative System, the customer may have to modify the system configuration specifications; refer to the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Publications: Refer to M5525 pages for the available publications.

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Color: Pearl White only (no specify required).
- Power Cord and Plug: Standard power cord is 2.4 meters (8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if this is required, specify **#9986**. Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Keyboard: Two keyboards must be selected (see "Special Features").
- Cables: See "Accessories" for 5254 cable ordering instructions. For cable specifications, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another source.

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5253s and 5254s to a single cable. Each unit on the cable, except the last, requires this feature. **Note:** For relocation flexibility, the customer should consider including #2680 on all display stations. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4610, #4611): Two of the following keyboards must be selected:

#4610: 92-character text keyboard with a typewriter-like layout, movable, with 46 alphameric keys and 36 control keys. **Maximum:** Two. **Field Installation:** Yes.

#4611: 96-character text keyboard with a typewriter-like layout, movable, with 48 alphameric keys and 36 control keys. **Maximum:** Two. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which helps prevent operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Keylock Keys: The 5254 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser of the keys only.) Key Identification Number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Palm Rest (#7796): This accessory is an extension to the keyboard providing increased operator comfort. Customers must be advised that it is a customer-attachable option only. All attachment hardware is provided and no tools are required. **Limitations:** Not available for 5254s with serial numbers 00085 and below.

Cables: The cables and/or associated parts to attach the 5254 to the 5525 System Unit may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5254.

Twinax® Connector Kit (P/N 7362268): Includes two connectors. Twinax Wire and one connector kit are required for each attachment cable. (Individual connectors, P/N 7362229, are available for replacement.)

Twinax Wire (P/N 7362211): Order must specify the desired length. Twinax Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (P/N 7362230): Permits two Twinax Cable Assemblies to be joined together.

Twinax Station Protector (P/N 7362426): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from that used for printers or a System Unit attached via a printer line.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

5254 Dual Display Station (cont'd)

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

5256 PRINTER

PURPOSE

The 5256 provides printed output for the 5280, Series/1, System/34, System/36, and System/38. It is a bidirectional impact matrix printer with dual 256 byte buffers and full buffer formatting capabilities.

MODELS

Model 1	001	40 cps maximum
Model 2	002	80 cps maximum
Model 3	003	120 cps maximum

Customer Setup (CSU): The 5256 is designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customers - Customer Setup* (G120-2743). CSU instructions are included with the 5256.

CSU allowance is as follows:

5280 System (with initial system installation) - 2 days
5280 System (subsequent installation) - 1 day
Series/1 (initial and subsequent installation) - 1 day
System/34 (initial and subsequent installation) - 1 day
System/36 (initial and subsequent installation) - 1 day
System/38 (initial and subsequent installation) - 1 day

The marketing representative must advise customers of their responsibilities before receipt of the machine.

When adding additional printers to the 5280, Series/1, System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference Manual* (GC21-7824), *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098), *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 - Changing Your System Configuration* (SC21-9052), or *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775).

HIGHLIGHTS

Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. Matrix characters are formed by eight vertical wires printing dots in up to four of seven possible horizontal positions, giving high legibility with character spacing at 10 characters to the inch for the standard upper/lower case 95-character set. A 184-character Multinational Character Set is available. See "Specify" below. The maximum print line is 132 print positions.

The operator can select six or eight lines per inch (lpi) vertical spacing. Overlapped printing may result when printing at eight lpi. A variable width forms tractor provides for feeding continuous forms. Single cut forms may be processed in typewriter fashion. For optimum handling of continuous forms, a Forms Stand (#4450) is recommended. See "Accessories". Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. See "Type Catalog" for character set arrays.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5256 Operator's Guide* (GA21-9260).

For Direct Attachment to the 5280: The 5280 Distributed Data System provides cable connectors for attachment of the 5256 Printer to the 5285 Programmable Data Station and to the 5288 Programmable Control Unit. The 5285 Programmable Data Station will allow local attachment of the 5256 Printer to the Twinaxial Printer Attachment (#1150). The 5288 Programmable Control Unit will allow local attachment of the 5256 Printer to the Single Twinaxial Printer Attachment (#1155), the Multiple Twinaxial Printer Attachment (#1160), or the Multiple start/Stop-Twinaxial Printer Attachment (#1162). If multiple printers are attached to one port (see M5285, 5288 pages), each printer except the last requires Cable-Thru (#2680) on the 5256. All connections use twinaxial cable only. The maximum length of the cable is 1,525 meters (5,000 feet). See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information. See the M5288 pages for description of these special features.

For Direct Attachment to Series/1: The Series/1 5250 Information Display System Attachment (#1210) provides four ports for attachment of the 5251 mdl 1 or 11, 5252, 5256, 5291, and 5292, and supports up to eight of these workstations. The 5252 represents two workstations. The Series/1 5250 Information Display System Attachment Cable (#5760) enables attachment to be made with twinaxial cable. Maximum length of twinaxial cable attached to any one port is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via Cable-Thru (#2680) on each workstation. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

For Direct Attachment to System/34: The 5340 System Unit provides four cable connectors for attachment of the 5219, 5224, 5225, 5251 mdl 1 and 11, 5252, 5256, 5291, and 5292. One cable connector is dedicated to the exclusive attachment of a display station utilized as the system console. No other devices may be attached to this cable. The three additional cable conectors on the 5340 are provided for attachment of additional workstations (5219, 5224, 5225, 5251 mdl 1 or 11, 5252, 5256, 5291, or 5292). Up to eight workstations, including the system console, may be attached to the 5340 without special features. Optional features on the 5340 allow up to 16 workstations to be directly attached. The 5252 represents two workstations. The maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to three such cables may be attached to the 5340. Multiple workstations (up to seven) may be attached to one cable via Cable-Thru (#2680) with each workstation. If a 5256 Printer is designated as the system printer, a 6 meter (20 foot) cable is provided with the 5340. Specify **#9306** on the 5340. See "Specify" in the M5340 pages. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for additional cabling information.

For Direct Attachment to System/36: The 5256 Printer may be attached to the System/36 in a manner similar to 5250 Information Display Station devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for additional cabling information.

For Direct Attachment to System/38: The 5381 System Unit provides eight cable connectors for attachment of the 5219, 5224, 5225, 5251 mdl 1 and 11, 5252, 5256, 5291, and 5292, and supports up to 12 of these workstations. Optional features on the 5381 allow up to 80 workstations to be attached. The 5252 represents two workstations. The cable attachment is made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via Cable-Thru (#2680) on each workstation. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5256 may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551). The Cluster feature allows attchment of up to four workstations (5219, 5224, 5225, 5251 mdl 1 or 11, 5252, 5256, or 5292), and the Dual Cluster feature allows attachment of up to eight workstations. The 5252 represents two workstations. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Publications: *IBM 5250 Information Display System Introduction* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Print Spanish N: Specify **#9570**. See "Type Catalog" for details.
- Character Set: The 95-character EBCDIC character set is provided as standard. If the 184-character Multinational Character Set is desired, specify **#9470**. All workstations and printers attached to a System/34, System/36, and a 5251 mdl 2 or 12 must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.
- Cables: See "Accessories" for cable ordering instructions. For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). Specify **#9050** if cable is ordered from IBM, **#9055** if cable is ordered from another supplier, **#9060** if the 5256 is used with System/34 as the system printer (no cable order required), or **#9065** if existing cable will be used (no cable order required).
- System Attachment: Specify the unit to which the 5256 is attached: **#9559** for 5251 mdl 2, **#9560** for 5251 mdl 12, **#9561** for 5340, **#9565** for 5360, **#9562** for 5381, **#9563** for Series/1, or **#9564** for 5280.

SPECIAL FEATURES

Audible Alarm (#1470): Provides an audible indication to the operator when manual intervention is required. **Maximum:** One. **Field Installation:** Yes.

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdls 1 or 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **Note:** For relocation flexibility, the customer should have Cable-Thru on all workstations. **Maximum:** One. **Field Installation:** Yes.

5256 Printer (cont'd)

MODEL CONVERSIONS

Model conversions are field installable.

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from a carton and provides for forms stacking on a single shelf after printing. This accessory is a one-shelf forms stand. For field installation, order by feature number on MES.

Cables: The twinaxial cables and/or associated parts to attach the printers to the 5251 mdl 2 or 12, 5285, 5288, 5340, 5360, 5381, or the Series/1 5250 Information Display System Attachment Cable (#5760) may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5256.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacements.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M **7361807**): A kit includes two protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. The station protector is a CSU accessory.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES

Ribbons: A black ribbon, P/N **1136653** or equivalent, is required. A black cartridge ribbon, P/N **7034535** or equivalent, is required for all machines shipped on or after September 19, 1980 or on machines having RPQ D09005 installed. Contact IBM.

5258 PRINTER

PURPOSE

An ink jet printer providing high-quality printer output for the 5520 Administrative System. A selection of print fonts is available to provide 10 pitch, 12 pitch, or proportional spacing of an international set of graphics.

MODELS

Model 1 001

Prerequisites: In the 5525 System Unit, Local Device Control feature (#4710, #4711, #4712); LDC Attachment feature #4715; and either feature #1105, #1700, #1701, #1702, or #1704. See M5525 pages for details.

HIGHLIGHTS

- Automatic feeding of cut sheet paper from two drawers (e.g., letterhead and plain) and envelopes from a hopper.
- Rated burst print speed of up to 92 characters per second (12 pitch).
- Horizontal spacing of 10 pitch, 12 pitch, or proportional.
- Vertical spacing is 5-1/3 and 6 lines per inch and half-line spacing for superscripts and subscripts (single level).
- One type style font standard, two more selectable (at time of manufacture), and a further two optional (possible five in total); each supports 187 characters from English and eight other language character sets (Artisan 10 U/C English only). Optional print font supports Greek alphabet and other symbol characters.
- Type style and format may be chosen by the user and then automatically changed under program control.
- Standard Cable-Thru capability to allow multiple printers (5219s and 5258s) to be multidropped up to a cumulative total of 1,524 cable-meters (5,000 cable-feet) radially from the 5525 System Unit on a single twinaxial cable.
- The printer is equipped with an envelope hopper and two paper drawers. The envelope hopper holds 600 75 g/sq.m (20 pound) bond envelopes. The envelope stacker holds 500 envelopes of the same weight. The paper drawers hold 600 sheets of 75 g/sq.m (20 pound) bond or 500 sheets of 90 g/sq.m (24 pound) bond each. The paper stacker holds 700 sheets of 75 g/sq.m (20 pound) bond.

Paper Specifications:

Paper sizes include:

178mm x 267mm (7 inches x 10.5 inches) *
184mm x 267mm (7.25 inches x 10.5 inches) *
191mm x 267mm (7.5 inches x 10.5 inches) *
203mm x 267mm (8 inches x 10.5 inches)
203mm x 330mm (8 inches x 13 inches)
216mm x 279mm (8.5 inches x 11 inches)
216mm x 330mm (8.5 inches x 13 inches)
216mm x 356mm (8.5 inches x 14 inches)

* Feed lengthwise only

Paper weights include:

60 g/sq.m (16 pound) bond
75 g/sq.m (20 pound) bond
90 g/sq.m (24 pound) bond

Envelope Specifications:

Envelope sizes include:

Number 7-3/4	98.4mm x 190.5mm (3.874 inches x 7.5 inches)
Number 9	98.4mm x 225.4mm (3.874 inches x 8.87 inches)
Number 10	104.8mm x 241.3mm (4.125 inches x 9.5 inches)

Envelope weights include:

48 g/sq.m (13 pound)
60 g/sq.m (16 pound)
75 g/sq.m (20 pound)
90 g/sq.m (24 pound)

Problem Determination Procedures: Problem determination (and recovery) procedures are provided by IBM with the 5258 Printer, and extended when attached to the 5525 System Unit using Licensed Program 5611-SS1 or 5611-SS2 to help provide increased availability of the printer, and other parts of the system, to the user.

These procedures are described in the reference cards accompanying the printer, in the HELPs and Messages facilities of the licensed program, and in *IBM 5258 Printer Operators Guide* (GA23-1005) and *IBM 5520 Administrative Systems Messages and Recovery Aids* (SC23-0733 or SC23-0748).

These procedures are designed to be easy to follow and use by the customer, and it is the customer's responsibility to use them prior to calling for IBM service.

Publications: *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011), and *IBM 5258 Operator Guide* (GA23-1005).

Customer Responsibilities: The customer is responsible for providing and installing requisite cabling and for providing paper and envelopes as appropriate prior to the installation of the printer by the CE; also for following the problem determination procedures prior to calling for the CE.

Operator intervention is required for replenishing the ink supply, paper, and envelopes, and handling exceptional conditions such as feed jams, stacker full, power on/off, and invalid format requests.

When adding additional printers to the 5520 Administrative System, the customer may have to modify the system configuration specifications. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Cabling: When used with the 5520 Administrative System, the 5258 is connected via a twinaxial cable to local device attachment connectors in a protected customer access area on the 5525 System Unit. Depending on the 5525 mdl, up to eight printers can be multidropped on the same cable up to a maximum length of 1,524 cable-meters (5,000 cable-feet). Depending on the mdl, up to eight cables (maximum of 12 printers) can be attached to the 5525. See M5525 pages.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): With a standard nonlocking plug (uses customer standard type receptacle). No specify required.
- Print Fonts: Available at time of manufacture only. Prestige Elite (12 pitch) is standard on every machine. Two additional fonts must be selected using specify numbers from the following. See "Type Catalog" for character set arrays.

Font (select two)

Pitch	Style	Feature Number	Specify Number
12	Letter Gothic	#7809	**#9809**
10	Courier	#7811	**#9811**
12	Courier	#7810	**#9810**
10	Courier Italic	#7825	**#9825**
12	Courier Italic	#7826	**#9826**
10	Prestige Pica	#7812	**#9812**
10	Artisan	#7813	**#9813**
10	Artisan (U/C)	#7822	**#9822**
10	Bookface Academic	#7824	**#9824**
PSM	Essay	#7814	**#9814**
PSM	Arcadia	#7815	**#9815**
PSM	Boldface	#7816	**#9816**
10/12	Symbol	#7830	**#9830**

The symbol font allows printing of symbol characters supported by keyboard IDs #202 and #204. See "Type Catalog" for details of these keyboards.

- Color: Pearl White with Pebble Gray accents. (No specify required.)
- Cables: Customer-supplied; see "Accessories" and the *IBM 5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for ordering information. Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another supplier.
- Data Rate: The data transfer rate is determined by the Local Device Control feature and the 5525 System Unit mdl. Specify **#9300** for printers attaching through feature #4710 on the 5525 mdl 020 or 021; **#9305** for printers attaching through feature #4710 on the 5525 mdl 030, 031, or 032; and **#9315** for printers attaching through feature #4711 or #4712 on any mdl 5525.

SPECIAL FEATURES

Optional Additional Print Fonts: Up to two optional print fonts may be ordered from the font list given in "Specify". Purchase only. Order by feature number. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The cables and/or associated parts to attach the 5258 to the 5525 may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM,

5258 Printer (cont'd)

specify a shipping date at least four weeks in advance of receiving the 5525.

Twinax® Connector Kit (P/N 7362268): Includes two connectors. Twinax Wire and one connector kit are required for each attachment cable. (Individual connectors P/N 7362229 are available for replacement.)

Twinax Wire (P/N 7362211): Order must specify the desired length. Twinax Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (P/N 7362230): Permits two Twinax Cable Assemblies to be joined together.

Twinax Station Protector (P/N 6819750): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from that used with the displays.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES

Ink: IBM Office System Ink (P/N 1354320) or equivalent. Contact IBM for ordering information. One bottle is included with the shipment of the machine.

5265 POINT OF SALE TERMINAL

PURPOSE

A Point of Sale Terminal which serves the cash register and data logging (store and forward) functions in sales-oriented establishments. Contains diskette assembly for recording detailed sales transaction information. The diskette is removable and can be transported to a host system for processing of the stored data. Communicating models allow direct batch communication of stored data to Series/1, System/3 models 4, 6, 8, 10, 12 and 15, System/32, System/34, System/36, S/370 models 115 through 195, 3031, 3032, 3033, 3741 models 2 and 4, 3747, 4331, 4341, 4361, 4381, 5110, 5280.

MODELS

Mdl	Base Storage	Keyboard Keys	Diskette Type	Communications	5266 Attachment
A11	16K	34	1		
A12	16K	34	1	Yes	
A21	16K	34	1		Yes
A22	16K	34	1	Yes	Yes
A31	16K	34	2D		
A32	16K	34	2D	Yes	
A41	16K	34	2D		Yes
A42	16K	34	2D	Yes	Yes
A51	32K	34	2D		
A52	32K	34	2D	Yes	
A61	32K	34	2D		Yes
A62	32K	34	2D	Yes	Yes
A71	64K	34	2D		
A72	64K	34	2D	Yes	
A81	64K	34	2D		Yes
A82	64K	34	2D	Yes	Yes
B11	16K	64	1		
B12	16K	64	1	Yes	
B21	16K	64	1		Yes
B22	16K	64	1	Yes	Yes
B31	16K	64	2D		
B32	16K	64	2D	Yes	
B41	16K	64	2D		Yes
B42	16K	64	2D	Yes	Yes
B51	32K	64	2D		
B52	32K	64	2D	Yes	
B61	32K	64	2D		Yes
B62	32K	64	2D	Yes	Yes
B71	64K	64	2D		
B72	64K	64	2D	Yes	
B81	64K	64	2D		Yes
B82	64K	64	2D	Yes	Yes

Note: The user of a 5265 model X3X, X4X, X5X, X6X, X7X or X8X should review the host diskette support to ensure that Diskette 2D capability exists. See *IBM 5260 Retail System-Systems Planning Guide* (GA21-9390), for additional information.

Customer Setup (CSU): The 5265 is designated as a customer setup device thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The CSU Allowance is one day.

HIGHLIGHTS

- 34-key or 64-key keyboard. See "Models".
- Personalization of function at each terminal allows customers to modify operations performed to meet their requirements.
- Easily readable transaction display.
- Automatic prompting for operator guidance.
- Diskette assembly to record sales transactions.
- Total Accumulations:
  - Up to 86 personalizable machine totals (including realtime and machine totals). With Extended Protected Totals (#3650), all of these are protected from external power interruptions. If the controlling 5265 terminal has #3650 installed, it is recommended that all attached 5266 terminals have #3650 installed also. 5265 mdls X5X, X6X, X7X and X8X have extended protected totals and do not require #3650.
  - Up to 256 auxiliary totals.
  - Non-resettable machine grand total.
- Cash Receipt/Document/Transaction Journal printing.
- Store Logo Printer available. See "Special Features".
- Up to two cash drawers available: Both attached, both remote, or one attached and one remote. See "Special Features".
- Time-of-day clock.
- Capability to attach up to five 5266 terminals (mdls X2X, X4X, X6X and X8X only) or up to four 5266 terminals and a 5265 which can provide backup if required. An additional five terminals can also be installed via special features on mdls X4X, X6X and X8X.

Information from up to five 5266 Point of Sale Terminals (attached via twinaxial cable) can also be stored on the 5265 diskette assembly (mdls X2X, X4X, X6X, and X8X only). By special feature, up to ten 5266s can be attached (mdls X4X, X6X and X8X). One 5265 will collect data from all the attached terminals.

- Communications to host system available. See "Models".
- Formatted data entry with optional totals accumulation, by field within format.
- Price look-up (with override capability) and Negative Credit files.
- Additional memory available, up to a total of 128K (mdls X7X and X8X only).
- Sharing of data files by all terminals in the cluster (mdls X6X and X8X only).
- Central site control file (mdls X5X, X6X, X7X and X8X only).
- Administrative message support (mdls X5X, X6X, X7X and X8X only).

Features

Keyboard: Allows key entry of cash register (sales) information, as well as entry of administrative data, non-sales oriented data and specification of non-sales function. All 5265 AXX mdls are equipped with 34 keys; all BXX mdls are equipped with 64 keys (basic 34 keys plus additional function keys) to simplify specifying of operater functions. Available with either Touch-Tone® style or adding machine style numeric keyboard arrangement. Function key arrangement may be modified by personalization to meet customer's needs. Key identifiers appear on a plastic overlay which can be modified to indicate keyboard layout as assigned by the customer. Use of unique function keys (salesperson and merchandise ID) requires Storage Increment (#4902) or mdl X5X, X6X, X7X or X8X.

Personalization: Allows customers to modify the functional operations performed at a given point of sale. By answering a series of questions (found in the Personalization Questionnaire) customers can alter functions and tailor the operation to match their requirements. Answers to personalization questions need only be entered once via the 5265 keyboard (at time of initial installation) and are stored on a diskette for use until a change is desired. Personalization is loaded from the 5265 diskette to the storage of the same 5265 or any attached 5266 or 5265. Values are assigned as defaults (preset values) for many questions; if no answer is given by the customer for a personalization question its default value is assumed. This allows the user to implement many functions as supplied by IBM, thus saving time in answering personalization questions, and in key entry of the answer.

Transaction Display: Shows details of sales transactions. An 8-position LED display shows transaction details as entered for such things as department, class, stock, quantity, total, amount due and change. Nine indicator lights identify AMOUNT DUE, SUBTOTAL, CHANGE, and REFUND, or call attention to machine status.

Operator Guidance Unit: Leads the salesperson through sales and non-sales transactions by offering a prompt for each action in sequence. The prompting drum has up to 24 prompts visible (one at a time) to the salesperson.

Totals: A non-resettable Grand Total is automatically maintained. Through personalization, the following types of totals can be selected for accumulation: Control totals (basic accounting totals), transaction type, tender type, salesperson, and merchandise totals. These totals, referred to as realtime totals, are maintained in machine storage and can be accessed individually or in groups at any time. Up to 52 realtime totals can be accumulated in the basic machine mdls X1X, X2X, X3X, and X4X and up to 86 if Storage Increment (#4902) is installed. All machine mdls X5X, X6X, X7X and X8X support up to 86 realtime totals.

Ten totals are protected from loss in the event of external power interruption on mdls X1X, X2X, X3X and X4X. With Extended Protected Totals (#3650) or machine mdls X5X, X6X, X7X or X8X, all totals are protected. Auxiliary Totals can be generated from data stored on the diskette transaction log. These totals are calculated, typically at the end of the sales day, by processing the diskette in the 5265. Three groups of Auxiliary Totals are predetermined: Auxiliary control, transaction type and tender type. Three other groups can be personalized: Salesperson, merchandise group and merchandise item totals.

Transaction Log Data Entry: Provides the capability of entering formatted data onto the diskette transaction log. Field entry requirements are personalized, as well as the capability of accumulating subtotals and totals by field within formats.

Cash Receipt/Document/Transaction Journal Printing: Uses 80 cps bidirectional matrix printer. Can generate up to 31-character print line on either a cash receipt or a customer-inserted document (sales check form or document to be endorsed), and on the transaction journal roll.

Time-of-Day-Clock: Used to automatically record on the transaction log the time each transaction occurs. Initially set by salesclerk via sign-on procedure.

5265 Point of Sale Terminal (cont'd)

Diskette Storage Capacity: Is available in two capacities of the standard removable Diskette 1 (.24MB) and Diskette 2D (.98MB). See "Models" for a list of mdls supporting each capacity. Either capacity diskette provides storage for operational (sales and non-sales) instructions, personalization tables, customer transaction log, and customer files. Diagnostic/exercisers are also resident on the diskette.

Binary Synchronous Communications (BSC): Capability on all XX2 machine mdls allows sales transaction log data collected at the 5265 to be forwarded to a system. Allows transmission of price look-up files and/or negative credit files from a system to the 5265. Requires one of the following on the 5265:

- External Modem Adapter feature.
- 1200 bps Integrated Modem, Switched Network, Auto-Answer feature.

Mdls X52, X62, X72 and X82 have the capability of receiving personalization updates, data file updates and administrative messages via the central file. An option is provided to automatically update personalization and the files and print the messages immediately following the transmission.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5260 Retail System Display Prompts and Problem Determination Procedures* (GA21-9399). Also, see "Customer Responsibilities" below.

Customer Responsibilities:

Physical Setup:

- Receipt at the customer's receiving dock, unpacking, and placement of the 5265.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM.
- Providing a counter or table-top to support the 5265.
- Installation and maintenance of twinaxial cables and associated parts for attaching a 5266 to the 5265 or to other 5266s.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5265.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (B/M 7365845) (if required) will be ordered from IBM.

The customer must be advised that:

- The customer is responsible for making arrangements for installation, pricing, charges of the data communication facility, and attachment of selected data sets.
- Toll charges, if required for installation and/or maintance or BSC, are to be paid by the customer.
- The IBM Marketing Representatives must have the customer obtain a firm installation date for transmission services (including modems and/or data coupler, if required) before the order for a communicating mdl of 5265 can be confirmed. For further information, refer to "Teleprocessing Systems" in the GI section, M2700 pages, and *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391).

Personalization: The customer must personalize the 5265 to obtain output compatible with any application programs.

Maintaining Operations:

- Using and following the Problem Determination Procedures for the 5265 prior to calling for IBM service.
- Relocation of the 5265, if required, to allow IBM service access.
- Implementation and incorporation of diskette changes into their store procedures. This includes:
  - Ensuring that the implementor at the central machine site has and is using the current level diskette.
  - Planning and coordinating the activities required for updating their store(s) to the new level diskettes.
  - Distribution of current level diskettes with their correct personalization to noncentral machine sites. Timely installation of these diskettes.

The following statement is to be included in proposals:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on an IBM 5265 Point of Sale Terminal when cash is contained in the unit. It shall be the purchaser's (customer's) responsibility to remove, control, and replace cash so that IBM can fulfill its warranty and maintenance obligations.
>
> The exception to the above shall be when a failure occurs in the cash drawer and it cannot be opened prior to CE maintenance. In those cases the customers shall assign one of their personnel to assume responsibility for removal of the cash once the drawer has been opened."

In addition, each Agreement for Lease or Rental, and Maintenance Agreement which includes a 5265 or 5266 must be amended and Special Provisions added as provided in the Agreement and Customer Document Section of the Branch Office Manual.

Environment: The 5265 Point of Sale Terminal is designed to operate in the following environment:

Temperature	10°C to 37.8°C (50°F to 100°F)
Relative Humidity	8 to 80%
Maximum Wet Bulb	22.8°C (73°F)

This machine is designed to operate in the normal retail environment. This assumes a building which is not air conditioned, but which has normal winter heat and normal ventilation. The 5265 is not recommended for outdoor usage. If it is occasionally used outdoors, it must be within the above conditions. Care must be taken to protect it from precipitation, dust, and direct sunlight.

Communications Facilities: Attachments for the 5265 BSC are designed to operate on transmission facilities such as:

- Common carrier leased telephone line services (Voice Grade); AT&T or Western Union Class 3002 (to 2400 bps).
- Private customer owned communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (Voice Grade) service at 600, 1200, or 2400 bps.

  Reference: See M2700 pages for additional information concerning modems, communications, facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

Publications:

- *IBM 5260 Retail System Introduction* (GA21-9284).
- *IBM 5260 Retail System Operator's Guide* (GBOF-4766).
- *IBM 5260 Retail System Implementation Guide* (GA21-9285).
- *IBM 5260 Retail System Personalization Questionnaire* (GA21-9324).
- *IBM 5265 Point of Sale Terminal Customer Setup Guide* (GA21-9321).
- *IBM 5266 Point of Sale Terminal Customer Setup Guide* (GA21-9400).
- *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391).
- *IBM 5260 Retail System - Systems Planning Guide* (GA21-9390).
- *IBM 5260 Retail System Display Prompts and Problem Determination Procedures* (GA21-9399).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug or **#9881** for nonlocking plug.
- Color: Pearl White only (no specify required).
- Numeric Pad: **#9480** for adding machine style numeric pad or **#9481** for Touch-Tone style numeric pad.
- Diskette Assembly Door Lock: A group of 11 unique lock types has been reserved to allow a customer to specify identical lock types for each terminal's Diskette Assembly Door Lock. One of the following must be specified:

  #9101 Type A
  #9102 Type B
  #9103 Type C
  #9104 Type D
  #9105 Type E
  #9106 Type F
  #9107 Type G
  #9108 Type H
  #9109 Type I
  #9110 Type J
  #9111 Type K

  Note: If a Cash Drawer (special feature) is installed and if it is desired that the same key operate the Diskette Assembly Door Lock and the cash drawer lock, *identical lock types* must be specified for each.
- Cash Drawer: If a Cash Drawer(s) is ordered, a Cash Till and a Lock Type must be specified. See "Cash Drawer" under "Special Features".

5265 Point of Sale Terminal (cont'd)

- Central Machine (**#9438**) or Non-Central Machine (**#9439**) Designation: A central machine is one intended for use in personalizing and testing diskettes. In a multiple store environment, a central machine would be used in preparing diskettes for a group of other 5265s. Every 5265 must be designated as either a Central Machine (**#9438**) or a Non-Central Machine (**#9439**) based on this use criteria. In order to successfully complete personalization and testing of diskettes for a group of 5265s, the central machine must at least be equal to the highest level 5265 in the group. See the *IBM 5260 Retail System-Systems Planning Guide* (GA21-9390), for additional information. A Master Diskette(s) selected from the table that follows must be available at the central machine to provide the starting point in the personalization process for all 5265s in the group. The master diskette shipped with each 5265 is to remain with the 5265 for future use by the CE. Master diskette engineering changes may be sent only to the central machine. At least one 5265 per enterprise must be designated as a Central Machine (**#9438**) to ensure proper notification and distribution of all diskette changes. All other 5265s in the enterprise, not designated as central machines, must be designated as Non-Central Machines (**#9439**). This designation does not involve hardware. It is used to provide a location identifier for distribution of IBM-provided Master Diskette releases.
- Master Diskette Specify Code: Selection of one or more Master Diskette Specify Codes provides for the shipment of the required Master Diskette(s) to the designated central machine, plus the shipment of future Master Diskette engineering changes for the diskette(s) selected. At least one Master Diskette Specify Code from the following table, consistent with the configuration of the central machine, must be selected.

  5265 Configuration:

	Diskette Specify Codes	
5265 Mdls	Storage Increment #4902 Installed	Master Diskette Specify Code
X1X	No	**#9440**
X1X	Yes	**#9442**
X2X	No	**#9444**
X2X	Yes	**#9446**
X3X, X4X	Yes or No	**#9448**
X5X, X6X	N/A	**#9450**
X7X, X8X	N/A	**#9450**

Prerequisites: #9438.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

OCR-A Wand Reader Attachment (#1050:) Provides the facility and support to allow attachment of a customer-supplied OCR-A Wand reader which meets the National Retail Merchants Association (NRMA) "Voluntary Optical Character Recognition - A Font Standard" for Universal Vendor Marking (UVM) and the *IBM 5260 Retail System OCR-A Wand Attachment* document available from IBM. **Limitations:** Cannot be installed with EAN/UPC Attachment (#1055) or if #1055 is installed on any 5265 or 5266 in the same cluster. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 16K Storage Increment (#4902) or mdl X5X, X6X, X7X or X8X.

EAN/UPC Attachment (#1055): Provides the facility and support to allow attachment of a customer-supplied EAN/UPC Reader. This feature will accommodate the digital transfer of the data translation of symbols (UPC Versions A and E) that meet the "UPC Symbol Specifications" dated August 1978 available from Uniform Product Code Council, Inc., 7061 Corporate Way, Suite 106, Dayton, OH 45459, U.S. The EAN/UPC Reader must comply with the *IBM 5260 Retail System EAN/UPC Attachment* document available from IBM . **Limitations:** Cannot be installed with OCR-A Wand Reader Attachment (#1050) or if #1050 is installed on any 5265 or 5266 in the same cluster. **Field Installation:** Yes. **Prerequisites:** 16K Storage Increment (#4902) or mdl X5X, X6X, X7X or X8X.

Customer Display (#1200): Provides a 6-digit, top-mounted, rotatable display for displaying Amount Due; Subtotal, Change, and Refund. **Field Installation:** Yes.

Second 5266 Attachment (#1300): [Mdls X4X, X6X and X8X]. Provides capability to attach a second string of up to five additional compatible 5266 Point of Sale Terminals (the last of which may be a compatible 5265 which can be used as a backup). **Maximum:** One. **Field Installation:** Yes.

Cash Drawer(s)(#1511, #1512, #1521, #1522): Provides for up to two cash drawers both attached, or both remote, or one attached and one remote. Each cash drawer consists of a housing, drawer, opening mechanism, lock, and two keys. The attached cash drawer(s) is mounted directly below the terminal and becomes an integral part of the machine. The remote cash drawer(s) consists of the same hardware plus brackets and cable for mounting under the counter. Remote cash drawers are not designed for stacked installation. The customer is responsible for installation of remote cash drawer units. When two cash drawers are installed, it is recommended that Extended Protected Totals (#3650) is also installed (except on mdls X5X, X6X, X7X and X8X) to provide protection for the Cash Drawer #2 totals.

Notes:
1. Each attached cash drawer adds approximately 12cm (4.75 inches) to the height of the terminal.
2. A top cover is not provided with the remote cash drawer feature; therefore, the customer must provide (by appropriate under-counter mounting) security against unauthorized access from the drawer top.

Order by the following codes:

#1511 First Cash Drawer-Attached. **Limitations:** Cannot be installed with First Cash Drawer-Remote (#1521).
#1512 Second Cash Drawer-Attached. **Prerequisites:** First Cash Drawer-Attached (#1511) and Storage Increment (#4902) or mdl X5X, X6X , X7X or X8X.
#1521 First Cash Drawer-Remote. **Limitations:** Cannot be installed with First Cash Drawer-Attached (#1511).
#1522 Second Cash Drawer-Remote. **Prerequisites:** First Cash Drawer-Attached (#1511), or First Cash Drawer-Remote (#1521) and Storage Increment (#4902), or mdl X5X, X6X, X7X or X8X.

Specify:

Cash Tills: One cash till (accessory) is supplied with each cash drawer special feature. Multiple compartment tills are available with fixed or adjustable bill and coin slots. The customer is responsible for assembly of tills with adjustable bill and coin compartments. For additional tills and lockable till covers see "Accessories". For each cash drawer ordered, specify one of the following:

#9180 Till with fixed bill and coin slots
#9181 Till with adjustable bill and coin slots

Cash Drawers: For each cash drawer ordered, the *type* of lock desired must be specified. A group of 11 unique lock types is reserved to allow a customer to specify either identical lock types or unique lock types. **Note:** If it is desired that the key(s) to the cash drawer(s) also operate the Diskette Assembly Door Lock, *identical lock types* must be specified for each. See "Accessories". One of the following *must* be specified for each cash drawer ordered:

#9121 Type A
#9122 Type B
#9123 Type C
#9124 Type D
#9125 Type E
#9126 Type F
#9127 Type G
#9128 Type H
#9129 Type I
#9130 Type J
#9131 Type K

Limitations: The cable from the terminal to a remote cash drawer is 3m (9.84 feet) long. **Maximum:** Two. **Field Installation:** Yes.

Extended Protected Totals (#3650): Must be ordered or installed on mdls X1X, X2X, X3X or X4X *before* ordering upgrades to mdls X5X, X6X, X7X or X8X. Provides protection from external power interruptions for realtime totals. This feature increases the number of protected totals from ten to the maximum number of realtime totals available in a given machine configuration. See "Totals" under "Highlights". With this feature, all realtime totals reflect voids of current transactions; without this feature, only the first ten realtime totals are net of void current transactions (mdls X5X, X6X, X7X and X8X do not apply; totals are protected on these mdls without requiring #3650). It is recommended that this feature be included in all machine configurations, having two cash drawers or requiring more than ten totals. **Limitations:** Not available on mdls X5X, X6X, X7X or X8X. **Field Installation:** Yes.

Journal Cover and Lock (#4675): Provides a lock and key for the journal. Limits access to the journal tape. Shipped with two keys. **Limitations:** Must be unlocked to replace paper rolls and/or ribbon. **Field Installation:** Yes.

16K Storage Increment (#4902): Provides 16K of additional storage for a total of 32K on mdls X1X, X2X, X3X, and X4X. Certain functions require this feature. See "Functional Dependencies" below. With the 16K storage increment feature installed, 11K of storage is available for price look-up and negative credit files and sales tables. The price look-up and negative credit files are packed as they are loaded into the 11K of storage. It is recommended that (#4902) be installed on all X1X, X2X, X3X, and X4X machine mdls. All machines in an X2X cluster must have the same amount of storage. See the *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391) for details. **Limitations:** Not available on mdls X5X, X6X, X7X or X8X. When upgrading a purchased installed mdl X1X, X2X, X3X or X4X with this feature installed to a mdl X5X, X6X, X7X or X8X consult IBM for appropriate action.

5265 Point of Sale Terminal (cont'd)

Functional Dependencies

The features and functions listed below are available only on mdls X5X, X6X, X7X, X8X and on mdls X1X, X2X, X3X, and X4X with the 16K storage increment feature:

- OCR, EAN, or UPC wand.
- Price look-up and/or negative credit files.
- Second cash drawer.
- Second set of machine control totals.
- Individual cashier security codes.
- More than 52 personalized totals.
- Unique salesperson and merchandise keys.
- Check tender floor limits.
- Combined modulus checking on merchandise IDs 1, 2, and 3.
- Temporary cashier close.
- Account number entry for Cash 1 and Cash 2 transactions.
- Account or document number entry for tender types 2 through 8.
- Expanded quantity of up to five digits.
- Optional receive on transmit/receive function.
- Personalization copy procedure involving a minimum of diskette handling.

The features and functions listed below are available only on mdls X5X, X6X, X7X and X8X:

- Price look-up enhancements.
  - Field length specifications.
  - Use of ID 4; up to 30-digit key field.
  - Look-up on voids and returns.
  - Optional bypass of Amount prompt.
  - Item look-up key.
  - Merchandise ID pickup.
- Central control file.
  - Personalization and personalization control number updates.
  - Price look-up, negative credit and duplicate descriptor file updates.
  - Administrative messages.
- Account number length up to 21 digits.
- Floor limit for tender types 3 through 8.
- Authorization code up to six digits.
- Tender type descriptors.
- Copy personalization enhancements.
  - Entry of multiple copy options.
  - Personalized copy procedures.

Mdls X5X and X6X have 8K of storage available for price look-up and negative credit files and sales tables. The data files can be shared with all terminals in the cluster .

Base mdls X7X and X8X have 8K of storage available for sales tables and price look-up and negative credit files, and an additional 32K of storage available for price look-up and negative credit files. (A 32K or 64K storage increment feature can be added on mdls X7X and X8X to increase the storage available for data files). The data files can be shared with all terminals in the cluster . **Field Installation:** Yes.

32K Storage Increment (#4903): Provides 32K of additional storage for a total of 96K on mdls X7X and X8X. On X8X mdls, data files residing in storage can be shared with all terminals in the cluster. **Limitations:** Available only on 5265 mdls X7X and X8X. Cannot be installed with 64K Storage Increment (#4904). **Field Installation:** Yes.

64K Storage Increment (#4904): Provides 64K of additional storage for a total of 128K on mdls X7X and X8X. On X8X mdls, data files residing in storage can be shared with all terminals in the cluster. **Limitations:** Available only on 5265 mdls X7X and X8X. Cannot be installed with 32K Storage Increment (#4903). **Field Installation:** Yes.

Security Lock and Key (#6300): Provides an additional level of security with key lock control over the customer-personalizable security functions. A group of 11 unique lock types is reserved to allow a customer to specify identical lock types or unique lock types for each terminal. Shipped with two keys. **Note:** The key for the Security Lock is *not* interchangeable with the key for the Diskette Assembly Door, nor the key for any installed cash drawer lock. **Field Installation:** Yes.

Specify: One of the following must be specified:

#9201 Type A	**#9207** Type G
#9202 Type B	**#9208** Type H
#9203 Type C	**#9209** Type I
#9204 Type D	**#9210** Type J
#9205 Type E	**#9211** Type K
#9206 Type F	

Store Logo Printer (#6500): Provides the capability to print, from a stamp type impact print device, a store logo, slogan, or other graphic at the top of the cash receipt. The maximum size of the logo, slogan, or graphic is 1.27cm (0.5 inches) vertically by 6.35cm (2.5 inches) wide. The pre-inked stamp for this print device is customer-supplied. See *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391) for details. Stamp ink life is dependent on ink color, lines of print, total amount of character surface, and customer acceptance of readability. **Field Installation:** Yes.

Diskette Type 1 Compatibility (#7850): Allows the following functions to be performed while using a Diskette 1. which was intended for use in the mdl A11, A12, B11, B12: Communications, Transaction Log Erase, Transaction Log Print, Auxiliary Totals, Personalization Copying, System Personalization. Allows all functions to be performed while using a Type 1 diskette which was intended for use in the mdl A21, A22, B21, B22. **Limitations:** Available only for mdls X3X, X4X, X5X, X6X, X7X, and X8X. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

The Binary Synchronous Communications facilities of the 5265 mdls X12, X22, X32, X42, X52, X62, X72 and X82 operates in half-duplex mode over facilities C4, C4M, C5, C5M, D3, D3M, D4, D4M, or X1M. For information concerning these facilities, see M2700 pages.

Binary Synchronous Transmission: Permits all 5265 XX2 mdls to function as a terminal emulating either System/3 or 3741 line protocol on a switched or nonswitched point-to-point communications line.

Functions include the batch transmission of transaction information and batch receipt of certain data files. It is possible to set the terminal in Data Communication mode, and have the data communications take place unattended. The terminal will then automatically power down. There are restrictions in the ability to operate unattended. See the *IBM 5260 Retail System - Systems Planning Guide* (GA21-9390) for additional information.

Communications may be established with the following using System/3 BSC line protocol:

- Series/1
- System/3 (mdl 4, 6, 8, 10, 12, and 15) RPG II, MLMP, or CCP
- System/32 RPG II
- System/34 RPG II or BSCEL subsystem under SSP-ICF
- System/36 RPG II or BSCEL subsystem under SSP-ICF

Communication may be established with the following using 3741 BSC line protocol:

- 3741 (mdls 2 and 4)
- 3747
- 5110
- 5120
- 5280
- Series/1
- System/38 RPG III or COBOL
- S/370 (mdls 115 through 195, 3031, 3032, 3033, 4331, 4341, 4361, or 4381 via 3704, 3705 or ICA as appropriate).
- Communication with a 3741 mdl 2 or mdl 4, or with a 3747 with Communication Adapter (#1660).
- Communications with System/370, 3031, 3032, 3033, 4331, 4341, or 4381 via 3704, 3705, or ICA as appropriate. Emulating 3741 line protocol, support is provided under DOS/VS or DOS/VSE operating systems by CICS/VS and BTAM or BTAM-ES, under OS/VS1 and OS/VS2 operating systems by TCAM or ACF/TCAM or by CICS/VS and BTAM. 3704 and 3705 support is via a BSCA and appropriate subfeatures, under EP/VS, NCP/VS or ACF/NCP/VS as appropriate.
- Communications with the Series/1 is via the single-line or multiline BSCA of the Series/1. Emulating System/3 BSC or 3741 BSC line protocol, support is provided using Realtime Programming System (RPS) V3 or V4 or EDX.

All 5265 XX2 mdls will operate with any of the above systems capable of communicating at the following nominal transmission rates on a point-to-point data link: 1200/600, 2000, and 2400 bps. Operation will be in half-duplex mode over dial (switched network) facilities, and

5265 Point of Sale Terminal (cont'd)

in half-duplex mode over nonswitched point-to-point communications lines which may be half- or full-duplex facilities.

BSC units at each termination of a data link to which the 5265 is attached must be set to operate at the same transmission rate, and to use EBCDIC transmission code. 5265 communicating mdls support the transmission and reception of blocked records. Switched network versions include the support of Manual Dial, and Manual or Auto-Answer (where the attached modem supports this capability). Where auto-call is supported at the host, modem compatibility between the host and the 5265 will require the use of the EIA feature on the 5265.

The internal clock will generate synchronizing and timing signals for BSC operation when they are not provided by the attached modem. The decision to use, or not use, the internal clock is made during personalization time. When the internal clock is used, all other devices attached to the same data link must also be equipped with similar internal clocking capability. Transmission rates of 600 or 1200 bps with internal clock are selectable at personalization time. One of two IBM modems, 3863 or 3872 mdl 1 (2400/1200 bps) may be attached to 5265 communicating mdls. For more information on the capabilities of these modems refer to the appropriate "Machines" pages.

Modem and Data Set interface to the BSC facilities of communicating mdls of 5265 are:

Facility	Speed	Type of Service	Type of Modem
C4	1200/600	Switched	Integrated
C4M	1200/600	Switched	Stand-alone
C5	2400/1200	Switched	3872
C5	2400/1200	Switched	3863
C5M	2000/2400	Switched	Stand-alone
D3M	1200/600	Nonswitched	Stand-alone
D4	2400/1200	Nonswitched	3872
D4	2400/1200	Nonswitched	3863 or 3868 mdl 1
D4M	2000/2400	Nonswitched	Stand-alone
X1M	2400	Private	Stand-alone

In addition to the basic functions of Binary Synchronous Communications provided by 5265 communicating mdls, one of the following special features must be added: Integrated Modem (1200/600 bps) or EIA Interface. **Field Installation:** Yes. **Prerequisites:** Systems must be equipped with an adapter from the following:

Feature Code of Communications Adapter

	#2500, #3500, or #4500	#2074	#2084	#4645 and #6202	#1501,2 and #2001,3 and #3200
System/3					
-4		X			
-6		X			
-8		X		X	
-10		X	X		
-12		X	X	X	
-15		X	X		
System/32		X			
System/34	X				
System/36	X				
System/38					X
5110		X			
5120		X			
5280	X				

EIA Interface (#3701): [Mdls XX2 only] Provides a cable and interface for the attachment of an IBM or non-IBM modem meeting RS-232-C characteristics . Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. The cable is 3 meters (9.84 feet) in length. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500 or #5501). **Maximum:** One. **Field Installation:** Yes.

Modem, 1200 bps Integrated (#5501): [Mdls XX2 only] A modem for BSC data transmission at 1200 bps over switched facilities. Supports Manual Dial, and Manual or Auto-Answer. Attachment to the switched C4 facility is via an IBM-provided cable directly to a customer-provided FCC Registered Protective Device of the Programmed Type. The cable is 3m (9.84 feet) in length. For additional details see the *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391). **Limitations:** Cannot be installed with Interface (#3701). **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Any model may be field converted to any other model. Caution should be taken when upgrading models to ensure that the requirements of Central Machine Specify Codes are being met. See "Central Machine" under "Specify". When upgrading installed models X1X, X2X, X3X or X4X to models X5X, X6X, X7X or X8X, note the description associated with 5265 feature code, 16K Storage Increment (#4902). Extended Protected Totals (#3650) must be ordered or installed *before* ordering the upgrade.

Electronic parts, with the exception of memory, removed during a model upgrade to a purchased machine become the property of IBM. All other parts removed when upgrading purchased machines remain the property of the customer.

When a storage change is made to a purchased machine, any removed parts become the property of the customer.

The upgrade purchase prices for Storage Increment Features installed in the field may be greater than the difference in price between features as installed at the factory. The customers should carefully evaluate their future requirements when purchasing a terminal.

ACCESSORIES

Cash Tills: One cash till is shipped with the Cash Drawer special feature. Additional multiple compartment cash tills with either fixed or adjustable bill and coin slots are available.

- Till with fixed bill and coin slots (without cover), B/M **1612499.**
- Till with adjustable bill and coin slots (without cover), B/M **1612500.** Note: Assembly of the till with adjustable slots is a customer responsibility.
- Lockable Till Cover including two keys, B/M **1612501.**
- Additional key for lockable till cover, P/N **1851268.**

Replacement Locks and Keys: The 5265 is equipped with a lock on the diskette assembly cover. The machine is shipped with two keys for the lock. Any cash drawer (special feature) on the 5265 is equipped with the *same lock type* as the diskette assembly cover lock. Additional or replacement keys may be purchased from a local locksmith.

Use the following part numbers when ordering replacement locks and keys:

Lock Type	Diskette Assembly Cover	Cash Drawer	Security Lock *
A	**1612369**	**1612386**	**1612412**
B	**1612370**	**1612387**	**1612413**
C	**1612371**	**1612388**	**1612414**
D	**1612372**	**1612398**	**1612415**
E	**1612373**	**1612399**	**1612416**
F	**1612374**	**1612403**	**1612417**
G	**1612376**	**1612405**	**1612418**
H	**1612378**	**1612406**	**1612419**
I	**1612379**	**1612407**	**1612420**
J	**1612382**	**1612409**	**1612421**
K	**1612383**	**1612410**	**1612422**

* The Security Lock and Key (#6300) must be installed *before* a replacement can be ordered. The security key is not interchangeable with the diskette assembly cover key or the cash drawer key.

Journal Lock Key: Order by machine type and P/N **1612439.**

KEYBOARD OVERLAYS

Standard Overlay: The standard keyboard overlay can be modified to identify the function of the keys as defined during personalization. This overlay is initially shipped with the 5265. To order additional or replacements, order by part number.

Standard Overlay P/Ns

	34 Key		64 Key	
Language	Touch-Tone® Keyboard	Adding Machine Keyboard	Touch-Tone Keyboard	Adding Machine Keyboard
English US	**1610411**	**1610431**	**1610451**	**1610471**

® Trademark of American Telephone & Telegraph Co.

Blank Overlay: Blank keyboard overlays are available for those customers with multiple machine installations who desire to have a local vendor silk screen them to match the personalized function. order by part number.

Blank Overlay, 34 Key, P/N **5559882**
Blank Overlay, 64 Key, P/N **5559883**

Personalization Overlay: The personalization overlay fits over the keyboard and is used to identify the function of the keys during personalization. This overlay is initially shipped with the 5265.

Personalization Overlay, Touch-Tone Style Keyboard, P/N **1610371.**
Personalization Overlay, Adding Machine Style Keyboard, P/N **1610391.**

Keyboard Overlay Nomenclature Kit: One kit of die-cut self-adhesive labels is shipped with each 5265. Used to modify keyboard to customer requirements.

5265 Point of Sale Terminal (cont'd)

To order additional or replacements, order by part number.

CABLES

Cables: Cables, connector, and adapters (to attach a 5266 to a 5265 or to other 5266s in the cluster) may be purchased from IBM or a customer-selected source. See *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391), for cable, connector, and adapter specifications. The customer is responsible for installation and maintenance of these cables. Assembled cables may be ordered from IBM. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5266s.

Twinaxial Connector Kit P/N **7362268**: Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors P/N **7362229** are available for replacements.)

Twinaxial Wire P/N **7362211**: Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly P/N **7362267**: Includes a Connector Kit (2 connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter P/N **7362230**: Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit P/N **7361807**: Includes two protectors. One is required at each end of attachment cable installed outdoors (either above or below ground level).

Twinaxialial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES

For ordering information, contact IBM.

Ribbons: Cash Receipt/Journal Roll Printer: Black P/N **1299285**, Purple P/N **1299286**. **Note:** Black is recommended.

Roll Paper: Cash Receipt and Journal Roll, P/N **432767** (Carton of 50 rolls).

Diskettes:

IBM Diskette 1	P/N **2305830**
IBM Diskette 2D	P/N **1766872**

Forms: Single and Multipart cut form sales slips may also be ordered.

5266 POINT OF SALE TERMINAL

PURPOSE

A point of sale terminal which serves as a cash register. It is attached via twinaxial cable to a controlling 5265 Point of Sale Terminal, which provides the data logging functions and personalization load capability.

MODELS

Model A01 34 keys
Model B01 64 keys

Customer Setup (CSU): The 5266 is designated as a customer setup device thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The CSU Allowance is one day.

HIGHLIGHTS

- 34-key or 64-key keyboard. See "Models".
- Personalization of function (at controlling 5265) allows customers to modify 5266 operations performed to meet their requirements.
- Easily readable transaction display.
- Prompting for operator guidance.
- Total Accumulations:
  - Up to 86 personalizable machine totals (including realtime and machine totals). With Extended Protected Totals (#3650), all of these are protected from external power interruptions. If the controlling 5265 terminal has #3650 installed it is recommended that all attached 5266 terminals have #3650 installed also.
  - Non-resettable machine grand total.
- Cash Receipt/Document/Transaction Journal printing.
- Store Logo Printer available. See "Special Features".
- Up to two cash drawers available: Both attached, both remote or one attached and one remote. See "Special Features".
- Time-of-day clock.
- Formatted data entry with optional totals accumulation, by field within format.
- Price look-up (with override capability) and negative credit files.
- When attached to a 5265 mdl X6X or X8X, the 5266 has access to files contained in the shared memory of the 5265. This capability enhances the price look-up and the negative credit functions of the 5266 to match that of the 5265 mdls X5X, X6X, X7X and X8X.

  Note: 5266 terminals attached to 5265 mdls X6X or X8X require both Storage Increment (#4902) and Extended Protected Totals (#3650).

Features

Keyboard: Allows key entry of cash register (sales) information, as well as entry of administrative data, non-sales oriented data and specification of non-sales function. Mdl A01 is equipped with 34 keys ; mdl B01 is equipped with 64 keys (basic 34 keys plus 30 additional function keys) to simplify specifying of operator functions. Available with either Touch-Tone® style or adding machine style numeric keypad. Function key arrangement may be modified by personalization to meet customer's needs. Key identifiers appear on a plastic overlay which can be modified to indicate keyboard layout as assigned by the customer. Use of unique function keys (salesperson and merchandise ID) requires Storage Increment (#4902).

Personalization: Allows customers to tailor the functional operations to be performed at a given point of sale. By answering a series of questions (found in the Personalization Questionnaire) customers can alter functions and tailor the operation to match their requirements. Answers to personalization questions need only be entered once (at time of initial installation). They are entered at the controlling 5265 keyboard and are stored on the diskette at that 5265. Personalization is loaded from the diskette at the 5265 into storage at the 5266. Different 5266s within the store cluster may have different personalization. Values are assigned as defaults (preset values) for many questions; if no answer is given, the default value is assumed. This allows the user to implement many functions as supplied by IBM, thus saving time in answering personalization.

Transaction Display: Shows details of sales transactions. An 8-position LED display which shows transaction details as entered for such things as department, class, stock, quantity, total, amount due and change. Nine indicator lights identify AMOUNT DUE, SUBTOTAL, CHANGE, and REFUND, or call attention to machine status.

Operator Guidance Unit: Leads the salesperson through sales and non-sales transactions by offering a prompt for each succeeding action in sequence. The prompting drum has up to 24 prompts visible (one at a time) to the salesperson.

Totals: A non-resettable Grand Total is automatically maintained. Through personalization, the following types of totals can be selected for accumulation: Control totals (basic accounting totals), transaction type, tender type, salesperson, and merchandise totals. These totals, referred to as realtime totals, are maintained in machine storage and can be accessed individually or in groups at any time. Up to 52 realtime totals can be accumulated in the basic machine and up to 86 if Storage Increment (#4902) is installed.

Ten totals are protected from loss in the event of external power interruption. With Extended Protected Totals (#3650), all totals are protected. 5266 terminals attached to 5265 mdl X6X or X8X require both the Storage Increment (#4902) and Extended Protected Totals (#3650).

Transaction Log Data Entry: Provides the capability of entering formatted data onto the diskette transaction log. Field entry requirements are personalized, as well as the capability of accumulating subtotals and totals by field within formats.

Cash Receipt/Document/Transaction Journal Printing: Uses 80 cps bidirectional matrix printer. Can generate up to 31-character print line on either a cash receipt or a customer-inserted document (sales check form or document to be endorsed), or on the transaction journal roll.

Time-of-Day Clock: Used to automatically record on the transaction log the time each transaction occurs. Initially set by salesclerk via sign-on procedure (at 5265).

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5260 Retail System Display Prompts and Problem Determination Procedures* (GA21-9399). Also, see "Customer Responsibilities" below.

Customer Responsibilities:

Physical Setup:

- Receipt at the customer's receiving dock, unpacking, and placement of the 5266.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM.
- Providing a counter or table-top to support the 5266.
- Installation and maintenance of twinaxial cables and associated parts for attaching a 5266 to the 5265 or to other 5266s.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5266.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (B/M 7365845) (if required) will be ordered from IBM.

Personalization: The customer must personalize the 5266 to obtain output compatible with any application programs.

Maintaining Operations:

- Using and following the Problem Determination Procedures for the 5266 prior to calling for IBM service.
- Relocation of the 5266, if required, to allow IBM service access.
- Implementation and incorporation of diskette changes into their store procedures. This includes:
  - Ensuring that the implementor at the central machine site has and is using the current level diskette.
  - Planning and coordinating the activities required for updating their store(s) to the new level diskettes.
  - Distribution of current level diskettes with their correct personalization to noncentral machine sites. Timely installation of these diskettes.

The following statement is to be included in proposals:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on an IBM 5266 Point of Sale Terminal when cash is contained in the unit. It shall be the purchaser's (customer's) responsibility to remove, control, and replace cash so that IBM can fulfill its warranty and maintenance obligations.
>
> The exception to the above shall be when a failure occurs in the cash drawer and it cannot be opened prior to CE maintenance. In those cases the customers shall assign one of their personnel to assume responsibility for removal of the cash once the drawer has been opened."

In addition, each Agreement for Lease or Rental and Maintenance Agreement which includes a 5265 or 5266 must be amended and Special Provisions added as provided in the Agreement and Customer Document Section of the Branch Office Manual.

5266 Point of Sale Terminal (cont'd)

Environment: The 5266 Point of Sale Terminal is designed to operate in the following environment:

Temperature	10°C to 37.8°C (50°F to 100°F)
Relative Humidity	8 to 80%
Maximum Wet Bulb	22.8°C (73°F)

The 5266 is designed to operate in the normal retail environment. This assumes a building which is not air conditioned, but which has normal winter heat and normal ventilation. The machine is not recommended for outdoor usage. If it is occasionally used outdoors, it must be within the above conditions. Care must be taken to protect it from precipitation, dust, and direct sunlight.

Publications:

- *IBM 5260 Retail System Introduction* (GA21-9284).
- *IBM 5260 Retail System Operator's Guide* (GBOF-4766).
- *IBM 5260 Retail System Implementation Guide* (GA21-9285).
- *IBM 5260 Retail System Personalization Questionnaire* (GA21-9324).
- *IBM 5265 Point of Sale Terminal Customer Setup Guide* (GA21-9321).
- *IBM 5266 Point of Sale Terminal Customer Setup Guide* (GA21-9400).
- *IBM 5269 Retail System Planning and Site Preparation Guide* (GA21-9391).
- *IBM 5260 Retail SystemSystems Planning Guide* (GA21-9390).
- *IBM 5260 Retail System Display Prompts and Problem Determination Procedures* (GA21-9399).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug or **#9881** for nonlocking plug.
- Color: Pearl White only (no specify required).
- Numeric Pad: **#9480** for adding machine style numeric pad or **#9481** for Touch-Tone style numeric pad.
- Cash Drawer: If a Cash Drawer(s) is ordered, a Cash Till and a Lock Type must be specified. See "Cash Drawer" under "Special Features".

SPECIAL FEATURES

OCR-A Wand Reader Attachment (#1050): Provides the facility and support to allow attachment of a customer-supplied OCR-A Wand reader which meets the National Retail Merchants Association (NRMA) Voluntary Optical Character Recognition - A Font Standard for Universal Vendor Marking (UVM) and the *IBM 5260 Retail System OCR-A Wand Attachment* document available from IBM. **Limitations:** Cannot be installed with EAN/UPC Attachment (#1055) or if #1055 is installed on any 5265 or 5266 in the same cluster. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4902.

EAN/UPC Attachment (#1055): Provides the facility and support to allow attachment of a customer-supplied EAN/UPC Reader. This feature will accommodate the digital transfer of the data translation of symbols (UPC Versions A and E) that meet the "UPC Symbol Specification" dated August, 1978 available from Uniform Product Code Council, Inc., 7061 Corporate Way, Suite 106, Dayton, OH 45459, U.S. The EAN/UPC Reader must comply with the *IBM 5260 Retail System EAN/UPC Attachment* document available from NMD OEM Marketing Representatives or Corporate Industry Relations/Product Information. **Limitations:** Cannot be installed with OCR-A Wand Reader Attachment (#1050) or if #1050 is installed on any 5265 or 5266 in the same cluster. **Field Installation:** Yes. **Prerequisites:** #4902.

Customer Display (#1200): Provides a 6-digit, top-mounted, rotatable display for displaying; Amount Due, Subtotal, Change, and Refund. **Field Installation:** Yes.

Cash Drawer(s) (#1511, #1512, #1521, #1522): Provides for up to two cash drawers both attached, or both remote, or one attached and one remote. Each cash drawer consists of a housing, drawer, opening mechanism, lock, and two keys. The attached cash drawer(s) is mounted directly below the terminal and becomes an integral part of the machine. The remote cash drawer(s) consists of the same hardware plus brackets and cable for mounting under the counter. Remote cash drawers are not designed for stacked installation. The customer is responsible for installation of remote cash drawer units. When two cash drawers are installed, it is recommended that Extended Protected Totals (#3650) is also installed to provide protection for the Cash Drawer 2 totals.

Notes:

1. Each attached cash drawer adds approximately 12cm (4.75 inches) to the height of the terminal.
2. A top cover is not provided with the remote cash drawer feature; therefore, the customer must provide (by appropriate under-counter mounting) security against unauthorized access from the drawer top.

Order by the following codes:

- #1511 First Cash Drawer-Attached. **Limitations:** Cannot be installed with First Cash Drawer-Remote (#1521).
- #1512 Second Cash Drawer-Attached. **Prerequisites:** #1511 and #4902.
- #1521 First Cash Drawer-Remote. **Limitations:** Cannot be installed with First Cash Drawer-Attached (#1511).
- #1522 Second Cash Drawer-Remote. **Prerequisites:** #1511, or #1521 and #4902.

Limitations: The cable from the terminal to a remote cash drawer is 3m (9.8 feet) long. **Maximum:** Two. **Field Installation:** Yes.

Specify:

Cash Tills: One cash till (accessory) is supplied with each cash drawer special feature. Multiple compartment tills are available with fixed or adjustable bill and coin slots. For each cash drawer ordered, specify one of the following:

#9180 Till with fixed bill and coin slots
#9181 Till with adjustable bill and coin slots

The customer is responsible for assembly of tills with adjustable bill and coin compartments. For additional tills and lockable till covers see "Accessories".

Cash Drawers: For each cash drawer ordered, the *type* of lock desired *must* be specified. A group of 11 unique lock types is reserved to allow a customer to specify either identical lock types or unique lock types. One of the following *must* be specified for each cash drawer ordered:

#9121 Type A	**#9127** Type G
#9122 Type B	**#9128** Type H
#9123 Type C	**#9129** Type I
#9124 Type D	**#9130** Type J
#9125 Type E	**#9131** Type K
#9126 Type F	

Note: If it is desired that the key(s) to the cash drawer(s) also operate the Diskette Assembly Door Lock, *identical lock types* must be specified for each. See "Accessories".

Extended Protected Totals (#3650): Required on 5266 terminals attached to 5265 mdls X6X or X8X. Provides protection from external power interruptions for realtime totals. This feature increases the number of protected totals from ten to the maximum number of realtime totals available in a given machine configuration. See "Totals" under "Highlights". With this feature, all realtime totals reflect voids of current transactions; without this feature, only the first ten realtime totals are net of void current transactions. It is recommended that this feature be included in all machine configurations having two cash drawers or requiring more than ten totals. **Field Installation:** Yes.

Journal Cover and Lock (#4675): Provides a lock and key for the journal. Limits access to the journal tape. Shipped with two keys. **Limitations:** Must be unlocked to replace paper rolls and/or ribbon. **Field Installation:** Yes.

16K Storage Increment (#4902): Required on 5266 terminals attached to 5265 mdls X6X or X8X. Provides 16K of additional storage for a total of 32K. Certain functions require this feature. See "Functional Dependencies" below. 5266 terminals with the 16K Storage Increment installed, that are attached to a 5265 mdl X2X or X4X, have 11K of storage available for price look-up, negative credit files and sales tables. The price look-up and negative credit files are packed as they are loaded into the 11K of storage. 5266 terminals attached to a 5265 mdl X6X or X8X have 8K of storage available for sales tables. The price look-up and negative credit files stored in the 5266 mdl X6X or X8X are shared with the attached 5266 terminals. It is recommended that (#4902) be installed on all 5266 terminals. All machines in an X2X cluster must have the same amount of storage. See the *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391) for details.

Functional Dependencies: The features and functions listed below are available only on 5266 terminals with the 16K storage increment feature:

- OCR, EAN, or UPC wand.
- Price look-up and/or negative credit files.
- Second cash drawer.
- Second set of machine control totals.
- Individual cashier security codes.
- More than 52 personalized totals.
- Unique salesperson and merchandise IDs 1, 2, and 3.
- Check tender floor limits.

5266 Point of Sale Terminal (cont'd)

- Combined modulus checking on merchandise IDs 1, 2, and 3.
- Temporary cashier close.
- Account number entry for Cash 1 and Cash 2 transactions.
- Account or document number entry for tender types 2-8.
- Expanded quantity of up to five digits.
- Optional receive on transmit/receive function.
- Personalization copy procedure involving a minimum of diskette handling.

The features and functions listed below are available only on 5266 terminals (with features #4902 and #3650 installed) attached to a 5265 mdl X6X or X8X:

- Price look-up enhancements.
  - Field length specifications.
  - Use of ID 4; up to 30-digit key field.
  - Look-up on voids and returns.
  - Optional bypass of Amount prompt.
- Account number length up to 21 digits.
- Floor limit for tender types 3 through 8.
- Authorization code up to six digits.
- Tender type descriptors.

Field Installation: Yes.

Security Lock and Key (#6300): Provides an additional level of security with key lock control over the customer personalizable security functions. A group of 11 unique lock types is reserved to allow a customer to specify identical lock types or unique lock types for each terminal. Shipped with two keys. One of the following must be specified:

Specify:

#9201 Type A
#9202 Type B
#9203 Type C
#9204 Type D
#9205 Type E
#9206 Type F
#9207 Type G
#9208 Type H
#9209 Type I
#9210 Type J
#9211 Type K

Note: The key for the Security Lock is *not* interchangeable with the key for the Cash Drawer Lock(s) (if installed). **Field Installation:** Yes.

Store Logo Printer (#6500): Provides the capability to print, from a stamp type impact print device, a store logo, slogan, or other graphic at the top of the cash receipt. The maximum size of the logo, slogan, or graphic is 1.27cm (0.5 inches) vertically by 6.35cm (2.5 inches) wide. The pre-inked stamp for this print device is customer-supplied. See *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391) for details. Stamp ink life is dependent on ink color, lines of print, total amount of character surface, and customer acceptance of readability. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cash Tills: One cash till is shipped with the Cash Drawer special feature. Additional multiple compartment cash tills with either fixed or adjustable bill and coin slots are available.

- Till with fixed bill and coin slots (without cover), B/M 1612499.
- Till with adjustable bill and coin slots (without cover), B/M 1612500. Note: Assembly of the till with adjustable slots is a customer responsibility.
- Lockable Till Cover including two keys, B/M 1612501.
- Additional key for lockable till cover, P/N 1851268.

Replacement Locks and Keys: The 5265 is equipped with a lock on the diskette assembly cover. The machine is shipped with two keys for the lock. Any cash drawer (special feature) on the 5265 is equipped with the *same lock type* as the diskette assembly cover lock. Additional or replacement keys may be purchased from a local locksmith.

Use the following part numbers when ordering replacement locks and keys:

Lock Type	Diskette Assembly Cover	Cash Drawer	Security Lock *
A	1612369	1612386	1612412
B	1612370	1612387	1612413
C	1612371	1612388	1612414
D	1612372	1612398	1612415
E	1612373	1612399	1612416
F	1612374	1612403	1612417
G	1612376	1612405	1612418
H	1612378	1612406	1612419
I	1612379	1612407	1612420
J	1612382	1612409	1612421
K	1612383	1612410	1612422

* The Security Lock and Key (#6300) must be installed *before* a replacement can be ordered. The security key is not interchangeable with the diskette assembly cover key or the cash drawer key.

Journal Lock Key: Order by machine type and P/N 1612439.

Keyboard Overlays

Standard Overlay: The standard keyboard overlay can be modified to identify the function of the keys as defined during personalization. This overlay is initially shipped with the 5265. To order additional or replacements, order by part number.

Standard Overlay P/Ns

	..... 34 Key		..... 64 Key	
Language	Touch-Tone® Keyboard	Adding Machine Keyboard	Touch-Tone Keyboard	Adding Machine Keyboard
English US	1610411	1610431	1610451	1610471

® Trademark of American Telephone & Telegraph Co.

Blank Overlay: Blank keyboard overlays are available for those customers with multiple machine installations who desire to have a local vendor silk screen them to match the personalized function. order by part number.

Blank Overlay, 34 Key, P/N 5559882
Blank Overlay, 64 Key, P/N 5559883

Personalization Overlay: The personalization overlay fits over the keyboard and is used to identify the function of the keys during personalization. This overlay is initially shipped with the 5265.

Personalization Overlay, Touch-Tone Style Keyboard, P/N 1610371.
Personalization Overlay, Adding Machine Style Keyboard, P/N 1610391.

Keyboard Overlay Nomenclature Kit: One kit of die-cut self-adhesive labels is shipped with each 5265. Used to modify keyboard to customer requirements.

To order additional or replacements, order by part number.

Cables: Cables, connector, and adapters (to attach a 5266 to a 5265 or to other 5266s in the cluster) may be purchased from IBM or a customer-selected source. See *IBM 5260 Retail System Planning and Site Preparation Guide* (GA21-9391), for cable, connector, and adapter specifications. The customer is responsible for installation and maintenance of these cables. Assembled cables may be ordered from IBM. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5266s.

Twinax Connector Kit P/N 7362268: Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (Individual connectors P/N 7362229 are available for replacements.)

Twinax Wire P/N 7362211: Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinax Cable Assembly P/N 7362267: Includes a Connector Kit (2 connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter P/N 7362230: Permits two Twinax Cable Assemblies to be joined together.

Twinax Station Protector Kit P/N 7361807: Includes two protectors. One is required at each end of attachment cable installed outdoors (either above or below ground level).

5266 Point of Sale Terminal (cont'd)

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES

For ordering information, Contact IBM.

Ribbons: Cash Receipt/Journal Roll Printer: Black P/N 1299285, Purple P/N 1299286. **Note:** Black is recommended.

Roll Paper: Cash Receipt and Journal Roll, P/N 432767 (Carton of 50 rolls).

Forms: Single and Multipart cut form sales slips may also be ordered.

5271 SYSTEM UNIT

PURPOSE

The 5271 System Unit operates with the 3270-PC Control Program (1837-434) and IBM Personal Computer DOS 2.0 to provide the user with multiple concurrent host sessions and one IBM Personal Computer DOS 2.0 session. The 5271 provides for the attachment of a 5271 keyboard and a display unit. The display may be either a 5151 Monochrome Display or a 5272 Color Display. The 5271 System Unit attaches to the 3274 Control Unit as a Category "A" terminal.

MODELS

Model 002 Includes: 256KB RAM (expandable to 640KB), 5151/5272 Display adapter, 5271 keyboard, 3270-PC Keyboard/Timer adapter, one Dual-Sided Diskette Drive and adapter, 3270 system adapter. 3270-PC Control Program, IBM PC DOS 2.0,

Model 004 Includes: Standard Model 002 features plus: Second Dual-Sided Diskette Drive, 64/256KB Memory Expansion Option (with 64KB for 320KB total), Printer Adapter for a 5152 Graphics Printer.

Model 006 Includes: Standard Model 002 features plus: One 10MB Fixed Disk and adapter, 64/256KB Memory Expansion Option (with 64KB for 320KB total), Printer Adapter for a 5152 Graphics Printer.

Customer Setup (CSU): Yes. (IBM setup is available at hourly rate and minimum charges.

HIGHLIGHTS

- The 5271 attaches to a 3274, 4321, 4331, or 4361 in Control Unit Terminal mode. In Distributed Function Terminal mode, it attaches to a 3274 using one physical port and up to four logical addresses. Up to 32 5271s can be attached to a 3274, depending on the application and the 3274 mdl used. The 5271 attaches via the same type coax cable used with other 3270 terminals.

Customer Responsibilities:
- Adequate site, system and other vendor preparations.
- Receipt at customer's receiving dock, unpacking, and placement of the unit.
- Physical setup, connection of cables in customer access areas, switch settings, and checkout.
- Contacting an IBM customer service coordinator for attachment of the 5271 communication cable to an on-site serviced IBM control unit where customer access area is not provided.
- Customizing the 3270-PC and 3274 (see *3274 Customizing Guide*, GA23 -0065).
- Determination of the required number of spares.
- Performing Customer Problem Analysis and Resolution (CPAR).
- Testing other IBM Personal Computer options not included with the 3270-PC to assure viability. IBM does not accept any responsibility for them.
- Spare blank diskettes must be ordered by the customer as required.

Mdls and Configuration Support: Table A identifies the 3274 mdls and configuration support required for the 3270-PC.

Table A. 3274 Mdls and Configuration Support.

Mode/Mdl/Storage			
5271 Mode			
1B	1A, C, D	1A, C, D	
21B	21A, C, D	31A, C, D	31A, C, D
		51C	51C
64KB	64KB	128KB	192KB
Control Unit Terminal Mode			
A	A, B	A, B, C, T*	D
64KB	64KB	128KB	192KB
Control Unit Terminal or Distributed Function Terminal Mode			
		T*	D*
		128KB	192KB

*Configuration Support T must be at release level 31 or higher and configuration support D at release level 61 or higher.

Note: The following RPQs in the 3274 Control Unit are not allowed when a 3270-PC operating in Control Unit Terminal mode is attached, they relate to keyboard changes: **8K0809, 8K0931, 8K0949, 8K0988, 8K1011, 8K1012, 8K1013, 8K1037, 8K1056, 8K1057, 8K1134, 8K1159, 8K11160 8K1162, 8K1163, 8K1169, 8K1170, 8K1195, 8K1198.**

Maximum number of 3274 attached terminals: The multiple logical terminal facility of the 3270-PC allows the user to designate up to four terminal addresses in a single 3270-PC. This requires one physical and four logical addresses for one physical port in the 3274 Control Unit. When planning installation of the 3270=PC, consideration must be given to the number of logical and physical addresses that are to be used compared to the maximum number of addresses and ports that are available. The number of addresses and ports available is dependent on the mdl of 3274, the method of system attachment, and the particular configuration of the 3274. When the 3274 has 3270-PCs attached that are operating in Distributed Function Terminal mode, table B specifies the maximum number of logical terminals that can be attached to the 3274.

Table B. Maximum number of Logical Terminals on a 3274

3274 Mdl	System Attachment	Max. No. Terminals
1A	Channel, SNA	128
1C	TP SDLC	128
	TP BSC	32
1D	Channel, non-SNA	32
31A	Channel, SNA	128
31C	TP SDLC	128
	TP BSC	32
31D	Channel, non-SNA	32
41A	Channel, SNA	128
41C	TP SDLC	128
	TP BSC	32
41D	Channel, non-SNA	32
51C	TP SDLC	36
	TP BSC	32
61C	TP SDLC	76
	TP BSC	32

Category "B" Terminal Restrictions: Category "B" terminals (e.g., 3277 Display Stations) cannot be used on the same 3274 when the 3274 is customized to support 3270-PCs operating in Distributed Function Terminal mode.

Bibliography: See KWIC index or specific system bibliography.

SPECIFY

- Voltage (120V AC, 60 Hz, 1-phase, 3-wire): No specify required.
- Line Cord: 1.8m (6 ft.), with no locking plug: No specify required.
- 5271 Keyboard and keyboard overlay: No specify required.
- Specify 5151 Monochrome or 5272 Color Display.

SPECIAL FEATURES

5152 Graphics Printer: Mdls 4 and 6. **Field Installation:** Yes.

PC FEATURES: The 5271 System Unit, when used with the IBM PC DOS 2.0, is capable of using many 5150/5160 Personal Computer options. The number of expansion slots available for these options are identified in the following table:

Slot	Option	Standard Mdl 2	4	6
1	3270 System adapter	X	X	X
2	64/256KB expansion		X	X
3				
4	Display adapter	X	X	X
5	Fixed Disk adapter			X
6	Diskette Drive adapter	X	X	X
7	Printer adapter		X	X
8	Keyboard adapter	X	X	X

Note: Slots 1 through 6 are long slots; 7 and 8 are short.

The following 5150/5160 Personal Computer options may be ordered with the 5271:

64KB Memory Module Kit (#1003).

64/256KB Memory Expansion Option (#1013).

Communications Adapter Cable (#2067).

Asynchronous Communications Adapter (#2074).

10MB Fixed Disk (#2500).

5271 System Unit (cont'd)

Fixed Disk Adapter (#2501).

Dual-Sided Diskette Drive (#3810).

Printer Adapter (#5200).

Printer Cable (#5612).

Although the Dual-Sided Diskette Drive and the 10MB Fixed Disk and Fixed Disk Adapter are 5150/5160 Personal Computer options that may be ordered with the 3270-PC, it is expected that new unit orders will be placed for appropriate configurations.

ORDERING AND SCHEDULING:

The 5271 is stocked in quantity at the IBM FE Distribution Center. Raleigh. Ordering is simplified because the 5271 standard mdls include most of the features; some options can be ordered with the 5271. When an order is placed, it is initially entered for a 5271. All orders are shipped from the FE Distribution Center.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 5271 shipment to a customer will include the following: Basic reference manual and binder ... *3270-PC Guide To Operations* ... *3270-PC Maintenance Information.*

5272 COLOR DISPLAY

PURPOSE

A 14-inch color cathode-ray tube (CRT) used with the 5271 System Unit for displaying data to the professional user. A tilt and rotate mechanism is included in the 5272 Color Display Stand.

MODELS

Model 001

Prerequisites: 5271 System Unit.

Customer Setup: Yes.

HIGHLIGHTS

Displays 720 by 350 picture elements which in host-interactive mode provides a 1920-character screen of 80-characters by 24 lines. A 25th line is available for an operator information area. When the 5271 operates in 3270 PC stand-alone mode, 2,000-characters are displayed as 80-characters by 25 lines. The character cell is 9 x 14.

- The following feature are automatically shipped with the 5272:

  5272 Line Cord (P/N 1836166): Provides 120V input power to the 5272 Color Display.

  5272 Color Display Stand (P/N 6871672): Provides a base for the 5272 Color Display and allows +/- 50 degrees of swivel and +15/-4 degrees tile.

Customer Responsibilities:

- Adequate site, system, and other vendor preparation.
- Receipt at customers receiving dock, unpacking and placement of the unit.
- Physical setup, connection of cables, switch settings, and checkout.
- Determination of required number of spares.
- Performing customer problem analysis and resolution.
- Calling a toll-free number for service.

Bibliography: See KWIC Index or specific system bibliography.

SPECIFY

- Voltage: 120V AC, 1-phase 60 Hz, (no specify required).

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

5281 DATA STATION

PURPOSE

A single, table-top, auxiliary keyboard/display for use in the 5280 Distributed Data System. Attaches to the 5285 Programmable Data Station, the 5286 Dual Programmable Data Station or the 5288 Programmable Control Unit.

MODELS

Model Z00

Prerequisites: The 5281 requires a 5285, 5286, or 5288 with appropriate auxiliary data station attachment special feature. A cable is required. If the 5281 contains one or two disk or diskette drives, the 5285, 5286, or 5288 requires an appropriate Remote Disk/Diskette Drive Attachment (special feature) ... see M5285, 5286, or 5288 pages. An additional cable is required if the 5281 contains one or two disk or diskette drives. See "Accessories" below.

Device Attachments: Appropriate special features are required to attach auxiliary data stations (5281, 5282) and some I/O units to a 5285, 5286, or 5288. See M5285, 5286, or 5288 "Special Features."

For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

HIGHLIGHTS

- Functions as an independent data station.
- Attaches via cable(s) to a 5285 Programmable Data Station, a 5286 Dual Programmable Data Station, or a 5288 Programmable Control Unit at a distance of up to 61m (200 feet).
- Obtains control, logic and main storage from the attaching 5285, 5286, or 5288. Each keyboard/display in a 5280 system operates independently and has identical access to system resources.
- Movable keyboard has palm rest for operator efficiency and comfort.
- Display sizes of 480, 960, and 1,920 characters.
- Disk storage capacity of 10M bytes or 20M bytes.
- Diskette storage capacity of 0.25M bytes to 2.4M bytes.

Display: Display sizes are: 480 characters (six lines of 80 characters), 960 characters (12 lines of 80 characters), and 1,920 characters (24 lines of 80 characters). The display size is determined by the auxiliary data station attachment feature on the controlling device to which the 5281 is attached. See M5285, 5286, or 5288 "Special Features".

Display characters are presented within an 8X16 dot matrix. The standard, upper/lower case, 94-character EBCDIC character set,94-character ASCII character set,and the 185-character Multinational Character Set are included. The character set is user-selectable. See "Type Catalog" for available character sets.

Extended highlighting provides screen attributes such as reverse image, high intensity, blink, underline, non-display, and column separator. Screen attributes are under program control and can be applied on a field basis. Brightness and contrast controls are provided to meet individual requirements.

Keyboard: A choice of three keyboard types provide input flexibility to meet individual user requirements; data entry, data entry with proof arrangement, and typewriter (see "Special Features" below). See Type Catalog for keyboard layout.

Each keyboard has cursor movement keys, special function keys, field exit keys and data keys (alphabetic and numeric). All data keys are typamatic. The keyboard is movable and has a palm rest for operator comfort and efficiency.

The keyboards contain only a subset of the characters in the Multinational Character Set. When the Multinational Character Set is used, the additional characters may be entered via multiple key sequence.

Typewriter keyboards provide for direct entry of upper and lowercase characters. Data entry keyboards provide for direct entry of uppercase only. Lowercase characters may be entered via multiple key sequence.

Disk: When attached to a 5285 or 5288, the 5281 can contain one or two 10MB disk storage drives ... see "Special Features". The disk storage is a physically non-removable, direct access storage medium. See M5285 or 5288 pages for characteristics and capacities. A cable is required ... see " Accessories".

Diskette: Two types of compact diskette drives are available for the 5281. A diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D ... see "Special Features" and M5285, 5286, or 5288 pages for diskette drive characteristics, capacities and diskette data exchange information. A cable is required ... see "Accessories" below.

Security: A non-display input mode allows data to be entered from the keyboard without being displayed on the screen. A security keylock (special feature on the 5285, 5286, and 5288) prevents keyboard entry or display of data, and on a communicating 5285 or 5288 system, prevents initiation of communications. A Magnetic Stripe Reader (special feature) is available which may be used to enter user identification. This allows user program routines to audit and control operator access to data.

Customer Setup (CSU): The 5281 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. The Customer Setup Allowance is two days . For additional information on CSU, refer to the GI section. One copy of *IBM 5280 User's Setup Procedures* (GA21-9365), is included with each 5281.

Customer Responsibility: The customer is responsible for;

- Adequate site, system, and other vendor preparation.
- Providing a desk, counter, or table-top to support the 5281.
- Receipt, unpacking, and placement of the 5281.
- Installation and maintenance of signal cables and associated parts for attaching the 5281 to a 5285, 5286, or 5288.
- Physical setup, switch setting, and checkout in accordance with instructions supplied by IBM.
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Relocation of the 5281 if required, to allow IBM service access.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5281.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the Branch Office.
- When adding a 5281 to a 5285, 5286, or 5288, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).

Publications: *IBM 5280 General Information* (GA21-9350) and *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

AAS Ordering Instructions: The 5281 is a System Component.

SPECIFY

- Voltage (115 V AC, 1-phase, 60 Hz): Specify **#9881** for a standard non-locking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl white only (no specify required).
- Signal Cables: Special, purchase-only, multi-wire cables are required. See "Accessories" for 5281 cable information and ordering instructions. **Specify: #9050** if cable is ordered from IBM, or **#9055** if cable is ordered from another source.
- A keyboard must be selected (see "Special Features").

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Disk/Diskette (#3401, #3402, #3410): Two physical positions are available for optional disk and diskette drives. The 5281 can contain 0, 1, or 2 drives. Any combination of disk/diskette drives is allowed. **Note:** When attached to a 5286, only diskette drives can be installed on the 5281.

Diskette 1 Drive (#3401): A diskette drive which can read/write IBM diskette 1. **Field Installation:** Yes. **Prerequisites:** The controlling device to which the 5281 is attached requires an appropriate Remote Disk/Diskette Drive Attachment (#1240 on the 5285, 5286) ... (#1300, #1301, #1302 on the 5288).

Diskette 2D Drive (#3402): A diskette drive which can read/write IBM diskette 1, 2, and 2D. **Prerequisites:** The controlling device to which the 5281 is attached requires an appropriate Remote Disk/Diskette Drive Attachment (#1240 on the 5285, 5286) ... (#1300, #1301, #1302 on the 5288). **Field Installation:** Yes.

Disk Storage Drive (#3410): A 10MB non-removable direct access storage device. **Prerequisites:** The controlling device to which the 5281 is attached requires an appropriate Remote Disk/Diskette Drive Attachment (#1240 on the 5285), (#1300, #1301, #1302 on the 5288) and Remote Disk Prerequisite (#4400 on the 5285, 5288). **Limitations:** Cannot be installed on a 5281 which is attached to a 5286. **Note:** If a Disk Storage Drive and a diskette drive (#3401 or #3402) are installed in a 5281, the Disk Storage Drive must be installed in the right-most position of the 5281. **Field Installation:** Yes.

Maximum: Two of the above.

5281 Data Station (cont'd)

Keyboard (#4600, #4601, #4602, #4603): One of the following must be selected.

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric keypad.

#4601: 66-key data entry style keyboard, movable, with 36 alphameric keys, and 30 function keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, and 30 function keys. The numeric keys are arranged similar to those of an adding machine.

#4603: 83-key keyboard with ASCII character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric keypad. **Maximum:** One of the above. **Field Installation:** Yes.

Magnetic Stripe Reader (#4950): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards, and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** The 5285, 5286, or 5288 requires a Magnetic Stripe Reader Adapter/Elapsed Time Counter (special feature).

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Cables to attach the 5281 to a 5285, 5286, or 5288 may be purchased from IBM or a customer-selected source. For a description of these cables and parts, see *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. Cables and parts which may be purchased from IBM are shown below. Order via MES. Specify bulk number, cable assembly number, or part number as appropriate. Allow a lead time of nine weeks.

Data Station Cable: Required to attach the 5281 to a 5285, 5286, or 5288.

Data Station Wire (B/N 7364108): Order must specify the desired length. Maximum length is 61m (200 feet). Data Station Wire and one Wire Connector Kit are required for each attachment cable.

Wire Connector Kit (P/N 4177800): Includes two connectors and associated hardware. One connector and Data Station Wire are required for each attachment cable.

Data Station Cable Assembly: Includes a connector kit (2 connectors) attached to bulk wire. A/N **7364212**. The reqiured length of wire must be specified on the order. Maximum length is 61m (200 feet).

Disk/Diskette Drive Cable: A single cable is required to attach either one or two disk/diskette drives housed within the 5281 or to a 5285, 5286 (diskette only), or 5288.

Disk/Diskete Drive Wire (B/N 7364109): Order must specify the desired length. Maximum length is 61m (200 feet). Disk/Diskette Drive Wire and one Wire Connector Kit are required for each attachment cable.

Wire Connector Kit (P/N 4177800): Includes two connectors and associated hardware. One connector kit and Disk/Diskette Drive wire are required for each attachment cable.

Disk/Diskette Drive Cable Assembly: Includes a connector kit (2 connectors) attached to a bulk wire.

A/N **7364208**. The required length of wire must be specified on the order. Maximum length is 61m (200 feet).

Display Screen Filter (#3300): An optically coated glass filter which attaches to the display, specifically designed to aid operator comfort by reducing reflected glare and providing improved display readability. Character contrast may also be enhanced. The filter is a CSU accessory. Order by feature number.

SUPPLIES

For IBM diskettes and magnetically striped and encoded identification cards contact IBM.

5282 DUAL DATA STATION

PURPOSE

A dual, table-top, auxiliary keyboard/display station for use in the 5280 Distributed Data System. Attaches to the 5285 Programmable Data Station, the 5286 Dual Programmable Data Station or the 5288 Programmable Control Unit.

MODELS

Model Z00

Prerequisites: The 5282 requires a 5285, 5286, or 5288 with appropriate auxiliary data station attachment (special feature). A cable is required. If the 5282 contains one or two diskette drives, the 5285, 5286, or 5288 requires an appropriate Remote Disk/Diskette Drive Attachment (#1240). See M5285, 5286, or 5288 pages.

Device Attachments: Appropriate special features are required to attach auxiliary data stations (5281, 5282) and some I/O units to a 5285, 5286, or 5288. See M5285, 5286, or 5288 "Special Features".

For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

An additional cable is required if the 5282 contains one or two diskette drives. See "Accessories" below.

HIGHLIGHTS

- Single, split screen CRT display with two keyboards.
- Functions two independent data stations.
- Attaches via cable(s) to a 5285 Programmable Data Station, a 5286 Dual Programmable Data Station, or a 5288 Programmable Control Unit at a distance of up to 61 meters (200 feet).
- Obtains control, logic and main storage from the attaching 5285, 5286, or 5288. Each keyboard/display in a 5280 system operates independently and has identical access to system resources.
- Display sizes of 480 and 960 characters.
- Movable keyboard has palm rest for operator efficiency and comfort.
- Diskette storage capacity of 0.25M bytes to 2.4M bytes.
- Provides two operator positions, each with keyboard, diskette (optional), and display area.

Display: Display sizes are: 480 characters (six lines of 80 characters), 960 characters (12 lines of 80 characters). Both positions have the same display size. The display size is determined by the auxiliary data station attachment feature on the controlling device to which the 5282 is attached. See M5285, 5286, or 5288 "Special Features".

Display characters are presented within an 8x16 dot matrix. The standard, upper/lower case, 94-character EBCDIC character set, 94-character ASCII character set, and the 185-character Multinational character set are included. The character set is user-selectable. . See "Type Catalog" for available character sets. Both operator positions must use the same character set.

Extended highlighting provides screen attributes such as reverse-image, high-intensity, blink, underline, non-display, and column separator. Screen attributes are under program control and can be applied on a field basis. Brightness and contrast controls are provided to meet individual requirements. Each control affects both operator positions.

Keyboard: A choice of three keyboard types provide input flexibility to meet individual user requirements; data entry, data entry with proof arrangement, and typewriter (see "Special Features" below). Both 5282 keyboards must be the same type. See Type Catalog for keyboard layout. Each keyboard has cursor movement keys, special function keys, field exit keys and data keys (alphabetic and numeric). All data keys are typamatic. The keyboards are movable and have a palm rest for operator comfort and efficiency.

The keyboards contain only a subset of the characters in the Multinational Character Set. When the Multinational Character Set is used, the additional characters may be entered via multiple key sequence.

Typewriter keyboards provide direct entry of upper and lowercase characters. Data entry keyboards provide for direct entry of uppercase only. Lowercase characters may be entered via multiple key sequence.

Diskette: Two types of compact diskette drives are available for the 5282. A diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D. See "Special Features", and M5285, 5286, or 5288 pages for diskette drive characteristics, capacities and diskette data exchange information. A cable is required ... see "Accessories" below.

Security: A non-display input mode allows data to be entered from the keyboard without being displayed on the screen. A security keylock (special feature on the 5285, 5286, and 5288) prevents keyboard entry or display of data, and, on a communicating 5285 or 5288 system, prevents initiation of communications. A Magnetic Stripe Reader (special feature) is available which may be used to enter user identification. This allows user program routines to audit and control operator access to data.

Customer Setup (CSU): The 5282 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. . For additional information on CSU, refer to the GI section. One copy of *IBM 5280 User's Setup Procedures* (GA21-9365), is included with each 5282.

Customer Responsibility: The customer is responsible for;

- Adequate site, system, and other vendor preparation.
- Providing a desk, counter, or table-top to support the 5282.
- Receipt, unpacking, and placement of the 5282.
- Installation and maintenance of signal cables and associated parts for attaching the 5282 to a 5285, 5286, or 5288.
- Physical setup, switch setting, and checkout in accordance with instructions supplied by IBM.
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Relocation of the 5282 if required, to allow IBM service access.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5282.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the Branch Office.
- When adding a 5282 to a 5285, 5286, or 5288, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).

Publications: *IBM 5280 General Information* (GA21-9350) and *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

AAS Ordering Instructions: The 5282 is a System Component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Signal Cables: Special, purchase-only, multi-wire cables are required. See "Accessories" for 5282 cable information and ordering instructions. **Specify: #9050** if cable is ordered from IBM, or **#9055** if cable is ordered from another source.
- Two keyboards must be selected (see "Special Features").

SPECIAL FEATURES

Diskette Drives (#3401, #3402): Two physical positions are available for optional diskette drives. The 5282 can contain 0, 1, or 2 drives.

Diskette 1 Drive (#3401): A diskette drive which can read/write Diskette 1. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** The controlling device to which the 5282 is attached requires an appropriate #1240 on the 5285, 5286, or #1300, #1301, #1302 on the 5288.

Diskette 2D Drive (#3402): A diskette drive which can read/write Diskette 1, 2, and 2D. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** The controlling device to which the 5282 is attached requires an appropriate #1240 on the 5285, 5286, or #1300, #1301, #1302 on the 5288.

Keyboard (#4600, #4601, #4602, #4603): Two of the following must be selected. Both must be the same type.

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric keypad.

#4601: 66-key data entry style keyboard, movable, with 36 alphameric keys, and 30 function keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, and 30 function keys. The numeric keys are arranged similar to those of an adding machine.

#4603: 83-key keyboard with ASCII character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric keypad.

Maximum: Two of the above. **Field Installation:** Yes. **Prerequisites:** Keyboard Language (see "Specify").

5282 Dual Data Station (cont'd)

Magnetic Stripe Reader (#4950): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards, and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data. If only one Magnetic Stripe Reader is used with the 5282, it will be assigned to and can only be used in conjunction with the keyboard located on the side of the 5282 which has the power switch. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** The 5285, 5286, or 5288 requires a Magnetic Stripe Reader Adapter/Elapsed Time Counter (special feature).

Replaced Parts: Replaced parts from any special feature installation or removal remain the property of the customer.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Cables to attach the 5282 to a 5285, 5286, or 5288 may be purchased from IBM or a customer-selected source. For a description of these cables and parts, see *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. Cables and parts which may be purchased from IBM are shown below. Order via MES. Specify bulk number, Cable assembly number, or part number as appropriate. Allow a lead time of nine weeks.

Data Station Cable: Required to attach 5282 to a 5285, 5286, or 5288.

Data Station Cable Assembly: Includes a connector kit (2 connectors) attached to bulk wire.

Data Station Wire (B/N 7364108): Order must specify the desired length. Maximum length is 60m (198 feet). Data Station Wire and one Wire Connector Kit are required for each attachment cable.

Disk/Diskette Drive Cable: A single cable is required to attach either one or two diskete drives housed within the 5282 to a 5285, 5286, or 5288.

Disk/Diskette Drive Cable Assembly: Includes a connector kit (2 connectors) attached to a bulk wire.

A/N 7364208. The required length of wire must be specified on the order. Maximum length is 60m (198 feet).

Disk/Diskete Drive Wire (B/N 7364109): Order must specify the desired length. Maximum length is 60m (198 feet). Disk/Diskette Drive Wire and one Wire Connector Kit are required for each attachment cable.

Wire Connector Kit (P/N 4177800): Includes two connectors and associated hardware. One connector kit and wire are required for each attachment cable.

SUPPLIES

For IBM diskettes and magnetically striped and encoded identification cards contact IBM.

5285 PROGRAMMABLE DATA STATION

PURPOSE

A single, table-top, programmable keyboard/display station with standard controller and diskette capability for data entry, associated processing and/or data communications. Part of the 5280 Distributed Data System.

MODELS

5285 models are available depending on main storage capacity and the type of diskette drive included in the base machine (one drive is standard).

Model	Main Storage Capacity	Diskette
A01*	32K	1
A05*	32K	2D
B01*	48K	1
B05*	48K	2D
C01	64K	1
C05	64K	2D
D01	96K	1
D05	96K	2D
E01	128K	1
E05	128K	2D

* Not available as of July 31, 1983.

Customer Setup (CSU): The 5285 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. The customer Setup Allowance is two days . One copy of *IBM 5280 User's Setup Procedures* (GA21-9365) is included with each 5285.

HIGHLIGHTS

- Multiple microprocessors provide independent processing and I/O control.
- Stored program function.
- Multiprogramming capability with multiple main storage partitions.
- Powerful and extensive data editing function.
- Multi-chip technology and compact disk and diskette drives allow compact table-top system packaging.
- 10MB disk storage drive available.
- Two types of compact diskette drives, housed within the 5285, support either Diskette 1 or Diskette 1, 2, and 2D and provide up to 2.4M bytes of storage capacity.
- Front-loading diskette drives provide convenience and ease of access.
- Movable keyboard with palm rest for operator comfort.
- Display size of 480, 960, or 1,920 characters.
- Multiple data station capability and additional disk and diskette capacity with attachment of one 5281 Data Station or one 5282 Dual Data Station.
- Attachment capability for up to seven printers.
- Security features for data asset protection.
- Independent data station operation through multiprogramming and system resource sharing.
- Communications adapters provide both SDLC and BSC capability.
- Communications programming support available for RJE, batch, and interactive communications via SNA/SDLC or BSC.

Controller: Provides processing capability, control, main storage, and optional I/O attachments and communications features. Controls all functions of the 5285 and an optionally attached 5281 Data Station or 5282 Dual Data Station. Multiple microprocessor architecture allows processing and I/O operations (e.g., disk, diskette, keyboard/display, communications) to operate independently. The 5285 provides 64K of main storage that can be expanded to a maximum of 128K. Multiprogramming capability is available through partitioned memory. The number of partitions and their size (6K minimum) are user-specified with a facility provided in 5280 System Control Programming (5708-SC1). Special features provide for the attachment of an auxiliary data station (5281 or 5282), 5217, 5222, 5224, 5225, 5242, or 5256 printers and the communications adapters which each provide both SDLC and BSC communications under stored program control.

Display: Displays up to 480 characters on six lines of 80 characters each. Optional display sizes are 960 characters (12 lines of 80 characters) or 1,920 characters (24 lines of 80 characters). Characters are presented within an 8x16 dot matrix. The standard, upper/lower case, 94-character EBCDIC character set,94-character ASCII character set, and the 185-character Multinational Character Set are included. The character set is user-selectable. See "Type Catalog" for available character sets.

Extended highlighting provides screen attributes such as reverse image, high intensity, blink, underline, non-display, and column separator. Screen attributes are under program control and can be applied on a field basis. Brightness and contrast controls are provided to meet individual requirements.

Keyboard: A choice of three keyboard types provide input flexibility to meet individual user requirements: data entry, data entry with proof arrangement, and typewriter (see "Special Features" below). See "Type Catalog" for keyboard layout. Each keyboard has cursor movement keys, special function keys, field exit keys, and data keys (alphabetic and numeric). All data keys are typamatic. The keyboard is movable and has a palm rest for operator comfort. The keyboards contain only a subset of the characters in the Multinational Character Set. When the Multinational Character Set is used, the additional characters may be entered via multiple key sequence. Typewriter keyboards provide for direct entry of upper and lower case characters. Data entry keyboards provide for direct entry of uppercase only. Lowercase characters may be entered via multiple key sequence.

Disk/Diskette: One diskette drive is standard, and its type is determined by the 5285 mdl number. An additional diskette drive or a Disk Storage Drive can be added. See "Special Features".

Disk: One 10MB Disk Storage Drive can be installed in a 5285. The disk storage is a physically non-removable, direct access medium. Capacity and access times are:

Bytes/Sector	256
Bytes/Cylinder	32,768
Cylinders *	303
Capacity * (bytes)	9,928,704
Access Time (ms)	
Minimum (cyl to cyl)	16.6
Average (102 cyl)	85
Maximum	205
Rotation Speed (rpm)	3,600

* Available to the user for programs and data.

Diskette: Two types of compact diskette drives are available with the 5285: A diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D. Capacity per drive ranges from 0.25M bytes to 1.2M bytes. The formats for the diskettes are:

Diskette 1

Format	Bytes/Sector	Capacity
1	128	246KB*
2	256	284KB
3	512	303KB

*243KB when used for Basic Exchange

Diskette 2

Format	Bytes/Sector	Capacity
4	128	492KB
5	256	568KB
6	512	606KB

Diskette 2D

Format	Bytes/Sector	Capacity
7	256	985KB
8	512	1136KB
9	1024	1212KB

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 4 above), H Exchange (Format 7 above), and I Exchange (all of the above formats). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Examples are the Series/1, System/3, System/32, System/34, System/36, System/38, S/370, 303X, 4300, 3540, 3740, 3747, 3770, 3790, 5110, 5230, 5260, and 8100.

The instantaneous data transfer rate using Diskette 1 or 2 is 31.2K bytes/sec and for Diskette 2D it is 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm. Diskette read or write is overlapped with seek. Diskette operations are overlapped with processing and other I/O device operations.

Auxiliary Data Station: One 5281 Data Station or 5282 Dual Data Station can be attached to the 5285. See "Special Features" below. The 5281 or 5282 is cable attached at a maximum distance of 61m (200 feet). The 5285 provides control and main storage in support of the auxiliary data station. Each keyboard/display (including the 5285) is assigned to a separate partition and operates independently. Each disk and diskette drive on the 5285 and an attached data station is available to any program and any keyboard/display.

The auxiliary data station must have the same display size(s) as the 5285. The auxiliary data station display size(s) is determined by the Auxiliary Data Station Attachment (special feature) on the 5285.

5285 Programmable Data Station (cont'd)

Printers: The 5217, 5222, 5224, 5225, 5242, and 5256 Printers are available for attachment to the 5285. One 5217, 5222, 5242 or a maximum of seven 5224, 5225, and/or 5256 Printers can be attached. See "Special Features". **Note:** Printer speeds may be affected by the customer's program, application load, forms design, and/or the number of printers attached to the system.

Security: A non-display input mode allows data to be entered from the keyboard without being displayed on the screen. A Security Keylock (special feature) prevents keyboard entry or display of data, and on a communicating 5285, prevents initiation of communications. In addition, a communicating 5285 can exchange identification sequences with the host, which assists the user in controlling access to data. A Magnetic Stripe Reader (special feature) is available which may be used to enter user identification. This assists user program routines in auditing and controlling operator access to data. Also, diskette media can be removed from the system and secured separately.

Communications: The Communications Adapter (#2500) operates under stored program control and allows for either SDLC or BSC data link control over a single communications line. The feature allows the 5285 to communicate on a switched point-to-point or nonswitched point-to-point or multipoint line at speeds up to 4800 bps. On a multipoint line, the 5285 operates as a tributary station.

The 3270 Emulation Communications Adapter (#3270) provides the same function as #2500 (above) and in addition, provides support for the 5280-3270 Emulation (5708-EM1) licensed program.

Connection to the line is supported by a Line Interface feature. Operation is half-duplex mode over a switched network on half-duplex facilities or half-duplex mode over nonswitched (or equivalent private) communications lines on duplex or half-duplex facilities. Switched network support includes manual dial and manual or auto-answer (where the attached modem supports this capability). The 5285 at each termination (drop point) of a communications line must use the same clocking source (modem or business machine). Units must be set to operate at the same transmission rate, use the same transmission code, and the same 2- or 4-wire connection to the line. Compatible modems must be used at all terminations on a network.

The 5285 using stored program control communicates using BSC protocol with:

- A Series/1 equipped with #2074, #2075, #2093/#2094.
- A System/3 equipped with #2074, #2084, or #2094.
- A System/32 equipped with #2074.
- A System/34 equipped with #2500, #3500, or #4500.
- A System/36 equipped with #2500 or #4500.
- A System/38 with appropriately configured BSC Adapter and subfeatures (point-to-point only).
- A S/370 via an Integrated Communications Adapter, a 4331 via a Communications Adapter, or a S/370, 303X, or 4300 via a 2701 Data Adapter Unit, or a 3704, 3705, or 3725 Communications Controller with the Network Controller Program (ACF/NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous communications adapter and appropriate subfeatures.
- A 3741 mdl 2 or 4.
- A 3747 Data Converter equipped with #1660.
- A 5265 communicating mdl XX2.
- A 5280 equipped with #2500 or #3270.

The 5285 using stored program control communicates in SNA/SDLC mode with a 4331 via a Communications Adapter, a S/370 via an Integrated Communications Adapter, an 8100 with DPPX/BASE, or a S/370, 303X, or 4300 via a 3704, 3705, or 3725 Communications Controller equipped with appropriate features. The 5285, using the 3270 Emulation Communications Adapter, communicates in SNA/SDLC mode with an 8100 Information System. See M3704, 3705, or 3725 pages.

See the 5280 programming pages for a description of the communications program support available, and any special feature requirements. The communications adapters are mutually exclusive and cannot be installed on a 5285 with the Second Application Microprocessor (#6800).

IBM Modems: One IBM modem can be attached to the Communications Adapter (#2500) or 3270 Emulation Communications Adapter (#3270). **Prerequisites:** #3701.

Modem	Speed (bps)	Facility
3863	2400	Switched, nonswitched
3868 mdl 1	2400	Nonswitched
3864	4800	Switched, nonswitched
3868 mdl 2	4800	Nonswitched
3872 mdl 1	2400/1200	Nonswitched

Note: The 5285 does not support Automatic Call Originate (#1091) on the 3872. For communication capabilities, product utilization and special features, see M2700, 3863, 3864, 3872 pages.

IBM Data Encryption Devices: An 3845 or 3846 Data Encryption Device may be attached between the 5285 communications adapter and the external modem. **Note:** Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability. The 3845 or 3846 device operating with SDLC will not operate with NRZI transmission mode. **Prerequisites:** #3701.

Communications References:

- See the Programming pages for possible restrictions with some products.
- See M2700 pages for additional information concerning modems, communications facility, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.
- For information concerning external modems attachable to the Adapter, contact IBM.
- Refer to the *IBM 5280 Planning and Site Preparation Guide* (GA21-9351) for physical planning information.

Communications Cable: A communications cable length is required. See "Specify".

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination procedures and recovery routines that are easily understood and used by the operator. The procedures are described in the *IBM 5280 Machine Verification Manual* (GA21-9357).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparation.
- Obtaining a firm installation date for the start of communications facilities and services (including any required modems). The marketing representative must assure that a firm installation date is established prior to Order Confirmation.
- Providing a desk, counter, or table-top to support the 5285.
- Receipt, unpacking, and placement of the 5285.
- Installation and maintenance of signal cables and associated parts for attaching a 5217, 5222, 5224, 5225, 5242, 5256, 5281, or 5282 to the 5285.
- Physical setup, connection of cables to communications lines/modems and IBM devices incorporating protected access areas, modem attenuation setting and checkout in accordance with instructions supplied by IBM.
- To provide an FCC registered protective circuit when attaching an integrated modem to the public switched telephone network. This registered protective circuit should be equivalent to either the CBS type coupler (for manual/automatic answering) or the CDT type coupler (for manual only answering).
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5285.
- Relocation of the 5285, if required, to allow IBM service access.
- When adding a 5281 or 5282 to the 5285, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 pages.

Publications: *IBM 5280 General Information* (GA21-9350) and *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

Notes:

1. Device Attachments: Appropriate special features are required to attach auxiliary data stations (5281, 5282) and some I/O units. See "Special Features".
2. IBM 5280 System Control Programming (5708-SC1) should be ordered at equipment order entry time.
3. For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

5285 Programmable Data Station (cont'd)

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard non-locking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl white only (no specify required).
- A keyboard must be selected (see "Special Features").
- Primary host system that will process the data captured by the 5285:

Series/1	**#9505**
System/3	**#9501**
System/32	**#9502**
System/34	**#9503**
System/36	**#9503**
System/38	**#9504**
Other Small IBM System	**#9506**
S/360	**#9507**
S/370:	
- Mdl 138 and below	**#9508**
- Mdl 145 and above	**#9509**
3031, 3032, 3033	**#9510**
4331, 4341	**#9511**
8100	**#9512**
Other Large IBM System	**#9513**
Non-IBM System	**#9514**
Host System Unknown	**#9515**
Non-Host System	**#9516**

- Communications Cable Length (with #2500 or #3270): Required when attaching the 5285 to the communications facility. **#9010** for a 6m (20 foot) cable or **#9015** for a 12m (40 foot) cable. Specify this cable length only once per system.
- **Mandatory Specify Codes for Communications:** One selection must be specified from each of the following tables. Entries selected from Tables D, E and F will be used to preset hardware functions during manufacture. Selection from each of the other tables should be based on prime usage.

Table A - Line Control

BSC	**#9400**
SDLC	**#9401**

Table B - Transmission Code

EBCDIC	**#9060**
ASCII	**#9061**

Table C - Prime Usage

Series/1	**#9599**
System/3	**#9580**
System/32	**#9591**
System/34	**#9593**
System/36	**#9593**
System/38	**#9594**
S/360	**#9570**
3031 or S/370 mdl 138 & Below	**#9277**
3032, 3033, or S/370 mdl 145 & Above	**#9278**
3740/3747	**#9579**
4300	**#9596**
4381	**#9597**
5260	**#9600**
5280	**#9598**
Other IBM	**#9275**
Non-IBM	**#9276**

Table D - Transmission Rate

600 bps	**#9750**
1200 bps	**#9751**
2000 bps	**#9752**
2400 bps	**#9753**
4800 bps	**#9754**

Table E - Network Attachment

Point-to-Point (nonswitched)	**#9481**
Point-to-Point (switched)	**#9483**
Multipoint Tributary	**#9482**
Local Attach	**#9485**

Table F - Line Facility Attachment

Duplex (4-wire only)	**#9391**
Half-duplex	**#9392**

Table G - Host Application

RJE, MRJE, SRJE	**#9440**
CICS/VS	**#9441**
IMS/VS	**#9442**
Other	**#9443**

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

NON-COMMUNICATIONS FEATURES

Twinaxial Printer Attachment (#1150): Provides for the attachment of 5224 mdl 1 or 2, 5225 mdl 1, 2, 3, or 4 and/or 5256 mdl 1, 2, or 3 Printers to a single twinaxial port. A maximum of seven printers can be attached. Attachment is by twinaxial cable. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with Start/Stop Printer Attachment (#1152). **Prerequisites:** If multiple printers are attached, each printer on the cable, except the last, requires a Cable-Thru feature. **Maximum:** One. **Field Installation:** Yes.

Start/Stop Printer Attachment (#1152): To attach one 5217, 5222, or 5242 mdl 2 Printer. Attachment is by double twisted pair cable. A 6m (20 foot) cable is provided with the printer. For the 5222 Printer, an extension cable accessory is available to provide a total cable length of up to 61m (200 feet) ... see M5222 "Accessories". **Limitations:** Cannot be installed with Twinaxial Printer Attachment (#1150). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If feature #1152 was shipped before April 1, 1983, the 5285 also requires EC #467318 for attachment of the 5217 or 5242.

Auxiliary Data Station Attachment (#1200, #1205, #1210, #1215, #1220 : To attach one 5281 Data Station or one 5282 Dual Data Station. This feature also determines the display size of the auxiliary data station. The 5281 or 5282 must have the same display size(s) as the 5285. Attachment is by cable ... see M5281 or 5282 "Accessories". The maximum cable length is 61m (200 feet). Select one feature from the following:

Data Station	Display Sizes	Order Feature Number
5281	480	#1200 *

Limitations: Cannot be installed with the 3270 Emulation Communications Adapter (#3270), Optional 960-Character Display Size (#3500), or Optional 1,920-Character Display Size (#3505).

5281	960	#1205*

Limitations: Cannot be installed with the 3270 Emulation Communications Adapter (#3270). **Prerequisites:** Optional 960-Character Display Size (#3500).

5281	1,920	#1210

Prerequisites: Optional 1,920-Character Display Size (#3505).

5282	480	#1215

Limitations: Cannot be installed with the 3270 Emulation Communications Adapter (#3270), Optional 960-Character Display Size (#3500), or Optional 1,920-Character Display Size (#3505).

5282	960	#1220*

Limitations: Cannot be installed with the 3270 Emulation Communications Adapter (#3270). **Prerequisites:** Optional 960-Character Display Size (#3500).

* Not available as of July 31, 1983.

Maximum: One. **Field Installation:** Yes.

Remote Disk/Diskette Drive Attachment (#1240): Required if an attached 5281 Data Station has a diskette drive(s) (#3401, #3402) and/or a Disk Storage Drive(s) (#3410). Required if an attached 5282 Dual Data Station has either one or two diskette drives (#3401, #3402). A cable is required ... see M5281 or 5282 "Accessories". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Auxiliary Data Station Attachment (#1200, #1205, #1210, #1215, or #1220). #4400, if an attached 5281 Data Station has either one or two #3410 disk storage drive(s).

Diskette 1 Drive (#3401): An additional diskette drive which can read/write Diskette 1. **Limitations:** Cannot be installed with the optional Diskette 2D Drive (#3402) or the Disk Storage Drive (#3410). **Maximum:** One. **Field Installation:** Yes.

Diskette 2D Drive (#3402): An additional diskette drive which can read/write Diskette 1, 2, and 2D. **Limitations:** Cannot be installed with the optional Diskette 1 Drive (#3401) or the Disk Storage Drive (#3410). **Maximum:** One. **Field Installation:** Yes.

Disk Storage Drive (#3410): A 10MB non-removable direct access storage device. **Limitations:** Cannot be installed with the optional Diskette 1 Drive (#3401) or Diskette 2D Drive (#3402). Must be

5285 Programmable Data Station (cont'd)

installed in the right-most disk/diskette position of the 5285. **Maximum:** One. **Field Installation:** Yes.

Optional 960-Character Display Size (#3500): [Not available as of July 31, 1983.] Provides a maximum display capacity of 960 characters with 12 lines of 80 characters each. This feature or the Optional 1,920-Character Display Size (#3505) is required for the 5280 Communications Utilities Licensed Program (5708-DC1). **Limitations:** Cannot be installed with Optional 1,920-Character Display Size (#3505) or with Auxiliary Data Station Attachment (#1200, #1210, or #1215). **Maximum:** One. **Field Installation:** Yes.

Optional 1,920-Character Display Size (#3505): Provides a maximum display capacity of 1,920 characters with 24 lines of 80 characters each. This feature or the Optional 960-Character Display Size (#3500) is required for the 5280 Communications Utilities Licensed Program (5708-DC1). **Limitations:** Cannot be installed with Optional 960-Character Display Size (#3500) or with Auxiliary Data Station Attachment (#1200, #1205, #1215, or #1220). **Maximum:** One. **Field Installation:** Yes.

Elapsed Time Counter (#3610): Used to measure elapsed real time. It is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280-3270 Emulation (5708-EM1) Licensed Programs. It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of the 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955 or #4960). **Maximum:** One. **Field Installation:** Yes.

Remote Disk Prerequisite (#4400): Provides control function required to accommodate either one or two #3410 disk storage drive(s) in an attached 5281 Data Station. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1240.

Keyboard (#4600, #4601, #4602, #4603): One of the following must be selected:

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

#4601: 66-key data entry style keyboard, movable, with 36 alphameric keys, and 30 function keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, and 30 function keys. The numeric keys are arranged similar to those of an adding machine.

#4603: 83-key keyboard with ASCII character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

Maximum: One of the above. **Field Installation:** Yes.

Magnetic Stripe Reader (#4950): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data. Cannot be installed with the Elapsed Time Counter (#3610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4955 or #4960.

Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955, #4960): Provides the Elapsed Time Counter and control for from one to three Magnetic Stripe Readers (#4950). The Elapsed Time Counter is used to measure elapsed real time.

#4955: For a non-communicating 5285, provides the Elapsed Time Counter and control for up to three Magnetic Stripe Readers (#4950) on the 5285 and on an attached 5281 Data Station or 5282 Dual Data Station. The Elapsed Time Counter is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter (#3610), the Communications Adapter (#2500) or the 3270 Emulation Communications Adapter (#3270).

#4960: For a communicating 5285, provides the Elapsed Time Counter and control for one Magnetic Stripe Reader (#4950). The Elapsed Time Counter is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1). It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter (#3610). **Maximum:** One of the above. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

Security Keylock (#6340): Provides a single, key-operated switch with three positions for controlling operations on the 5285 and on an attached 5281 Data Station or 5282 Dual Data Station: "Lock" position prevents operator entry and display of data and prevents initiation of communications. "Local" position allows operator entry and display of data. "Normal" position allows initiation of communications in addition to operator entry and display of data. Two unique keys are provided: One allows selection of "Lock"/"Local". The other allows selection of "Lock"/"Normal". On a noncommunicating 5285, both operating positions ("Local" and "Normal") provide "Local" position operation. **Maximum:** One. **Field Installation:** Yes.

Second Application Microprocessor (#6800): A microprocessor which performs identical function and operates concurrently with the first (base) application microprocessor. This feature provides more processing power and is designed as an aid to performance improvement in a multiprogramming environment which has heavy processor utilization. **Limitations:** Cannot be installed with the Communications Adapter (#2500) or the 3270 Emulation Communications Adapter (#3270). **Maximum:** One. **Field Installation:** Yes.

Communications Features

Communications Adapter (#2500): Required to attach a communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits the 5285 to function on a switched or nonswitched public, or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501 , #5502, #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. **Limitations:** Cannot be installed with the Second Application Microprocessor (#6800) or the 3270 Emulation Communications Adapter (#3270). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5500, #5501, #5502, #5507, #5508, #3701, or #5650 or #5651. See the Programming section for 5280 Communications Utilities Licensed Program (5708-DC1) minimum system and feature requirements. See "Specify" for required communications cable length and "Additional Communications Information" for mandatory specify codes.

3270 Emulation Communications Adapter (#3270): Supports the 5280 - 3270 Emulation (5708-EM1) licensed program, and in conjunction with stored program control, permits the 5285 to function on a switched or nonswitched public or private communications line. This adapter is required to attach to a communications line via the appropriate interface or modem and provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501 , #5502, #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. Keyboard interpretation functions are provided in support of the 5280–3270 Emulation licensed program. **Limitations:** Cannot be installed with Communications Adapter (#2500), Auxiliary Data Station Attachment (#1200, #1205, #1215, or #1220), or the Second Application Microprocessor (#6800). **Maximum:** One **Field Installation:** Yes. **Prerequisites:** #5500, #5501, #5502, #5507, #5508, #3701, or #5650 or #5651. #3505 (optional). See the programming section of the sales manual for 5280 Communications Utilities (5708-DC1) and 5280-3270 Emulation (5708-EM1) minimum system and feature requirements. See "Specify" for required communications cable length and mandatory specify codes.

EIAInterface (#3701): Provides the appropriate cable and interface logic necessary to attach an external modem (either an IBM or non-IBM modem meeting RS-232-C characteristics . Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with Digital Data Service (DDS) Adapter feature (#5650 or #5651) or 1200 bps Integrated Modem [#5500, #5501, #5502, #5507, or #5508]. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270 and #5810.

1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508): [#5500, #5502, #5507 not available as of July 31, 1983.] A modem for SDLC or BSC data transmission at 600/1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is indicated via a 5280 Communications Utilities (5708-DC1) parameter. Available in five different versions: #5500 for nonswitched, #5501 for switched with auto-answer, #5502 for switched without auto-answer, #5507 for nonswitched with switched network backup manual answer capability, and #5508 for nonswitched with switched network backup auto-answer capability. The nonswitched versions (#5500, #5507, and #5508) provide a cable for attachment directly to a nonswitched 2- or 4-wire line, Type 3002. The switched with auto-answer versions (#5501 and #5508) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. The switched with manual answer versions (#5502 and #5507) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. The devices communicating with the 5285 must also be equipped with a compatible 1200 bps modem. **Limitations:** Cannot be installed with EIA interface (#3701) or Digital Data Service (DDS) Adapter (#5650 or #5651). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270. #5810 is required for #5501 and #5508.

Digital Data Service (DDS) Adapter (#5650, #5651): #5650 for Point-to-Point Operation ... #5651 for Multipoint Operation. An adapter for SDLC or BSC data transmission at speeds of 2400 or 4800

5285 Programmable Data Station (cont'd)

bps over AT&T nonswitched Data-Phone® digital data service. The DDS Adapter provides the appropriate cable and interface to the DDS channel service unit, the customer site termination of the DDS network. The DDS Adapter may also be used to locally connect a 5285 to another supported device which has a compatible DDS Adapter. This connection requires a special DDS Adapter Connector (see "Accessories") and supports point-to-point connections only. The maximum length of the connection is the sum of the modem cable lengths supported by the two devices. No modem or channel service unit is required. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem [#5500, #5501, #5502, #5507, or #5508]. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

Power Supply Expansion (#5810): Additional power for communications. Required for EIA Interface (#3701) and 1200 bps Integrated Modem (#5501 and #5508). **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customers should carefully evaluate their future requirements when purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Display Screen Filter (#3300): An optically coated glass filter which attaches to the display, specifically designed to aid operator comfort by reducing reflected glare and providing improved display readability. Character contrast may also be enhanced. The filter is a CSU accessory. Order by feature number.

Keylock Keys: The 5285 with Security Keylock (#6340) is shipped with two unique keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to original purchaser.) A letter of authorization with key identification numbers must accompany each order. With each order of quantity of one, the customer receives two keys (one key of each type). **Specify:** P/N **4177799** or, if EC 868325 is installed, specify P/N **6044248.** Allow six to eight weeks for delivery.

DDS Adapter Connector (P/N 4236967): A specially designed connector allows the cable from a 5285 DDS Adapter (#5650or #5651) to be connected to the cable of another supported device which has a compatible DDS Adapter. This provides for the local connection of two devices without the use of any modems or channel service units. Only one DDS Adapter Connector is required per connection. The maximum length of the connection is the sum of the modem cable lengths of the two devices. This is a purchase only item. . Allow six to eight weeks for delivery. **Maximum:** One per connection. **Field Installation:** Yes. **Specify:** P/N **4236967.**

SUPPLIES

Diskettes and Magnetic Cards: For diskettes and magnetically striped and encoded identification cards, consult IBM.

5286 DUAL PROGRAMMABLE DATA STATION

PURPOSE

A dual table-top, programmable keyboard/display station with standard controller and diskette capability for data entry and associated processing. Part of the 5280 Distributed Data System.

MODELS

Model	Main Storage	Diskette Number of Drives Diskette 1	Diskette 2D
A02*	32K	2	0
A10*	32K	0	2
B02*	48K	2	0
B10*	48K	0	2
C02	64K	2	0
C10	64K	0	2
D02	96K	2	0
D10	96K	0	2

* Not available as of July 31, 1983.

Customer Setup (CSU): The 5286 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. The Customer Setup Allowance is two days . One copy of *IBM 5280 User's Setup Procedures* (GA21-9365) is included with each 5286.

HIGHLIGHTS

- Single, split-screen CRT display with two keyboards.
- Functions as two independent programmable data stations.
- Provides two operator positions; each with keyboard, diskette, and display area.
- Multiple microprocessors provide processing and independent I/O control.
- Stored program function.
- Multiprogramming capability with multiple main storage partitions.
- Powerful and extensive data editing function.
- Multi-chip technology and compact diskette drives allow compact table-top system packaging.
- Diskette drives housed within the 5286 support either Diskette 1 or Diskette 1, 2, and 2D and provide up to 2.4M bytes of storage capacity.
- Movable keyboards have palm rest for operator comfort.
- 480-character display size at each operator position.
- Additional data station capability and diskette capacity available with attachment of a 5281 Data Station or a 5282 Dual Data Station.
- Security features for data asset protection.
- Independent data station operation through multiprogramming and system resource sharing.

5286 Components

Controller: Provides processing capability, control, main storage, and optional auxiliary data station capability. Controls all functions of the 5286 and an optionally attached 5281 Data Station or 5282 Dual Data Station. Multiple microprocessor architecture allows processing and I/O operations (diskette, keyboard/display) to operate independently.

The 5286 provides 64K of main storage that can be expanded to a maximum of 96K. Multiprogramming capability is available through partitioned memory. The number of partitions and their size (6K minimum) are user-specified with a facility provided in 5280 SCP (5708-SC1).

Display: Displays up to 480 characters at each operator position ... six lines of 80 characters. Characters are presented within an 8 x 16 dot matrix. The standard, upper/lower case, 94-character EBCDIC character set,94-character ASCII character set,and the 185-character Multinational Character Set are included. The character set is user-selectable. . See "Type Catalog" for available character sets. Both operator positions must use the same character set.

Extended highlighting provides screen attributes such as reverse image, high intensity, blink, underline, non-display, and column separator. Screen attributes are under program control and can be applied on a field basis. Brightness and contrast controls are provided. Each control affects both operator positions.

Keyboards: A choice of three keyboard types provide input flexibility to meet individual user requirements: data entry, data entry with proof arrangement, and typewriter. See "Special Features" below. Both 5286 keyboards must be the same type. The keyboards are movable and have a palm rest for operator comfort. See "Type Catalog" for keyboard layout. Each keyboard has cursor movement keys, special function keys, field exit keys, and data keys (alphabetic and numeric). All data keys are typamatic. The keyboards contain only a subset of the characters in the Multinational Character Set. When the Multinational Character Set is used, the additional characters may be entered via multiple key sequence. Typewriter keyboards provide for direct entry of upper and lowercase characters. Data entry keyboards provide for direct entry of upper case only. Lowercase characters may be entered via multiple key sequence.

Diskette: Two types of compact diskette drives are available with the 5286: A diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D. Capacity per drive ranges from 0.25M bytes to 1.2M bytes. The formats for the diskettes are:

Diskette 1

Format	Bytes/Sector	Capacity
1	128	246KB*
2	256	284KB
3	512	303KB

*243KB when used for Basic Exchange

Diskette 2

Format	Bytes/Sector	Capacity
4	128	492KB
5	256	568KB
6	512	606KB

Diskette 2D

Format	Bytes/Sector	Capacity
7	256	985KB
8	512	1136KB
9	1024	1212KB

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 4 above), H Exchange (Format 7 above), and I Exchange (all of the above formats). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Examples are the Series/1, System/3, System/32, System/34, System/38, S/370, 303X, 4300, 3540, 3740, 3747, 3770, 3790, 5110, 5230, 5260, and 8100. The instantaneous data transfer rate using Diskette 1 or 2 is 31.2K bytes/sec ... for Diskette 2D, 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm. Diskette read or write is overlapped with seek. Diskette operations are overlapped with processing and other I/O device operations.

Auxiliary Data Station: One 5281 Data Station or 5282 Dual Data Station can be attached to the 5286. See "Special Features" below. The 5281 or 5282 is cable attached at a maximum distance of 61 meters (200 feet). The 5286 provides control and main storage in support of the auxiliary data station. Each keyboard/display (including the 5286) is assigned to a separate partition and operates independently. Each diskette drive on the 5286 and an attached data station is available to any program and any keyboard/display. The auxiliary data station must have the same display size(s) (480-character) as the 5286. The auxiliary data station display size(s) is determined by the Auxiliary Data Station Attachment (special feature) on the 5286.

Security: A non-display input mode allows data to be entered from the keyboard without being displayed on the screen. A Security Keylock (#6340) prevents keyboard entry or display of data. A Magnetic Stripe Reader (#4950) is available which may be used to enter user identification. This assists user program routines in auditing and controlling operator access to data.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination procedures and recovery routines that are easily understood and used by the operator. The procedures are described in the *IBM 5280 Machine Verification Manual* (GA21-9357).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparation.
- Providing a desk, counter, or tabletop to support the 5286.
- Receipt, unpacking, and placement of the 5286.
- Installation and maintenance of signal cables and associated parts for attaching a 5281, or 5282 to the 5286.
- Physical setup, switch setting, and checkout in accordance with instructions provided by IBM.
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5286.
- Relocation of the 5286, if required, to allow IBM service access.

5286 Dual Programmable Data Station (cont'd)

- When adding a 5281 or 5282 to the 5286, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.

Publications: *IBM 5280 General Information* (GA21-9350) and *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

Notes:

1. Device Attachments: Appropriate special features are required to attach an auxiliary data station (5281, 5282) and some I/O units see "Special Features".
2. IBM 5280 System Control Programming (5708-SC1) should be ordered at equipment order entry time.
3. For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard non-locking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Two keyboards must be selected (see "Special Features").
- Primary host system that will process the data captured by the 5286:

Series/1	**#9505**
System/3	**#9501**
System/32	**#9502**
System/34	**#9503**
System/36	**#9503**
System/38	**#9504**
Other Small IBM System	**#9506**
System/360	**#9507**
System/370:	
– Mdl 138 and below	**#9508**
– Mdl 145 and above	**#9509**
3031, 3032, 3033	**#9510**
4331, 4341	**#9511**
8100	**#9512**
Other Large IBM System	**#9513**
Non-IBM System	**#9514**
Host System Unknown	**#9515**
No Host System	**#9516**

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Auxiliary Data Station Attachment (#1200, #1215): To attach one 5281 Data Station or one 5282 Dual Data Station. Attachment is by cable. See M5281 or 5282 "Accessories". The maximum cable length is 61m (200 feet). Select one feature from the table below.

Data Station	Display Size	Order Feature Number
5281	480	#1200 *
5282	480	#1215

* Not available as of July 31, 1983.

Maximum: One. **Field Installation:** Yes.

Remote Diskette Drive Attachment (#1240): Required if an attached 5281 Data Station or 5282 Dual Data Station has either one or two diskette drives. A cable is required. See M5281 or 5282 "Accessories". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1200 or #1215.

Elapsed Time Counter (#3610): Used to measure elapsed real time. It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of the 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955). **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4600, #4601, #4602 , #4603): Two of the following must be selected ... both must be the same type:

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

#4601: 66-key data entry style keyboard, movable, with 36 alphameric keys, and 30 function keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, and 30 function keys. The numeric keys are arranged similar to those of an adding machine.

#4603: 83-key keyboard with ASCII character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

Maximum: Two of the above. **Field Installation:** Yes.

Magnetic Stripe Reader (#4950): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data. If only one Magnetic Stripe Reader is used with the 5286, it will be assigned to and can only be used in conjunction with the keyboard located on the side of the 5286 which has the power switch. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #4955.

Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955): The Magnetic Stripe Reader Adapter provides control for up to four Magnetic Stripe Readers (#4950) on the 5286 and an attached 5281 Data Station or 5282 Dual Data Station. The Elapsed Time Counter is used to measure elapsed real time. It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter feature (#3610). **Maximum:** One. **Field Installation:** Yes.

Security Keylock (#6340): Provides a single, key-operated switch for controlling operations on the 5286 and an attached 5281 Data Station or 5282 Dual Data Station. Prevents operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Second Application Microprocessor (#6800): A microprocessor which performs identical function and operates concurrently with the first (base) application microprocessor. This feature provides more processing power and is designed as an aid to performance improvement in a multiprogramming environment which has heavy processor utilization. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customers should carefully evaluate their future requirements when purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Keylock, Keys: The 5286 with Security Keylock (#6340) is shipped with two unique keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to original purchaser.) With each order of quantity of one, the customer receives two keys (one key of each type). A letter of authorization with key identification numbers must accompany each order. **Specify:** P/N **4177799** or, if EC 868325 is installed, specify P/N **6044248**. Allow six to eight weeks for delivery.

SUPPLIES

For IBM diskettes and magnetically striped and encoded identification cards, consult IBM.

5288 PROGRAMMABLE CONTROL UNIT

PURPOSE

Provides processing, control, main storage, diskette storage, communications features, and device attachment capabilities for the 5280 Distributed Data System. Allows attachment of multiple 5281 Data Stations and/or 5282 Dual Data Stations and 5217, 5222, 5224, 5225, 5242, and 5256 Printers.

MODELS

5288 models are available depending on main storage capacity and the type of diskette drive included in the base machine. One drive is standard.

Model	Main Storage Capacity	Diskette
A01 *	32K	1
A05 *	32K	2D
C01	64K	1
C05	64K	2D
D01	96K	1
D05	96K	2D
E01	128K	1
E05	128K	2D
F01	160K	1
F05	160K	2D
H01	224K	1
H05	224K	2D
J01	288K	1
J05	288K	2D

* Not available after July 31, 1983.

Prerequisites:

1. Device Attachments: Appropriate special features are required to attach auxiliary data stations (5281, 5282) and some I/O units ... see "Special Features".
2. 5280 System Control Programming (5708-SC1) should be ordered at equipment order entry time.
3. For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

Minimum Configuration: Any mdl of the 5288 with one 5281 Data Station or one 5282 Dual Data Station.

Customer Setup (CSU): The 5288 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. The customer setup allowance is two days . One copy of *IBM 5280 User's Setup Procedures* (GA21-9365) is included with each 5288.

HIGHLIGHTS

- System flexibility allows specification of configuration to meet specific user requirements for data entry, associated processing, and communications.
- Base unit contains controller, main storage, and diskette drive capability.
- Multiple microprocessors provide processing and independent I/O control.
- Stored program function.
- Multiprogramming capability with up to eight main storage partitions.
- Powerful and extensive data editing function.
- 10MB disk storage drives available.
- Compact diskette drives housed within the 5288 support Diskette 1 or Diskette 1, 2, and 2D providing up to 4.8M bytes of storage capacity.
- Addition of optional disk and/or diskette storage drives within attached 5281 Data Stations and/or 5282 Dual Data Stations (diskette only) provide a total system capacity of eight drives ... one diskette and seven disk or diskette drives in any combination.
- Maximum of four keyboard/displays with attachment of 5281 and/or 5282 data stations.
- Attachment capability for up to eight printers.
- Security features for data asset protection.
- Independent data station operation through multiprogramming and system resource sharing.
- Communications adapters provide both SDLC and BSC capability.
- Communications programming support available for RJE, batch, and interactive communications via SNA/SDLC or BSC.

5288 Components

Controller: Provides processing capability, control, main storage, and optional I/O attachments and communications features. Controls all functions of the 5288 and attached 5281 Data Stations, 5282 Dual Data Stations, and 5217, 5222, 5224, 5225, 5242, and 5256 Printers. Multiple microprocessor architecture allows processing and I/O operations (e.g., diskette, keyboard/display, communications) to operate independently. The 5288 provides 64K of main storage that can be expanded to a maximum of 288K. Multiprogramming capability is available through a partitioned memory. The number of partitions (up to eight) and their size (6K to 64K) are user-specified with a facility provided in 5280 System Control Programming (5708-SC1). Special features provide for the attachment of 5281 and 5282 data stations (maximum, four keyboards), and 5217, 5222, 5224, 5225, 5242, and 5256 Printers (maximum, eight printers). The communications adapters (special features) each provide both SDLC and BSC communications under stored program control.

Disk/Diskette: One diskette drive is standard, and its type is determined by the 5288 mdl number. Three physical drive positions are available on the 5288 for optional disk and/or diskette drives ... see "Special Features". For the optional drives, any combination (up to three) of disk and/or diskette drives is allowed. For a 5288 system, including auxiliary data stations, the maximum number of optional disk/diskette drives is seven.

Disk: In addition to one diskette drive, the 5288 can contain up to three 10MB Disk Storage Drives ... see "Special Features". The disk storage is a non-removable direct access medium. Capacity and access times are as follows:

Bytes/Sector	256
Bytes/Cylinder	32,768
Cylinders *	303
Capacity * (bytes)	9,928,704
Access Time (ms)	
Minimum (cyl to cyl)	16.6
Average (102 cyl)	85
Maximum	205
Rotation Speed (rpm)	3,600

* Available to the user for programs and data.

Diskette: Two types of compact diskette drives are available with the 5288: a diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D. Capacity per drive ranges from 0.25M bytes to 1.2M bytes. The formats for the diskettes are:

Diskette 1

Format	Bytes/Sector	Capacity
1	128	246KB *
2	256	284KB
3	512	303KB

* 243KB when used for Basic Exchange

Diskette 2

4	128	492KB
5	256	568KB
6	512	606KB

Diskette 2D

7	256	985KB
8	512	1136KB
9	1024	1212KB

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 4 above), H Exchange (Format 7 above), and I Exchange (all of the above formats). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Examples are the System/3, System/32, System/34, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3770, 3790, 5110, 5230, 5260, and 8100.

The instantaneous data transfer rate using Diskette 1 or 2 is 31.2K bytes/sec; for Diskette 2D, 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm. Diskette read or write is overlapped with seek. Diskette operations are overlapped with processing and other I/O device operations.

Auxiliary Data Stations: The 5281 Data Station and the 5282 Dual Data Station can be attached to the 5288 in any combination to provide a maximum of four keyboards. In Chart A below, all possible combinations are presented. Each vertical column represents a valid combination of machine type quantities. At least one 5281 or 5282 must be attached.

5288 Programmable Control Unit (cont'd)

Chart A

Machine	Quantity							
5281	1	2	3	4	1	2	0	0
5282	0	0	0	0	1	1	1	2

For maintenance purposes, one auxiliary data station (designated as the "First Auxiliary Data Station") must be installed within sight of, and have easy access to, the 5288. This data station is attached via the First Auxiliary Data Station Attachment (special feature). All other data stations are attached via an Auxiliary Data Station Attachment, Additional (special feature). *Each data station requires a separate attachment.* Each data station is cable attached (see M5281 or 5282 "Accessories"). The maximum cable length is 60 meters (198 feet).

The display size (480, 960, or 1920 characters) of attached data stations is determined by the 5288 auxiliary data station attachment (special feature). *All data stations must have the same display size(s).* The 5280 Communications Utilities licensed program (5708-DC1) requires a display size(s) of 960 or 1920 characters.

An attached 5281 can have zero, one or two disk or diskette drives. An attached 5282 can have zero, one, or two diskette drives. These drives are designated "remote" (from the 5288). Remote drives are attached via a Remote Disk/Diskette Drive Attachment to the 5288 ... see "Special Features". A cable is required ... see M5281 or 5282 "Accessories".

Printers: The 5217, 5222, 5224, 5225, 5242, and 5256 printers are available for attachment to the 5288. A maximum of eight printers acn be attached ... see 'Special Features".

Security: A non-display input mode on attached 5281 Data Stations and 5282 Dual Data Stations allows data to be entered from the keyboard without being displayed on the screen. A Security Keylock (special feature) prevents keyboard entry or display of data on all auxiliary data stations and, on a communicating 5288, prevents initiation of communications. In addition, a communicating 5288 can exchange identification sequences with the host, which assists the user in controlling access to data. A Magnetic Stripe Reader (special feature) is available for the 5281 and 5282 which may be used to enter user identification. This assists user program routines in auditing and controlling operator access to data.

Communications: The Communications Adapter (#2500) operates under stored program control and allows for either SDLC or BSC data link control over a single communications line. This feature allows the 5288 to communicate on a switched point-to-point, nonswitched point-to-point, or multipoint line at speeds up to 4800 bps. On a multipoint line, the 5288 operates as a tributary station. The 3270 Emulation Communications Adapter (#3270) provides the same function as #2500 (above) and, in addition, provides support for the 5280 - 3270 Emulation (5708-EM1) licensed program. Connection to the line is supported by a Line Interface feature. Operation is half-duplex mode over a switched network on half-duplex facilities, or half-duplex mode over nonswitched (or equivalent private) communications lines on duplex or half-duplex facilities. Switched network support includes manual dial and manual or auto-answer (where the attached modem supports this capability). The 5288 at each termination (drop point) of a communications line must use the same clocking source (modem or business machine). Units must be set to operate at the same transmission rate, use the same transmission code, and the same 2- or 4-wire connection to the line. Compatible modems must be used at all terminations on a network. The 5288, using stored program control, communicates using BSC protocol with:

- A Series/1 equipped with #2074, #2075, or #2093/#2094.
- A System/3 equipped with #2074, #2084, or #2094.
- A System/32 equipped with #2074.
- A System/34 equipped with #2500, #3500, or #4500.
- A System/36 equipped with #2500 or #4500.
- A System/38 with appropriately configured BSC adapter and sub-features (point-to-point only).
- A S/370 via an Integrated Communications Adapter, a 4331 via a Communications Adapter, or a S/370, 303X, or 4300 via a 2701 Data Adapter Unit, or a 3704, 3705, or 3725 Communications Controller with the Network Control Program (ACF/NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous communications adapter and appropriate sub-features.
- A 3741 mdl 2 or 4.
- A 3747 Data Converter equipped with #1660.
- A 5265 communicating mdl (XX2).
- A 5280 equipped with #2500 or #3270.

The 5288, using stored program control, communicates in SNA/SDLC mode with a 4331 via a Communications Adapter, a S/370 via an integrated communications adapter, an 8100 with DPPX/BASE, or a S/370, 303X, or 4300 via a 3704, 3705, or 3725 Communications Controller equipped with appropriate features. See M3704, 3705, or 3725 pages. The 5288, using the 3270 Emulation Communications Adapter, communicates in SNA/SDLC mode with an 8100 Information System. See the 5280 programming pages for a description of the communications program support available and any special feature requirements.

Note: A line interface feature must be ordered for the type of communication facility and modem to be used.

IBM Modems: One IBM modem can be attached to the Communications Adapter (#2500) or the 3270 Emulation Communications Adapter (#3270). **Prerequisites:** #3701.

Modem	Speed (bps)
3863	2400
3864	4800
3872	2400/1200

Note: The 5288 does not support Automatic Call Originate (#1091) on the 3872. For communication capabilities, product utilization, and special features see M2700, 3863, 3864, and 3872 pages.

Communications References:

- See the SCP pages for possible restrictions.
- See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities and customer responsibilities.
- Refer to the
- Refer to the *IBM 5280 Planning and Site Preparation Guide* (GA21-9351) for physical planning information.

Communications Cable: A communications cable length is required. See "Specify".

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination procedures and recovery routines that are easily understood and used by the operator. The procedures are described in the *IBM 5280 Machine Verification Manual* (GA21-9357).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparation.
- Obtaining a firm installation date for the start of communications facilities and services (including any required modems). The IBM Marketing Representative must assure that a firm installation date is established prior to Order Confirmation.
- Receipt, unpacking, and placement of the 5288.
- Installation and maintenance of signal cables and associated parts for attaching a 5217, 5222, 5224, 5225, 5242, 5256, 5281, or 5282 to the 5288.
- The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 pages.
- Physical setup, connection of cables to communications lines/modems and IBM devices incorporating protected access areas, modem attenuation setting and checkout in accordance with instructions supplied by IBM.
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5288.
- Relocation of the 5288, if required, to allow IBM service access.
- When adding a 5281 or 5282 to the 5288, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.

Publications: *IBM 5280 General Information* (GA21-9350), *IBM 5280 Planning and Site Preparation Guide* (GA21-9351), *IBM 5280 User's Setup Procedures* (GA21-9365), *IBM 5280 Machine Verification Manual* (GA21-9357), *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).

Replaced Parts: Replaced parts from any special feature installation or removal remain the property of the customer.

5288 Programmable Control Unit (cont'd)

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard nonlocking plug (uses customer standard type receptacle), or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Primary host system that will process the data captured by the 5288:

System/3	**#9501**
System/32	**#9502**
System/34	**#9503**
System/36	**#9503**
System/38	**#9504**
Series/1	**#9505**
Other Small IBM System	**#9506**
S/360	**#9507**
S/370 mdl 138 and Below	**#9508**
S/370 mdl 145 and Above	**#9509**
3031, 3032, 3033	**#9510**
4331, 4341	**#9511**
8100	**#9512**
Other Large IBM System	**#9513**
Non-IBM System	**#9514**
Host System Unknown	**#9515**
No Host System	**#9516**

- Communications Cable Length with Communications Adapter (#2500) or 3270 Emulation Communications Adapter (#3270): Required for attaching the 5288 to the communications facility. **#9010** for a 6 meter (20 foot) cable or **#9015** for a 12 meter (40 foot) cable. Specify this cable length only once per system.
- Mandatory Specify Codes for Communications: One selection must be specified from each of the following tables. Entries selected from Tables D, E, and F will be used to preset hardware functions during manufacture. Selection from each of the other tables should be based on prime usage.

Table A - Line Control

BSC	**#9400**
SDLC	**#9401**

Table B - Transmission Code

EBCDIC	**#9060**
ASCII	**#9061**

Table C - Prime Usage

S/360	**#9570**
3031 or S/370 mdl 138 and Below	**#9277**
3032, 3033, or S/370 mdl 145 and Up	**#9278**
4300	**#9596**
Series/1	**#9599**
System/3	**#9580**
System/32	**#9591**
System/34	**#9593**
System/36	**#9593**
System/38	**#9594**
3740/3747	**#9579**
5260	**#9600**
5280	**#9598**
Other IBM	**#9275**
Non-IBM	**#9276**

Table D - Transmission Rate

600 bps	**#9750**
1200 bps	**#9751**
2000 bps	**#9752**
2400 bps	**#9753**
4800 bps	**#9754**

Table E - Network Attachment

Point-to-Point (nonswitched)	**#9481**
Point-to-Point (switched)	**#9483**
Multipoint Tributary	**#9482**
Local Attach	**#9485**

Table F - Line Facility Attachment

Duplex (4-wire only)	**#9391**
Half-Duplex	**#9392**

Table G - Host Application

RJE, MRJE, SRJE	**#9440**
CICS/VS	**#9441**
IMS/VS	**#9442**
Other	**#9443**

SPECIAL FEATURES

Non-Communications Features

Printers: Attachment of the 5217, 5222, 5224, 5225, 5242, and 5256 Printers is provided by one of four special features. Up to eight printers, in any combination, may be attached consistent with special feature limitations. Printer speeds may be affected by the customer's program, application load, forms design and/or the number of printers attached to the system.

Single Twinax® Printer Attachment (#1155): Provides a single port for the attachment of 5224 (mdl 1 or 2), 5225 (mdl 1, 2, 3, or 4) and/or 5256 (mdl 1, 2, or 3) Printers to a single twinaxial port. A maximum of seven printers can be attached. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Multiple Twinax Printer Attachment (#1160), the Single 5222 Printer Attachment (#1157), or the Multiple Start/Stop-Twinax Printer Attachment (#1162). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached, each printer on the cable, except the last, requires a Cable-Thru feature.

Single 5222 Printer Attachment (#1157): [Not available after July 31, 1983] Provides a single port for the attachment of one 5222 Printer. Attachment is by a double twisted pair cable. A 6 meter (20 foot) cable is provided with the printer. An extension cable accessory is available to provide a total cable length of up to 61 meters (200 feet) (see M5222 "Accessories"). **Limitations:** Cannot be installed with the Multiple Start/Stop-Twinax Printer Attachment (#1162), the Single Twinax Printer Attachment (#1155), or the Multiple Twinax Printer Attachment (#1160). **Maximum:** One. **Field Installation:** Yes.

Multiple Twinax Printer Attachment (#1160): [Not available after July 31, 1983] Provides four ports for attaching, via twinaxial cable, 5224 (mdl 1 or 2), 5225 (mdl 1, 2, 3, or 4) and/or 5256 (mdl 1, 2, or 3) Printers. A maximum of eight printers can be attached. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Single Twinax Printer Attachment (#1155), the Single 5222 Printer Attachment (#1157), or the Multiple Start/Stop-Twinax Printer Attachment (#1162). A maximum of seven printers can be attached to a single port (using Cable-Thru feature). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached to one port, each printer on the cable, except the last, requires a Cable-Thru feature.

Multiple Start/Stop-Twinax Printer Attachment (#1162): Attaches up to eight printers. Provides four Start/Stop (5217, 5222, 5242) Printer ports and one Twinax Printer (5224/5225/5256) port. A single 5217, 5222, or 5242 mdl 2 Printer can be attached to each Start/Stop port. Each Start/Stop Printer is attached by a double-twisted pair cable. A 6 meter (20 foot) cable is provided with each printer. For the 5222, an extension cable accessory is available to provide a maximum cable length of up to 61 meters (200 feet) ... see M5222 "Accessories". From one to seven twinaxial printers (5224 mdl 1 or 2 and/or 5225 mdl 1, 2, 3, or 4 and/or 5256 mdl 1, 2, or 3) can be attached to the twinaxial port, using a single twinaxial cable. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Single Twinax Printer Attachment (#1155), the Single 5222 Printer Attachment (#1157), or the Multiple Twinax Printer Attachment (#1160). A maximum of seven printers can be attached to the twinaxial port (using Cable-Thru feature). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached to the twinaxial printer port, each printer on the cable, except the last, requires a Cable-Thru feature. If #1162 was shipped before April 1, 1983, the 5288 also requires EC 467318 for attachment of the 5217 or 5242.

First Auxiliary Data Station Attachment (#1245, #1250, #1255, #1260, #1265 : To attach the first 5281 Data Station or 5282 Dual Data Station. This feature also determines the display size of the auxiliary data station. All data stations on the 5280 system must have the same display size(s). Attachment is by cable ... see "Accessories". The maximum cable length is 61 meters (200 feet). Select one feature from the table below.

Data Station	Display Size	Order Feature Number
5281	480	#1245 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290).

5281	960	#1250 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1270, #1280, #1285).

5281	1920	#1255

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1275, #1285, #1290).

5282	480	#1260 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290).

5288 Programmable Control Unit (cont'd)

5282	960	#1265 *

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1280, #1285).

* Not available after July 31, 1983.

Maximum: One of the above. **Field Installation:** Yes.

Auxiliary Data Station Attachment, Add'l (#1270, #1275, #1280, #1285, #1290): To attach one 5281 Data Station or one 5282 Dual Data Station. This feature also determines the display size of the auxiliary data station. All data stations on the 5280 system must have the same display size(s). Attachment is by cable ... see "Accessories". The maximum cable length is 61 meters (200 feet). Select the appropriate features from the table below.

Data Station	Display Size	Order Feature Number
5281	480	#1270 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290). **Prerequisites:** #1245 or #1260.

5281	960	#1275 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1270, #1280, #1285). **Prerequisites:** #1250 or #1265.

5281	1920	#1280

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1275, #1285, #1290). **Prerequisites:** #1255.

5282	480	#1285 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290). **Prerequisites:** #1245 or #1260.

5282	960	#1290 *

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1280, #1285). **Prerequisites:** #1250 or #1265.

* Not available after July 31, 1983.

Maximum: The 5281 and 5282 can be attached in any combination to provide a maximum of four keyboards ... see Chart A above for valid combinations. **Field Installation:** Yes.

Remote Disk/Diskette Drives: Disk and diskette drives housed within a 5281 or 5282 Dual Data Station (diskette only) are designated as "remote" (from the 5288). The drives can be any combination of disk or diskette. Remote drives require the 5288 attachment special features (#1300, #1301, #1302) described in Chart B below. An attachment can service two disk or diskette drives, and the drives may be in the same or different data stations. A cable is required ... see M5281 or 5282 "Accessories".

If the base 5288 contains one or two disk or diskette drives, the maximum number of remote drives is six. If the base 5288 contains three or four drives, the maximum number of drives is four.

Chart B below presents all valid disk/diskette drive quantities and location combinations with respective special feature requirements.

Chart B

These Combinations		Require These Special Features *		
Number of Drives Base 5288	Remote	#1300	#1301	#1302
1 or 2	0			
1 or 2	1	X		
1 or 2	2	X		
1 or 2	3	X	X	
1 or 2	4	X	X	
1 or 2	5	X	X	X
1 or 2	6	X	X	X
3 or 4	0			
3 or 4	1		X	
3 or 4	2		X	
3 or 4	3		X	X
3 or 4	4		X	X

* Note: If an attachment services two drives, the drives may be in the same or different data stations.

Remote Disk/Diskette Drive Attachment, 1st (#1300): Required to attach disk, Diskette 1 or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the first and second remote drives. **Maximum:** One. **Field Installation:** Yes. **Corerequisites:** #4400 , if one or more #3410s are installed in one or more attached 5281s.

Remote Disk/Diskette Drive Attachment, 2nd (#1301): Required to attach disk, Diskette 1 or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the third and fourth remote drives. When the base 5288 contains three or four drives, this feature is required to attach the first and second remote drives. **Maximum:** One. **Field Installation:** Yes. **Corequisites:** #4400 , if one or more #3410s are installed in one or more attached 5281s.

Remote Disk/Diskette Drive Attachment, 3rd (#1302): Required to attach disk, Diskette 1, or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the fifth and sixth remote drives. When the base 5288 contains three or four drives, this feature is required to attach the third and fourth remote drives. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1301.

Disk/Diskette Drives (#3401, #3402, #3410):

Diskette 1 Drive (#3401): An additional diskette drive which can read/write Diskette 1.

Diskette 2D Drive (#3402): An additional diskette drive which can read/write Diskette 1, 2, and 2D.

Disk Storage Drive (#3410): A 10MB non-removable direct access storage device. **Note:** The disk storage drive(s) must be installed to the right of the diskette drive(s).

Maximum: The maximum number of optional disk and/or diskette drives housed within a 5288 is three. The maximum number of optional drives on a 5288 system, including auxiliary data stations, is seven. The drives may be any combination of disk and diskette. **Field Installation:** Yes.

Elapsed Time Counter (#3610): Used to measure elapsed real time. It is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1). It is required by DE/RPG (5708-DE1) and the Key Entry Utility, which is part of 5280 Utilities (5708-UT1), if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955). **Maximum:** One. **Field Installation:** Yes.

Remote Disk Prerequisite (#4400): Provides control function required to accomodate on or more Disk Storage Drive (#3410) installed in one or more attached 5281 Data Stations. **Maximum:** One. **Field Installation:** Yes. **Corequisites:** #1300 and/or #1301.

Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955): Provides the following: The Magnetic Stripe Reader Adapter provides control for up to four Magnetic Stripe Readers (#4950) on attached 5281 Data Stations and/or 5282 Dual Data Stations. The Elapsed Time Counter is used to measure elapsed real time. It is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1). It is required by DE/RPG (5708-DE1) and the Key Entry Utility, which is part of 5280 Utilities (5708-UT1), if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter feature (#3610). **Maximum:** One. **Field Installation:** Yes.

Security Keylock (#6340): Provides a single, key-operated switch with three positions for controlling operations on all attached 5281 Data Stations and 5282 Dual Data Stations: "Lock" position prevents operator entry and display of data and prevents initiation of communications. "Local" position allows operator entry and display of data. "Normal" position allows initiation of communications in addition to operator entry and display of data. Two unique keys are provided: one allows selection of "Lock"/"Local", the other allows selection of "Lock"/"Normal". On a non-communicating 5288, both operating positions ("Local" and "Normal") provide "Local" position operation. **Maximum:** One. **Field Installation:** Yes.

2nd Application Microprocessor (#6800): A microprocessor which performs identical functions and operates concurrently with the first (base) application microprocessor. This feature provides more processing power and is designed as an aid to performance improvement in a multiprogramming environment which has heavy processor utilization. **Maximum:** One. **Field Installation:** Yes.

Communications Features

Communications Adapter (#2500): Required to attach a communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits the 5288 to function on a switched or nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. **Limitations:** Cannot be installed with the 3270 Emulation Communications Adapter (#3270). See "Specify" for required communications cable length and mandatory specify codes. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] A line

5288 Programmable Control Unit (cont'd)

interface special feature consisting of one of the 1200 bps Integrated Modems (#5500, #5501, #5502, #5507, #5508), Interface (#3701), or DDS Adapter (#5650or #5651) must be ordered; [2] See the Programming section for 5280 Communications Utilities (5708-DC1) minimum system and feature requirements.

3270 Emulation Communications Adapter (#3270): Supports the 5280 - 3270 Emulation (5708-EM1) licensed program and, in conjunction with stored program control, permits the 5288 to function on a switched or nonswitched public or private communications line. This adapter is required to attach to a communications line via the appropriate interface or modem and provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501, #5502 , #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. Keyboard interpretation functions are provided in support of the 5280 - 3270 Emulation licensed program. **Limitations:** Cannot be installed with Communications Adapter (#2500). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] A line interface special feature consisting of one of the 1200 bps Integrated Modems (#5500, #5501 , #5502, #5507, #5508), Interface (#3701), or DDS Adapter (#5650or #5651) must be ordered; [2] Attached 5281 Data Station(s) with a display size of 1920 characters (5288 feature #1255, #1280); [3] See the Programming section for 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1) minimum system and feature requirements. See "Specify" for required communications cable length and for mandatory specify codes.

EIA Interface (#3701): Provides the appropriate cable and interface logic necessary to attach an external modem (either an IBM or non-IBM modem meeting RS-232-C characteristics). Refer to M2700 pages. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with Digital Data Service (DDS) Adapter feature (#5650or #5651) or 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

IBM Data Encryption Devices (#3845, #3846): A 3845 or 3846 Data Encryption Device may be attached between the 5288 Communications Adapter and the external modem. **Note:** Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability. The 3845 or 3846 device operating with SDLC will not operate with NRZI transmission mode. **Prerequisites:** #3701.

1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508): [#5500, #5502, #5507 not available after July 31, 1983] A modem for SDLC or BSC data transmission at 600/1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is indicated via a 5280 Communications Utilities (5708-DC1) parameter. Available in five different versions: #5500 - nonswitched, #5501 - switched with auto-answer, #5502 - switched without auto-answer, #5507 - nonswitched with switched network backup manual answer capability, and #5508 - nonswitched with switched network backup auto-answer capability. The nonswitched versions (#5500, #5507, and #5508) provide a cable for attachment directly to a nonswitched (2- or 4-wire) line, Type 3002. The switched with auto-answer versions (#5501 and #5508) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. The switched with manual answer versions (#5502 and #5507) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. The devices communicating with the 5288 must also be equipped with a compatible 1200 bps modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or Digital Data Service (DDS) Adapter (#5650 or #5651). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

Digital Data Service (DDS) Adapter (#5650 for Point-to-Point Operation ... #5651 for Multipoint Operation): An adapter for SDLC or BSC data transmission at speeds of 2400 or 4800 bps over AT&T nonswitched Data-Phone® digital data service. The DDS Adapter provides the appropriate cable and interface to the DDS channel service unit, the customer site termination of the DDS network. The DDS Adapter may also be used to locally connect a 5288 to another supported device which has a compatible DDS Adapter. This connection requires a special DDS Adapter Connector (see "Accessories") and supports point-to-point connections only. The maximum length of the connection is the sum of the modem cable lengths supported by the two devices. No modem or channel service unit is required. **Limitations:** Cannot be installed with Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

MODEL CONVERSIONS

Field installable. Replaced parts from any model conversion become the property of IBM.

Purchase Considerations: The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customers should carefully evaluate their future requirements when purchasing a system.

ACCESSORIES

Keylock Keys: The 5288 with Security Keylock (#6340) is shipped with two unique keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to original purchaser.) With each order of quantity of one, customer receives two keys (one key of each kind). Key identification numbers must accompany each order. Specify P/N 4177799. Allow six to eight weeks for delivery.

DDS Adapter Connector: A specially designed connector allows the cable from a 5288 DDS Adapter to be connected to the cable of another supported device which has a compatible DDS Adapter. This provides for the local connection of two devices without the use of any modems or channel service units. Only one DDS Adapter Connector is required per connection. The maximum length of the connection is the sum of the modem cable lengths of the two devices. This is a purchase-only item. Specify P/N 4236967. Allow 6 to 8 weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter. **Field Installation:** Yes.

SUPPLIES

For IBM diskettes, see IBM.

5291 DISPLAY STATION

PURPOSE

The 5291 Display Station is a member of the 5250 Information Display System and can be used with Series/1, System/34, System/36, and System/38 for entering, editing and displaying alphameric data. A movable keyboard permits the operator to enter, display, and manipulate data on the screen in a highly flexible and efficient manner. This display station performs the same basic functions as the 5251 model 11, in a compact package with a low profile keyboard and a tiltable display screen. Displays up to 1,920 characters with 24 lines of 80 characters each. The display station status, including cursor location (row/column), is shown on the 25th line.

MODELS

Model 1 001

Prerequisites: A 5251 mdl 2 or 12 with #2550 or #2551, or a 5340 (System/34 must be at SSP release 7 level or greater, and if the 5291 is to be used as a console, the System/34 must be at diagnostic release level 9.2 or greater), or a System/36, 5381, or Series/1 with #1210.

HIGHLIGHTS

The standard character set includes 96 characters: 52 upper/lower case alphabetic, 10 numeric, and 33 special characters in addition to "space". Cable-Thru is a standard capability. A Display Screen Glare Reduction Filter is also provided as a standard feature. See "Type Catalog" for keyboard layout. Display functions in addition to normal intensity are: high intensity, nondisplay, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. The operator can reverse the image of the entire screen. An operator-adjustable audible alarm, under program control, is provided to alert the operator to special conditions. The low profile keyboard with adjustable slope and 24 application assigned command functions provides input and control flexibility.

Security Enhancements: Data fields can be defined allowing entered data to be accepted without being displayed on the screen.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachment between the 5291 and other 5250 system components and/or systems must be made with twinaxial cable. Cable connection: Maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 5291. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5291 may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations.

Communications: The 5291 can communicate with a System/34, System/36, or System/38 via a 5251 mdl 12. The 5291 can also communicate with a System/34 or System/38 via a 5251 mdl 2. See M5251 pages for communicating capability of the mdl 2 or 12.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5291 Display Station Operator's Guide* (GA21-9409). Also, see "Customer Responsibilities" below.

Customer Setup (CSU): The 5291 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5291.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions.
- Relocation of the 5291, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5291 prior to calling for IBM service.
- Providing a desk or table-top to support the 5291.
- Installation and maintenance of signal cables and associated parts for attaching the 5291 to the 5251 mdl 2 or 12, 5340, 5360, 5381, or Series/1.
- When adding additional direct or remote display stations to Series/1, System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 Changing Your System Configuration* (SC21-9052), *IBM System/38 Guide to Program Product and Device Configuration* (GC21-7775), or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Documentation: *IBM 5250 Information Display System Introduction Manual* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5291 Display Station Operator's Guide* (GA21-9409), and *IBM 5291 Set-up Procedures* (GA21-9408) (shipped with the product).

AAS Ordering Instructions: The 5291 is a System Component.

SPECIFY

- Default Order Entry: Specify Codes are not required when ordering a 5291. Associated system ID must be indicated on the order.
- Power Default (100-127V AC, 1-phase, 50/60 Hz): A standard non-locking plug (uses customer standard type receptacle) will be furnished. Standard Power cord is 2.4m (8 feet), no specify is required.
- Color Default: Pearl White only.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Power Cable: A 1.8m (6 foot) power cable with standard non-lock plug is available. The power cable is pluggable at the machine.

Cables: The twinaxial cables and/or associated parts to interconnect the 5250 Information Display System components and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinaxial Wire (P/N 7362211): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Connector Kit (P/N 7362268): Includes two connectors. Twinaxial wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors P/N 7362269 are available for replacement.

Twinaxial Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N 3762230): Permits two Twinaxial Cables Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M 7361807): Two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N 7362426, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code Requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

5292 COLOR DISPLAY STATION

PURPOSE

The 5292 is an advanced color display station for use in 5250 Information Display System networks. It is attachable to System/34, System/36, System/38, and 5251 model 2 or 12.

Model 1: The 5292 model 1 is a 7-color display station plug compatable in 5250 Information Display System networks. It can be used with System/34, System/36, and System/38 for entering, editing and displaying alphameric data. Displayable colors are red, green, turquoise, yellow, pink, blue and white. A low profile, typewriter-style movable keyboard permits the operator to enter, display, and manipulate data on the screen in a highly flexible and efficient manner. This display station performs the same basic functions as the 5251 model 11, but utilizes a color display screen. Displays up to 1,920 characters with 24 lines of 80 characters each. The display station status is shown on a 25th line. Optionally, the user can also display the cursor location (row/column) on this status line.

Model 2: In addition to being able to operate exactly like a model 1 in alphameric mode (described above), the 5292 model 2 provides the capability of producing business graphics utilizing up to eight colors (black plus seven from a palette of 512 colors -- requires host system programming support). Examples of graphic images which can be displayed include bar charts, pie charts, line graphs, and surface graphs. High flexibility in creating graphic images is achieved by the inclusion of an All Points Addressable (APA) display and a customized vector-to-raster conversion processor. Also included in the model 2 are three standard output ports: IEEE 488 (requires host system programming support), parallel printer (requires RPQ for 5292 mdl 2 microcode support), and video. These ports allow the direct attachment of various plotters, printers, and electronic film cameras, monitors, or projectors.

MODELS

Model 1 001

Model 2 002

Prerequisites: A 5251 mdl 2 or 12 with Cluster (#2550) feature or Dual Cluster (#2551) feature, or a 5340 (System/34 must be at SSP release 7 level or greater), 5360, or a 5381 (Release 4.1 or higher). For the mdl 2, programming graphics support is provided on System/36 via System/36 Business Graphics Utilities, 5799-BNW, (PRPQ P84056). The 5292 mdl 2 will attach to the System/34 and System/38 and operate as a mdl 1 but graphics programming support is not available. An RPQ is required to provide the microcode to support a parallel printer attachment to the 5292 mdl 2.

HIGHLIGHTS

Mdls 1 and 2 Alphameric Mode: The standard character set includes 96 dot-matrix characters: 52 upper/lower case alphabetic, 10 numeric, and 33 special characters in addition to "space". The display of colors is achieved through the use of already existing attribute codes and can be used without program modification. (For example, the high intensity attribute code will result in white color; the blink attribute code will result in red color, etc.) For optimum use of color, changes may be desired in existing programming support for the customer 5251 or 5252 Display Stations. See *IBM 5292 Color Display Station Programmer's Guide to Using Color* (GA21-9413). Cable-Thru and Screen Glare Reduction are provided as standard features. See "Type Catalog" for keyboard layout. Display functions include: nondisplay, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. An operator-adjustable audible alarm is provided to alert the operator to special conditions. The low profile keyboard with adjustable slope and 24 application assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink, limit line space and limited use of color. The operator can also elect to display the cursor location (row/column) and the screen attribute codes being utilized as well as set the audible alarm volume.

Mdl 2 in Graphics Mode: Inclusion of the vector-to-raster conversion processor provides for host offload, area fill of complex shapes, flexible line styles, and double width line generation. The All Points Addressable (APA) capability gives access to 480 addressable points in the horizontal direction by 288 points in the vertical direction utilizing eight colors (black plus seven colors from a palette of 512 colors). Color selection is a function of host system graphics software support. Three output ports are provided on the mdl 2: The IEEE output port provides for attachment of various plotters (requires host system programming support), the parallel printer output port allows attachment of various mono/color printers for screen copy (requires RPQ for 5292 mdl 2 microcode support), the video output port provides RGB (red, green, blue) plus synchronization signals to provide for attachment of various electronic film cameras, monitors, or projectors (host programming support is not required). Also provided on the mdl 2 when used in graphics mode are additional operator controls including graphics on/off, erase graphics display, terminate graphics processing, and screen copy (local hard copy via the parallel printer port). When in graphics mode the mdl 2 utilizes limited line space.

Security Enhancements: Data fields can be defined so entered data is accepted without being displayed on the screen.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachment between 5250 system components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 5292. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information. See "Accessories" for twinaxial cable and associated accessories.

Clustering: The 5292 Color Display Station may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. See "Special Features" in M5251 pages.

Communications: The 5292 Color Display Station can communicate with a System/34, System/36, or System/38 via a 5251 mdl 12. The 5292 can also communicate with a System/34 or System/38 via a 5251 mdl 2. See M5251 pages for communicating capability of the mdl 2 or 12.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5292 Color Display Station Color Alignment and Problem Determination Procedures* (GA21-9420) which is shipped with the machine. Also, see "Customer Responsibilities" below.

Customer Setup (CSU): The 5292 Color Display Station is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5292.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions.
- Relocation of the 5292, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5292 prior to calling for IBM service.
- Providing a desk or table-top to support the 5292.
- Installation and maintenance of signal cables and associated parts for attaching the 5292 to other components of the 5250 Information Display System or other attached system. The customer is also responsible for providing and installing cables from any of the output ports of the mdl 2 to the output device if not supplied with the device.
- When adding display stations to System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 Changing Your System Configuration* (SC21-9052), or *IBM System/38 Guide to Program Product and Device Configuration* (GC21-7775).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5292 Color Display Station Operator's Guide* (GA21-9416), and, *IBM 5292 Color Display Station Programmer's Guide to Using Color* (GA21-9413), *IBM 5292 Color Display Station Color Alignment and Problem Determination Procedures* (GA21-9420). The *IBM 5250 Functions Reference Manual* (SA21-9247), containing mdl 2 output port interface description, will be available in September, 1983.

AAS Ordering Instructions: The 5292 is a System Component.

SPECIFY

- Default Order Entry: Specify Codes are not required when ordering a 5292. Associated system ID must be indicated on the order. Default parameters are shown below.
- Power Default (100-127V AC, 1-Phase, 60 Hz): A standard non-locking plug (uses customer standard type receptacle) will be furnished. Standard power cord is 2.4m (8 feet). See also "Accessories" for alternate cord.
- Color Default: Pearl White only.

5292 Color Display Station (cont'd)

SPECIAL FEATURES: None

MODEL CONVERSIONS: None

ACCESSORIES

Cables: The twinaxial cables and/or associated parts to interconnect the 5292 and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinaxial Connector Kit (**P/N 7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors **P/N 7362229** are available for replacement.)

Twinaxial Wire (**P/N 7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (**P/N 7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (**P/N 3762230**): Permits two Twinaxial Cables Assemblies to be joined together.

Twinaxial Station Protector Kit (**B/M 7361807**): Two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, **P/N 7362426**, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order **P/N 7362063** for Teflon-covered cable. Individual connectors **P/N 7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order **P/N 7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order **P/N 7362062** for Teflon-covered cable assembly.

Power Cord: A 1.8m (6 foot) power cord with standard non-locking plug is available. The power cord is pluggable at the machine.

SUPPLIES (None)

5320 SYSTEM UNIT

[NO LONGER AVAILABLE]

Special features, accessories, RPQs, and MESs may be obtained on an "as available" basis only.

PURPOSE

The System/32 is a compact commercial data processing system designed primarily for small businesses.

MODELS

Model	Printing Speed	Disk Storage Capacity (Bytes)
A01	40 cps unidirectional	3,210,240
A02	40 cps unidirectional	5,053,440
A03	40 cps unidirectional	9,169,920
A04	40 cps unidirectional	13,777,920
A11	40 cps bidirectional	3,210,240
A12	40 cps bidirectional	5,053,440
A13	40 cps bidirectional	9,169,920
A14	40 cps bidirectional	13,777,920
A21	80 cps bidirectional	3,210,240
A22	80 cps bidirectional	5,053,440
A23	80 cps bidirectional	9,169,920
A24	80 cps bidirectional	13,777,920
A31	120 cps bidirectional	3,210,240
A32	120 cps bidirectional	5,053,440
A33	120 cps bidirectional	9,169,920
A34	120 cps bidirectional	13,777,920
B11	50 lpm	3,210,240
B12	50 lpm	5,053,440
B13	50 lpm	9,169,920
B14	50 lpm	13,777,920
B21	100 lpm	3,210,240
B22	100 lpm	5,053,440
B23	100 lpm	9,169,920
B24	100 lpm	13,777,920
B31	155 lpm	3,210,240
B32	155 lpm	5,053,440
B33	155 lpm	9,169,920
B34	155 lpm	13,777,920
C41	285 lpm	3,210,240
C42	285 lpm	5,053,440
C43	285 lpm	9,169,920
C44	285 lpm	13,777,920

Note: All models have 16,384 bytes of main storage standard.

Limitations: See the appropriate host system programming pages for possible restrictions.

HIGHLIGHTS

- Operator-oriented data processing.
- Direct keyboard data entry.
- Display screen.
- Batch processing with stored job stream procedures.
- RPG II programming support.
- Communications capability via SDLC or BSC.
- Word processing functions.
- Metal Oxide Semiconductor Field Effect Transistor (MOSFET) main storage.
- 600-nanosecond main storage cycle time.
- Main storage available in 16K, 24K, or 32K bytes with 2K bytes reserved for SCP functions.
- Internal structure is EBCDIC 8-bit byte.

Keyboard: Used for data entry and operator/system communication. It features a familiar typewriter layout plus a 10-key proof keyboard and function keys. The top row of typewriter keys are dual-defined, providing 24 command keys. In addition to the standard alphameric keys, the keyboard has record, field, character advance, backspace, repeat, and printer control keys. A Dual Case Keyboard and Display feature provides upper/lower case and special character/graphic support and a code key used by application programs to simulate the Mag Card (Selectric, II, A, and Executive) Typewriter code key.

Display Screen: Provides operator guidance and prompting and auxiliary output under program control. Up to 240 characters can be displayed, six rows of 40 characters each. All data entered through the keyboard is displayed on the screen by the programming system.

Disk Storage: Capacity of 3.2, 5.0, 9.1, or 13.7 million bytes of nonremovable high-speed direct access storage. The disk rotates at 2,964 rpm, yielding a data rate of up to 889,000 bytes per second, and so permitting efficient sequential and random access processing. The following table provides corresponding capacity data and access times.

For more specific access times, refer to timing charts. Average latency is 10.1 milliseconds.

	3.2MB	5.0MB	9.1MB	13.7MB
Bytes/Sector	256	256	256	256
Sectors/Track	60	60	60	60
Tracks/Cylinder	2	2	2	3
Bytes/Cylinder	30,720	30,720	30,720	46,080
Cylinders	104.5	164.5	298.5	299.0
Access Time (ms)				
Minimum	13.0	13.0	14.2	14.2
Average	50.4	70.0	72.5	72.5
Maximum	121.0	180.0	166.9	166.9

Line Printing: B and C mdls with a 48-character print belt provide printed output at nominal rated speeds of 50, 100, 155, or 285 lpm depending upon mdl. Included as standard is one engraved font print belt. See "Specify" for proper ordering. Nominal printing speeds are as follows:

	Character Set Size		
Mdl	48	64	96
B1X	50 lpm	50 lpm	50 lpm
B2X	100 lpm	100 lpm	80 lpm
B3X	155 lpm	120 lpm	80 lpm
C4X	285 lpm	225 lpm	160 lpm

Mdl C4X, 96-character set prints at 80 lpm when used with Word Processor/32 (5725-XX1) PP.

Horizontal spacing is 10 characters to the inch with a 132-position print line. Vertical spacing is six lines to the inch. For eight lines to the inch vertical spacing and programming support, see RPQ S40127. A variable width forms tractor provides for feeding continuous forms. Refer to *Forms-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. Forms jam detection is standard. See "Type Catalog" for character set arrays and styles.

Serial Printing: The A mdls print at a maximum rate of 40 cps in a unidirectional mode or 40, 80, or 120 cps in a bidirectional mode depending on mdl. Matrix characters are formed by eight vertical wires. Horizontal spacing is 10 characters to the inch with a 132-position print line. Vertical spacing is six lines to the inch. A variable width forms tractor provides for feeding continuous forms. Refer to *Forms-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. Single form/ledger cards may be processed typewriter-fashion. See "Type Catalog" for character set arrays.

Notes:

- Differences between line and serial printing are transparent to RPG II object code for continuous forms and recompilation is not required when changing printer mdls.
- System/32 printed output is not recommended for optical character reading.
- A forms stand, providing for the feeding and stacking of continuous forms, is provided with the system.
- Printed output utilizing Artisan or Modified Courier print belts should not be expected to compare in quality to the Selectric typewriter.

Diskette Drive: Provides the capability of entering data recorded offline and also is a load/dump backup facility via the Diskette 1. The diskette also provides compatible media for interchange with other systems utilizing Diskette 1 (up to 242,944 byte capacity). For System/32 use, Diskette 1 capacity is 246,272 bytes in standard interchange format and 303,104 bytes in 512-byte extended format. 128-byte records are processed at rates of up to 3,400 per minute reading and up to 1,800 per minute writing. "Read" and "Write" are not overlapped with processing or other devices. However, "one track forward seek" is overlapped.

Card I/O: Utilizing the 129 Card Data Recorder (80-column) provides reading up to 50 cards per minute and punching or punching and printing from 12 to 50 cards per minute. In punch mode, throughput may vary. When two or more adjacent columns are blank, the equivalent of read speed is achieved until a non-blank column is encountered. Utilizing the 5496 Data Recorder (96-column) provides reading, punching, and printing speeds of up to 21 cards per minute. Cannot be installed with 5321 Mag Card Unit Attachment (#4900) and Half-Line Space Printing (#4530). Card I/O operation within the same program as the diskette drive, BSCA, or SDLC is not supported. . .

Mag Card I/O: Utilizing the 5321 Mag Card Unit provides reading and recording of information up to 102 characters per track and 50 tracks per card. Reading is at the rate of 230 milliseconds per track; recording is at the rate of 450 milliseconds per track. The 5321 Mag Card Unit uses the same card and recording discipline as the Mag Card products. Operation of the Mag Card Unit within the same program as the diskette drive, BSCA, or SDLC is not supported.

5320 System Unit (cont'd)

Magnetic Character Reading: Utilizing the 1255 Magnetic Character Reader provides reading and sorting of MICR-inscribed documents at 500 documents per minute for mdl 1 and 750 documents per minute for mdls 2 and 3. Six stackers are provided on mdls 1 and 2, and 12 stackers on mdl 3. Operation of the 1255 within the same program as the diskette drive, BSCA, or SDLC is not supported.

Customer Responsibilities: The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 pages and "Teleprocessing Systems" in the GI section.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to processing the Order Confirmation card.

Publications: *System/32 Bibliography* (GC20-0032). Refer to *IBM System/32 Installation Manual - Physical Planning* (GA21-9177) for physical installation requirements.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9884** for 208V or **#9886** for 230V.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for light gray.
- Print Belt (B and C mdls): Available at time of manufacture only, except when upgrading an installed A mdl. Specify one of the following:

Belt Description	Specify Code .079 Inches	Specify Code .095 Inches
48-character EBCDIC	**#9491** *	**#9497**
48-character FORTRAN	N/A	**#9492**
64-character ASCII	**#9493** *	**#9498**
64-character EBCDIC	**#9490** *	**#9496**
96-character Artisan	N/A	**#9487**
96-character Modified Courier	N/A	**#9499**

* Recommended for use with six or eight lpi RPQ S40127.

- ASCII Key Tops and Display Screen Graphics: Specify **#9370**. **Note:** Includes ASCII graphics on serial printing (A mdls).
- Modem Cable (SDLC or BSCA only): Required for attaching System/32 to the communications facility regardless of whether an IBM integrated modem or an external modem is used. Specify **#9460** for a 6 meter (20 foot) cable or **#9461** for a 12 meter (40 foot) cable.
- Upending: If required, upending may be accomplished by following the instructions shipped with the system.

SPECIAL FEATURES

Non-Communications Features

Additional Storage (#1005): Provides an additional 8,192 bytes of main storage. **Maximum:** Two. **Field Installation:** Yes.

1255 Attachment (#1100): To attach a 1255 Magnetic Character Reader mdl 1, 2, or 3 equipped with a System/3/32/34 Adapter (#6303). See *IBM System/32 Installation Manual - Physical Planning* (GA21-9177) for cabling information. **Limitations:** Cannot be installed with Data Recorder Attachment (#3200) or 5321 Mag Card Unit Attachment (#4900). **Maximum:** One. **Field Installation:** Yes.

Control Storage Increment (#1500): Provides additional control storage and access to a Scientific Instruction Set, a group of additional instructions which perform functions commonly required in scientific programs. Required for execution of FORTRAN IV (5725-F01) generated object programs. #1500 is not required for compiling programs. **Maximum:** One. **Field Installation:** Yes.

Data Recorder Attachment (#3200): To attach either a 129 Card Data Recorder mdl 2 equipped with a 3741/5320 Attachment (#8201) or a 5496 Data Recorder mdl 1 equipped with a 2772/3741/5320 Attachment (#7850). A 3 meter (10 foot) cable and connector required to attach a 129 or 5496 to the 5320 is included. Card I/O operation within the same program as the diskette drive, BSCA, or SDLC is not supported. **Limitations:** Cannot be installed with 1255 Attachment (#1100) or 5321 Mag Card Unit Attachment (#4900). **Maximum:** One. **Field Installation:** Yes.

Dual Case Keyboard and Display (#3400): [B, C mdls] Provides upper and lower case characters and new graphics and redefines the character/graphic arrangement of the System/32 keyboard and display. See "Type Catalog" for character/graphic arrangements supported. One set of prompt templates (ten keyboard arrangements) is supplied with #3400. See "Accessories" for additional sets. **Limitations:** Not compatible with ASCII Key Tops and Display Screen Graphics (**#9370**), RPQ GG0339 (additional print belt -- 96-character) or RPQ S40127 (six or eight lines per inch spacing). **Field Installation:** Yes.

Half-Line Space Printing (#4530): [B, C mdls] Provides half-line vertical spacing for printing. This feature supports superscript and subscript requirements normally associated with the character sets provided by Artisan and Modified Courier print belts. **Limitations:** Application programs using half-line spacing must include repositioning to the next full vertical space where full space alignment is required. Cannot be installed with RPQ S40127 (eight lines per inch spacing) or Data Recorder Attachment (#3200). **Field Installation:** Yes.

Keylock (#4655): Replaces on/off power switch to protect against unauthorized use. See "Accessories" for additional information. **Field Installation:** Yes.

5321 Mag Card Unit Attachment (#4900): [B, C mdls] To attach a 5321 Mag Card Unit Mdl 1 to a System/32. A 4.5 meter (15 foot) cable and connector required to attach the 5321 is included. **Limitations:** Cannot be installed with Data Recorder Attachment (#3200) or 1255 Attachment (#1100). **Maximum:** One. **Field Installation:** Yes.

Communications Features

Binary Synchronous Communications Adapter (BSCA) (#2074): In conjunction with stored program control, this feature permits System/32 to function on a switched, nonswitched, or private communications line as a processor/terminal communicating in binary synchronous mode with:

- Another System/32 equipped with #2074.
- A System/34 equipped with a communication adapter.
- A System/38 with appropriately configured BSC adapter and sub-features (point-to-point only).
- A 6640 Document Printer equipped with BSC/EBCDIC feature. Requires communicating features #3700 and #3701 or #5501, #5508, or #5510. System/32 requires SCP (#6002) with WPCU.
- Office System 6/430, 6/440, and 6/450 equipped with BSC/EBCDIC feature. Requires communicating features #3700 and #3701 or #5501, #5508, or #5510. System/32 requires SCP (#6002) with WPCU.
- A Mag Card II Typewriter - Communicating.
- A System/3 equipped with #2074 or #2084.
- A System/360 mdl 20 equipped with #2074.
- A System/360 or System/370 (which is supported by OS or DOS BTAM, OS TCAM, OS/VS1 or OS/VS2 BTAM, TCAM or VTAM, DOS/VS BTAM, or VTAM) via an Integrated Communications Adapter, a 2701 Data Adapter Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
- A 3741 Data Station mdl 2 or 3741 Programmable Workstation mdl 4.
- A 3747 Data Converter equipped with Communications Adapter (#1660).
- A 5110 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
- A 5231 mdl 2 equipped with BSCA (#2074) (point-to-point unidirectional transmission only).
- A 5280 Distributed Data System equipped with Communications Adapter (#2500).
- A System/7 equipped with BSCA (#2074).

See the System/32 programming pages for a description of the program support provided on System/32 for this feature.

The BSCA feature is designed to operate at speeds between 600 and 7200 bps over common carrier switched or nonswitched facilities or equivalent privately-owned communication facilities.

The BSCA feature (#2074) will allow System/32 to communicate on a nonswitched point-to-point or multipoint line at speeds of up to 7200 bps and on a switched point-to-point line at speeds of up to 4800 bps. See M2700 pages for information on communication facilities.

On a multipoint line System/32 operates as a tributary station. No support is provided for System/32 to operate as a control station on a multipoint line. Therefore, communication with other devices which do not provide control station capability must be done on a point-to-point line only.

This feature, Binary Synchronous Communications Adapter, will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be duplex or half-duplex facilities. Operation of this feature on System/32 will be overlapped at all transmission rates with processing and/or I/O device operations including disk. BSC units at each termination or drop point of a data link to which the System/32 is attached must use the same clocking source (modem or

5320 System Unit (cont'd)

business machine) and must be set to operate at the same transmission rate and to use the same transmission code.

Switched network versions include as a basic capability support of manual dial and manual or auto-answer operations (where the attached modem supports this capability).

ASCII, EBCDIC or EBCDIC Text Transparency are standard. One of the above transmission codes is selected at program compilation time.

Limitations: Cannot be installed with SDLC (#6301). Card I/O, the 5321 Mag Card Unit, the 1255 Magnetic Character Reader, and the diskette drive cannot be operated within the same program as the BSCA. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, #5501, #5600, #5602, or #5610. **Specify:** Modem cable (see "Specify").

EIA Interface (#3701): Provides a cable and interface for the attachment of an IBM modem or non-IBM data set meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500, #5501) or 2400 bps Integrated Modem (#5600, #5602 , #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301.

Internal Clock (#4703): Generates synchronizing and timing signals for SDLC or BSC operation when they are not provided by the modem. Clocking speeds available with this feature are 600 bps and 1200 bps. Selection of speed is indicated via a system utility program (SCP). When this feature is installed on System/32, all other SDLC or BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. **Limitations:** Cannot be installed with 2400 bps Integrated Modem (#5600, #5602, #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #3701, #5500, or #5501.

1200 bps Integrated Modem (#5500, #5501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program (SCP). Available in two different versions: #5500 - nonswitched and #5501 - switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with 1200 bps integrated modem/line adapter. **Limitations:** Cannot be installed with EIA Interface (#3701) or 2400 bps Integrated Modem (#5600, #5602, #5610). #5500 and #5501 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #4703.

2400 bps Integrated Modem (#5600, #5602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 modems. Half-speed operations at 1200 bps is indicated via a system utility program (SCP). Available in two different versions: #5600 - nonswitched point-to-point and #5602 - nonswitched multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with 2400 bps integrated modem/line adapter or 3872 modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). 2400 bps Integrated Modems (#5600, #5602 , #5610) cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5733.

2400 bps Integrated Modem (#5610): A modem for SDLC or BSC data transmission at 2400 bps over the switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 modems. Half-speed operation at 1200 bps is indicated via a system utility program (SCP). Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with a 2400 bps integrated modem/line adapter or 3872 modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). #5600, #5602, and #5610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5733.

Processing Unit Expansion (#5733): Provides for mounting of one 2400 bps Integrated Modem (#5600, #5602, #5610). **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5600, #5602, or #5610.

Synchronous Data Link Control Communications (SDLC) (#6301): In conjunction with stored program control, this feature provides communications capability with S/370 mdls 115, 125, 135, 145, 155II, 158, 158MP, 165II, 168, and 168MP via a 3704 or 3705 Communications Controller equipped with appropriate features. See M3704 and 3705 pages. The S/370 must be operating under control of DOS/VS, OS/VS1, or OS/VS2 VTAM and the 3704/3705 under control of the Network Control Program/VS (NCP/VS). See the System/32 programming pages for a description of the program support provided on System/32 for this feature.

The SDLC feature is designed to operate at speeds between 600 and 7200 bps over common carrier switched or nonswitched facilities or equivalent privately-owned communication facilities.

SDLC (#6301) will allow System/32 to communicate on a nonswitched point-to-point or multipoint line at speeds of up to 7200 bps and on a switched point-to-point line at speeds of up to 4800 bps. See M2700 pages for information on communication facilities.

This SDLC feature will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be duplex or half-duplex facilities. Operation of this feature on System/32 will be overlapped at all transmission rates with processing and/or I/O device operations including fixed disk. SDLC units at each termination or drop point of a data line to which the System/32 is attached must use the same clocking source (modem or business machine), the same transmission encoding option (NRZ or NRZI), and must be operating at the same transmission rate.

Switched network versions include as a basic capability support of manual dial and manual or auto-answer operations (where the attached modem supports this capability).

The System/32 operates as an SDLC secondary station and can operate on a communication line with other IBM SDLC terminals.

Limitations: Cannot be installed with BSCA (#2074). Card I/O, the 5321 Mag Card Unit, the 1255 Magnetic Character Reader, or the diskette drive cannot be operated within the same program as SDLC. SDLC supported by SCP (5723-SC1) requires 24K bytes of main storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, #5501, #5600, #5602, or #5610. **Specify:** Modem cable (see "Specify").

Switched Network Backup (SNBU) (#7951): Provides for backup attachment of System/32 to the public switched network when the 2400 bps Integrated Modem (#5600, #5602, #5610) is used on a nonswitched line as the primary facility. It can communicate with another 2400 bps Integrated Modem or a 3872 modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator-invoked system utility program (SCP). Attachment to the switched network is made via FCC-registered protective circuitry of the CDT Type (or equivalent) provided by the user. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1, and OS/VS2 in certain configurations or with TCAM/VTAM under OS/VS1 or OS/VS2. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of Switched Network Backup. For additional information, see the *3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with SDLC (#6301) or Switched Network Backup with Auto-Answer (#7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074, #5600 or #5602, and #5733.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. Selection of the primary or backup facility is via an operator-invoked system utility program (SCP). Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 or OS/VS2 in certain configurations or with TCAM/VTAM under OS/VS1 or OS/VS2. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with SDLC (#6301) or Switched Network Backup (#7951). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074, #5600 or #5602, and #5733.

IBM Modems:

Modem	Speed (bps)
3863	2400
3864	4800
3865	9600
3872	2400/1200

Note: System/32 does not support Auto-Call Originate (#1091) on the 3872. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages.

5320 System Unit (cont'd)

To verify the proper integrated modem or external modem interface configuration, refer to the following chart. Select one of the categories numbered from 1 to 3 and follow across for the required and optional special features.

Modem/Interface Feature Configurator

Modem/Interface	Internal Clock (#4703)	Processing Unit Expansion (#5733)	SNBU (#7951) or SNBU/AA (#7952)
EIA Interface (#3701)	Optional	-	-
1200 bps Integrated Modem:			
Nonswitched (#5500)	Required	-	-
Switched with Auto-Answer (#5501)	Required	-	-
2400 bps Integrated Modem:			
Nonswitched Point-to-Point (#5600)	-	Required	Optional
Nonswitched Multipoint Tributary (#5602)	-	Required	Optional
Switched Network Auto-Answer (#5610)	-	Required	-

Maximum: One IBM modem can be attached to a System/32. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #3701.

References:

Contact IBM for information concerning external modems attachable to the System/32 SDLC or BSCA features.

See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, and operating capabilities.

Refer to SCP (#6002) for Word Processing Communications Utility support of 6640 Document Printer, Office Systems 6/430, 6/440, 6/450, a second Word Processing System/32, and a Mag Card II Typewriter - Communicating.

MODEL CONVERSIONS

Model conversions are field installable.

Any model conversion that involves a disk storage capacity requires replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

Model conversions between A, B, and C models require replacement of the print mechanism and may require replacement of the power supply. A0X, A1X, or A2X models, when converted to A31, A32, A33, or A34 models, must be at EC level 828749 or the print mechanism must be replaced.

When upgrading from model A, a print belt must be specified. See "Specify".

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Locks and Keys: The 5320 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser.) Key identification number and P/N **2546418** must accompany each order. Allow six to eight weeks for delivery.

Additional Print Belts: [B, C mdls] Permits the customer to print more than one character set for various applications. Can be interchangeably used with the belt provided with the machine. Order by feature number with the machine or by MES for field installation.

Belt Description	Feature Code .079 Inches	Feature Code .095 Inches
48-character EBCDIC	**#5906** *	**#5911**
48-character FORTRAN	N/A	**#5552**
64-character ASCII	**#5907** *	**#5912**
64-character EBCDIC	**#5905** *	**#5910**
96-character Artisan	N/A	**#5914**
96-character Modified Courier	N/A	**#5913**

* Recommended for use with six or eight lpi RPQ S40127.

Dual Case Keyboard Prompt Templates (P/N 2773082): A set of ten keyboard redefine prompt templates support the keyboard options as identified in the "Type Catalog". One set is provided with Dual Case Keyboard and Display (#3400).

Cables: A modem cable is required. See "Specify". No other cable order is required for the System/32.

SUPPLIES

Ribbons: A black ribbon is required: P/N **1136653** or equivalent for A mdls, P/N **1136634** or equivalent for B mdls, and P/N **1136670** or equivalent for C mdls.

Diskettes: For Diskette 1, contact IBM.

Mag Cards: For Mag Cards and related supply items, contact IBM.

5321 MAG CARD UNIT

PURPOSE

The 5321 provides magnetic card input and output for System/32 and allows reading and recording to magnetic cards for the 5520 Administrative System.

MODELS

Model 1 001

Limitations: Cannot be installed on 5320 A models. Cannot be installed on 5320 B or C models with 1255 Attachment (#1100) or Data Recorder Attachment (#3200) installed.

Maximum: Only one 5321 may be attached to a system.

Prerequisites: For System/32, the 5321 Mag Card Unit Attachment (#4900) and System Control Program (SCP) (5725-SC1) with #6002. For attachment to the 5525, the 5321 Mag Card Unit Attachment (#1100) and the 5520 Administrative Processing Program (5611-SS1) Release 2.

HIGHLIGHTS

The 5321 reads and records information using 50 track magnetic cards. Reading is at the maximum rate of 20 seconds per card (102 characters per track). Recording is at the maximum rate of 30 seconds per card (102 characters per track). Mag Card products may be used to prepare the cards to be read by the 5321. Playback of the cards recorded by the 5321 can be on Mag Card Selectric Typewriters, Mag Card II, 6640 Document Printer, Mag Card/A, 6240 Communicating Mag Card Typewriter, and the 6670 Information Distributor. Character sets and command codes are supported by application programming under licensed programs such as Word Processor/32 (5725-XX1) on System/32. For the 5520 Administrative System, however, see 5520 Programming pages for operating characteristics and restrictions in this area. The input hopper holds a maximum of 50 cards and the output stacker a maximum of 60 cards.

Publications: *System/32 Bibliography* (GC20-0032).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify required.
- Color: Cloud White (no specify required).
- Attachment: Specify **#9457** for attachment to the 5320 or **#9458** for attachment to the 5525. Note that **#9458** must also be specified when changing attachment of an existing Mag Card Unit from the 5320 to the 5525.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The 5321 is shipped with a 4.6 meter (15 foot) cable and connector.

SUPPLIES

Magnetic Cards: Only diagnostic magnetic cards are shipped with the 5321. Magnetic cards for customer applications must be ordered separately. For magnetic cards and erase magnets, contact IBM.

5322 COMPUTER

[NO LONGER AVAILABLE]

PURPOSE

The System/23 Datamaster is a compact, desk-top, data processing system designed with many functions intended to simplify use by first time computer users. It is a distributed logic system architecturally structured to support file sharing by multiple workstations. Function-oriented hardware combined with licensed programs provide the additional capabilities of word processing and a flexible communications facility.

The 5322 Computer is a processor unit for the System/23. It contains main storage, arithmetic and logical processing circuits, control functions for I/O units on System/23 and also the keyboard/CRT. Most models have integrated diskette drive(s). A significant standard function of System/23 processors is an interpretive BASIC language processor which provides an integrated, high level, interactive language designed for commercial data processing applications.

MODELS

The model number of the 5322 is determined by the function, memory size, and integrated diskette capability as follows:

Model	Main Storage	Diskette Capacity	Number of Drives
Data Processing Models			
110*	32KB	0MB	0
111*	32KB	.3MB	1
112*	32KB	.6MB	2
113*	32KB	1.1MB	1
114*	32KB	2.2MB	2
120	64KB	0MB	0
121	64KB	.3MB	1
122*	64KB	.6MB	2
123*	64KB	1.1MB	1
124	64KB	2.2MB	2
130*	96KB	0MB	0
131*	96KB	.3MB	1
132*	96KB	.6MB	2
133*	96KB	1.1MB	1
134*	96KB	2.2MB	2
140	128KB	0MB	0
141	128KB	.3MB	1
142*	128KB	.6MB	2
143*	128KB	1.1MB	1
144	128KB	2.2MB	2
*Data Processing and Word Processing** Models*			
420	64KB	0MB	0
421	64KB	.3MB	1
422*	64KB	.6MB	2
423*	64KB	1.1MB	1
424	64KB	2.2MB	2
430*	96KB	0MB	0
431*	96KB	.3MB	1
432*	96KB	.6MB	2
433*	96KB	1.1MB	1
434*	96KB	2.2MB	2
440	128KB	0MB	0
441	128KB	.3MB	1
442*	128KB	.6MB	2
443*	128KB	1.1MB	1
444	128KB	2.2MB	2

* These models are no longer available.
** See System/23 Word Processing requirements under "Standard Features".

The first digit of the mdl number indicates Data Processing function only (1XX) or Data Processing and Word Processing (4XX). The second digit of the mdl number indicates main storage size, and the third digit indicates the number of diskette drives and their capacity.

Maximum Configuration:

Attachable to the 5322 are:

- Up to two printers 5217, 5241, or 5242.
- Single or dual additional diskette drives with the 5246 Diskette Unit.
- High performance, fixed disk storage with the 5247 Disk Storage Unit.

Up to two 5322 Computers can be included in a configuration by attachment to a shared function model of the 5246 Diskette Unit (mdls 21 or 22) or the 5247 Disk Storage Unit.

Prerequisites: Every System/23 must have a diskette storage facility available for system support and maintenance diagnostic support purposes. Therefore, each 5322 must have either the Integrated Diskette Controller (#3780), the 5246 Diskette Unit Controller (#3775), the Extended 5246 Controller (RPQ 8N5008), or the 5247 Disk Unit Adapter Controller (#3770).

Word Processing system configurations must have at least .6MB of diskette capacity available in order to use the word processing licensed program (5715-WP1). See "Special Features" for a description of limitations and prerequisites.

HIGHLIGHTS

- User-oriented system design.
- Wide choice of main memory and diskette storage options provide configuration flexibility to satisfy specific customer requirements.
- Integrated high level interactive language - BASIC.
- Easy-to-use, adjustable typewriter-like keyboard with numeric keypad and control keys.
- Full screen processing ability with 1920-character CRT display screen.
- Customer Support Function diskettes provide easy start-up and simplified diskette data handling.
- Optional word processing capability.
- Dual workstation capability.
- Flexible communications adapter feature and licensed program for either asynchronous or binary synchronous operations.
- Field upgrades provide for future system growth.

Standard Features

Processor: Main storage is available in 32K, 64K, 96K, or 128K bytes (12K bytes of which are permanently allocated for use by the BASIC language interpreter, display, printer and diskette buffers). Main storage cycle time is 975 nanoseconds with internal parity checking. All features and mdl upgrades (see "Model Conversions") are field installable. One printer attachment is standard on all mdls and three special feature slots are provided on the Data Processing mdls (1XX). Two special feature slots are provided on the combined Data and Word Processing mdls (4XX).

Diskette Capability: Two types of diskette drives are supported by the 5322 Computer; a diskette that can read/write IBM Diskette 1 (5322 mdls XX1 and XX2) and a diskette drive which can read/write IBM Diskette 1, 2, and 2D (5322 mdls XX3 and XX4 or the 5246 Diskette Drive). The 5322 uses the 512 byte format when operating under the BASIC language. However, the Customer Support Functions can use other formats to copy files for data interchange purposes. The possible formats for the diskettes are:

Diskette	Format	Bytes/ Sector	Capacity
1	1	128	*243KB
1	2	512	303KB
2	3	128	*486KB
2	4	512	606KB
2D	5	256	985KB
2D	6	512	1136KB

* Basic Exchange format

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 3 above) and H Exchange (Format 5 above). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Data exchange with other system types may require code translation for character set integrity.

Examples are the System/3, System/32, System/34, System/36, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3790, 5110, 5120, 5230, 5260, and 8100.

The instantaneous data transfer rate using IBM Diskette 1 or 2 is up to 31.2K bytes/sec, and for IBM Diskette 2D is up to 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm.

For information on System/23 diskette operations, see *System/23 Customer Support Functions Volume I* (SA34-0175), *BASIC Language Reference Manual* (SA34-0109), or *System/23 Operator Reference* (SA34-0108).

BASIC Language: The System/23 BASIC Language Interpreter provides convenient and powerful facilities and features for the development and execution of application programs. Among these facilities are:

- Residence in read-only storage requiring no control program load.
- Improved program diagnostic tools, such as the TRACE statement.
- Several new functions, statements and commands to simplify:

5322 Computer (cont'd)

- Character String Processing
- Error Recovery
- File Processing and Management
- Printer Control
- Display/Keyboard Processing
- Procedure Control

- File sharing between two 5322 computers.
- Fully overlapped printing and program execution.
- Encyclopedia format reference manual with extensive cross referencing, examples and in-depth description of system function.

Word Processing (WP): The Word Processing mdls consist of additional logic and microcode hardware to be used in conjunction with one of the System/23 Word Processing licensed programs to provide word processing capabilities. Word processing requires a minimum of 64K of main storage and .6MB of diskette storage. See the programming pages for Word Processing systems requirements.

Some functions supported by the Word Processing hardware and licensed programs to create, edit, print, etc., are:

Word Processing II (5715-WP2) Licensed Program provides all of the functions shown for Word Processing (5715-WP1) plus those shown in the WPII column.

WP (5715-WP1)	WP II (5715-WP2)
• **Input**	
-Create document	-Get page/display
-Formats	
-Automatic word wrap	
• **Edit**	
-Delete	-Spelling verification
-Find	-Spelling Assistance
-Indent	-Automatic hyphenation
-Block operations	-Synonym assistance
-Word underscore glossary	-Phrase glossary
-Page delete/restore	-Column alignment right, center, and decimal
	-Page GOTO
	-Page split
• **Merge**	
-DP/WP merge	-DP/WP merge with multiple record types
	-Basic language operations
	-Display files
• **Pagination**	
-Character and line count	-Widow line control
-Syllable hyphen control	-Keep
-Page end control	
• **Document**	
-Copy document	-Operator personalization
-Delete document	-Change document profiles
-Change document profiles	
-List drive contents	

For further information on Word Processing, see the System/23 programming pages (5715-WP1 , 5715-WP2) or the *Word Processing Operator Reference Manual* (SA34-0613).

The keyboard has a familiar typewriter-like layout plus a numeric keypad. Four arithmetic function keys (+, -, *, /) located above the numeric pad provide convenient entry of data in desk calculator mode. Many of the keys in the top row provide system commands when depressed in connection with the COMMAND key. Special BASIC command words can be entered via the keys in conjunction with the COMMAND key. Thus, the COMMAND key can be used to reduce keying time. The keys on the 10-key keypad can also be defined by the user to perform special functions and may be activated with the COMMAND key under program control.

A variety of different language keyboard layouts may be specified when the machine is ordered. For user reference, a Keyboard Aid (SX34-0051) (language and keyboard dependent) is supplied with each 5322. This aid is a set of plasticized printed cards that will lie above the top row of keys, and contain:

- Selected BASIC keywords.
- Operator Commands and user-defined function keys.
- Operator messages for each action code.
- Non-native language characters and block graphics.

See "Keyboard/Keyboard Aid/Publications Set" in the "Specify" section. A single specify code is used to order the desired Keyboard/Keyboard Aid.

Display: The screen (CRT) displays keyed input, output, and provides user guidance. Up to 1840 characters can be displayed, 23 lines of 80-characters each. The 24th line is used to report status and system information. The user is permitted full screen management and display of upper/lower case characters. The size of a full screen display is 205mm (8.1 inches) by 160mm (6.3 inches). At any time, 128 different character images may be displayed in addition to 11 block graphics for presentation of blocks, bar charts, frames, etc. User-controlled field attributes are underline, blink, reverse image, high intensity, and non-display. The cursor can be positioned at any input field and optional field attributes of automatic advance and automatic enter are also available.

Character Sets: Any one of five Display Character Subsets may be selected from the keyboard (using ALTERNATE keying) because they are all stored within the system. This selection has no effect on internal data representation but, affects only the set of displayed graphics. This "internally stored" language capability is significant because any 5322 can utilize all five Display Character Subsets. The stored character sets are:

1. US, Canada-English
2. Canada-French
3. European countries (except Spain)
4. Nordic (including Iceland)
5. Spain and Spanish speaking countries

The primary set of display graphics at "Power On" is set at the plant of manufacture based upon the keyboard specified. See the *Basic Language Reference* (SA34-0109) for further details. For character sets that may be printed, see the appropriate printer pages.

Printers: Each 5322 may attach up to two 5241 or 5242 table-top impact matrix printers. The first printer attachment is standard and the Second Printer Attachment (#6350) is optional. The optional Second Printer Attachment (#6350) must be installed if the 5217 printer is attached. Either attachment may be used with the 5217, 5241, or 5242 Printers. The 5241 provides printing speeds of 80 characters per second and the 5242 provides 160 characters per second. In addition, the 5242 mdl 2 provides the capability of quality printing at 40 cps. Quality print provides additional matrix dots per character and is suitable for applications such as letter writing which require typewriter-like quality. See the pages for operating characteristics.

Communications

System Communications: System/23 may communicate with the following systems:

Systems	BSC	Asynchronous
Series/1 (EDX, RPS)	X	X
System/3	X	
System/23	X	X
System/34	X	
System/36	X	
System/38	X	
5110/5120	X	
5280	X	
5265	X	

Using Asynchronous Communications, System/23 can communicate with S/370, mdls 135-168, 3031, 3032, 3033, 3081, 4331 and 4341 via 3704/3705-EP Release 3.0 to VM/370, using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communication Terminal function of the licensed program. The 3135 and 3138 attach via ICA to VM/370 and the 4331 attaches via CA to VM/370. System/23 attachment to VM/370 is provided through VM/System Product, VM/Basic Systems Extension and VM/System Extensions Program Products with VM/370 Release 6 PLC 4 level or higher.

System/23 is supported for attachment to S/370 mdls 115-168, 3031, 3032, 3033, 3081, 4331 and 4341 through CICS/VS using BTAM under VSE, VS1 or MVS. 3741 BSC protocol is provided for communications using point-to-point leased or switched facilities via ICA or CA (where applicable), or 3704/3705. In particular, support is provided for the following CICS/VS release/versions:

-CICS/DOS/VS	Version 1.5	On VSE/AF	Release 2
-CICS/OS/VS	Version 1.5	On VS1	Release 7
-CICS/OS/VS	Version 1.5	On MVS	Release 3.8

Asynchronous Communications: Asynchronous communication is provided by the licensed program (5715-AC1). The physical interface is EIA RS-232-C/CCITT V24-V28. Transfer of data is via American National Standard Code for Information Interchange (ASCII). Auto-answer is supported in a switched network.

The ASCII code and the asynchronous communication interface allows System/23 to communicate with the above mentioned processors using a capability that is commonly referred to as TTY-compatible. Various communications options, such as line speed and parity bits, can be selected by the customer.

The communications are via start/stop on point-to-point facilities. For communications to VM/370, the facilities are full duplex, switched up to 300 bps. Series/1 support is half duplex, switched facilities up to 300 bps. For communication to another System/23, the facilities are full or half duplex, switched or nonswitched, up to 1200 bps.

5322 Computer (cont'd)

Binary Synchronous Communications: The licensed program (5715-BC1) supports data transmission rates up to 4800 bps and is implemented to support the line protocol of the 3741. This protocol is supported for point-to-point on switched or nonswitched lines. For communication to another System/23 or 5265 in point-to-point configurations, one System/23 is required to act as a primary station. For all other configurations, the System/23 is the secondary station. Transfer of data is in EBCDIC in either non-transparent or transparent mode. The physical interface is EIA RS-232-C/CCITT V.24-V.28 with clocking supplied by modem.

One of the IBM modems, 3863 (2400 bps), 3864 (4800 bps), 3872 (2400 bps), or 3874 (4800 bps) may be attached to the Communications Adapter Feature (#2550). For more information on the capabilities of these modems refer to M3863 or 3864 and 3872 pages.

Additional Information: Communications facilities attachments for the Communication Adapter Feature (#2550) are designed to operate on transmission facilities such as:

- Common carrier leased telephone line service (voice grade) .
- Voice grade (common carrier or private) lines supporting a 4800 bps transmission rate. Channel requirements may vary according to the data circuit terminating equipment selected. The data circuit terminating equipment manufacturer should be consulted by the customer for this information.
- Common carrier switched network telephone (voice grade) service at up to 4800 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.

References:

See M2700 pages for additional information concerning communication facilities, machine attachment requirements, operating capabilities, and customer responsibilities.

Refer to *System/23 Communications Guide* (SA34-0111) for further details.

See appropriate programming pages for requirements relating to System/23 licensed programs (5715-AC1, 5715-BC1).

Customer Responsibilities: The marketing representative must advise the customers of their responsibilities before receipt of the machine:

- They are responsible for making arrangements for installation, pricing and charges for the data communication facility and attachment of selected data sets.
- They are responsible for paying toll charges, if required for installation and/or maintenance of the Communications Adapter Feature (#2550).
- The IBM Marketing Representative must have the customer obtain a firm installation date for transmission services (including modems) before the order for Communications Adapter Feature (#2550) can be confirmed.
- The customer is responsible for providing a desk or table to support System/23 table-top units.

For further information, refer to the M2700 pages.

Customer Support Functions: Customer Support Functions are commonly used system functions distributed with the 5322 on diskette and are also utilized as part of power-up procedures. The functions provided include:

- A loader for machine updates.
- Diskette preparation.
- Alternative collating sequences.
- Diskette-to-diskette copy.
- Diskette compression to another diskette.
- Diskette recovery.
- Index file generation.
- Label display.
- An Audible Alarm to signal operator attention required and, under program control, operator messages such as "end of job."
- Twenty-four Hour Time Clock and Date functions that are set by the operator when starting up the system.
- A sort function is also provided on the CSF diskette as a special feature.

See "Special Features" section and *System/23 Customer Support Functions* (SA34-0175 and SA34-0176) for more details.

Customer Set-Up (CSU): The 5322 is designated for Customer Set-up. Setup details can be found in *System/23 Set-Up Instructions* (GA34-0107). The CSU allowance is two days.

SPECIFY

- Power (120V AC, 1-phase, 60 Hz): Non-locking plug.
- Color: Pearl White.
- Power Cables: Standard power cord is 2.4m (8 feet).
- Adapter Cables: A 6m (19.8 foot) modem cable for communications features is standard.
- Keyboard/Keyboard Aid/Publications Set: Publication Set includes;
  - Set-up Instructions.
  - Learning to Use System/23.
  - Operator Reference.
  - Messages.
  - Customer Support Function Volumes I and II.
  - Diskette(s) containing Customer Support Functions.
  - Diskette(s) containing Operator Training

  (Machine-readable material above may be combined in one or more diskettes).

Keyboard	Keyboard Aid	Publication Aid	Specify
US	English US	English US	Std

- Word Processing Publications: For Word Processing mdls (4XX), or MES upgrades to a 4XX mdl, specify: **#9850** for publications supporting 5715-WP1, or **#9851** for publications supporting 5715-WP2.
  If no specify is entered, default will be to **#9850**.
  Upgrades from **#9850** to **#9851** may be ordered via MES.
- **Codes:** SIU = 5322 ID = P30
- **AAS Ordering Instructions:** The 5322 is a Computer System.

SPECIAL FEATURES

Communications Adapter Feature (#2550): Communications interface hardware and System/23 Licensed Programs (5715-BC1 for BSC and/or 5715-AC1 for ASC) have been combined to provide a flexible, easy-to-use communications facility for System/23.

The hardware feature provides the communications interface logic and circuitry, an installation test diskette and cable wrap connector, the *System/23 Communications Guide* (SA34-0111), and a 6m (19.8 foot) modem cable assembly.

The licensed programs give the user the ability to tailor the communications function to meet their specific requirements through the use of a step-by-step prompting procedure. These programs also provide a user-programmable interface through BASIC language statements and commands. These interactive programs and the accompanying documentation are available only in English and Japanese. For further information see "Communications", the appropriate programming pages (5715-BC1 or 5715-AC1), or *System/23 Communications Guide* (SA34-0111). **Maximum:** One. **Field Installation:** Yes. **Prerequisite:** One available feature slot on the 5322. **Specify:**

5246 Diskette Unit Controller (#3775): Provides direct connection and control function of any mdl of 5246 to any mdl of the 5322. It also provides the function of the Integrated Diskette Controller (#3780) for integrated diskette drives. Either this feature or the Extended 5246 Controller (RPQ 8N5008) is required on mdls with no integrated diskettes. No feature slot required. **Limitation:** Mutually exclusive with #3780 and RPQ 8N5008. **Maximum:** One. **Field Installation:** Yes.

Integrated Diskette Controller (#3780): Provides control function for diskette drives that are integral to mdls XX1, XX2, XX3 or XX4 of the 5322. Either this feature or the 5246 Diskette Unit Controller (#3775) or the Extended 5246 Controller (RPQ 8N5008) is required with every 5322. No feature slot required. **Limitation:** Mutually exclusive with #3775 and RPQ 8N5008. **Maximum:** One. **Field Installation:** Yes.

Disk(ette) Sort Feature (#6300): Provides the 5322 Computer user with the ability to sort disk(ette) data files. Both full record sorts and address out (ADDROUT) sorts are possible. This function is shipped on the Customer Support Functions diskette when ordered with the 5322. See *Customer Support Functions* (SA34-0175) for details. **Limitations:** This feature or the No Disk(ette) Sort (**#9300**) feature must be ordered for every 5322. **Maximum:** One. **Field Installation:** Yes.

5322 Computer (cont'd)

Second Printer Attachment (#6350): This feature allows the attachment of a second printer which may be either a 5241 or 5242 mdl 1 or 2, and is required for attachment of the 5217. The hardware attachment is identical for all three printers. Output may be directed to a second printer by specifying it in a PRINT statement following a FILE OPEN statement for that printer. This feature is attractive for specific applications in that no physical changing of forms, etc., is required to run a priority interim job such as a management summary report or a short job requiring quality print using a 5242 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisite:** One available feature slot in the 5322.

Extended 5246 Controller (RPQ 8N5008): Provides the function of the 5246 Diskette Unit Controller (#3775) plus the capability to locate one 5322 (in a Dual Configuration only) up to 60m (200 feet) from the attached 5246. The standard cable length supplied with the 5246 is 4m (13 feet). **Limitation:** Not available on XX0 mdls. Mutually exclusive with 5246 Diskette Unit Controller (#3775) or Integrated Diskette Controller (#3780). **Maximum:** One. **Prerequisite:** RPQ 8N5009 or 8N5023 on the attached 5246 and Extended Cable RPQ SW2901, SW2902 or SW2903, or equivalent. Requires one available feature slot on the 5322.

MODEL CONVERSIONS

Any model processor may be field upgraded to any other model through addition of main storage or diskette drives or diskette drive capacity. Changing a model 1X2 or 4X2 to a model 1X3 or 4X3 respectively is not considered an upgrade.

All features may be field installed.

No model conversion features are CSU.

The upgrade purchase price for model conversion may be greater than the purchase price differentials. Customers should carefully evaluate their requirements prior to purchasing a system.

All replaced parts from model conversions become the property of IBM.

ACCESSORIES

Diskettes: For Diskettes see IBM. See *Customer Support Function Vol. I* (SA34-0175) to determine diskette type (1, 2, 2D) required.

5324 COMPUTER

PURPOSE

The System/23 is a compact data processing system designed with many functions intended to simplify use by first-time computer users. It is a distributed logic system architecturally structured to support file sharing by multiple workstations. Function-oriented hardware combined with licensed programs provide the additional capabilities of word processing and a flexible communications facility. A significant standard function of System/23 processors is an interpretive BASIC language processor which provides an integrated, high level, interactive language designed for commercial data processing applications. The 5324 Computer is a processor unit for the System/23. It is a compact, floor-standing unit convenient for office environments, and contains the processor, integrated diskette units (optional), power supply, and space for optional attachments.

The Display Module (#1000) and Keyboard Module (#1020) are compact, table-top units which are cable-connected to the 5324 computer. This modularity allows flexible unit positioning and, when combined with the adjustments on these modules, provides maximum individual workstation convenience considering variations in system use, operator size, posture, furniture dimensions, or lighting conditions.

MODELS

The model number of the 5324 Computer is determined by the function, memory size, and integrated diskette capability as follows:

Model	Main Storage	Diskette Capacity	Number of Drives
Data Processing Models			
120	64KB	0MB	0
123	64KB	1.1MB	1
124	64KB	2.2MB	2
140	128KB	0MB	0
143	128KB	1.1MB	1
144	128KB	2.2MB	2
Data Processing and Word Processing Models*			
420	64KB	0MB	0
423	64KB	1.1MB	1
424	64KB	2.2MB	2
440	128KB	0MB	0
443	128KB	1.1MB	1
444	128KB	2.2MB	2

* See Word Processing System Requirements in the programming pages.

The first digit of the model number indicates Data Processing function only (1XX) or Data Processing and Word Processing (4XX). The second digit of the model number indicates main storage size, and the third digit indicates the number of diskette drives and their capacity.

One diskette drive is required in a system configuration for Customer Support Functions and maintenance.

Maximum Configuration:

Attachable to the 5324 are:

- Up to two Printers (5217, 5241, or 5242 in any combination).
- High performance, fixed disk storage with the 5247 Disk Storage Unit.

Multiple 5324 or 5322 Computers can be included in a configuration by attachment to the 5247 Disk Storage Unit.

HIGHLIGHTS

- Flexible modular structure for maximum operator convenience.
- Wide choice of main memory and diskette storage options provide configuration flexibility to satisfy specific customer requirements.
- Integrated high level interactive language - BASIC.
- Easy-to-use, adjustable typewriter-like keyboard module with numeric keypad and control keys.
- Full screen processing ability with 1,920-character CRT display module screen.
- Customer Support Function diskettes help provide easy start-up and simplified diskette data handling.
- Optional word processing capability.
- Multiple workstation capability.
- Flexible communications adapter feature and licensed program for either asynchronous or binary synchronous operations.
- Field upgrades provide for future system growth.

Components

Processor: Main storage is available in 64K, or 128K bytes (12K bytes of which are permanently allocated for use by the BASIC language interpreter, display, printer and diskette buffers). Main storage cycle time is 975 nanoseconds with internal parity checking. All features and mdl upgrades (see "Model Conversions") are field installable. One printer attachment is standard on all mdls and three special feature slots are provided on the Data Processing mdls (1XX). Two special feature slots are provided on the combined Data and Word Processing mdls (4XX).

Every System/23 5324 or 5322 Computer must have a disk or diskette storage facility available for system support and maintenance diagnostic support purposes. Therefore, each 5324 or 5322 must have either the Integrated Diskette Controller (#3780), the 5246 Diskette Unit Controller (#3775), the Extended 5246 Controller (RPQ 8N5008), or the 5247 Disk Unit Adapter (#3770). See "Special Features" for a description of limitations and prerequisites.

Diskette Capability: The type of diskette drive supported by the 5324 Computer can read/write IBM Diskette 1, 2, and 2D (5324 mdls XX3 and XX4). The System/23 uses the 512 byte format when operating under the BASIC language. However, the Customer Support Functions can use other formats to copy files for data interchange purposes. The possible formats for the diskettes are:

Diskette	Format	Bytes/ Sector	Capacity
1	1	128	*243KB
1	2	512	303KB
2	3	128	*486KB
2	4	512	606KB
2D	5	256	985KB
2D	6	512	1136KB

* Basic Exchange format

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 3 above) and H Exchange (Format 5 above). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Data exchange with other system types may require code translation for character set integrity.

Examples are the System/3, System/32, System/34, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3790, 5110, 5120, 5230, 5260, and 8100.

The instantaneous data transfer rate using IBM Diskette 1 or 2 is up to 31.2K bytes/sec, and for IBM Diskette 2D is up to 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm.

For information on System/23 diskette operations, see *System/23 Operator Reference* (SA34-0108), *System/23 Customer Support Functions, Volume I* (SA34-0175), or *BASIC Language Reference Manual* (SA34-0109).

BASIC Language: The System/23 BASIC Language Interpreter provides convenient and powerful facilities and features for the development and execution of application programs. Among these facilities are:

- Residence in read-only storage requiring no control program load.
- Program diagnostic tools, such as the TRACE statement, status line, and split-screen mode for operator intervention in error situations.
- Several new functions, statements and commands to help simplify:
  - Character String Processing
  - Error Recovery
  - File Processing and Management
  - Printer Control
  - Display/Keyboard Processing
  - Procedure Control
- File sharing between multiple System/23 processors.
- Overlapped printing and program execution.
- Encyclopedia format reference manual with extensive cross referencing, examples and in-depth description of system function.

Word Processing (WP): The Word Processing mdls provide additional logic and microcode hardware to be used in conjunction with one of the System/23 Word Processing licensed programs to provide word processing capabilities. See the programming sales pages for Word Processing systems requirements.

Some functions supported by the Word Processing hardware and licensed programs to create, edit, print, etc., are shown below. Word Processing II (5715-WP2) licensed program provides all of the functions shown for Word Processing (5715-WP1), plus those shown in the Word Processing II column.

5324 Computer (cont'd)

WP (5715-WP1)	WP II (5715-WP2)
• **Input**	
-Create document	-Get page/display
-Formats	
-Automatic word wrap	
• **Edit**	
-Delete	-Spelling verification
-Find	-Spelling assistance
-Indent	-Automatic hyphenation
-Block operations	-Synonym assistance
-Word underscore glossary	-Phrase glossary
-Page delete/restore	-Column alignment right, center, and decimal
	-Page GOTO
	-Page split
• **Merge**	
-DP/WP merge	-DP/WP merge with multiple record types
	-BASIC language operations
	-Display files
• **Pagination**	
-Character and line count	-Widow line control
-Syllable hyphen control	-Keep
-Page end control	
• **Document**	
-Copy document	-Operator personalization
-Delete document	-Change document profiles
-Change Document profiles	
-List drive contents	

For further information on Word Processing function, and system requirements, see the System/23 programming sales pages or the *Word Processing Operator Reference Manual* (SA34-0613).

Keyboard Module: The Keyboard Module (#1020) is connected to the 5324 Computer by a 1.8m (6 foot) cable, which may be routed under the Display Module. The keyboard has a palm rest beneath the keys and space for the Keyboard Aids above the keys. A slope adjustment mechanism at the top of the keyboard allows positioning for individual comfort and convenience. One Keyboard Module is required for each 5324.

The keyboard has a familiar typewriter-like layout plus a numeric keypad. Many of the keys in the top row provide system commands when depressed in connection with the COMMAND key. Special BASIC command words can be entered via the keys in conjunction with the COMMAND key. Thus, the COMMAND key can be used to reduce keying time. The keys on the 10-key keypad can also be defined by the user to perform special functions and may be activated with the COMMAND key under program control.

For user reference, a Keyboard Aid (language and keyboard dependent) is supplied with each 5324 Computer. This aid is a set of plasticized printed cards that will lie above the top row of keys, and contain:

- Programmer Commands.
- Operator Commands.
- Operator action codes.
- Additional language characters and other symbols.

See "Keyboard/Keyboard Aid/Publications Set" in the "Specify" section. See Appendix A in *System/23 Operator Reference* (SA34-0108) for keyboard layouts.

Display Module: The Display Module (#1000) is a compact, desk-top unit connected to the 5324 Computer by two 1.8m (6 foot) cables. With a minimum of effort, vertical height and screen angle may be adjusted for variations in workstation layout, display usage, lighting conditions, and operator preference.

The screen displays keyed input, output, and provides user guidance. Up to 1840 characters can be displayed, 23 lines of 80-characters each. The 24th line is used to report status and system information. The user is permitted full screen management and display of upper/lower case characters. At any time 127 different character images may be displayed in addition to 11 block graphics for presentation of blocks, bar charts, frames, etc. User-controlled field attributes are underline, blink, reverse image, high intensity, and non-display. The cursor can be positioned at any input field and optional field attributes of automatic advance and automatic enter are also available.

Character Sets: Any one of five Display Character Subsets may be selected from the keyboard (using ALTERNATE keying) because they are all stored within the system. This selection has no effect on internal data representation but, affects only the set of displayed graphics. This "internally stored" language capability is significant because any 5324 can utilize all five Display Character Subsets. The stored character sets are:

1. US, Canada-English
2. Canada-French
3. European countries (except Spain)
4. Nordic (including Iceland)
5. Spain and Spanish speaking countries

The primary set of display graphics at "Power On" is set at the plant of manufacture based upon the keyboard specified. See the *Basic Language Reference* (SA34-0109) for further details. For character sets that may be printed, see the appropriate printer pages.

Printers: Each 5324 Computer may attach up to two printers. The first printer attachment is standard and the Second Printer Attachment (#6350) is optional. The optional Second Printer Attachment must be installed if the 5217 Printer is attached. The 5217 may then be attached to either printer attachment. The 5241 or 5242 may be attached to either attachment without restriction. (See the M5217, 5241, and 5242 pages for operating characteristics.)

Communications

System Communications: System/23 may communicate with the following systems:

Systems	BSC	Asynchronous
Series/1 (EDX, RPS)	X	X
System/3	X	
System/23	X	X
System/34	X	
System/36	X	
System/38	X	
5110/5120	X	
5265	X	
5280	X	

Using Asynchronous Communications, System/23 can communicate with S/370, mdls 135-168, 3031, 3032, 3033, 3081,4331 and 4341 via 3704/3705-EP Release 3.0 to VM/370, using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communication Terminal function of the licensed program. The 3135 and 3138 attach via ICA to VM/370 and the 4331 attaches via CA to VM/370. System/23 attachment to VM/370 is provided through VM/System Products, VM/Basic System Extensions and VM/System Extensions Program Products with VM/370 Release 6 PLC 4 level or higher.

System/23 is supported for attachment to S/370 Models 115-168, 3031, 3032, 3033, 3081, 4331 and 4341 through CICS/VS using BTAM under VSE, VS1 or MVS. 3741 BSC protocol is provided for communications using point-to-point leased or switched faciiities via ICA or CA (where applicable), or 3704/3705. In particular, support is provided for the following CICS/VS release/versions:

-CICS/DOS/VS	Version 1.5	On VSE/AF	Release 2
-CICS/OS/VS	Version 1.5	On VS/1	Release 7
-CICS/OS/VS	Version 1.5	On MVS	Release 3.8

Asynchronous Communications: Asynchronous communication is provided by the licensed program (5715-AC1). The physical interface is EIA RS-232-C/CCITT V24-V28. Transfer of data is via American National Standard Code for Information Interchange (ASCII). Autoanswer is supported in a switched network.

The ASCII code and the asynchronous communication interface allows System/23 to communicate with the above mentioned processors using a capability that is commonly referred to as TTY-compatible. Various communications options, such as line speed and parity bits, can be selected by the customer.

The communications are via start/stop on point-to-point facilities. For communications to VM/370, the facilities are full-duplex, switched up to 300 bps. Series/1 support is half-duplex, switched facilities up to 300 bps. For communication to another System/23, the facilities are full- or half-duplex, switched or nonswitched, up to 1200 bps.

Binary Synchronous Communications: The licensed program (5715-BC1) supports data transmission rates up to 4800 bps and is implemented to support the line protocol of the 3741. This protocol will be supported for point-to-point on switched or nonswitched lines. Autoanswer is supported on a switched line. Transfer of data is in EBCDIC in either non-transparent or transparent mode. The physical interface is EIA RS-232-C/CCITT V24-V28 with clocking supplied by modem.

One of the IBM modems, 3863 (2400 bps), or 3864 (4800 bps), 3872 (2400 bps) or 3874 (4800 bps), may be attached to the Communications Adapter (#2550). For more information on the capabilities of these modems refer to M3863, 3864, and 3872 pages.

Customer Responsibilities: The customers must be advised that:

- They are responsible for making arrangements for installation, pricing and charges for the data communication facility and attachment of selected data sets.

5324 Computer (cont'd)

- Toll charges, if required for installation and/or maintenance of the Communications Adapter (#2550), are to be paid by the customer.
- The IBM Marketing Representative must have the customer obtain a firm installation date for transmission services (including modems) before the order for Communications Adapter (#2550) can be confirmed.

For further information, refer to the M2700 pages.

Additional Information: Communications facilities attachments for the Communication Adapter (#2550) are designed to operate on transmission facilities such as:

- Common carrier leased telephone line service (voice grade) .
- Voice grade (common carrier or private) lines supporting a 4800 bps transmission rate. Channel requirements may vary according to the data circuit terminating equipment selected. The data circuit terminating equipment manufacturer should be consulted by the customer for this information.
- Public switched network telephone (voice grade) service at up to 4800 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.

References:

See M2700 pages for additional information concerning communication facilities, machine attachment requirements, operating capabilities, and customer responsibilities.

Refer to *System/23 Communications Guide* (SA34-0111) for further details.

See appropriate programming pages for requirements relating to System/23 licensed programs (5715-AC1, 5715-BC1).

Customer Support Functions: Customer Support Functions are commonly used system functions distributed with the 5324 Computer on diskette and are also utilized as part of power-up procedures. The functions provided include:

- A loader for machine updates.
- Volume preparation (disk or diskette).
- Alternative collating sequences.
- Diskette-to-diskette copy.
- Backup-restore disk.
- Data recovery (disk or diskette).
- Index file generation.
- Label display.
- An Audible Alarm to signal operator attention required and, under program control, operator messages such as "end of job."
- Twenty-four Hour Time Clock and Date functions that are set by the operator when starting up the system.
- A sort function is also provided on the CSF diskette as a Special Feature.

See "Special Features" section and, *System/23 Customer Support Functions* (SA34-0175 and SA34-0176) for more details.

Customer Setup (CSU): The 5324 Computer is designated for Customer Setup. The marketing representative must advise the customers of their responsibilities before receipt of the machine. Setup instructions are shipped with the 5324. The customer is responsible for providing a desk or table to support System/23 table-top units. The CSU Allowance is two days.

AAS Ordering Instructions: The 5324 is a Computer System.

SPECIFY

- Power (120V AC, 1-phase, 60 Hz): Nonlock plug.
- Color: Pearl White.
- Power Cables: Standard power cord is 2.4m (8 feet). A 6m (19.8 foot) modem cable for communications feature is standard.
- Keyboard/Keyboard Aid/Publications Set: Publication Set includes:
  - Setup Instructions.
  - Learning to Use System/23.
  - Operator Reference.
  - Messages.
  - Customer Support Function Volumes I and II.
  - Diskette(s) containing Customer Support Functions.
  - Diskette(s) containing Operator Training (Machine-readable material above may be combined in one or more diskettes).

Keyboard	Keyboard Aid	Publication Aid	Specify
US	English US	English US	Std

- Word Processing Publications: For Word Processing mdls (4XX), or MES upgrades to a 4XX mdl, specify: **#9850** for publications supporting 5715-WP1, or **#9851** for publications supporting 5715-WP2. If no specify is entered, default will be to **#9850**. Upgrades from **#9850** to **#9851** may be ordered via MES.
- **Codes:** SIU = 5324 ID = P30

SPECIAL FEATURES

Display Module (#1000): Provides a free-standing display screen for the 5324 Computer. One required for each 5324 Computer. No feature slot required. **Limitations:** Not available for MES orders. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Customer setup instructions are included with the 5324.

Keyboard Module (#1020): Provides the keyboard for attachment to the 5324 Computer. One required for each 5324 Computer. No feature slot required. **Limitations:** Not available for MES orders. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Customer setup instructions are included with the 5324.

Communications Adapter (#2550): Communications interface hardware and System/23 Licensed Programs (5715-BC1 for BSC and/or 5715-AC1 for ASC) have been combined to provide a flexible, easy-to-use communications facility for System/23. The hardware feature provides the communications interface logic and circuitry, an installation test diskette and cable wrap connector, the *System/23 Communications Guide* (SA34-0111), and a 6m (19.8 foot) modem cable assembly.

The licensed programs give the user the ability to tailor the communications function to meet their specific requirements through the use of a step-by-step prompting procedure. These programs also provide a user-programmable interface through BASIC language statements and commands. These interactive programs and the accompanying documentation are available only in English, German, and Japanese. For further information see "Communications", the appropriate programming pages (5715-BC1 or 5715-AC1), or *System/23 Communications Guide* (SA34-0111). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot on the 5324.

5247 Disk Unit Adapter (#3770): Provides direct connection and control function for any mdl of the 5247 to any mdl of the 5324 or 5322 Computer. **Limitations:** If this attachment is for the first or only 5324 or 5322 attached to the 5247, the 5324 or 5322 must have a diskette capability, be attached to the 5247 via the standard 4m cables and be located adjacent to the 5247. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot in the 5324 or 5322.

Integrated Diskette Controller (#3780): Provides control function for diskette drives that are integral to mdls XX3 or XX4 of the 5324 Computer. Either this feature or the 5247 Disk Unit Adapter (#3770) is required with every 5324. No feature slot required. **Maximum:** One. **Field Installation:** Yes.

Disk(ette) Sort Feature (#6300): Provides the 5324 Computer user with the ability to sort disk(ette) data files. Both full-record sorts and address-out (ADDROUT) sorts are possible. This function is shipped on the Customer Support Functions diskette when ordered with the 5324. See *Customer Support Functions* (SA34-0175) for details. **Limitations:** This feature or the No Disk(ette) Sort (**#9300**) feature must be ordered for every 5324. **Maximum:** One. **Field Installation:** Yes.

Second Printer Attachment (#6350): This feature allows the attachment of a second printer which may be either a 5241 or 5242 mdls 1 or 2 and is required for attachment of the 5217. The hardware attachment is identical for all three printers. Output may be directed to a second printer by specifying it in a PRINT statement following an OPEN statement for that printer. This feature is attractive for specific applications in that no physical changing of forms, etc., is required to run a priority interim job such as a management summary report or a short job requiring quality print using a 5242 mdl 2. **Maximum:** One.

5324 Computer (cont'd)

Field Installation: Yes. **Prerequisites:** One available feature slot in the 5324.

MODEL CONVERSIONS

Any model processor may be field upgraded to any other model through addition of main storage or diskette drives or diskette drive capacity.

All features may be field installed.

Model conversion features are not CSU.

The upgrade purchase price for model conversion may be greater than the purchase price differentials. Customers should carefully evaluate their requirements prior to purchasing a system.

All replaced parts from model conversions become the property of IBM.

ACCESSORIES

Diskettes: For Diskettes see IBM. See *Customer Support Function Vol. I* (SA34-0175) to determine diskette type (1, 2, 2D) required.

5340 SYSTEM UNIT

PURPOSE

Contains main storage, disk storage, diskette drive, facilities for addressing main storage, and logical processing circuits and control for I/O units on System/34.

MODELS

Model	Main Storage	Diskette	Disk Storage Capacity (MB)
A11	32K	Diskette 1	8.6
A12	32K	Diskette 1	13.2
A13	32K	Diskette 1	27.1
A14	32K	Diskette 1	63.9
A15	32K	Diskette 1	128.4
A21	32K	Diskette 2D	8.6
A22	32K	Diskette 2D	13.2
A23	32K	Diskette 2D	27.1
A24	32K	Diskette 2D	63.9
A25	32K	Diskette 2D	128.4
A31	32K	Magazine	8.6
A32	32K	Magazine	13.2
A33	32K	Magazine	27.1
A34	32K	Magazine	63.9
A35	32K	Magazine	128.4
B11	48K	Diskette 1	8.6
B12	48K	Diskette 1	13.2
B13	48K	Diskette 1	27.1
B14	48K	Diskette 1	63.9
B15	48K	Diskette 1	128.4
B21	48K	Diskette 2D	8.6
B22	48K	Diskette 2D	13.2
B23	48K	Diskette 2D	27.1
B24	48K	Diskette 2D	63.9
B25	48K	Diskette 2D	128.4
B31	48K	Magazine	8.6
B32	48K	Magazine	13.2
B33	48K	Magazine	27.1
B34	48K	Magazine	63.9
B35	48K	Magazine	128.4
C11	64K	Diskette 1	8.6
C12	64K	Diskette 1	13.2
C13	64K	Diskette 1	27.1
C14	64K	Diskette 1	63.9
C15	64K	Diskette 1	128.4
C21	64K	Diskette 2D	8.6
C22	64K	Diskette 2D	13.2
C23	64K	Diskette 2D	27.1
C24	64K	Diskette 2D	63.9
C25	64K	Diskette 2D	128.4
C31	64K	Magazine	8.6
C32	64K	Magazine	13.2
C33	64K	Magazine	27.1
C34	64K	Magazine	63.9
C35	64K	Magazine	128.4
C36	64K	Magazine	192.9
C37	64K	Magazine	257.4
D11	96K	Diskette 1	8.6
D12	96K	Diskette 1	13.2
D13	96K	Diskette 1	27.1
D14	96K	Diskette 1	63.9
D15	96K	Diskette 1	128.4
D21	96K	Diskette 2D	8.6
D22	96K	Diskette 2D	13.2
D23	96K	Diskette 2D	27.1
D24	96K	Diskette 2D	63.9
D25	96K	Diskette 2D	128.4
D31	96K	Magazine	8.6
D32	96K	Magazine	13.2
D33	96K	Magazine	27.1
D34	96K	Magazine	63.9
D35	96K	Magazine	128.4
D36	96K	Magazine	192.9
D37	96K	Magazine	257.4
E11	128K	Diskette 1	8.6
E12	128K	Diskette 1	13.2
E13	128K	Diskette 1	27.1
E14	128K	Diskette 1	63.9
E15	128K	Diskette 1	128.4
E21	128K	Diskette 2D	8.6
E22	128K	Diskette 2D	13.2
E23	128K	Diskette 2D	27.1
E24	128K	Diskette 2D	63.9
E25	128K	Diskette 2D	128.4
E31	128K	Magazine	8.6
E32	128K	Magazine	13.2
E33	128K	Magazine	27.1
E34	128K	Magazine	63.9
E35	128K	Magazine	128.4
E36	128K	Magazine	192.9
E37	128K	Magazine	257.4
F22	256K	Diskette 2D	13.2
F23	256K	Diskette 2D	27.1
F24	256K	Diskette 2D	63.9
F25	256K	Diskette 2D	128.4
F33	256K	Magazine	27.1
F34	256K	Magazine	63.9
F35	256K	Magazine	128.4
F36	256K	Magazine	192.9
F37	256K	Magazine	257.4

Minimum System Configuration: A 5340 System Unit, a display/console (5251 mdl 1, 11, or 999, 5252, 5291, or 5292), and printer (serial -- 5219, 5256, ... line -- 5211, 5224, 5225, or 3262). A system printer must be provided to satisfy IBM maintenance requirements when using System Support Program (5726-SS1) or Preconfigured System Support Program (5726-SS2). Special microcode for the Preconfigured System Support Program (5726-SS2) must also be specified.

HIGHLIGHTS

- Multiple workstation system capability
- Multiprogramming and printer spooling provided with System Support Licensed Program (5726-SS1)
- Multiprogramming and printer spooling for entry level systems with Preconfigured System Support Program (5726-SS2)
- Extension of System/32 capabilities
- Local and remote workstation attachment flexibility:
  - 5219 Printer
  - 5224 Printer
  - 5225 Printer
  - 5251 Display Station
  - 5252 Dual Display Station
  - 5256 Printer
  - 5291 Display Station
  - 5292 Color Display Station
- I/O units:
  - 1255 Magnetic Character Reader
  - 3262 Printer
  - 5211 Printer
  - 5219 Printer
  - 5224 Printer
  - 5225 Printer
- Diskette Magazine Drive
- Communications capability via BSC or SDLC through attachment of one to four lines
- Easy-to-use workstation utility programming support available
- Facilities to provide high-level of system availability
- Main Storage Failure Recovery
- Scientific Instruction Set
- Fixed interval timer
- Address Translation Registers
- Storage protection
- MICR document processing capability
- 5211/3262 translation tables for character substitution

Processor Unit: The main storage processor represents a hardwired System/3 language processor with 32K, 48K, 64K, 96K, 128K, or 256K bytes of main storage. A microprocessor, with 16K words of control storage, operates in parallel with the main storage processor, and supports a microcoded control function and each of the I/O devices. The processor unit uses a combination of LSI/MSI - large and medium scale integration for the logic circuitry. Memory technology is Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. A ninth bit is added for parity checking. Main storage internal cycle time is 600 nanoseconds.

Workstation Controller: The 5250 Information Display System devices (5251 mdls 1, 11, and 999 Displays, 5252 Dual Displays, 5291 Displays, 5292 Color Displays, 5219 Printer, 5224 Printer, 5225 Printer and the 5256 Printer), used as locally attached System/34 workstations, attach to a controller in the 5340 System Unit via four twinaxial cable connectors on the 5340.

One cable connector must be dedicated to attachment of a 5251 mdl 1, 11, or 999, or 5252, or 5291, or 5292 to be used as the system console. **Note:** If the 5291 or 5292 is to be attached to the System/34, the system must be at SSP Release 7 level or higher. Also, if the 5291 or 5292 is to be used as the console the System/34 must be at Diagnostic Release Level 9.2 or higher. For maintenance reasons, only one of the above machine types 5251, 5252 or 5291 should be attached to this cable. A 6 meter (20 foot) twinaxial cable is provided with the 5340 for attachment of the system console.

Up to three additional cables may be connected to the 5340 for attachment of additional workstation devices. A maximum of 16 display stations and printers (the 5252 counts as two display stations), including the console, may be attached when the optional Workstation Control Expansion B (#4901) is installed. The maximum length of any one twinaxial cable attached to the 5340 cable connector is 1,525 meters (5,000 feet). Multiple workstations (up to seven) may be attached to one cable via the Cable-Thru on the display station or printer (Cable-Thru is a standard capability on the 5291 Display

5340 System Unit (cont'd)

Station). See *IBM System/34 Installation Manual - Physical Planning* (GA21-9242).

Diskette: Included in the mdls X1X of the System Unit is the Diskette 1 drive, mdls X2X incorporate the Diskette 2D drive, and the mdls X3X use the Diskette Magazine drive.

The Diskette 1 drive is capable of reading and writing the Diskette 1 in Basic format or Extended format. The Diskette 2D drive can read and write either the Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format).

The Diskette Magazine drive can process individual diskettes or magazines. The magazine holds up to ten operator accessible diskettes. The magazine drive can accommodate two magazines and three individual diskettes. The selecting of diskettes within a magazine, and proceeding from the first magazine to the second, is automatic (under program control). The magazines will typically be used for Save/Restore functions. The three individual slots may be used for smaller jobs. Selection of up to three individual diskettes is automatic (under program control). Both Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format) can be used in the Diskette Magazine. The select cycle time (eject diskette, move to next diskette, load diskette) is approximately three seconds.

The compatible media for data exchange with other devices such as 3740 is the Diskette 1 in Basic format or the 5280 is the Diskette 1 or 2D in Basic format. The formats for diskettes are:

	Diskette 1	Diskette 2D
Data Tracks/Diskette	74	148 (74 Cylinders)
Capacity		
Basic Format		
Bytes/Sector	128	256
Sectors/Track	26	26
Tracks/Cylinder	1	2
Data Bytes/Diskette	246,272	985,088
Extended Format		
Bytes/Sector	512	1,024
Sectors/Track	8	8
Tracks/Cylinder	1	2
Data Bytes/Diskette	303,104	1,212,416

The data transfer rate for the Diskette 1 drive is 31.2KB/sec; for Diskette 2D drive it is 62.5KB/sec (using Diskette 2D); and for the Diskette Magazine drive it is 125.0KB/sec (using Diskette 2D).

"Read or Write" of diskettes is overlapped with processing and other device functions except disk storage data transfer. All diskette seek operations are overlapped with processing and I/O devices.

Disk Storage: The 5340 System Unit can contain one of seven disk storage capacities. The disk storage is physically non-removable, high speed, direct access media, and the primary processing file in the system. Programs and data are stored on the disk for processing. Data can be stored off-line for security or backup purposes by first copying the data from disk storage to either of the two diskette media. The System/34 with the Diskette 1 drive, the Diskette 2D drive, or the Diskette Magazine drive, plus a multiprogramming capability provide flexible combinations to optimize diskette functions with system disk storage. Disk storage capacities available to the users may be reduced by the installation of optional features.

Disk Storage Specifications:

	8.6MB	13.2MB	27.1MB	63.9MB
Bytes/Sector	256	256	256	256
Bytes/Cylinder	46,080	46,080	46,080	180,224
Disk Spindles	1	1	2	1
Cylinders	187	288	589.33	354.5
Capacity *	8,616,960	13,271,040	27,156,480	63,905,792
Access Time (ms)				
Cyl-to-Cyl	10	10	10	9
Average **	33	38	38	27
Maximum	55	70	70	46
	(201 cyl/ spindle)	(302 cyl/ spindle)	(302 cyl/ spindle)	(359 cyl/ spindle)
Rotational Speed (rpm)	2,964	2,964	2,964	3,125
Data Transfer Rate (MB/sec)	.889	.889	.889	1.031

	128.4MB	192.9MB	257.4MB
Bytes/Sector	256	256	256
Bytes/Cylinder	180,224	180,224	180,224
Disk Spindles	2	3	4
Cylinders	712.5	1,070.5	1,428.5
Capacity *	128,425,984	192,946,176	257,466,368
Access Time (ms)			
Cyl-to-Cyl	9	9	9
Average **	27	27	27
Maximum	46	46	46
	(359 cyl/ spindle)	(359 cyl/ spindle)	(359 cyl/ spindle)
Rotational Speed (rpm)	3,125	3,125	3,125
Data Transfer Rate (MB/sec)	1.031	1.031	1.031

* These capacities (available to the user) may be reduced by installation of optional features. See "Limitations" under optional feature MLCA (#4500), and Workstation Control Expansion C (#4902).

** Average of all possible disk accesses.

System Console: A system console is not a component of the 5340 System Unit. The system console may be a 5251 Display Station, mdl 1, 11, or 999 a 5252 Dual Display Station, a 5291 Display Station, or a 5292 Color Display Station which is physically attached to the System Unit similar to other locally attached workstation devices. When using the 5291 or 5292 as the system console, the System/34 must be at SSP Release 7 or higher and Diagnostic Release Level 9.2 or higher. For system operation and service reasons, the console is required to be located within 6 meters (20 feet) of the System Unit. Its primary use is to facilitate operator control of the system via operator commands and to allow the operator to respond to system messages presented on the display. It may also be used as a data entry/inquiry workstation, interacting with a user application. The mode of operation is easily switched from workstation mode to console mode for servicing system requests.

Customer Responsibilities: The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information see M2700 pages.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to processing Order Confirmation.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9902** for 208V or **#9904** for 230V.
- Color: Pearl white only (no specify code required).
- Communications Cable (with #2500, #3500): Required for attaching System/34 to the communications facility regardless of whether an IBM integrated modem, an external modem, or DDSA is used. Specify **#9460** for a 6 meter (20 foot) cable or **#9461** for a 12 meter (40 foot) cable. Specify this cable only once per system. If two Communications Adapters are installed, the cable length will be the same on both.

  The communications cable for MLCA (#4500) will be 12 meters (40 feet) for each line. No specify for cable length is required nor can one be made. The cable for the 4800 bps Integrated Modem with Auto-Answer and Integrated Protective Coupler (#536X) will be 5.5 meters (18 feet).
- Twinaxial Cable: A 6 meter (20 foot) twinaxial cable is included with the system unit for the system console [5251 mdl 1, 11, or 999, 5252, 5291, or 5292]. A 6 meter (20 foot) cable is also included if a 5224, 5225 or 5256 Printer is used as the system printer . See M5251, 5252, 5291, 5292, 5224, 5225, and 5256 pages for additional workstation cable order information.
- System Printer: Specify **#9301** if 5211 mdl 1 is attached; **#9302** if 5211 mdl 2 is attached; **#9303** if 3262 mdl B1 is attached; **#9306** or if a 5256 is the system printer (no 5211 or 3262); **#9308** if a 5224 is the system printer, or **#9307** if a #5225 is the system printer (no 5211 or 3262).
- Up-Ending Kit: (**#9845**) enables the 5340 to be up-ended for installation or moving purposes. This kit is furnished only as necessary and remains the property of IBM.

Notes:

1. I/O Unit Attachments: Appropriate special features are required to attach some I/O units. See "Special Features".
2. System Support Licensed Program (5726-SS1): Should be ordered at equipment order entry time. See System Support Program (5726-SS1) for additional information.
3. Refer to *IBM System/34 Installation Manual - Physical Planning* (GA21-9242) for physical installation requirements.

SPECIAL FEATURES

Non-Communications Features

1255 Attachment (#1100): Required to attach 1255 Magnetic Character Reader mdls 1, 2, or 3. **Limitations:** The 1255 attachment cannot operate with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. therefore, only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Processor Unit Expansion A and/or E may be required on certain mdls. See "Processor Unit Expansion

5340 System Unit (cont'd)

Feature Configurator" and *IBM System/34 Installation Manual - Physical Planning* (GA21-9242) for cabling information.

1255 Attachment Expansion (#1105): Required when using the System/34 Assembler Macros to provide 1255 stacker logic programs. This feature provides an additional 28K of user programmable storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1100.

5211/3262 Base Printer Attachment (#1110): Required when attaching either the 3262 or the 5211 Printer. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4655): Replaces on/off power switch to protect against unauthorized use. See "Accessories" for information concerning additional keys. **Maximum:** One. **Field Installation:** Yes.

Internal Clock (#4703): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem on either Communications Adapter (#2500 or #3500). Clocking speeds available with this feature are 600 bps and 1200 bps. Selection of full or half-speed is indicated via a system utility program. When this feature is installed on System/34, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. See IBM, for determination of the feature's requirement with planned modems. **Maximum:** One per system; will handle either or both lines. **Field Installation:** Yes. **Prerequisites:** Communications Adapter (#2500 or #3500), Interface (#3701 or #3702) or 1200 bps Integrated Modem (#5500, #5501, #6500, or #6501).

Workstation Control Expansion A (#4900): Required if Magnetic Stripe Reader (#4910) is installed on any 5251 or 5252 that is locally attached to the 5340. Also required when using the 3270 Device Emulation Licensed Program (5726-EM1). **Limitations:** May not be installed with Workstation Control Expansion B (#4901). **Maximum:** One. **Field Installation:** Yes.

Workstation Control Expansion B (#4901): Required when attaching nine to sixteen 5250 workstations and/or printers locally to the 5340 System Unit. This feature also contains the control necessary if Magnetic Stripe Readers (#4910) are installed on any 5251 or 5252 that is locally attached to the 5340. Also required when using the 3270 Device Emulation Licensed Program (5726-EM1). **Limitations:** May not be installed with Workstation Control Expansion A (#4900). **Maximum:** One. **Field Installation:** Yes.

Multinational Control (#4905): Required if Multinational Character Set (#4905) is installed on any 5251 or 5252 attached to the 5340 or if #9470 is installed on any 5224, 5225 or 5256. **Maximum:** One. **Field Installation:** Not recommended for field installation.

Internal Clock (#5321): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem used with any of the Line Base Adapters on the Multiline Communications Adapter (#4500). Clocking speeds available with this feature are 600 and 1200 bps. Selection of full or half-speed and the appropriate line is indicated via a system utility program. When this feature is installed on System/34, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. See IBM, for determination of the feature's requirement with planned modems. **Maximum:** One per system; will handle one to four lines. **Field Installation** Yes. **Prerequisites:** #4500 and EIA Interface or 1200 bps Integrated Modem for the MLCA.

Processor Unit Expansion A (#5732): This is a feature I/O board required for 1255 Attachment (#1100). Not required on XX3 (27.1MB) mdls. **Limitations:** See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion B (#5733): Additional power for communications. Required for 2400 bps Integrated Modem (#5600, #6600, #5601, #6601, #5602, #6602, #5610, #6610). Not required on XX4, XX5, XX6 and XX7 mdls. **Limitations:** See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion C (#5734): I/O modem regulator required for Interface (#3701 or #3702), or 1200 bps Integrated Modem, (#5500, #5501, #6500, #6501). Not required on XX4, XX5, XX6, and XX7 mdls. Not required if Processor Unit Expansion B (#5733) is already installed. **Limitations:** Not used with the MLCA (#4500). See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion D (#5735): Gate Assembly required for 2400 bps Integrated Modem (#5600, #6600, #5601, #6601, #5602, #6602, #5610, #6610). See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion E (#5736): Additional power required for 1255 Attachment (#1100) on certain mdls. See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field installation:** Yes.

Processor Unit Expansion Feature Configurator:

	5340 Mdls				
			X14		
			X15		
			X24		
			X25		
	X11		X34		
	X12		X35		
	X21	X13	X36	X31	
	X22	X23	X37	X32	X33
Attachments					
#1255	A	-	A, E	A, E	E
EIA/1200 IM *	C **	C **	-	C **	C **
2400 IM *	B, D	B, D	D	B, D	B, D

* These IM (Integrated Modem) features apply only to the First or Second Communications Adapter (#2500 or #3500).

** C is not required if both B and 2400 IM are installed.

Notes: Processor Unit Expansion Features required for communications features (EIA Interface or Integrated Modems) are required only once per system regardless of whether one or two Communications Adapters (#2500 or #3500) are installed. If 2400 bps Integrated Modem is installed on either Communication Adapter (#2500, #3500), order Processor Unit Expansion Feature B and D. If 2400 bps Integrated Modem is not installed on either Communications Adapter, order Processor Unit Expansion C for EIA or 1200 bps Integrated Modem. No Processor Unit Expansion Feature is required if DDSA is installed on both Communications Adapters.

5211 Printer Attachment (#5811): Required to attach a 5211 Printer mdl 1 or 2. A translation capability provides for use of translation tables for substituting characters when the characters to be printed are not contained on the print belt. **Limitations:** Cannot be installed with 3262 Printer Attachment (#5815). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "System Printer" in "Specify" above. 5211/3262 Base Printer Attachment (#1110).

3262 Printer Attachment (#5815): Required to attach a 3262 mdl B1 Printer. A translation capability provides for use of translation tables for substituting characters when the characters to be printed are not contained on the print belt. **Limitations:** Cannot be installed with 5211 Printer Attachment (#5811). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "System Printer" in "Specify" above. 5211/3262 Base Printer Attachment (#1110).

Communications Features

Communications Adapters - General: System/34 can attach up to four communications lines depending upon the adapters selected. Three separate adapters are available. The First and Second Communications Adapters (#2500 and #3500) allow one line each to be attached to the system. When these adapters are used, a total of two communications lines can be attached. The Multiline Communications Adapter (MLCA - #4500) can provide for attachment of from one to four communications lines but is mutually exclusive with the First and Second Communications Adapters. The MLCA has up to four Line Base Adapters, each allowing attachment of one line.

Below is a discussion of the communications hardware support: (1) common to both BSC and SDLC, (2) specific to BSC support, and (3) specific to SDLC support.

1. Support Common to Both BSC and SDLC:

   Communications Adapters #2500 and #3500 will allow System/34 to communicate on a nonswitched point-to-point or multipoint line at speeds up to 9600 bps and on a switched point-to-point line at speeds up to 4800 bps. Each adapter operates independently under program control; however, the maximum aggregate bit rate for adapters #2500 and #3500 operating concurrently is 9600 bps. The maximum aggregate bit rate for all lines for adapter #4500 is 65,600 bps. When one line operates at 19,200, 48,000, 50,000, or 56,000 bps, the remaining lines are restricted to a total aggregate rate of 9600 bps. See M2700 pages for information on communication facilities.

   The System/34 operates as a control station on a multipoint line for the 5251 mdl 2 or 12, 3601, 3694, 4701, System/36, and another System/34, all under SDLC. If the other device on a multipoint line is a control station, the System/34 operates as a tributary station for BSC or a secondary station for SDLC. Otherwise, communication with other devices must be on a point-to-point line only.

   Each communications adapter will operate in half-duplex mode over dial (switched network) facilities, and half-duplex mode over nonswitched (or equivalent private) communications lines which may be duplex or half-duplex facilities. Operation of each feature will be overlapped at all transmission rates with processing and/or I/O device operations. See tables below. Units at each termination, or drop point, of a communications line to which the System/34 is attached must use the same clocking source (modem

5340 System Unit (cont'd)

or business machine) and must be set to operate at the same transmission rate and to use the same transmission code. Compatible modems must be used at all terminations on a network and must use the same mode of attachment (2- or 4-wire). Switched network versions include, as a basic capability, support of Manual Dial and Manual or Auto-Answer (where the attached modem supports this capability) operations.

2. Support Specific to BSC Operations:

   The communication adapter allows operation in BSC mode as requested by the executing program.

   See the System/34 programming pages for a description of the program support provided for this feature. ASCII, EBCDIC, or EBCDIC Text Transparency are standard. ASCII or EBCDIC transmission codes are selected at program compilation time. In conjunction with stored program control, this feature permits System/34 to function on a switched or nonswitched communications line as a processor/terminal communicating in binary synchronous mode with:

   - A Series/1 equipped with BSCA (#2074, #2075, #2093, or #2094) (as a System/3).
   - A System/3 equipped with #2074, #2084, or #2094.
   - A System/7 equipped with BSCA (#2074) (as a System/3).
   - A System/32 equipped with #2074.
   - Another System/34 equipped with #2500, #3500, or #4500.
   - A System/36 equipped with #2500 or #4500.
   - A System/38 with appropriately configured BSC adapter and subfeatures, (point-to-point only).
   - An S/360 mdl 20 equipped with #2074.
   - An S/370 via an Integrated Communications Adapter, a 4331 Communications Adapter, a 2701 Data Adapter Unit, a 2703 Transmission Control Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
   - A 3741 Data Station mdl 2 or 3741 Programmable Workstation mdl 4.
   - A 3747 Data Converter equipped with Communications Adapter (#1660).
   - A 5110 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
   - A 5231 mdl 2 equipped with BSCA (#2074) (as a 3741 mdl 2 or 4 in transmit mode only).
   - A 5265 communicating mdl (point-to-point, batch transmission only).
   - A 5280 Distributed Data System equipped with #2500.

3. Support Specific to SDLC Operations:

   The communications adapter allows operation in SDLC mode as requested by the executing program. The System/34 provides SDLC communications support for multipoint line control when the 5251 mdl 2 or 12 Display Stations, 3601 Finance Communications Controller, 3694 Document Processor, 4700 Finance Communications System, System/36, or another System/34 are attached to the communications adapter. In conjunction with stored program control, this feature provides communications capability with 4331 Communications Adapter or a S/370, 303X, or 4300 via a 3704 or 3705 Communications Controller equipped with appropriate features. See M3704, 3705, or 4331 pages. Switched network backup and speed select modem features are not supported under program control when communicating with 5251 mdl 2, 12. See the System/34 programming pages for a description of the program support provided on System/34 for SNA/SDLC operations. ASCII support for 5251 mdl 2 or 12 is by RPQ only.

First Communications Adapter - BSC/SDLC (#2500): Required to attach a communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits System/34 to function on a switched, nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is loaded into the control processor at program execution time. The communications adapters (#2500 and #3500) operate at speeds up to 9600 bps on a nonswitched point-to-point or multipoint common carrier facility or equivalent privately owned communication facility and up to 4800 bps on a switched point-to-point facility. However, the aggregate bit rate when both adapters (#2500 and #3500) are operating concurrently is 9,600 bps. **Limitations:** Cannot be installed with Multiline Communications Adapter (#4500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). The 1255 attachment cannot operate concurrently with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. Therefore only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One of the Integrated Modems, EIA Interface, or DDSA for this adapter. See "Specify" for required modem cable and attachment codes.

Second Communications Adapter - BSC/SDLC (#3500): Required to attach a second communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits System/34 to function on a switched, nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is loaded into the control processor at program execution time. The Communications Adapter features (#2500 and #3500) operate at speeds up to 9600 bps on a nonswitched point-to-point or multipoint common carrier facility or equivalent privately owned communication facility and up to 4800 bps on a switched point-to-point facility. However, the aggregate bit rate when both adapters (#2500 and #3500) are operating concurrently is 9600 bps. The Second Communications Adapter (#3500) may be physically attached to System/34 which also has the 1255 Attachment (#1100), but these two attachments (#1100 and #3500) cannot operate concurrently. **Limitations:** Cannot be installed with Multiline Communications Adapter (#4500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). The 1255 attachment cannot operate concurrently with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. Therefore only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, one of the Integrated Modems, EIA Interface, or DDSA for this adapter. See "Specify" for required modem cable and attachment codes.

EIA Interface (#3701): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500, #5501), or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610), or DDSA (#5650, #5651). Maximum speed is 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 and may require #5734. See "Processor Unit Expansion Feature Configurator". **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. See "Modem/Interface Feature Configurator".

EIA Interface (#3702): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#6500, #6501) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610) or DDSA (#5652, #5653). Maximum speed is 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and may require #5734. See "Processor Unit Expansion Feature Configurator". **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. See "Modem/Interface Feature Configurator".

IBM Data Encryption Device (#3845, #3846): A 3845 or 3846 Data Encryption Device may be attached between the System/34 communications adapter and the external modem. **Limitations:** The 3845 or 3846 device operating with SDLC will not operate with NRZI transmission mode. **Prerequisites:** #3701, #3702, or #531X. **Note:** Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability.

Multiline Communications Adapter - MLCA (#4500): Four communications lines can be attached to System/34 using the MLCA. The MLCA is a microprocessor that operates in parallel with the main storage processor and other microprocessors in the system. Each communications line provides either BSC or SDLC protocol. The proper line protocol is loaded into the control processor at program execution time. This feature permits, in conjunction with stored program control, System/34 to function on a switched, nonswitched public or private communications line. Each communications line operates independently up to 9600 bps concurrently with the other lines. One line may operate at high-speed (above 9600 bps) independent of the other lines. However, the aggregate rate of the remaining lines must not exceed 9600 bps and the aggregate rate of all four lines must not exceed 65,600 bps. For BSC multipoint tributary operation, an auto-monitoring function is provided that allows the line to be monitored without a main storage program being required. In this mode, a negative response is sent to all polls and selects received from the host. For BSC processing to become active in main storage the operator must activate BSC data management. An SDLC auto-response mode is implemented in MLCA for secondary SDLC. The MLCA will handle some redundant supervisory responses, thus eliminating the need to always utilize the SDLC task is main storage for nonproductive activity. The MLCA in a primary SDLC environment off-loads from the main storage processor, the majority of the work required for nonproductive polling. In either case, an SNA/SDLC task must be active in main storage. The Multiline Communications Adapter (#4500) may be installed in place of the First and Second Communications Adapters (#2500 and #3500) providing for up to four communications lines. The maximum aggregate bit rate when all four lines of the MLCA are operating concurrently is 65,600 bps. One line may operate at 19,200, 50,000, or 56,000 bps, but the remaining lines must not exceed a total aggregate bit rate of 9600 bps. **Limitations:** When installed will reduce the disk storage available to the user by 80,640 bytes. Cannot be installed with First or Second

5340 System Unit (cont'd)

Communications Adapter (#2500 or #3500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Specify" for mandatory attachment codes. A Line Base Adapter must be configured for each line. **Note:** The units position of features #53XX and #54XX corresponds to the line number position; e.g., #5301 refers to the Line Base Adapter for line 1.

Line Base Adapter (#5301, #5302, #5303, #5304): Required for attachment of communication lines to the MLCA. Each line is independent of the others and may be ordered in any sequence. However, it is recommended that lines be ordered and installed in sequence. **Limitations:** See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #4500 and an Integrated Modem, DDS Adapter, Wideband Adapter, Auto-Call Adapter, or EIA Interface.

EIA Interface (#5311, #5312, #5313, #5314): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with an Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. Maximum speed is 9600 bps. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total). **Field Installation:** Yes. **Prerequisites:** The Line Base Adapter corresponding to line using the EIA Interface. This feature may also require Internal Clock (#5321) if the external modem does not provide its own 1200 bps clocking.

1200 bps Integrated Modem (#5331, #5332, #5333, #5334, #5341, #5342, #5343, #5344): A modem integrated into the system for SDLC or BSC data transmission at 1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is indicated via system utility program. It is available in two different versions: #533X for nonswitched and #534X for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002. Attachment to the switched facilities is via an IBM-provided cable or to an FCC registered protective circuitry provided by the user. **Limitations:** Cannot be installed with EIA Interface, Analog Wideband Adapter, Auto-Call Adapter, another integrated modem, or DDS Adapter on the same Line Base Adapter. #533X and #534X cannot be installed together on the same Line Base Adapter. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total). **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the 1200 bps Integrated Modem and #5321. **Note:** The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem using the same 2-wire or 4-wire mode of attachment to the line.

4800 bps Integrated Modem (#5351, #5352, #5353, #5354, #5361, #5362, #5363, #5364): A modem integrated into the system for SDLC or BSC data transmission at 4800 bps over nonswitched facilities or switched network. Half-speed operation at 2400 bps is possible via a systems utility program. Configuration options such as "local speed control" or "remote speed control" are performed by Field Engineering at install time. For additional information on configuration options refer to M3864 pages. The 4800 bps modem is available in two different versions: #535X for nonswitched and #536X for switched with auto-answer and Integrated Protective Coupler (contingent upon FCC registration). Attachment to nonswitched (4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is directly to the line for the Integrated Protective Coupler . The 4800 bps Integrated Modem is equivalent to and compatible with the 3864 Modem. The device communicating with the System/34 must also be equipped with a 3864 compatible integrated 4800 bps modem or a stand-alone 3864 using the same 2- or 4-wire mode of attachment to the line. For additional information on the 3864, refer to *IBM 3863, 3864, 3865 Introduction and Site Preparation Guide* (GA27-3200).

Communications Facilities - Nonswitched Lines: Nonswitched modems attach to a 4-wire voiceband line, type 3002 (or equivalent). Special conditioning is not necessary. Attachment to the line is by a cable that is terminated with a 4-prong plug (WE 283B or equivalent). A 12 meter (40 foot) cable is furnished. The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount, or equivalent) which is connected to the line. The receptacle is a conventional item of communications equipment and is, upon customer request, ordinarily furnished by the telecommunications service supplier. Communications Facilities - Switched Lines: Switched modems attach to a 2-wire voiceband line. Attachment to the line is by a cable that is terminated with an 8-pin mini plug (USOC 45A or 41S). A 5.5 meter (18 foot) cable is furnished. The mini plug mates with a programmed data jack that is provided by the telecommunications service supplier.

Limitations: Cannot be installed with EIA Interface, 1200 bps Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. See "MLCA Feature Configurator" for possible combination of features. **Maximum:** One per Line Base Adapter; two per MLCA. **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the 4800 bps Integrated Modem.

Digital Data Service (DDS) Adapter (#5391, #5392, #5393, #5394): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, and 56,000 bps over the AT&T nonswitched Data-Phone® digital service network. The DDS Adapter interfaces to a channel service unit (not a Data Service Unit), the customer site termination of the DDS network. **Note:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with an Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or EIA Interface on the same Line Base Adapter. When a DDS Adapter is operating at 56,000 bps, the other lines cannot exceed an aggregate rate of 9600 bps. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total) **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the DDS Adapter.

Analog Wideband Adapter (#5401, #5402, #5403, #5404): Provides a cable and interface for attachment of a WE 303 type modem or equivalent operating at 19,200 bps or 50,000 bps. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with an Integrated Modem, EIA Interface, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. Other lines cannot exceed an aggregate speed of 9600 bps when operating in conjunction with the Analog Wideband Adapter. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per MLCA. **Field Installation:** Yes. **Prerequisites:** The Line Base Adapter corresponding to line using the Analog Wideband Adapter.

Auto-Call Adapter (#5411, #5412, #5413, #5414): Permits the System/34 when attached to a switched network facility via an appropriate external modem and Auto-Call unit, (meeting EIA Standard RS-366) to initiate a data link connection to a remote device. Provides automatic dialing under program control. An Auto-Call Adapter (#541X) must always be installed in conjunction with an Interface (#531X) on another line , thus utilizing two line positions on the MLCA. Therefore, the use of auto-call will reduce the total number of lines available. **Limitations:** Cannot be installed with an EIA Interface, Integrated Modem, Analog Wideband Adapter, or DDS Adapter on the same Line Base Adapter as the Auto-Call feature. See "Multiline Communications Adapter Configurator" for possible combination of features. **Maximum:** One per Line Base Adapter, two per MLCA. **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the Auto-Call Adapter.

1200 bps Integrated Modem (#5500, #5501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program. Available in two different versions: #5500 for nonswitched or #5501 for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user . The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed with Interface (#3701) or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610), or DDSA (#5650, #5651). #5500 and #5501 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #4703, and may require #5734. See "Processor Unit Expansion Feature Configurator" and "Modem/Interface Feature Configurator".

2400 bps Integrated Modem (#5600, #5601, #5602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 Modems. Available in three different versions: #5600 for nonswitched, point-to-point, #5601 for nonswitched, multipoint control and #5602 for nonswitched, multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is directly to the line, type 3200 via an IBM-provided cable. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3701) or another Integrated Modem (#5500, #5501, #5610), or DDSA (#5650, #5651). #5600, #5601, and #5602, or #5610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #5733 and/or #5735. See "Processor Unit Feature Expansion Configurator" and "Modem/Interface Feature Configurator".

5340 System Unit (cont'd)

2400 bps Integrated Modem (#5610): A modem for SDLC or BSC data transmission at 2400 bps over a switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 Modems. Half-speed operation at 1200 bps is indicated via a system utility program. Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user, type CBS or equivalent. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3701) or another Integrated Modem #5500, #5501, #5600, #5601, #5602), or DDSA (#5650, #6551). **Maximum:** One. **Note:** This feature is not compatible with the 2400 bps Integrated Modem available on the 5251. **Field Installation:** Yes. **Prerequisites:** #2500, #5733 and/or #5735. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator". (

Digital Data Service (DDS) Adapter (#5650, #5651): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Data-Phone® digital service network. The DDSA interfaces to a DDS channel service unit (not a Data Service Unit), the customer site termination of the DDS network. Available at three speeds: 2400, 4800, or 9600 bps. For point-to-point or multipoint control (#5650), for multipoint tributary (#5651). **Notes:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with EIA interface (#3701) or 1200 bps Integrated Modem (#5500, #5501) or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500.

Digital Data Service (DDS) Adapter (#5652, #5653): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800,or 9600 bps over the AT&T nonswitched Data-Phone® digital service network. The DDSA interfaces to a DDS channel service unit (not a Data Service Unit), the customer site termination of the DDS network. Available at three speeds: 2400, 4800, or 9600 bps. For point-to-point or multipoint control (#5652), for multipoint tributary (#5653). **Note:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with EIA Interface (#3702) or 1200 bps Integrated Modem (#6500, #6501) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500.

1200 bps Integrated Modem (#6500, #6501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program. Available in two different versions: #6500 for nonswitched, #6501 for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user type CBS or equivalent. . The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed with Interface (#3702) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610), or DDSA (#5652, #5653). #6500 and #6501 cannot be installed together. **Maximum:** One. **Prerequisites:** #3500, #4703, and may require #5734. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator".

2400 bps Integrated Modem (#6600, #6601, #6602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 Modems. Available in three different versions: #6600 for nonswitched, point-to-point, #6601 for nonswitched multipoint control, and #6602 for nonswitched multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is directly to the line, type 3002 via an IBM-provided cable. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3702) or another Integrated Modem (#6500, #6501, #6610), or DDSA (#5652, #5653). #6600, #6601, #6602, and #6610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6500, #5733 and/or #5735. See "Processor Unit Expansion Feature Configurator".

2400 bps Integrated Modem (#6610): A modem for SDLC or BSC data transmission at 2400 bps over a switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 Modems. Half-speed operation at 1200 bps is indicated via a system utility program. Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user type CBS. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3702) or another Integrated Modem (#6500, #6501, #6600, #6601, #6602). **Note:** This feature is not compatible with the 2400 bps Integrated Modem available on the 5251. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500, #5733 and/or #5735. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator".

Switched Network Backup (SNBU) (#7951): Provided for backup attachment of System/34 to the public switched network when the 2400 bps Integrated Modem (#5600, #5601, #5602) is used on a nonswitched line as the prime facility. It can communicate with a compatible 2400 bps Integrated Modem or a 3872 Modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator invoked system utility program. Attachment to the switched network is made via an FCC registered protective circuitry provided by the user type CDT or equivalent. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *IBM 3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with Switched Network Backup with Auto-Answer (#7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 and #5600, #5601, or #5602, and appropriate Processor Unit Expansion Features for 2400 bps Integrated Modem.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to an FCC registered protective circuitry provided by the user of the CBS type (or equivalent). Selection of the prime or backup facility is via an operator invoked system utility program. Operation intervention, program modification, or both may be required on the using system or terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of Switched Network Backup. For additional information see the *IBM 3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup (#7951). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #5600, #5601, or #5602, and appropriate Processor Unit Expansion Features for 2400 bps Integrated Modem.

Switched Network Backup (SNBU) (#7953): Provided for backup attachment of System/34 to the public switched network when the 2400 bps Integrated Modem (#6600, #6601, #6602) is used on a nonswitched line as the prime facility. It can communicate with a compatible 2400 bps Integrated Modem or a 3872 Modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator invoked system utility program. Attachment to the switched network is made via an FCC registered protective circuitry provided by the user type CDT or equivalent. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *IBM 3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup with Auto-Answer (#7954). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and #6600, #6601, or #6602.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7954): Same as Switched Network Backup (#7953) plus the added capability of automatically answering incoming calls when attached to an FCC registered protective circuitry provided by the user type CDT or equivalent. Selection of the prime or backup facility is via operator invoked system utility program. Operation intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information see the *3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup (#7953). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and #6600, #6601, or #6602.

IBM Modems: One IBM Modem can be attached to each Communications Adapter. **Prerequisites:** Communications Adapter (#2500, #3500); Interface (#3701, #3702), Processor Unit Expansion (#5734) or Multiline Communications Adapter (#4500), Line Base Adapter (#5301, #5302, #5303, #5304), and Interface (#5311, #5312, #5313, #5314).

5340 System Unit (cont'd)

Modem	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3863 mdl 2	4800
3865	9600
3868 mdl 3,4	9600
3872	2400/1200

Note: For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages. To verify the proper integrated or external modem interface configuration to #2500 and #3500, refer to "Modem/Interface Feature Configurator" below. Select one of the categories and follow across for the required and optional special features. To verify the proper integrated or external modem interface configuration to #4500, refer to "Multiline Communications Adapter Configurator" below.

Modem/Interface Feature Configurator: (#2500 or #3500) only.

Modem/ Interface	Internal Clock (#4703)	Processor Unit Expansion (1) B (#5733)	C (#5734)	D (#5735)	SNBU, SNBU/AA (#7951, #7952, #7953, #7954)
EIA Interface (#3701, #3702)	Optional	-	Required (2)	-	-
1200 bps Integrated Modem:					
Nonswitched (#5500, #6500)	Required	-	Required (2)	-	-
Switched with Auto-Answer (#5501, #6501)	Required	-	Required (2)	-	-
2400 bps Integrated Modem:					
Nonswitched Point-to-Point (#5600, #6600)	-	Required (3)	-	Required	Optional
Nonswitched Multipoint Tributary (#5602, #6602)	-	Required (3)	-	Required	Optional
Switched Network with Auto-Answer (#5610, #6610)	-	Required (3)	-	Required	-
Nonswitched Multipoint Control (#5601, #6601)	-	Required (3)	-	Required	Optional

Notes:

(1) See "Processor Unit Expansion Feature Configurator".

(2) Not required if Processor Unit Expansion B (#5733) and 2400 IM are installed. Not required on XX4, XX5, XX6, and XX7 mdls.

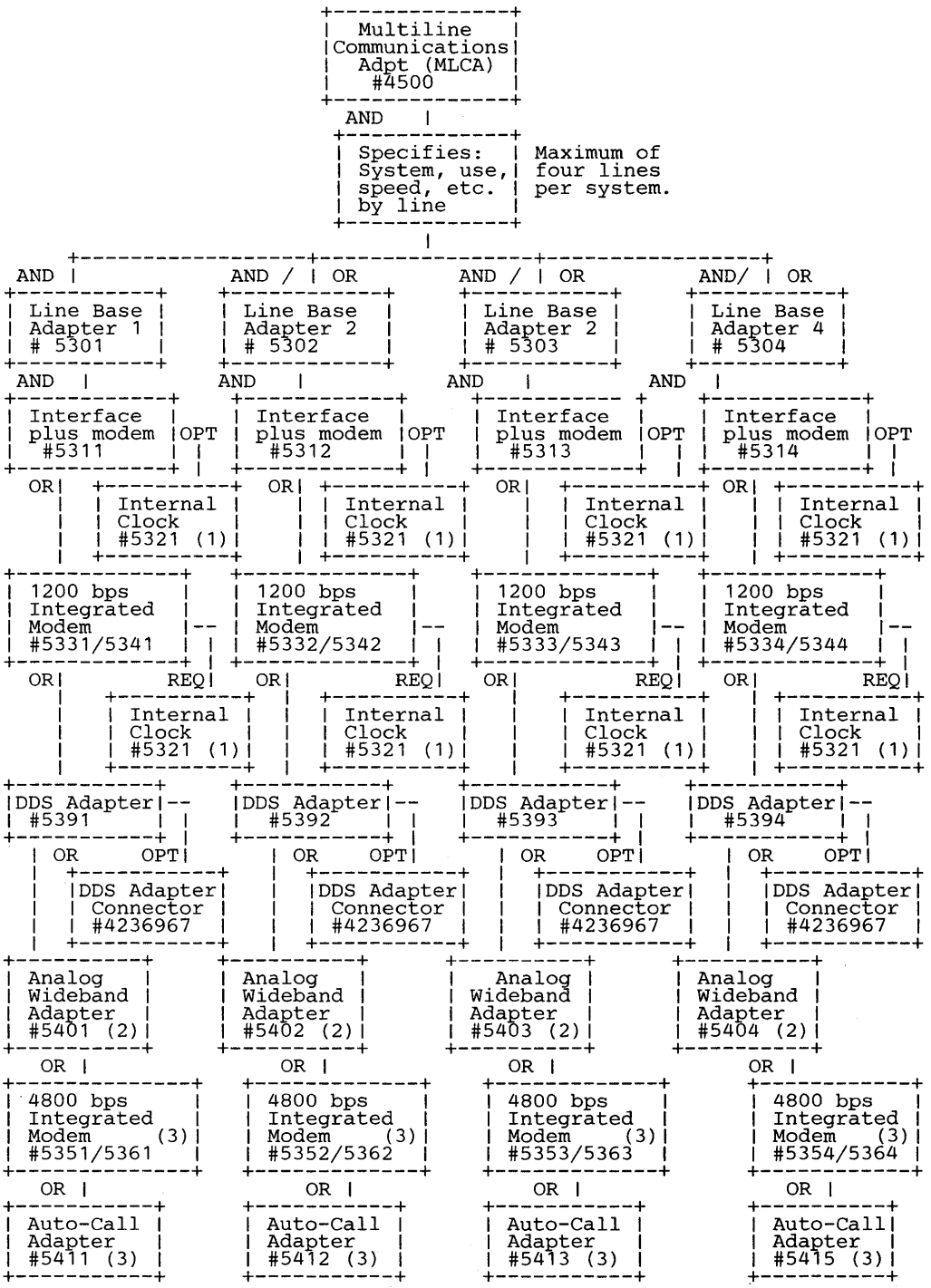
n(3) Not required on XX4, XX5, XX6, and XX7 mdls.

Adapter/Facility Specify Codes For Communications: One selection must be specified from each of the following four categories for each Adapter/Line:

	Line	1 #2500 or (#4500)	2 #3500 or (#4500)	3 (#4500)	4 (#4500)
A	**Transfer Rate (bps):**				
	600	#9001	#9401	#9501	#9601
	1200	#9002	#9402	#9502	#9602
	2000	#9003	#9403	#9503	#9603
	2400	#9004	#9404	#9504	#9604
	4800	#9005	#9405	#9505	#9605
	7200/3600	#9006	#9406	#9506	#9606
	9600	#9007	#9407	#9507	#9607
	High-Speed (above 9600)	#9008	#9408	#9508	#9608
B	**Network Attachment:**				
	Point-to-Point (nonswitched)	#9101	#9102	#9103	#9104
	Point-to-Point (switched)	#9111	#9112	#9113	#9114
	Multipoint Tributary	#9121	#9122	#9123	#9124
	Multipoint Control	#9131	#9132	#9133	#9134
	Local Attach via DDSA	#9141	#9142	#9143	#9144
C	**Line Facility:**				
	Duplex (4-wire)	#9311	#9411	#9511	#9611
	Half-Duplex (2-wire)	#9310	#9410	#9510	#9610
D	**Primary Line Control:**				
	BSC	#9201	#9202	#9203	#9204
	SDLC	#9211	#9212	#9213	#9214

5340 System Unit (cont'd)

Multiline Communications Adapter (#4500) Configurator:



Notes:

(1) Total of one per system, one will handle any or all lines.

(2) One only per system.

(3) Two only per system.

5340 System Unit (cont'd)

System Utility Support: A system utility program is used for the selection of certain data communications characteristics such as: full-speed or half-speed, internal or external modem clocking, line type, station address, etc. See the *System/34 System Support Reference Manual* (SC21-5155) for a complete description of $SETCF utility.

References: See the appropriate host system programming pages for possible restrictions.

See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

Refer to *System/34 Installation Manual - Physical Planning* (GA21-9242) for physical installation requirements.

Replaced Parts: Replaced parts from any special feature installation or removal remain the property of the customer.

MODEL CONVERSIONS

All conversions may be field installed.

Any model upgrade that involves a disk storage capacity change may require replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customer should carefully evaluate his future requirements when purchasing a system.

Replaced parts from any model conversion that includes a disk storage capacity change become the property of IBM.

Replaced parts from any model conversion which changes the diskette remain the property of the customer.

ACCESSORIES

Keys: The 5340 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to the original purchaser). Order , specifying P/N 2546418. A letter of authorization with key identification number must accompany each order. Allow six to eight weeks for delivery.

DDS Adapter Connector: A specially designed connector allows the cables from a System/34 DDS Adapter to be connected to another supported device with a DDS Adapter. This provides for the local connection of two devices without the use of any modems or channel service units. This is a purchase only item. Order , specifying P/N 4236967. Allow six to eight weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter (four per system total). **Field Installation:** Yes.

Cables: Required, see "Specify".

SUPPLIES

For Diskettes and Diskette Magazines see IBM.

5360 SYSTEM UNIT

PURPOSE

Contains main storage, disk storage, diskette drive, communications features, logical processing circuits and control for I/O units on System/36.

MODELS

Model	Main Storage*	Diskette Drive	Disk Storage**
A11	128K	Single	30MB
A21	128K	Magazine	30MB
A12	128K	Single	60MB
A22	128K	Magazine	60MB
B13	256K	Single	200MB
B23	256K	Magazine	200MB
B14	256K	Single	400MB
B24	256K	Magazine	400MB

* Additional main storage (up to a maximum of 256K on AXX models and 512K on BXX models) is available as features.

** The actual capacity of the first disk on each system is reduced by 1.67MB. This area is required for microcode, service aids, error logs, and diagnostics, and is not available to the user.

Disk Storage	Actual Capacity	User Capacity
30MB	30.84MB	29.17MB
60MB	61.69MB	60.02MB
200MB	200.20MB	198.53MB
400MB	400.40MB	398.73MB

Standard Mdls: The 5360 mdls B23 and B24 have been designated as standard mdls for this machine type. The three standard 5360 B24 mdls are comprised of a "Base Configuration" plus one of the three configuration options. A standard 5360 mdl B24 is ordered by simply specifying the three standard mdl configuration options below.

Basic Configuration:

5360 B24 256K, Magazine, 400MB
#1006 Additional 256K Storage
#4900 Workstation Controller Expansion

Configuration Options:

1. #5830 3262 Printer Attachment
#9876 3262 is mdl B01 (Previously Attached to a System/34)
#4500 MLCA
#5301 Line Base Adapter
#9701 Line Position (Line-1) for #5301
#5301 Line Base Adapter
#9702 Line Position (Line-2) for #5301
#3701 EIA RS-232-C Adapter
#9711 Line Position (Line-1) for #3701
**#9111 Network Type (Line-1) Switched
**#9221 Line Speed (Line-1) 4800 bps
**#9014 Remote Device Type - Other IBM
#3701 EIA RS-232-C Adapter
#9712 Line Position (Line-2) for #3701
**#9112 Network Type (Line-2) Switched
**#9222 Line Speed (Line-2) 4800 bps

2. #4500 MLCA
#5301 Line Base Adapter
#9701 Line Position (Line-1) for #5301
#5301 Line Base Adapter
#9702 Line Position (Line-2) for #5301
#3701 EIA RS-232-C Adapter
#9711 Line Position (Line-1) for #3701
**#9111 Network Type (Line-1) Switched
**#9221 Line Speed (Line-1) 4800 bps
**#9014 Remote Device Type - Other IBM
#3701 EIA RS-232-C Adapter
#9712 Line Position (Line-2) for #3701
**#9112 Network Type (Line-2) Switched
**#9222 Line Speed (Line-2) 4800 bps

3. #5830 3262 Printer Attachment
#9876 3262 is mdl B01 (Previously Attached to a System/34)

**Included for record purposes only. On EIA, these can be altered using software procedure at installation time.

A standard 5360 mdl B23 can be ordered by specifying 5360 mdl B23 and selecting the standard mdl option. The base configuration for a mdl B23 is 256K, magazine, and 200MB. There are no additional features on this standard mdl configuration. **Note:** No accessories, special features (other than shown above), RPQs, or other alterations can be ordered or shipped with standard mdls.

Minimum System Configuration: A 5360 System Unit, a system console (5251 mdl 11, 5291, or 5292), and a printer (3262, 5224, 5225, or 5256). A system printer (not a 5219) must be identified to satisfy IBM maintenance requirements when using the System Support Program (5727-SS1).

Customer Setup: The 5360 is designated Customer Setup (CSU) and offers customers ease-of-setup and relocation flexibility. The Customer Setup Allowance is one day. One copy of *Setting Up Your Computer* (SA21-9430), is included with each 5360.

HIGHLIGHTS

- Multiple workstation system with multiprogramming capability provided by the System Support Licensed Program (5727-SS1).
- Extension of System/34 capabilities.
- Local and remote workstation devices (up to 30 Local, 64 Remote):

  Printers:
  5219 - D01, D02
  5224 - 001, 002
  5225 - 001, 002, 003, 004
  5256 - 001, 002, 003

  Displays:
  5150 Personal Computer
  5251 - 011
  5251 - 012 (remote only)
  5291 - 001
  5292 - 001
  5292 - 002

- Other I/O devices:

  1255 Magnetic Character Reader mdls 1,2,3 (available 2Q84)
  3262 Printer mdls B1, C1
  8809 Magnetic Tape Units mdls 1C, 2C (available 2Q84)

- Customer setup to offer earlier availability and relocation flexibility.
- Customer Problem Determination aids are provided to assist users in correcting problems or deciding who to call if service is required.
- High level of system availability
- Data error checking and correction for disk and main storage
- Fixed interval timer
- Storage protection
- Security keylock
- Communications: Communication lines may be attached to System/36 using either a Single Line Communications Adapter or a Multiline Communications Adapter.

  The Single Line Communications Adapter permits half-duplex operation at speeds from 600 bps to 9600 bps. The following interface adapters are available for use with the SLCA.

  - EIA RS-232-C
  - 1200 bps integrated modem (switched and nonswitched)
  - Digital Data Service Adapter
  - X.21 (nonswitched operation only)

  The Multiline Communications Adapter (MLCA) permits attachment of up to four communication lines, each of which is capable of half-duplex operation at speeds from 600 bps to 9600 bps. In addition, one line is capable of operating at speeds up to 57.6K bps in half-duplex mode, provided the aggregate of the remaining three lines does not exceed 9600 bps, or one line can operate at 50K bps in half-duplex mode and the remaining lines (up to three) at speeds up to 4800 bps each, or one line can operate at 19.2K bps and the remaining lines (up to three) at speeds up to 9600 bps each. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA. The following interface adapters are available for use with the MLCA. See the communications configurator for possible combinations of adapters.

  - EIA RS-232-C
  - V.35
  - Autocall
  - 1200 bps integrated modem (switched and nonswitched)
  - Digital Data Service
  - X.21 (switched and non-switched)

  Both communications adapters support Binary Synchronous Communications (BSC) and Synchronous Data Link Control (SDLC) protocols. In BSC mode, switched, nonswitched point-to-point and multipoint tributary operation is supported. ASCII, EBCDIC, or EBCDIC Text Transparency is standard and is program selectable by line. In SDLC mode, switched, nonswitched, and multipoint operation is supported. The System/36 can operate as either a

5360 System Unit (cont'd)

primary or a secondary station on a multipoint line. Refer to the M2700 pages for a description of attachment capability.

5360 System Unit Components

Processors: The 5360 has a multiple processor architecture. The main storage processor is an enhanced System/34 instruction processor with 128K, 256K, 384K, or 512K bytes of main storage. A control processor operates in parallel with the main storage processor, and provides microcoded control function for the I/O processors and interfaces. A file processor is added when 8809 Magnetic Tape Attachment (#7960) is installed. This processor will then manage the device-to-device data transfers between disk, diskette, and tape. Additional processors are included to control other I/O functions. The processors use LSI (Large Scale Integration) for the logic circuitry. Storage technology is MOSFET (Metal Oxide Semiconductor Field Effect Transistor). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. ECC (Error Correction Code) is maintained in main storage. Single-bit error correction and double-bit error detection is performed on every two bytes. Parity is added for all data transfers to and from main storage.

Workstation Controller: All displays and printers used as locally attached workstations connect to a controller in the 5360 System Unit via twinaxial cable connectors on the 5360. One cable connector must be dedicated to attachment of a display to be used as the system console. Up to five additional cables can be connected to the 5360 for attachment of additional workstations. Up to seven workstations may be attached to one cable via the Cable-Thru feature on displays and printers. The maximum aggregate length of twinaxial cable attached to one 5360 cable connector is 1,525 meters (5,000 feet). **Maximum:** A maximum of six [30 with Workstation Controller Expansion (#4900)] workstations, including the system console, may be locally attached via twinaxial cable to the 5360. See *Preparing a Place for Your Computer* (SA21-9444), for physical planning information.

Diskette Drive: Mdls X1X of the 5360 have a single diskette drive incorporated. Mdls X2X have a diskette magazine drive incorporated. Both drives can read and write either the Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format).

Diskette Specifications:

	Diskette 1	Diskette 2D
Data Tracks/Diskette	74	148 (74 Cylinders)
Capacity		
Basic Format		
Bytes/Sector	128	256
Sectors/Track	26	26
Tracks/Cylinder	1	2
Data Bytes/Diskette	246,272	985,088
Extended Format		
Bytes/Sector	512	1,024
Sectors/Track	8	8
Tracks/Cylinder	1	2
Data Bytes/Diskette	303,104	1,212,416

The reading, writing, and seek operations of diskettes are overlapped with processing and I/O device operations. The diskette magazine drive can process individual diskettes or magazines. A magazine holds up to ten operator accessible diskettes. The magazine drive can accommodate two magazines and three diskettes. The selection of diskettes within a magazine, and processing from the first magazine to the second, is under program control. The select cycle time (eject diskette, move to next diskette, load diskette) is approximately three seconds. In addition to the two magazines, the magazine drive contains three diskette slots which can be used for loading one to three diskettes. The data transfer rate for the single diskette drive is 62.5K B/sec (using Diskette 2D); and for the diskette magazine drive, it is 125.0K B/sec (using Diskette 2D).

Disk Storage: The 5360 can contain one of four disk storage capacities: 30MB, 60MB, 200MB, or 400MB. Disk storage is high-speed, direct access media and is not physically removable from the system. Programs and data are stored on the disk for processing. Data can be stored offline for security or backup purposes by copying the data to diskettes or magnetic tape.

Disk Storage Specifications:

	30/60MB	200/400MB
Bytes/Sector	256	2x256
Bytes/Cylinder	69,632	351,232
Blocks/Cylinder	27.2	137.2
Cylinders/Drive	443	570
Capacity/Drive(bytes)	30,845,440	200,202,240
Capacity/Two Drives (bytes)	61,690,880	400,404,480
Access Time (ms)		
Cyl-to-Cyl	*7	7
Average	**38	25
Maximum	**75	45
Rotational Speed (rpm)	3,151	2964
Instantaneous Data Rate (MB/sec)	1.25	1.50

Notes:
* Seven or less.
** Less than shown.

System Control Panel: The system control panel contains controls and indicators required for system operation. This panel combines the hardware/programming service representative and operator functions that serve as diagnostic aids for locating hardware and programming problems. The system control panel, in conjunction with the system console, provides the primary interface between the system and the operator or hardware/programming service representative. A 3-position keylock switch, located on the panel, can be used to prevent unauthorized personnel from accessing storage through the panel or turning on the system power.

System Console: The system console is not a component of the 5360 System Unit. The console may be any one of the supported display station devices except the 5150 Personal Computer, that can be locally attached to the 5360 System Unit. For servicing reasons, the primary system console (alternative may be assigned through programming) is required to be located within 6 meters (20 feet) of the System Unit. It is used to facilitate operator control of the system via operator commands and to allow the operator to respond to system messages presented on the display. It can also be used as a data entry/inquiry workstation, interacting with a user-application.

Customer Responsibilities: The customer is responsible for:

- Adequate site and system planning and preparation. Customers who request CSD personnel to perform these activities are subject to a charge.
- Receipt, unpacking, and placement of the 5360.
- Ordering, installation, and maintenance of signal cables and associated parts for attaching devices to the 5360 twinaxial ports.
- Physical setup, connection of cables to communications lines/modems and IBM devices, incorporating protected access areas, and checkout in accordance with instructions supplied by IBM.
- Using and following the System/36 problem determination procedures before calling IBM for service.
- Relocation of the 5360, if required, to allow IBM service access.
- Disconnecting and moving of the 5360 to the customer's shipping dock at the time of discontinuance.

Publications: *Guide to Publications* (GC21-9015).

SPECIFY

Non-Communications Specify Codes

Unless indicated, otherwise, these specify codes are available only at time of manufacture.

- Voltage (180-254V, 1-phase, 3-wire, 60 Hz): 250V locking-type plug provided. No specify code required.
- Color: Pearl White with Pebble Gray accent ... end covers only. No specify code required or permitted.
- Attaching 3262 mdl B1: Specify **#9876** only if attaching a 3262 mdl B1 that was previously attached to a System/34. Do not use this code if attaching a 3262 mdl C1. Also, if attaching a 3262 mdl B1, refer to the M3262 mdl B1 pages for additional ordering information.
- System Character Set: Specify **#2990** for Multinational * Character Set.

  * **Prerequisites:** #4900. Also, all displays and printers must be equipped with the Multinational Character Set.
- Twinaxial cables: Cables for the system console and system printer are *Not* supplied with the 5360 System Unit. See "Accessories" and the 5219, 522X, 525X, or 529X pages for cable ordering information.
- I/O Unit Attachments: Appropriate special features are required to attach any I/O device that does not have twinaxial connection capability. See "Special Features".
- For physical planning information, refer to *Preparing a Place for Your Computer* (SA21-9444).

Mandatory Specify Codes for Communications

- Specify Codes for Remote Device Types: Enter a specify code from the following list for each type of device with which the System/36 communicates. Codes are for record purposes only and do not affect the operation of the communication hardware or programming.

Code	System/Terminal Type

5360 System Unit (cont'd)

#9000	S/370, 303X, 308X, 43XX
#9001	System/34
#9002	System/36
#9003	System/38
#9004	Series/1
#9005	5250
#9006	5260
#9007	5280
#9008	5322 Datamaster
#9009	5520
#9010	6580 Displaywriter
#9011	OS/6, 6670
#9012	3601, 4701
#9013	3694
#9014	Other IBM
#9015	Non-IBM

- Line Position: Use the following table to specify where line interfaces are to be installed. For each line interface, select the desired interface type from the first column of the table. The second column shows the features that need to be ordered for each type of interface, and the third section of the table indicates the specify codes that are required to indicate line position. For example, to order an X.21 adapter on Line-2 of the MLCA, order feature #5301 and feature #5655 and specify **#9702** and **#9782**.

For each line using the interface shown below	Order the Feature Below Note (1)	AND		Specify Line Position with Position Specify Codes			
		SLCA	OR	MLCA Line-1	MLCA Line-2	MLCA Line-3	MLCA Line-4
Interface Note (2)	#5301 #3701	**#9697** **#9711**		**#9701** **#9711**	**#9702** **#9712**	**#9703** **#9713**	**#9704** **#9714**
CCITT V.35 Interface	#5301 #5401						**#9704** **#9804**
Autocall Interface Note (3)	#5301 #5411				**#9702** **#9722**		**#9704** **#9724**
1200 bps Int. Modem Nonswitched Note (4)	#5301 #5500	**#9697** **#9731**		**#9701** **#9731**	**#9702** **#9732**	**#9703** **#9733**	**#9704** **#9734**
1200 bps Int. Modem Switched/AA Note (4)	#5301 #5501	**#9697** **#9741**		**#9701** **#9741**	**#9702** **#9742**	**#9703** **#9743**	**#9704** **#9744**
Digital Data Service Interface	#5301 #5650	**#9697** **#9751**		**#9701** **#9751**	**#9702** **#9752**	**#9703** **#9753**	**#9704** **#9754**
CCITT X.21 Interface Note (5)	#5301 #5655	**#9697** **#9781**		**#9701** **#9781**	**#9702** **#9782**	**#9703** **#9783**	**#9704** **#9784**

Notes:
(1) Maximum quantity of each feature is one.
(2) Interface EIA RS-232-C
(3) Interface EIA RS-366-A
(4) #5321 is a prerequisite.
(5) X.21 switched operation is mutually exclusive with Autocall.

- Internal Clocking: If internal (business machine) clocking is required for use with an external modem, specify the lines which require internal clocking using the following specify codes. The internal clocking specify code applies only to lines using Adapter (#3701). Clocking speed is 1200 bps only. **Prerequisites:** #5321 is a prerequisite for the following codes.

Single Line	OR	MLCA Line-1	MLCA Line-2	MLCA Line-3	MLCA Line-4
#9261		**#9261**	**#9262**	**#9263**	**#9264**

- Network Type: Specify the type of network to which each communication interface attaches. The network type should be described as seen by the System/36. The network type specified will be supplied to the customer on a system description listing that will be shipped with the system.

	Single Line	OR	MLCA Line-1	MLCA Line-2	MLCA Line-3	MLCA Line-4
Point-to-Point Nonswitched	**#9101**		**#9101**	**#9102**	**#9103**	**#9104**
Point-to-Point Switched	**#9111**		**#9111**	**#9112**	**#9113**	**#9114**
Multipoint Tributary	**#9121**		**#9121**	**#9122**	**#9123**	**#9124**
Multipoint Control	**#9131**		**#9131**	**#9132**	**#9133**	**#9134**
Local Attach. via DDSA	**#9141**		**#9141**	**#9142**	**#9143**	**#9144**

- Line Speed: Specify the communication line speed to be used with each communication interface on the System/36. The line speed specified will be supplied to the customer on a system description listing that will be shipped with the system.

Speed (bps)	Single Line	OR	MLCA Line-1	MLCA Line-2	MLCA Line-3	MLCA Line-4
1200	**#9201**		**#9201**	**#9202**	**#9203**	**#9204**
2400	**#9211**		**#9211**	**#9212**	**#9213**	**#9214**
4800	**#9221**		**#9221**	**#9222**	**#9223**	**#9224**
9600	**#9231**		**#9231**	**#9232**	**#9233**	**#9234**
Greater than 9600 bps						**#9244**

SPECIAL FEATURES

Replaced parts from any special feature installation on a purchased 5360 remain the property of the customer.

Non-Communications Features

Add'l Storage - 128K (#1005): Provides an additional 128K bytes of main storage. **Limitations:** Mutually exclusive with Add'l Storage - 256K (#1006). **Maximum:** One. **Field Installation:** Yes.

Add'l Storage - 256K (#1006): Provides an additional 256K bytes of main storage. **Limitations:** BXX mdls only, and mutually exclusive with Add'l Storage - 128K (#1005). **Maximum:** One. **Field Installation:** Yes.

1255 Attachment (#1100): Required to attach 1255 Magnetic Character Reader mdls 1, 2, or 3. **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls. AXX mdls require #5732. #5733 is required if #5830 is installed.

1255 Attachment Expansion (#1105): Required when using the System/36 Assembler Macros to provide 1255 stacker logic programs. This feature provides an additional 28K of user-programmable storage. **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1100.

Workstation Controller Expansion (#4900): Required when attaching seven to 30 displays and/or printers locally to the 5360. This feature also supports: Hex Key operation, the 3270 Device Emulation program, the Multinational Character Set (**#2990**) installed on displays or printers, and the Magnetic Stripe Reader on displays. **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion A (#5732): This is a feature I/O board required on AXX mdls for the 1255 Attachment (#1100), 3262 Printer Attachment (#5830), or the 8809 Magnetic Tape Attachment (#7960). **Limitations:** AXX mdls only. **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion B (#5733): Additional power feature required on AXX mdls for the 8809 Magnetic Tape Attachment (#7960) or if attaching both the 1255 and 3262. **Limitations:** AXX mdls only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732.

3262 Printer Attachment (#5830): Required when attaching a 3262 mdl B1 or C1 Printer. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls, AXX mdls require #5732, #5733 if #1110 is installed. **#9876** if 3262 mdl B1 is to be attached.

8809 Magnetic Tape Attachment (#7960): Required when attaching the 8809 mdl 1C Magnetic Tape Unit (8809 mdl 2C attaches to the mdl 1C). **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls, AXX mdls require #5732 and #5733.

Communications Special Features

Single Line Communications Adapter - SLCA (#2500): Provides for attachment of a single communication line to the System/36. It permits half-duplex operation at speeds from 600 bps to 9600 bps using either BSC or SDLC protocols. Both switched and nonswitched operation is supported. **Note:** Only nonswitched operation is supported when using an X.21 interface. **Limitations:** Cannot be installed with the MLCA (#4500). **Maximum:** One. **Field Installation:** Yes. **Specify:** Network type line speed and remote station type for line attached to SLCA. See "Mandatory Specify Codes for Communications".

EIA Adapter (#3701): Provides a cable and interface for attachment of an IBM modem or a non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with another EIA Adapter, V.35 Adapter, Autocall Adapter, integrated modem, Digital Data Service Adapter or X.21 Adapter on the same

5360 System Unit (cont'd)

Communications Line Base Adapter (#5301). Maximum speed is 9600 bps. See the "Communications Configurator" for possible combination of features. **Maximum:** One per Communications Line Base Adapter (#5301). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the EIA Adapter. This feature may also require #5321 if the external modem does not provide its own 1200 bps clocking. **Specify:** Network type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

Multiline Communications Adapter - MLCA (#4500): Four communication lines can be attached to System/36 using the MLCA. The MLCA is a microprocessor that operates in parallel with the main storage processor and other microprocessors in the system. Each communications line uses either BSC or SDLC protocol. The proper line protocol is loaded into the MLCA microprocessor at program execution time. This feature, in conjunction with stored program control, permits System/36 to function on a switched or nonswitched, public or private communications line. For BSC multipoint tributary operation, an auto-monitoring function is provided that allows the line to be monitored without a user's main storage program being required. In this mode, a negative response is sent to all polls and selects received from the control station. For BSC processing to become active in main storage, the operator must activate BSC data management. An SDLC auto-response mode is implemented in MLCA for secondary SDLC. The MLCA will handle some redundant supervisory responses, thus, eliminating the need to always utilize the SDLC task in main storage for nonproductive activity. The MLCA in a primary SDLC environment offloads from the main storage processor the majority of the work required for nonproductive polling. In either case, a SNA/SDLC task must be active in main storage. **Limitations:** Each line is capable of half-duplex operation at speeds from 600 bps to 9600 bps. In addition, one line may operate at speeds up to 57.6K bps in half-duplex mode provided the aggregate of the remaining three lines does not exceed 9600 bps, or one line can operate at 50K bps and the remaining lines at speeds up to 4800 bps each, or one line can operate at 19.2K bps and the remaining lines at speeds up to 9600 bps each. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA. Cannot be installed with SLCA (#2500). **Maximum:** One. **Field Installation:** Yes. **Specify:** Network type, line speed, line position and remote station type for lines attached to MLCA. See "Mandatory Specify Codes for Communications".

Multiline Communications Adapter Expansion (#4501): A storage expansion for the MLCA microprocessor which allows switched operation of X.21 lines attached to the MLCA. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4500.

Communications Line Base Adapter (#5301): Required for attachment of line interface adapters to the MLCA or the SLCA. **Maximum:** One per communication line. Four total when using the MLCA or a total of one when when using the SLCA. **Field Installation:** Yes. **Prerequisites:** #4500 when using multiline attachment option. #2500 when using single line option.

Communications Internal Clock (#5321): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem used with Adapter (#3701). #5321 is required for use with the 1200 bps Integrated Modem (#5500, #5501). Clocking speeds available with this feature are 600 and 1200 bps. Selection of full- or half-speed and the appropriate line is indicated via a system utility program. When this feature is installed on System/36, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. **Maximum:** One per system. One clock can control all lines on system. **Field Installation:** Yes. **Prerequisites:** At least one line with #3701 or with #5500 or #5501 installed. **Specify:** Lines for which internal clocking is to be used with external modem. See "Mandatory Specify Codes for Communications".

V.35 Adapter (#5401): Provides a cable and interface for attachment of an external modem meeting CCITT V.35 characteristics. The V.35 Adapter will operate at speeds of 20.4K bps, 24K bps, 40.8K bps, 48K bps, and 56K bps. The adapter will also operate at 57.6K bps for local 3705 attachment. **Limitations:** Restricted to Line-4 of MLCA (#4500). Cannot be installed with another V.35 Adapter, EIA Adapter, integrated modem, Digital Data Service Adapter or X.21 Adapter on the same Communications Line Base Adapter (#5301). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5301 installed on Line-4 of #4500. **Specify:** Network Type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

Autocall Adapter (#5411): Provides a cable and interface for attachment to an external automatic calling unit. This adapter allows automatic dialing under program control. The remote device must have auto answer capability. Automatic calling equipment which complies with EIA RS-266-A may be attached under the provisions of the IBM Multiple Supplier Systems Policy. **Limitations:** Available only on Line-2 and -4 of the MLCA (#4500). An EIA Adapter must be installed on Line-1 for operation with an Autocall Adapter on Line-2 or on Line-3 for operation with an Autocall Adapter on Line-4. Cannot be installed with another Autocall Adapter, EIA Adapter, V.35 Adapter, integrated modem, Digital Data Service Adapter or X.21 Adapter on the same Communications Line Base Adapter (#5301). The Autocall Adapter cannot be used on a System/36 that has X.21 switched lines. See the "Communication Configurator" for possible combination of features. **Maximum:** Two per system. **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the Line-2 or -4 using the Autocall Adapter. #4500 is required. See "Mandatory Specify Codes for Communications".

1200 bps Integrated Modem (#5500, #5501): A modem integrated into the system for SDLC or BSC data transmission at 1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is controlled by a system utility program. It is available in two different versions: #5500--nonswitched and #5501--switched with auto-answer. Attachment to the nonswitched (4-wire) facility is via an IBM-provided cable directly to the line Type 3002. Attachment to the switched facilities is via an IBM-provided cable to an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** The device communicating with System/36 must also be equipped with a 1200 bps integrated modem. **Limitations:** Cannot be installed with another integrated modem, EIA Adapter, V.35 Adapter, Autocall Adapter, Digital Data Service Adapter, or X.21 Adapter on the same Communications Line Base Adapter (#5301). See the "Communication Configurator" for possible combination of features. **Maximum:** Four per system when using MLCA (#4500). One per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the integrated modem, Internal Clock (#5321). **Specify:** Network type, line speed, line position, and remote station type. See "Mandatory Specify Codes for Communications".

Digital Data Service Adapter (#5650): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, and 56,000 bps over the AT&T nonswitched Data-Phone® digital service network. The Digital Data Service Adapter interfaces to a channel service unit (not a Data Service Unit) which is the customer site termination of the digital network. **Note:** This service is available only in certain cities within the US. The Digital Data Service Adapter may also be used to locally connect a System/36 to another supported device with a Digital Data Service Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See DDS Adapter Connector under "Accessories". **Limitations:** Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA (#4500). See the "Communication Configurator" for possible combination of features. **Maximum:** Four per system when using MLCA (#4500). One per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the Digital Data Service Adapter. **Specify:** Network type, line speed, line position, and remote station type. See "Mandatory Specify Codes for Communications". ® Trademark of AT&T.

X.21 Adapter (#5655): This feature provides an interface for attachment to either an X.21 switched or an X.21 nonswitched network. Both BSC and SDLC communications are supported. The network establishes the data rate and supplies the clock. The System/36 can communicate via the X.21 Adapter with devices that do not have native X.21 Adapters. These devices must be attached to the network via an X.21bis DCE. This method of attachment uses the EIA RS-232-C interface. Refer to Chart K (switched) and Chart M (nonswitched) in the M2700 pages for the list of devices that can be attached via an X.21bis DCE. On switched networks: Communications at 2400, 4800, 9600 and 48K bps are supported. Autocall function is provided for switched lines. On nonswitched networks: Transmission may be at speeds of 2400, 4800, 9600, or 48K bps for point-to-point operations and 2400, 4800, or 9600 bps for multipoint operations. Some X.21 networks may not support multipoint operations. The installation of these features is dependent on the availability of an X.21 network that is compatible with IBM's implementation of X.21 as described in *IBM Implementation of X.21 General Information Manual* (GA27-3287). **Limitations:** The X.21 Adapter cannot be configured to support switched lines on a System/36 that has an Autocall Adapter (#5411) installed. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA (#4500). Switched operation is limited to the MLCA. Cannot be installed with another X.21 Adapter, Adapter, V.35 Adapter, Autocall Adapter, integrated modem, or Digital Data Service Adapter on the same Communication Line Base Adapter. See the "Communication Configurator" for possible combination of features. **Maximum:** One per Communications Line Base Adapter (#5301). Four per system when using MLCA (#4500) or one per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the X.21 Adapter. #4501 is required for switched operation. **Specify:** Network type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

ADDITIONAL COMMUNICATIONS INFORMATION

IBM Modems: One IBM modem can be attached to each Adapter. **Prerequisites:** #3701 and #5301 used with either #2500 or #4500.

Modem	Speed (bps)
3863	2400
3864	4800
3865	9600
3872	2400/1200

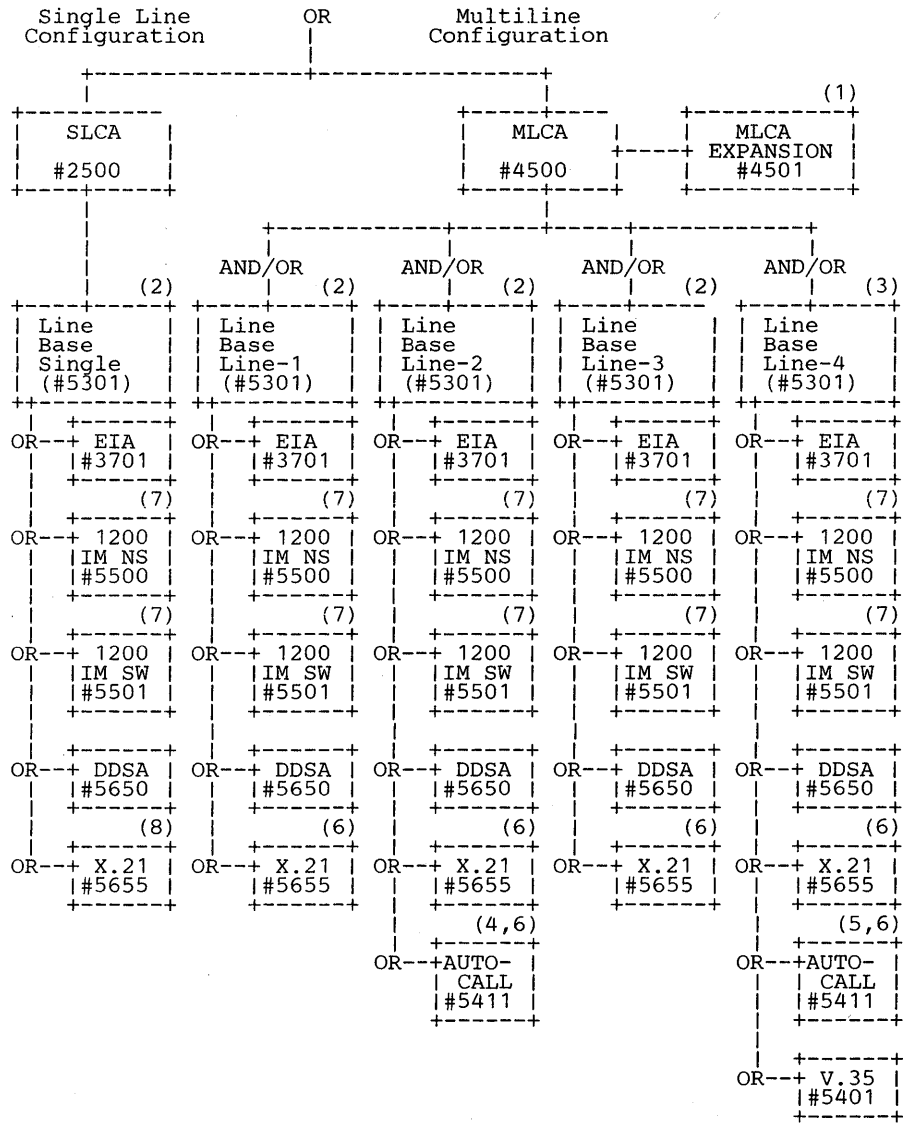
5360 System Unit (cont'd)

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the System/36 #3701 Adapter and the external modem. Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability.

References: See the appropriate host system programming pages for possible restrictions. Refer to *Preparing to Receive Your Computer* (SA21-9442) for physical installation requirements. See IBM for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

5360 System Unit (cont'd)

Communication Configurator:



Notes:

(1) Required for X.21 switched operation.
(2) Half-duplex operation at speeds from 600 bps to 9600 bps allowed.
(3) Half-duplex operation at speeds from 600 bps to 57.6K bps allowed. See MLCA (#4500) description for allowable aggregate data rate considerations.
(4) Must be used in conjunction with EIA Adapter (#3701) on line 1 of MLCA.
(5) Must be used in conjunction with EIA Adapter (#3701) on line 3 of MLCA.
(6) X.21 switched operation is mutually exclusive with Autocall.
(7) Communications Internal Clock (#5321) required.
(8) Nonswitched operation only.

5360 System Unit (cont'd)

MODEL CONVERSIONS

Any model can be converted to another model. All model conversions are field installable. Conversions from model AXX to model BXX require replacement of the base main storage card and the disk storage device(s). Adequate provision must be made for retaining the data contained on the replaced disk storage device(s) and elimination of user-proprietary information. Customer Price quotations and customer order acknowledgment letters for purchased model conversion from model AXX to model BXX or from model X1X to X2X, must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM".

Purchase Considerations: An additional charge has been added to the purchase price for certain model conversions. Users should carefully evaluate their future requirements before final selection of a 5360 System Unit.

ACCESSORIES

Cables: The twinaxial cables and/or associated parts to interconnect the 5360 and components may be purchased from IBM or from a customer-selected source. The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinax® Connector Kit (**P/N 7362268**): Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. Individual connectors **P/N 7362229** are available for replacement.

Twinax Wire (**P/N 7362211**): Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinax Cable Assembly (**P/N 7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (**P/N 3762230**): Permits two Twinax Cables Assemblies to be joined together.

Twinax Station Protector Kit (**B/M 7361807**): Two protectors. One is required at each end of each Twinax Attachment Cable installed outdoors (either above or below ground level). Individual Twinax Station Protectors, **P/N 7362426**, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order **P/N 7362063** for Teflon-covered cable. Individual connectors **P/N 7362229** are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order **P/N 7362061** for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order **P/N 7362062** for Teflon-covered cable assembly.

DDS Adapter Connector: A specially designed connector allows the cables from a System/36 DDS Adapter to be connected to another supported device with a DDS Adapter. This provides for the local connection of two devices without the use of any modems. This is a purchase-only item. Allow eight weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter. **Field Installation:** Yes. **Specify: P/N 4236967.**

Keylock Keys: The 5360 is shipped with two keys. Additional keys may be purchased from IBM. Vendor will supply additional keys only to the original purchaser. A letter of authorization with Key Identification Number must accompany each order. Allow 6-8 weeks for delivery. **Specify: P/N 2546418.**

SUPPLIES

Diskettes and Diskette Magazines: For diskettes and diskette magazines, see IBM.

5381 SYSTEM UNIT

PURPOSE

Contains main storage, control storage, workstation controllers, communications controller (optional), disk storage, diskette magazine drive, system console keyboard/display, operator/service panel, facilities for addressing main storage, arithmetic and logical processing circuits and control functions for I/O units on System/38.

MODELS

5381 Model Designation: A B C Where:

A = System Unit Model* (Nominal Internal Cycle per 4-Byte Access)
3 = 1100 Nanoseconds
4 = 1100 Nanoseconds
5 = 600 Nanoseconds
7 = 400 Nanoseconds
8 = 400 Nanoseconds

B = Main Storage Capacity Available by System Unit Model:	3	4	5	7	8
4 = 1024K	X	X	X		
6 = 1536K	X	X	X		
8 = 2048K		X	X	X	
C = 3072K				X	
G = 4096K				X	X
L = 5120K					X
Q = 6144K					X
U = 7168K					X
Y = 8192K					X

C = Integrated Disk Storage Available by System Unit Model:	3	4	5	7	8
1 = 64.5MB**		X	X	X	X
2 = 129.0MB**	X	X	X	X	X
3 = 193.5MB	X	X	X	X	X
4 = 258.0MB	X	X	X	X	X
5 = 322.6MB	X	X	X	X	X
6 = 387.1MB	X	X	X	X	X
A = 64.5MB		X	X	X	X
B = 129.0MB	X	X	X	X	X

* In relationship to the mdl 3XX, the mdl 4XX has approximately 1.35 times the internal performance; the mdl 5XX has approximately 1.75 times the internal performance; and the mdl 7XX and mdl 8XX have approximately 3.5 times the internal performance. (This may not have a corresponding relationship to throughput.) It is not advisable to field upgrade a 4MB mdl 7 to a 4MB mdl 8 if performance is a primary objective, because no performance improvement should be expected.

** These mdls do not include the expansion enclosure.

Notes:

- Mdls XXA and XXB are required when the user only requires 64.5MB or 129.0MB of integrated disk storage and any one of the following:
  - Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403)
  - Workstation Controller, 4th (#5304) or Workstation Controller - Extended, 4th (#5404)
  - Communication Attachment, 2nd (#1502)
- Mdl 8: The Workstation Controller - Extended is standard in controller position 1 of the base mdl 8, the Workstation Controller is standard in controller position 1 of the base mdls 3, 4, 5, and 7.

Minimum Configuration: Any model of the 5381 System Unit. **Note:** The minimum amount of auxiliary storage required to support IBM-supplied program products will exceed 64.5MB.

Although a customer may order a System/38 without a line printer, he must be made aware that IBM's ability to diagnose the system without an attached line printer may be impaired and thus have an adverse effect on the system's availability.

Note: To order cables, see *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cable order requirements.

HIGHLIGHTS

- Interactive workstation system.
- System architecture oriented to workstation environment.
- Virtual storage for efficient management of main storage.

System Architecture: A primary feature of System/38 is the 5381 unit advanced instruction set which embodies many basic supervisory, resource and data base management functions. As an example of the power, the instruction set includes data base operations that retrieve, update, and logically order data records.

The 5381 has an object-oriented architecture fundamental to its overall design. Objects are structures such as programs, processes, and data base files, which are manipulated at a logical level through the unit's instruction set. The 5381 manages storage on an object basis, thereby reducing user dependence on main storage size, physical disk location, and internal implementation.

Access to objects is machine controlled providing a high level of integrity, automatic serialization of concurrent operations on an object, and effective authority enforcement.

Units of work are managed as independent processes (tasks) which share the machine resources (processor, storage, devices). Interprocess communication is accomplished through queues and event signals. Objects can be locked to control and serialize concurrent access to them by several processes.

All objects reside in virtual storage which is managed by the 5381 processing unit. Objects are allocated space on permanent disk storage and are brought into main storage (as needed) where they may be shared by all processes. Although system performance may be affected by main storage size, applications are not limited in the number or size of objects used. This allows additional disk or main storage to be added without a need to restructure applications.

Input/output operations offer improved device independence through the use of the 5381 device support (source/sink) functions which manage the channel, communications, and other asynchronous hardware operations. This high level of function is standard on all System/38 mdls.

Microcode Main Storage Utilization: The System/38 accomplishes much of its advanced function using main storage resident microcode. The amount of main storage used depends on system size and configuration, and the number of system functions active at any specific time.

Hardware Features

- Main storage capacity: 1024K, 1536K, 2048K, 3072K, 4096K, 5120K, 6144K, 7168K, and 8192K bytes. Main storage capacities vary by System Unit mdl; see Table B above for specific capacity.
- Single level storage management: Manages main storage and disk storage as one logical storage resource which contains all programs and data.
- Main storage internal cycle time per 4-byte access (nominal):
  - Mdl 3XX - 1100 nanoseconds
  - Mdl 4XX - 1100 nanoseconds
  - Mdl 5XX - 600 nanoseconds
  - Mdl 7XX - 400 nanoseconds
  - Mdl 8XX - 400 nanoseconds
- Control storage capacity (32-bit word):
  - Mdl 3XX - 8K words
  - Mdl 4XX - 8K words
  - Mdl 5XX - 8K words
  - Mdl 7XX - 12K words
  - Mdl 8XX - 12K words
- Control storage instruction cycle time (minimum):
  - Mdl 3XX - 400 nanoseconds
  - Mdl 4XX - 200 nanoseconds
  - Mdl 5XX - 200 nanoseconds
  - Mdl 7XX - 133 nanoseconds
  - Mdl 8XX - 133 nanoseconds
- From one to six spindles of disk storage (64.5MB - 387.1MB). Two to six (129.0MB - 387.1MB) on mdl 3XX.
- From one to eight spindles of 3370 disk storage (571.3MB to 5,838.8MB).
  - One to four spindles on mdls 4XX, 5XX, and 7XX (571.3MB to 2,919.4MB)
  - One to eight spindles on mdl 8XX (571.3MB to 5,838.8MB)
  - Not available on mdl 3XX

5381 System Unit (cont'd)

- Direct attachment capability of 5250 workstation devices:
  - Mdl 3XX, 4XX, 5XX, and 7XX ... 116 maximum
  - Mdl 8XX ... 128 maximum
- 5424 MFCU mdl A1/A2.
- Maximum of two adapter-attached printers in any speed combination.
- 3410/3411 Magnetic Tape Unit and Control mdls 1, 2, or 3.
- 3430 Magnetic Tape Subsystem:
  - Mdl A01, Tape Unit and Control
  - Mdl B01, Tape Unit.
- Diskette magazine drive is standard.
- System console/keyboard display is standard.
- Up to a maximum of eight SNA/SDLC and/or BSC communication lines, in any combination.
- Main storage error checking and correction.
- Instruction retry capability (except where "results" field is also an operand field).
- I/O controller retry.
- Reliability, Availability, and Serviceability (RAS) features are implemented throughout the system and are all supported by new and improved diagnostic aids.

Note: In device operations, the nominal or rated throughputs represented in this publication may not be achieved in an actual customer environment when used with the customer's control program or application load.

System Unit Components

Processor Unit: Main storage capacities and internal cycle times as well as control storage capacities and instruction cycle times are detailed under "Hardware Features" above. For performance comparisons, see the chart above.

Virtual Address Translation (VAT) is a standard facility on the 5381. Virtual Address Translation converts virtual addresses to real addresses.

The VAT facilities include:

- Primary Directory (PD) - indicates the virtual address and status information of a page stored in a block of real storage called a page frame.
- Hash Table (HT) - a list of entries used to index the Primary Directory.
- Lookaside Buffer (LB) - a high-speed buffer storage which contains certain information specified in the primary directory. The translation process time is reduced if the referenced virtual address is listed in the LB.

Main storage technology is dynamic Metal Oxide Semiconductor Field Effect Transistor (MOSFET). The processor unit uses LSI (Large Scale Integration) for the logic circuitry.

The processor provides overlap operation of instruction fetch and execution functions. The time-of-day clock provides a measure of time suitable for elapsed time measurements and time-of-day indications.

The high-speed integrated channel has an instantaneous character transfer rate of up to 2.5 million bytes per second in byte mode, or up to 5.0 million bytes per second in half-word mode. The 3370 Direct Access Storage device on the 5381 operates in half-word mode. The other devices on the 5381 operate in byte mode.

The System Control Adapter (SCA) provides the capability to initiate a power-on off sequence and also provides a central serviceability point to all system units. The SCA provides a dual interface between the operator/service panel and the console to the system. At initial power-on or Initial Microprogram Load (IMPL) time, the SCA performs functional testing of the processor and diagnostic check-out of main storage prior to loading the control store with microcode. Execution of the microcode initializes the system and control is then transferred to the operator. The SCA is an integral part of the hardware system.

The operator/service panel is located on the system where it is easily accessible to the operator and service personnel. The operator/service panel contains 24 indicators (LEDs), one LOAD pushbutton switch, one power-on pushbutton switch, one display intensity switch, and two rotary switches. Three optional features may be included on the panel: An audible alarm and attention indicator, a power keylock switch, and an automatic IMPL switch.

System Console/Keyboard Display: System console functions are invoked by the standard CRT display and keyboard. They are physically integrated into the right top section of the system. The console display uses a 12-inch CRT, and contains 1024 character positions, 16 lines of 64 character positions each. The large characters improve readability for the operator. Upper/lower case characters are standard , as well as four display indicators (attention, input inhibited, reset required, and upper shift).

Display attributes include protected fields, underscore, and non-display. The keyboard has a typewriter-like layout with 24 Command Function keys and a HEX key. The Multinational character set provides the overstrike function. Overstrike is the capability to create, process, and output national usage characters. In addition, the Multinational character set provides the capability for multi-country processing. See "Type Catalog" for character sets and keyboard layout. A display station of the 5250 Information Display System can be attached to serve as an alternate console should the user desire the console in a different location or require a desk-top sitting position.

Diskette Magazine Drive: A diskette drive is standard on the System/38 and provides three significant functions: save/restore, diskette I/O, and CE servicing. The diskette drive is designed to accept two 10-diskette magazines which can be used for save/restore and other diskette I/O operations. In addition to the two magazines, the diskette drive contains three diskette slots which can be used for loading one to three diskettes manually. Diskette types 1, 2, and 2D may be read or written.

Disk Storage: The System Unit can contain from one to six spindles (two to six for 3XX mdls) of integrated nonremovable disk storage. The following table provides capacity and access times.

Bytes/Sector	512
Bytes/Cylinder	180,224
Capacity (bytes)	64,520,192
Access Time	
Minimum (Cyl to Cyl) Seek (ms)	9
Maximum Average Seek (ms)	27
Maximum Seek (ms)	46
Average Rotational Delay (ms)	9.6
Rotational Speed (rpm)	3,125
Data Transfer Rate (Nominal) (MB/sec)	1.031

Data can be stored offline for security or backup purposes by writing the data to diskettes or magnetic tape.

Workstation Controller: Direct local attachment of 5250 Information Display System devices as well as the 5219 Printer (i.e., 5219 Printer, mdls D01 and D02, 5224 Printer mdls 1 and 2, 5225 Printer mdls 1, 2, 3, and 4, 5251 Display Station mdls 1, 11, 999, 5252 Dual Display Station mdl 1, 5256 Printer mdls 1, 2, and 3, 5291 Display Station mdl 1, and 5292 Color Display Station mdl 1 or 2), is provided by the Workstation Controller. One Workstation Controller is standard on mdls 3XX, 4XX, 5XX, and 7XX, of System/38. It provides eight ports for attaching up to 12 workstations (keyboard displays and/or printers) directly to the system in any combination.

Workstation Controller - Extended: Direct local attachment of 5250 Information Display System devices and the 5219 Printer (i.e., 5219 Printer, mdls D01 and D02, 5224 Printer mdls 1 and 2, 5225 Printer mdls 1, 2, 3, and 4, 5251 Display Station mdls 11, 999, 5256 Printer mdls 1, 2, and 3, 5291 Display Station mdl 1, and 5292 Color Display Station mdl 1 or 2), is provided by the Workstation Controller - Extended. Up to three Workstation Controller - Extended features, along with the standard Workstation Controller in the base (position 1), can be installed on mdls 3XX, 4XX, 5XX, and 7XX. Mdl 8 can have up to four Workstation Controller - Extended features, including the standard feature in position one of the base. Each provides eight ports for attaching up to 32 workstations (keyboard displays and/or printers) directly to the system in any combination.

Publications: *IBM System/38 Guide to Publications* (GC21-7726).

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): Specify **#9903** for 208V or **#9905** for 230V.
- Accent Panel Color (one must be specified): **#9060** for Willow Green, **#9061** for Garnet Rose, **#9062** for Sunrise Yellow, **9063** for Classic Blue, **#9064** for Charcoal Brown, or **#9065** for Pebble Gray. (**Note:** The color for the base enclosure is Pearl White.)
- Console Character Sets: Specify **#9540** for the English US character set. **#9535** provides the Multinational character set. See "Type Catalog" for details. **Maximum:** One. **Field Installation:** Yes.
- I/O Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- 3370 Direct Access Storage Device Attached: Select only one specify code from each group (as applicable) to designate the 3370 units to be attached.

5381 System Unit (cont'd)

CPU Mdl 4XX, 5XX, 7XX and 8XX (1-4 3370s):

Mdl A11	**#9560**
Mdl A11 and one B11	**#9561**
Mdl A11 and two B11s	**#9562**
Mdl A11 and three B11s	**#9563**

CPU Mdl 8XX Only (5-8 3370s):

Mdl A11	**#9564**
Mdl A11 and one B11	**#9565**
Mdl A11 and two B11s	**#9566**
Mdl A11 and three B11s	**#9567**

Note: It is not required that the first 3370 Disk Storage Attachment (#1130) have a maximum number of 3370 Direct Access Storage (DAS) units (four) attached before the second 3370 Disk Storage Attachment (#1132) is attached. For example, the first 3370 attachment feature could have only two 3370 DAS units attached, and the second 3370 attachment feature could have from one to four 3370 DAS units attached.

- Feature code **#3000** is required when the first 3770 mdl A12 or B12 is added to an installed 5381.
- Diagnostic and Analysis Support:

  Systems that will use Control Program Facility (CPF) must specify **#9995**. This will ensure that the customer receives the Diagnostic and Analysis Support. For systems that will not use CPF, the customer must submit a PRPQ to obtain diagnostic and analysis support relative to his needs.
- When attaching previously installed 5251 mdl 11s to a System/38, a no charge RPQ S40213 may be needed. Review the RPQ description for S40213

  to determine if applicable to the previously installed 5251 mdl 11s.
- When designating a 5225 as a system printer, specify **#9817**.

SPECIAL FEATURES

Processor Unit

5211/3262 Printer Attachment, 1st (#1100): To attach the first 5211/3262 Printer, one of the following feature codes must also be specified: 5211-2 (#1204), or 3262-B1 (#1208). **Limitations:** Attachment #1100 is mutually exclusive with Printer Attachment #1135. **Maximum:** One. **Field Installation:** Yes.

5211/3262 Printer Attachment, 2nd (#1110): To attach a second 5211/3262 Printer, one of the following feature codes must also be specified: 5211-2 (#1232) or 3262-B1 (#1234). **Limitations:** Attachment #1110 is mutually exclusive with Printer Attachment #1136. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine requirements.

3370 Disk Storage Attachment, 1st (#1130): To attach the first 3370 mdl A11 or A12 disk storage drive. **Limitations:** Not available on the mdl 3XX. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

3370 Disk Storage Attachment, 2nd (#1132): To attach the second 3370 mdl A11 or A12 Disk Storage Drive. **Note:** It is not required that the first 3370 Disk Storage Attachment (#1130) have a maximum number of 3370 Direct Access Storage (DAS) units (four) attached before the second 3370 Disk Storage Attachment (#1132) is attached. For example, the first 3370 attachment feature could have only two 3370 DAS units attached, and the second 3370 attachment feature could have from one to four 3370 DAS units attached. **Limitations:** Not available on mdls 3XX, 4XX, 5XX, or 7XX. **Maximum:** One on mdl 8XX only. **Prerequisites:** #1130. See "Processor Unit Expansion Feature Configurator".

3203 Mdl Printer Attachment, 1st (#1135): Required to attach one or two 3203-5s to the 5381. Specify code **#9550** must be specified for the second 3203-5. **Limitations:** Attachment #1135 is mutually exclusive with Printer Attachment, 1st (#1100). The second 3203-5 **(#9550)** is mutually exclusive with Printer attachments #1100, #1110, and #1136. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine overall requirements.

3203 Mdl 5 Printer Attachment, 2nd (#1136): Required to attach the 3203-5 when a 3262/5211 is the first printer attached to the 5381. **Limitations:** Attachment #1136 is mutually exclusive with #1135 and #1110. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine overall requirements. **Note:** A second printer attachment should not be installed without a first printer attachment. If two attachments exist on a System/38 and the first is removed, then the second should be removed and installed as the first.

Multifunction Card Unit Attachment 250/60/60 CPM (#1220): To attach a 5424 MFCU mdl A1. **Maximum:** One 5424 per system. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator". #6500 is required on the 5424.

Multifunction Card Unit Attachment 500/120/120 CPM (#1221): To attach a 5424 MFCU mdl A2. **Maximum:** One 5424 per system. **Field Installation:** Yes. **Prerequisites:** Multifunction Card Unit Attachment - 250/60/60 (#1220). See "Processor Unit Expansion Feature Configurator". #6500 is required on the 5424.

Automatic Initial Microprogramming Load (#1300): Auto-IMPL enables the system to automatically initiate a power-on sequence following the restoration of commercial (utility) AC power after a commercial power failure. The primary use is for unattended operations; therefore, manual intervention is not required. A manually controlled toggle switch located on the operator/service panel permits the user to enable or disable the feature. **Maximum:** One. **Field Installation:** Yes.

Note: When Power Keylock (#3210) and Automatic Initial Microprogramming Load (#1300) are jointly installed, the AIMPL (#1300) has priority over the Power Keylock (#3210) setting in the event of a commercial power failure and subsequent return.

Audible Alarm And Attention Indicator (#2100): Provides, in addition to the attention indicator on the display, a backlighted indicator, an audible alarm, and a volume control to alert the operator of an outstanding message requiring attention. **Maximum:** One. **Field Installation:** Yes.

Power Keylock (#3210): A key-controlled switch, in series with the power-on pushbutton, will inhibit the power-on cycle if the keylock switch is off. The keylock cannot power the system down. The keylock is located on the operator/service panel. See "Accessories" for key ordering information. **Limitations:** When Power Keylock (#3210) and Automatic Initial Microprogramming Load (#1300) are jointly installed, the AIMPL (#1300) has priority over the Power Keylock (#3210) setting in the event of a commercial power failure and subsequent return. **Maximum:** One. **Field Installation:** Yes.

Power Warning Feature (#3220): Provides the capability to accept an Uninterruptible Power Supply (UPS) signal when commercial power has failed or has been restored. This feature also provides the capability to log each power failure/restoration occurrence. The System/38 Program System (VMC/CPF) support enables the user to select one of three options to respond to a power outage: (1) handle the power outage on a manual basis, (2) handle the power outage/restoration via a user-written program, or (3) if the user does not select one of the first two options, an immediate power-down command will be initiated. The time required to accomplish a power-down sequence is approximately 60 seconds per megabyte of main storage. **Maximum:** One per 5381 System Unit. **Field Installation:** Yes. **Prerequisites:** A user-provided Uninterruptible Power Supply (UPS) equipped with adequate battery reserve time to support the user's operational environment. **Publication:** *System/38 Uninterruptible Power Supply Planning Guide* (GA21-9421) contains the operating and programming characteristics and specifications for the System/38 Power Warning Feature.

Processor Unit Expansion 1 (#6300): This feature is an I/O board/power supply and is required for attaching either of the following I/O devices: (1) Communication Attachment (#1501) ... (2) Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 2 (#6301): This feature is an I/O board/power supply and is required for attaching any of the following I/O devices: (1) the 5424 Multifunction Card Unit (#1220, #1221) ... (2) attaching the 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970) ... (3) the 5211/3262 as a second printer (#1110) ... (4) the 3203-5 as a second printer (#1136) when the first printer is a 5211 or 3262. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 3 (#6302): This feature is an air circulating/cable assembly and is required for attaching any of the following I/O devices: (1) Communication Attachment (#1501) ... (2) Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402) ... (3) the 5424 Multifunction Card Unit (#1220, #1221) ... (4) the 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970) ... (5) the 5211/3262 as a second printer (#1110) ... (6) the 3203-5 as a second printer (#1136) when the first printer is a 5211 or 3262. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 4 (#6303): This feature is a power expansion assembly required to attach: (1) 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970), ... (2) 3370 Disk Storage (#1130 and #1132 - mdl 8XX only) ... (3) 3203-5 Printer, as first printer (#1135 or #1136). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 5 (#6304): This feature is a gate/AC power supply and is required for attaching any of the following features: (1) Communication Attachment, 2nd (#1502) ... (2) Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403) ... (3) Workstation Controller, 4th (#5304) or Workstation Controller -

5381 System Unit (cont'd)

Extended, 4th (#5404). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 6 (#6305): This feature is a board/power supply and is required for attaching either of the following features: (1) Communication Attachment, 2nd (#1502) ... (2) Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 7 (#6306): This feature is a board/power supply and is required for attaching Workstation Controller, 4th (#5304) or Workstation Controller - Extended, 4th (#5404). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

3411 Magnetic Tape Attachment (#7960): To attach a 3411 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) See "Processor Unit Expansion Feature Configurator" ... (2) the System/3, System/38 Attachment (#7003) is required on the 3411. Can be installed with 3430 Magnetic Tape Attachment (#7970).

3430 Magnetic Tape Attachment (#7970): To attach 3430 mdl A01 Magnetic Tape Unit and Control. **Maximum:** One. **Prerequisites:** See "Processor Unit Expansion Feature Configurator". Can be installed with 3411 Magnetic Tape Attachment (#7960).

Processor Unit Expansion Feature Configurator (maximum required - one each)

I/O Function Required	Required Processor Unit Expansion						
	#1 #6300	#2 #6301	#3 #6302	#4 #6303	#5 #6304	#6 #6305	#7 #6306
2nd 5211/3262 Printer Attachment (#1110)		X	X				
3370 Disk Storage (#1130/#1132)				X			
3203-5 as 1st printer (#1135) (Two 3203-5s may be attached via this feature)				X			
3203-5 as 2nd printer (#1136) (Required only when 5211 or 3262 is attached as 1st printer)		X	X	X			
5424 MFCU (#1220/#1221)		X	X				
Communication Attachment, 1st (#1501)	X		X				
Communication Attachment, 2nd (#1502) *					X	X	
Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402)	X		X				
Workstation Controller, 3rd (#5303) * or Workstation Controller - Extended, 3rd (#5403)					X	X	
Workstation Controller, 4th (#5304) * or Workstation Controller - Extended, 4th (#5404)					X		X
3411 Magnetic Tape (#7960) and/or 3430 Magnetic Tape (#7970)		X	X	X			

* Requires mdls XX3 through XX6, XXA and XXB (includes expansion enclosure)

Local Workstation Controller

Workstation Controller: Provides direct local attachment of supported workstation devices to System/38. One Workstation Controller is standard on System/38 mdls 3XX, 4XX, 5XX, and 7XX. It provides eight ports for attaching workstations (keyboard displays and/or printers) directly to the system in any combination. These eight ports permit attachment of up to 12 devices with twinaxial cabling using the Cable-Thru feature on the 5250 devices. With the selection of an appropriate expansion feature, the Workstation Controller will support a maximum of 20 devices. The System/38 can be featured with three additional Workstation Controllers. With a total of four Workstation Controllers and the appropriate expansion features, a maximum of 80 devices can be attached.

Devices supported via the Workstation Controller are:

Displays:
- 5251 Display Station, mdl 11 (1,920 characters)
- 5251 Display Station, mdl 999 (1,920 characters)
- 5291 Display Station, mdl 1 (1,920 characters)
- 5292 Color Display Station, mdl 1 or 2 (1,920 characters)
- 5150 Personal Computer (with Display Station Emulation Adapter and the 5250 Emulation program)

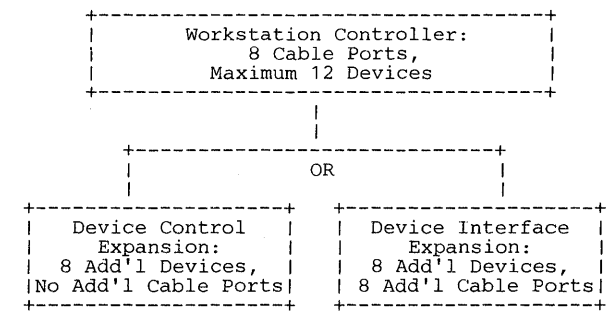
Printers:
- 5219 Printer, mdl D01 (40 cps)
- 5219 Printer, mdl D02 (60 cps)
- 5224 Printer, mdls 1 and 2 (matrix line printer)
- 5225 Printer, mdls 1, 2, 3, and 4 (matrix line printer)
- 5256 Printer, mdl 1 (40 cps)
- 5256 Printer, mdl 2 (80 cps)
- 5256 Printer, mdl 3 (120 cps)

The Workstation Controller contains translation tables that map a keyboard configuration to data that is passed to the host system and/or workstation. Each Workstation Controller can support any two combinations (keyboard/character sets) from the following list:

Character Set	Keyboard Type
Standard 96-Character Set	83-Key
Standard 96-Character Set	66-Key (both styles)
Multinational 188-Character Set	83-Key
Multinational 188-Character Set	66-Key (both styles)

The Workstation Controller provides support for device attachment cabling via 5250 twinaxial cable. Twinaxial cable provides for multipoint cable connections at distances up to 1,524 meters (5,000 feet). Up to seven devices may be attached to a single port via twinaxial cable. The Right-to-Left Display RPQ (8T0358) provides the capability of scanning characters in the right-to-left sequence for those countries where this support is a language requirement. This RPQ is not available on the Workstation Controller - Extended at this time. For attachment of additional devices, see Device Interface Expansion (#5321, #5322, #5323, #5324), Device Control Expansion (#5331, #5332, #5333, #5334), Workstation Controller, 2nd (#5302), Workstation Controller, 3rd (#5303), and Workstation Controller, 4th (#5304).

Workstation Controller Configuration



- Maximum of 20 devices per controller
- Maximum of four Workstation Controllers
- Maximum of 80 devices per system
- Up to seven devices may be attached to a single cable port via twinaxial cabling using device Cable-Thru feature

Note: The 5252 mdl 1 is counted as two devices.

Workstation Controller, 2nd (#5302): Provides direct local attachment of additional devices (5219 mdls D01 and D02, 5224 mdls 1 and 2, 5225 mdls 1, 2, 3, and 4, 5251 mdls 1, 11, and 999, 5252 mdl 1, 5256 mdls 1, 2, and 3, 5291 mdl 1, 5292 mdl 1 or 2, and 5150 Personal Computer), in any combination. This feature (#5302), with expansion features described below, extends the system maximum of locally attached devices to 40. #5302 includes basic control and eight cable interfaces for attaching additional workstations. Up to 12 workstations can be attached using the Cable-Thru features on the devices.

Cabling provisions are the same as the basic Workstation Controller described above. For further expansion of devices (maximum of 20 for this controller), see Device Interface Expansion (#5322), or Device Control Expansion (#5332). Programming support for the attached devices is provided by the Control Program Facility Licensed Program. (**Note:** The 5252 represents two devices.) **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Workstation Controller, 3rd (#5303): Provides the same function as Workstation Controller, 2nd (#5302). This feature (#5303), with Device Interface Expansion (#5323) or Device Control Expansion (#5333), extends the system maximum of locally attached devices to 60. This feature is installed in the System Unit Expansion Enclosure, therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5302. Also see "Processor Unit Expansion Feature Configurator".

Workstation Controller, 4th (#5304): Provides the same function as Workstation Controller, 2nd (#5302). This feature (#5304), with Device Interface Expansion (#5324) or Device Control Expansion (#5334), extends the system maximum of locally attached devices to 80. This feature is installed in the System Unit Expansion Enclosure; therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5303. Also see "Processor Unit Expansion Feature Configurator".

Device Interface Expansion (#5321, #5322, #5323, #5324): Provides the necessary control and eight twinaxial cable connectors for

5381 System Unit (cont'd)

attachment of eight additional devices (5219 mdls D01 and D02; 5224 mdls 1 and 2; 5225 mdls 1, 2, 3, and 4; 5251 mdls 1, 11, and 999; 5252 mdl 1; 5256 mdls 1, 2, and 3; 5291 mdl 1; and 5292 mdl 1 or 2) in any combination. This feature is always installed in conjunction with a Workstation Controller.

#5321 - for 1st Workstation Controller (component of base system)
#5322 - for Workstation Controller, 2nd (#5302)
#5323 - for Workstation Controller, 3rd (#5303)
#5324 - for Workstation Controller, 4th (#5304)

Refer to sales pages for information pertaining to device features, accessories, and cabling requirements. (**Note:** The 5252 represents two devices.) **Limitations:** Cannot be installed with Device Control Expansion (#5331, #5332, #5333, #5334) on the same Workstation Controller. #5321 cannot be installed on a mdl 8. **Maximum:** One per Workstation Controller. **Field Installation:** Yes. **Prerequisites:** #5302 for #5322, etc.

Device Control Expansion (#5331, #5332, #5333, #5334): Permits Workstation Controllers to support up to eight additional devices (5219 mdls D01 and D02; 5224 mdls 1 and 2; 5225 mdls 1, 2, 3, and 4; 5251 mdls 1, 11, and 999; 5252 mdl 1; 5256 mdls 1, 2, and 3; 5291 mdl 1; and 5292 mdl 1 or 2). This feature does not provide any additional cable connectors, but provides the necessary control storage to support additional devices attached via the cable connectors provided by Workstation Controllers.

#5331 - for 1st Workstation Controller (component of base system)
#5332 - for Workstation Controller, 2nd (#5302)
#5333 - for Workstation Controller, 3rd (#5303)
#5334 - for Workstation Controller, 4th (#5304)

See M5219, 5224, 5225, 5251, 5252, 5256, 5291, or 5292 pages for selection of appropriate features which permit multidropping of devices on twinaxial cable facilities. (**Note:** The 5252 represents two devices.) **Limitations:** Cannot be installed with Device Interface Expansion (#5321, #5322, #5323, #5324) on the same Workstation Controller. #5331 cannot be installed on a mdl 8. **Maximum:** One per Workstation Controller. **Field Installation:** Yes. **Prerequisites:** #5302 for #5332, etc.

Local Workstation Controller - Extended

Workstation Controller - Extended: Provides direct local attachment of 5250 Information Display System devices and the 5219 Printer (see below for list of supported devices and mdls) to System/38. An orderable feature on all mdls of System/38. Each controller provides eight ports for attaching workstations (keyboard displays and/or printers) directly to the system in any combination.these eight ports permit attachment of up to 32 devices with twinaxial cabling using the Cable-Thru feature on 5250 devices. The System/38 with mdls 3XX, 4XX, 5XX, and 7XX, can be featured with three Workstation Controller - Extended features, along with the standard Workstation Controller in the base (position 1), providing up to a maximum attachment of 116 local devices. The System/38 mdl 8 can be featured with four Workstation Controller - Extended features, including the standard Workstation Controller -Extended in the base (position 1), providing up to a maximum of 128 local devices.

Devices supported via the Workstation Controller - Extended are:

Displays:
- 5251 Display Station, mdl 11 (1,920 characters)
- 5251 Display Station, mdl 999 (1,920 characters)
- 5291 Display Station, mdl 1 (1,920 characters)
- 5292 Color Display Station, mdl 1 or 2 (1,920 characters)
- 5150 Personal Computer (with Display Station Emulation Adapter and the 5250 Emulation program)

Printers:
- 5219 Printer, mdl D01 (40 cps)
- 5219 Printer, mdl D02 (60 cps)
- 5224 Printer, mdl 1 (140 lpm)
- 5224 Printer, mdl 2 (240 lpm)
- 5225 Printer, mdl 1 (280 lpm)
- 5225 Printer, mdl 2 (400 lpm)
- 5225 Printer, mdl 3 (490 lpm)
- 5225 Printer, mdl 4 (560 lpm)
- 5256 Printer, mdl 1 (40 cps)
- 5256 Printer, mdl 2 (80 cps)
- 5256 Printer, mdl 3 (120 cps)

The Workstation Controller - Extended supports the same devices and has the same translate capabilities as the base Workstation Controller, with the exception of the 960-character displays which the Workstation Controller - Extended does not support. Each Workstation Controller - Extended can support any two combinations (keyboard/character sets) from the following list:

Character Set	Keyboard Type
Standard 96-Character Set	83-Key
Standard 96-Character Set	66-Key (both styles)
Multinational 188-Character Set	83-Key
Multinational 188-Character Set	66-Key (both styles)

The Workstation Controller -Extended provides for device attachment cabling via 5250 twinaxial cable. Twinaxial cable provides for multipoint cable connections at distances up to 1,524 meters (5,000 feet). Up to seven devices may be attached to a single port via twinaxial cable, however the total number of devices per adapter must not exceed 32.

Workstation Controller - Extended, 2nd (#5402): Provides local attachment of an additional 32 devices for a maximum total of 52 devices (for mdls 3, 4, 5, and 7) or 64 devices (for mdl 8). **Limitations:** Mutually exclusive with base Workstation Controller , Second. **Maximum:** One. **Prerequisites:** Base Workstation Controller or base Workstation Controller - Extended.

Workstation Controller - Extended, 3rd (#5403): Provides local attachment of an additional 32 devices and extends the system maximum of locally attached devices to 84 (for mdls 3, 4, 5, and 7) and 96 (for mdl 8). This feature is installed in the System Unit Expansion Enclosure, therefore it can only be installed on System/38 mdls having the Processor Unit Expansion Feature (mdls XX3 through XX6, XXA, and XXB). **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. Mutually exclusive with base Workstation Controller, Third. **Maximum:** One. **Prerequisites:** #5402 or #5302 (if presently installed). See also "Processor Unit Expansion Feature Configurator".

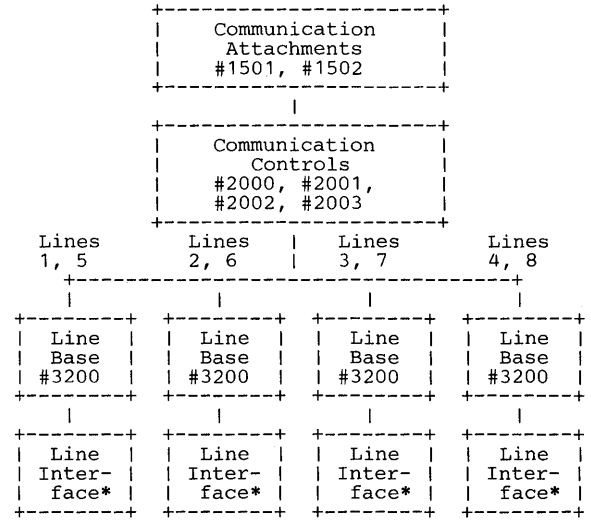
Workstation Controller - Extended, 4th (#5404): Provides local attachment of an additional 32 devices and extends the system maximum of locally attached devices to 116 (for mdls 3, 4, 5, and 7) and 128 (for mdl 8). This feature is installed in the System Unit Expansion Enclosure, therefore it can only be installed on System/38 mdls having the System Unit Expansion Enclosure (mdls XX3 through XX6, XXA, and XXB). These system mdls are identified in the 5381 System Unit description with an asterisk(*) by the mdl numbers. **Limitations:** Cannot be installed on System/38 mdls not having the System Unit Expansion Enclosure (mdls XX1 and XX2). Mutually exclusive with base Workstation Controller, Fourth. **Maximum:** One. **Prerequisites:** #5403 or #5303. See "Processor Unit Expansion Feature Configurator".

Communications

Communications capability is provided by a multi-line facility integrated in the 5381 System Unit. It is made up of several features to allow flexibility to best satisfy various communication application requirements. There are four basic building blocks (features), each being one or more features which can be selected to provide the function desired (see Communications Configurator diagram below). These are:

- Communication Attachments (#1501, #1502)
- Communication Controls (#2000, #2001, #2002, #2003)
- Line Base(s) (#3200)
- Line Interfaces (#3701, etc.; see below)

Communications Configurator



* See Table A

Following is a discussion of the communications hardware support: (1) common to both BSC and SDLC, (2) specific to BSC support, (3) specific to SDLC support, and (4) for local communications connections.

1. Support Common To Both BSC And SDLC: Communication Attachments 1st (#1501) and 2nd (#1502), when featured with appropriate sub-features, will allow the System/38 to communicate on

5381 System Unit (cont'd)

nonswitched lines up to 56K bps and on switched lines at speeds up to 9600 bps. A maximum of eight lines can be featured and each line operates independently under System/38 CPF program control. The System/38 operates as a control station on a multipoint line for the 5251 mdl 2 or 12 and as a secondary SDLC station to a host S/370. For BSC, the System/38 operates on a point-to-point line (switched or nonswitched) and as a tributary (secondary) on a multipoint network.

Each communications line will operate in half-duplex mode over dial (switched network) facilities, and half-duplex mode over nonswitched (or equivalent private) communications lines which may be duplex or half-duplex facilities. Units at each termination, or drop point, of a communications line to which the System/38 is attached must use the same clocking source (modem or business machine) and must be set to operate at the same transmission rate and to use the same transmission code. (No special features required for: clocking, transmission code, or line speed.) Compatible modems must be used at all terminations on a network.

System/38 supports, as a basic capability, manual dial, manual, or auto-answer (where the attached modem supports this capability) operation.

2. Support Specific To BSC Operations: The Communication Attachment features, when appropriately featured, allow operation (by line) in BSC mode as requested by the System/38 CPF program.

In conjunction with stored program control, these features permit the System/38 to function on switched or nonswitched point-to-point and multipoint lines communicating in binary synchronous mode. System/38 can function as a tributary when connected to a multipoint network controlled by a Series/1, System/370, 30XX, or 43XX, and System/3 with CCP. In BSC mode, communications attachment can be with:

- A System/3 equipped with #2074, #2084, or #2094.
- A System/23 equipped with #2550.
- A System/32 equipped with #2074.
- A System/34 equipped with #2500, #3500, or #4500.
- A System/36 equipped with #2500 or #4500.
- Another System/38 equipped with #1501 or #1502.
- A S/370 via an integrated communications adapter, a 4331 Communications Adapter, a 2701 Data Adapter Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
- A Series/1 equipped with BSCA (#2074, #2075, #2093, or #2094) (as a System/3).
- A 3741 Data Station mdl 2 or 4.
- A 5110/5120 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
- A 5231 mdl 2 equipped with BSCA (#2074) (as a 3741 mdl 2 or 4 in transmit mode only).
- A 5265 communicating mdl (point-to-point, batch transmission only).
- A 5280 Distributed Data System equipped with #2500.
- A 5520 Administrative System.
- An OS/6 Office System/6.
- A 6670 Information Distributor.
- A 6640 Document Printer.
- A 6580 Displaywriter System.
- A 6240 Communicating Magnetic Card Typewriter.
- A CMCII Communicating Magnetic Card Typewriter II.

See the System/38 programming pages for more description of program support provided for this feature.

ASCII, EBCDIC, or EBCDIC Text Transparency are standard support. Transmission codes are selectable via System/38 CPF command parameters.

Note: 3270 emulation requires Workstation Controller EC 841441 on System/38s shipped prior to Jan. 1983.

3. Support Specific To SDLC Operation: The Communication Attachment features, when featured with appropriate sub-features, will allow operation in SDLC mode as requested via System/38 CPF command parameters.

The System/38 provides SDLC communication support for multipoint line control when the 5251 mdl 2 or 12 display stations are attached. With these features, the System/38 can operate as an SDLC secondary, switched or nonswitched, attached to a host S/370 with IMS/VS and CICS/VS applications. See the System/38 programming pages for more detail of the program support provided for SNA/SDLC operations.

4. Local Communications Attachments:

- Local DDS Attachment Feature (#5650)

  Utilizing the local DDS Adapter cable described in "Accessories", a System/38 with a DDSA interface can be connected locally to another System/38 or to a System/34 with a DDSA interface. Using this connection and the BSC support, the systems can communicate at nominal line speeds of 2400, 4800, 9600, or 56K bps. Connection is point-to-point only.

  Restrictions:

  - When operating at 56K bps, only one high-speed line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each Communication Attachment). This feature cannot be installed on a Communication Attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.
  - Maximum distance between systems is approximately 24 meters (80 feet with 40-foot cable on each system).
  - Maximum block size for System/38 is 8K bytes; for System/34, 4K bytes.

- Local High-Speed Attachment Feature (#5680)

  This feature permits System/38 with CPF to be locally connected to a Series/1 which has EDX or RPS and RPQ D02349 (Direct BSC Attachment) and RPQ D02492 (Direct BSC Attachment Cable) installed. Using the BSC support, data can be transferred between the systems at a nominal line speed of 56K bps. Connection is point-to-point only and requires two cables (System/38 Cable Group Number 3422 and the Series/1 RPQ cable listed above).

  Restrictions:

  - When operating at 56K bps, only one line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot be run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each Communication Attachment). This feature cannot be installed on a Communication Attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.
  - Maximum cabling distance with this feature is approximately 122 meters (400 feet), including Series/1 cable length.
  - Maximum block size is 8K bytes.

5. Remote Communications Attachments:

- High-Speed Line Remote Attachment (#5660):

  This feature allows System/38 with CPF to communicate locally or remotely with a 3705 Communications Controller at nominal speeds of 57.6K bps (locally) or 56K bps (remotely), communicate remotely with a 4331 Communications Adapter or another System/38 at nominal speed up to 56K bps . For the local attachment, two cables are required, the System/38 cable (Cable Group Number 3423) and the 3705 Local Attach Cable. The attachment provides local half-duplex, point-to-point communication to a host system (S/370, 30XX, and 434X), and requires #5660 on System/38 and 3705 Line Set, Type 1W (#4727) and 3705 Business Machine Clock (#4651) at 57.6K bps ... specify **#9622**. For the remote connection, the System/38

  cable attaches to a modem and can communicate with the host system at rates up to 56K bps with the clocking provided by the modem. The 3705 requires Line Set, Type 1S (#4720). The 4331 Communications Adapter requires High-Speed Modem Adapter (#4720), specify **#9501**. System/38 requires #5660.

  Restrictions:

  - When operating at line speeds greater than 9600 bps, only one line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot be run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each communications attachment). This feature cannot be installed on a communications attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.

5381 System Unit (cont'd)

- Maximum cabling distance with this feature to a local 3705 attachment is approximately 58 meters (190 feet, 150 feet for 3705 cable and 40 feet for System/38 cable).
- Maximum block size is 8K bytes for BSC and 32K bytes for SNA/SDLC.

Limitations: Use discretion when proposing high-speed lines. Depending upon the system mdl, high-speed lines (when operating at 56K bps) can require a significant portion of the CPU resources. A dedicated mdl 3 operating two high-speed lines concurrently, using 512-byte blocks and including all data base operations, could require nearly 100% of the CPU resources (depending upon the partner system and transmission parameters). A mdl 5 doing the same job might only require 60% of its CPU resources. A mdl 7 would use less than 30% of its CPU. Increasing the block size to 2K bytes in each case will further reduce CPU utilization (by as much as 35% in some instances). As with any added application, high-speed lines operating concurrently with other applications can result in degradation of data throughput or response times.

Recommendations:

- When operating these features at 56K bps, it is recommended that the user transmit in large blocks (e.g., 2K bytes) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

Communication Attachment, 1st (#1501): Provides the basic control and common circuits for direct attachment of up to four communication lines. This feature, in conjunction with the appropriate sub-features, allows System/38 to communicate on four lines concurrently, each operating at data rates up to 9600 bps utilizing either SDLC or BSC data link control or operating one line at 56K bps (nominal). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Communication Attachment, 2nd (#1502): Provides the basic control and common circuits for a second group of four communication lines. This feature, in conjunction with the appropriate sub-features, allows System/38 to communicate on four lines concurrently, using the SDLC or BSC data link control. Each line can operate at data rates of 600 to 9600 bps or operate one line at 56K bps (nominal). This feature is installed in the System Unit Expansion Enclosure; therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1501. See "Processor Unit Expansion Feature Configurator".

Communication Control, SDLC (#2000, #2002): Provides the basic control storage and common circuits for SDLC data link control. When Communication Attachment, 1st (#1501) is featured with Communication Control, SDLC (#2000) all four attachable lines will support SDLC data link control. Communication Control, SDLC (#2002) provides the same SDLC data link control function for Communication Attachment, 2nd (#1502). **Limitations:** Supports SDLC only. **Maximum:** One per Communication Attachment. **Field Installation:** Yes. **Prerequisites:** #1501 for #2000 and #1502 for #2002.

Communication Control, SDLC/BSC (#2001, #2003): Provides the basic control storage and common circuits for both SDLC and BSC data link control. When Communication Attachment, 1st (#1501) or Communication Attachment, 2nd (#1502) is featured with Communication Control, SDLC/BSC (#2001 or #2003), any line interface can be optioned via CPF parameter for either SDLC or BSC. This feature provides SDLC support for point-to-point switched or nonswitched and also multipoint control. The BSC support is for point-to-point switched or nonswitched and multipoint tributary attachment. BSC multipoint control is not supported. **Maximum:** One per Communication Attachment feature. **Field Installation:** Yes. **Prerequisites:** #1501 for #2001 and #1502 for #2003.

Line Base (#3200): This feature provides the interface and control between the line interface features and the Communication Control features. This feature is required for each line appearance and provides the necessary control required for each of the unique line interface types. Line interfaces supported via this feature are: EIA (#3701), DDSA (#5650, #5651), 1200 bps Integrated Modems (#5500, #5501, #5502, #5508), 2400 bps Integrated Modems (#5640, #5641), 4800 bps Integrated Modems (#5740, #5741), High-Speed Line Remote Attachment (#5660), Local High-Speed Attachment (#5680), and Auto-Call Adapter (#5760). **Limitations:** None. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #2000, #2001, #2002, or #2003. Line Position 1 (**#9001**) must be occupied for Communication Attachment, 1st (#1501), and Line Position 5 (**#9005**) must be occupied for Communication Attachment, 2nd (#1502) if installed. **Specify:** Line position code for installation (see Table A).

Line Interfaces

One of the following line interface features must be ordered for each Line Base depending on the type of communication facility and modem to be used.

EIA Interface (#3701): Provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed on same line position with any other line interface type. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E).

1200 bps Integrated Modem (#5500, #5501, #5502, #5508): A modem for data transmission at 1200 bps over switched or nonswitched facilities. Half-speed operation at 600 bps is optional via a Control Program Facility command. Available in four different versions: #5500 - nonswitched, #5501 - switched with auto-answer, #5502 - switched with manual answer, and #5508 - nonswitched (primary mode) with switched network backup auto-answer capability. The nonswitched version (#5500) provides for a cable attachment directly to a non-switched facility, Type 3002. The switched with auto-answer versions (#5501 and #5508) provide for a cable attachment to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The switched network manual answer version (#5502) provides for a cable attachment to FCC-registered protective circuitry of the CDT Type (or equivalent) provided by the user. The devices communicating with System/38 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E).

2400 bps Integrated Modem, Nonswitched (#5640): This integrated modem operates in half-duplex mode over normal quality 4-wire, nonswitched duplex communications facilities at speeds of 2400/1200 bps. The following operational modes are selectable by specify codes in Table A. These codes determine the network operational mode of the modem and also determine how the speed selection in the modem will function. These modes are: (1) Multipoint Control -- Operates as control station in a multipoint network and also provides for "local speed control" via a Control Program Facility command. Equalization to the line is automatic and adaptive to the received signal. (2) Multipoint Tributary -- Operates as a tributary station in a multipoint network and provides for "remote speed control" that will automatically adjust its data rate to the rate it is receiving. Equalization to the line is adaptive to its received signal. (3) Point-to-Point -- For point-to-point operation and provides "local speed control" via a Control Program Facility command. Point-to-point can also be configured for "remote speed control" by the Customer Engineer at time of installation. Equalization to the line is adaptive to its received signal. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5640) will operate with System/38-supported communication products equipped with the 3863, mdl 1 modem or products featured with integrated modem compatible with 3863, mdl 1.

2400 bps Integrated Modem, Switched (#5641): This integrated modem operates in half-duplex mode over 2-wire, switched communications facilities at speeds of 2400/1200 bps. Speed selection is under local or remote operator control. Manual originate, manual answer, and auto-answer procedures are used to establish connections. Equalization to the line is automatic and is performed each time a switched connection is established. An external cable 6.3 meters (21 feet) in length for attaching to the public switched network is supplied with this feature. No cable order required. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5641) will operate with System/38-supported communication products equipped with the 3863, mdl 2 modem or products featured with integrated modem compatible with 3863, mdl 2.

The Integrated Protective Coupler (FCC registration requirement for direct connection to the public switched network) is included with this feature.

5381 System Unit (cont'd)

Digital Data Service Adapter (DDSA) (#5650, #5651): An integrated data link adapter for data transmission over the AT&T nonswitched Data-Phone® Digital Service network and for local connections between System/38 and another System/38 or a System/34. #5650 provides local (point-to-point only) and remote (point-to-point and multipoint control) support and operates at nominal speeds of 2400 bps, 4800 bps, 9600 bps or 56K bps (multipoint control is not supported at 56K bps). For remote connections, the DDSA interfaces via a DDS adapter cable to a DDS Channel Service Unit (not a DDS Data Service Unit). For local connections, the DDS Adapter Connector accessory cable provides the interface between the DDS Adapter cables on the two systems. #5651 provides remote multipoint tributary support at speeds of 2400 bps, 4800 bps, and 9600 bps. **Limitations:** Cannot be installed on same line position with any other line interface type. Cannot be installed on same attachment with #5660 or #5680. **Maximum:** One per line position; one per attachment at 56K bps. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Recommendations:** When operating this feature locally at 56K bps, it is recommended that the user transmit in large blocks (2K bytes BSC, 1792 bytes SDLC) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

® Data-Phone is a registered trademark of AT&T.

High-Speed Line Remote Attachment (#5660): This feature allows System/38 with CPF to communicate locally or remotely with a 3705 Communications Controller at nominal speeds of 57.6K bps (locally) or 56K bps (remotely), communicate remotely with a 4331 Communications Adapter or another System/38 at nominal speeds up to 56K bps . **Limitations:** Cannot be installed on same line position with any other interface type. Cannot be installed on same attachment with another high-speed line feature (#5650 at 56K bps or #5660 or #5680). **Maximum:** One per communications attachment, two per system. **Field Installation:** Yes. **Prerequisites:** System/38 requires #3200, #2001 or #2003, and CPF at Release 5.0 or later. The 3705-II or 3705-80 must have #4727, and #4651 at 57.6K bps, specify **#9622** for local connection or Line Set, Type 1S (#4720) for remote connection. The 4331 Communications Adapter requires High-Speed Modem Adapter (#4720) and **#9501**. The System/38 requires #5660. For local connections two cables are required, the System/38 cable and the 3705 local attachment cable. For remote connections, the System/38 and the 3705 must be connected to compatible modems. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cabling information. **Specify:** One code must be specified from each of the following tables: Line Bases and Line Interfaces Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), and Line Protocol (Table D). **Recommendations:** When operating #5660 at 56K bps (57.6K bps locally), it is recommended that the user transmit in large blocks of uncompressed EBCDIC data to optimize CPU utilization and line throughput. For SDLC protocol, the maximum pacing count allowed by the 3705 NCP should be specified.

Local High-Speed Attachment (#5680): Permits a Series/1 to be locally attached to a System/38 at a nominal line speed of 56K bps. Communications is point-to-point BSC and program-to-program. **Limitations:** Cannot be installed on same line position with any other interface type. Cannot be installed on same attachment with another high-speed line feature (#5650 at 56K bps or #5660 or #5680). **Maximum:** One per Communication Attachment, two per system. **Field Installation:** Yes. **Prerequisites:** System/38 requires Line Base (#3200), SDLC/BSC controller feature (#2001 or #2003) and their prerequisites, and CPF at Release 4.0 or later. Series/1 must have EDX or RPS and RPQ D02349 (Direct BSC Attachment) and RPQ D02492 (Direct BSC Attachment Cable) installed. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), and Line Protocol (Table D). **Recommendations:** When operating this feature at 56K bps, it is recommended that the user transmit in large blocks (e.g., 2K bytes) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

4800 bps Integrated Modem, Nonswitched (#5740): This integrated modem operates in half-duplex mode over normal quality 4-wire, nonswitched duplex communications facilities at speeds of 4800/2400 bps. The following operational modes are selectable by specify codes in Table A. These codes determine the network operational mode of the modem and also determine how the speed selection in the modem will function. These modes are: (1) Multipoint Control -- Operates as control station in a multipoint network and also provides for "local speed control" via a Control Program Facility command. Equalization to the line is automatic and adaptive to the received signal. (2) Multipoint Tributary -- Operates as a tributary station in a multipoint network and provides for "remote speed control" that will automatically adjust its data rate to the rate it is receiving. Equalization to the line is adaptive to its received signal. (3) Point-to-Point -- For point-to-point operation and provides "local speed control" via a Control Program Facility command. Point-to-point can also be configured for "remote speed control" by the Customer Engineer at the time of installation. Equalization to the line is adaptive to its received signal. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5740) will operate with System/38-supported communication products equipped with the 3864, mdl 1 modem or products featured with integrated modem compatible with 3864, mdl 1.

4800 bps Integrated Modem, Switched (#5741): This integrated modem operates in half-duplex mode over 2-wire switched communications facilities at speeds of 4800/2400 bps. Speed selection is under local or remote operator control. Manual originate, manual answer, and auto-answer procedures are used to establish connections. Equalization is automatic and is performed each time a switched connection is established. An external cable 6.3 meters (21 feet) in length for attaching to the public switched network is supplied with this feature. No cable order required. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5741) will operate with System/38-supported communication products equipped with the 3864, mdl 2 modem or products featured with integrated modems compatible with 3864, mdl 2. The Integrated Protective Coupler (FCC requirement for direct connection to the public switched network) is included with this feature.

Auto-Call Adapter (#5760): Permits the System/38, when attached to a switched network facility via an appropriate modem and auto-call unit, to initiate a data link connection to a remote station. Provides automatic dialing under program control. An Auto-Call Adapter (#5760) must always be installed in conjunction with an EIA Interface (#3701) for each line to automatically originate calls on switched network facilities. Each line featured with Auto-Call Adapter (#5760) takes two line positions, thereby reducing the maximum number of lines which can be supported. **Limitations:** Cannot be installed on same line position with any other line interface type. Installable in Line Position 2, 3, 4, 6, 7, or 8 only. **Maximum:** Two per Communication Attachment feature (#1501 or #1502). Maximum of four per system. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), and Device Attachment Codes (Table C). The line position code specified must be the next higher order position relative to the modem it is associated with.

5381 System Unit (cont'd)

Table A: Line Bases and Line Interface Codes

Line Position	1	2	3	4	5	6	7	8
Line Base (#3200)	#9001	#9002	#9003	#9004	#9005	#9006	#9007	#9008
Line Interface Type:								
EIA (#3701)	#9101	#9102	#9103	#9104	#9105	#9106	#9107	#9108
1200 bps Integrated Modems:								
Nonswitched (#5500)	#9111	#9112	#9113	#9114	#9115	#9116	#9117	#9118
Switched - Auto-Answer (#5501)	#9121	#9122	#9123	#9124	#9125	#9126	#9127	#9128
Switched - Manual Answer (#5502)	#9131	#9132	#9133	#9134	#9135	#9136	#9137	#9138
Sw Net Backup - Auto-Ans (#5508)	#9141	#9142	#9143	#9144	#9145	#9146	#9147	#9148
2400 bps Integrated Modems:								
Nonswitched (#5640)								
Multipoint Control	#9601	#9602	#9603	#9604	#9605	#9606	#9607	#9608
Multipoint Tributary	#9611	#9612	#9613	#9614	#9615	#9616	#9617	#9618
Point-to-Point	#9621	#9622	#9623	#9624	#9625	#9626	#9627	#9628
Switched (#5641)	#9631	#9632	#9633	#9634	#9635	#9636	#9637	#9638
4800 bps Integrated Modems:								
Nonswitched (#5740)								
Multipoint Control	#9641	#9642	#9643	#9644	#9645	#9646	#9647	#9648
Multipoint Tributary	#9651	#9652	#9653	#9654	#9655	#9656	#9657	#9658
Point-to-Point	#9661	#9662	#9663	#9664	#9665	#9666	#9667	#9668
Switched (#5741)	#9671	#9672	#9673	#9674	#9675	#9676	#9677	#9678
DDSA - Pt-to-Pt & Multpt Ctrl (#5650)	#9151	#9152	#9153	#9154	#9155	#9156	#9157	#9158
DDSA - Multipoint Tributary (#5651)	#9161	#9162	#9163	#9164	#9165	#9166	#9167	#9168
Auto-Call Adapter (#5760)	N/A	#9172	#9173	#9174	N/A	#9176	#9177	#9178
Local High-Speed Attachment (#5680)	#9181	#9182	#9183	#9184	#9185	#9186	#9187	#9188
High-Speed Line Remote Attachment (#5660)	#9191	#9192	#9193	#9194	#9195	#9196	#9197	#9198

Table B: Line Speed Codes

Line Position	1	2	3	4	5	6	7	8
Line Speed:								
1200 bps	#9201	#9202	#9203	#9204	#9205	#9206	#9207	#9208
2000 bps	#9211	#9212	#9213	#9214	#9215	#9216	#9217	#9218
2400 bps	#9221	#9222	#9223	#9224	#9225	#9226	#9227	#9228
4800 bps	#9231	#9232	#9233	#9234	#9235	#9236	#9237	#9238
7200 bps	#9241	#9242	#9243	#9244	#9245	#9246	#9247	#9248
9600 bps	#9251	#9252	#9253	#9254	#9255	#9256	#9257	#9258
48K bps	#9271	#9272	#9273	#9274	#9275	#9276	#9277	#9278
56K bps	#9281	#9282	#9283	#9284	#9285	#9286	#9287	#9288

5381 System Unit (cont'd)

Table C: Device Attachment Codes

Line Position	1	2	3	4	5	6	7	8
Series/1	#9351	#9352	#9353	#9354	#9355	#9356	#9357	#9358
System/3	#9311	#9312	#9313	#9314	#9315	#9316	#9317	#9318
System/23	#9441	#9442	#9443	#9444	#9445	#9446	#9447	#9448
System/32	#9321	#9322	#9323	#9324	#9325	#9326	#9327	#9328
System/34	#9331	#9332	#9333	#9334	#9335	#9336	#9337	#9338
System/36	#9331	#9332	#9333	#9334	#9335	#9336	#9337	#9338
System/38	#9341	#9342	#9343	#9344	#9345	#9346	#9347	#9348
System/370	#9301	#9302	#9303	#9304	#9305	#9306	#9307	#9308
3741	#9361	#9362	#9363	#9364	#9365	#9366	#9367	#9368
3776/3777	#9501	#9502	#9503	#9504	#9505	#9506	#9507	#9508
5110/5120	#9421	#9422	#9423	#9424	#9425	#9426	#9427	#9428
5230	#9371	#9372	#9373	#9374	#9375	#9376	#9377	#9378
5250	#9381	#9382	#9383	#9384	#9385	#9386	#9387	#9388
5260	#9391	#9392	#9393	#9394	#9395	#9396	#9397	#9398
5280	#9431	#9432	#9433	#9434	#9435	#9436	#9437	#9438
5520	#9451	#9452	#9453	#9454	#9455	#9456	#9457	#9458
6240	#9491	#9492	#9493	#9494	#9495	#9496	#9497	#9498
6580	#9481	#9482	#9483	#9484	#9485	#9486	#9487	#9488
6670	#9461	#9462	#9463	#9464	#9465	#9466	#9467	#9468
OS/6	#9471	#9472	#9473	#9474	#9475	#9476	#9477	#9478
Other IBM	#9401	#9402	#9403	#9404	#9405	#9406	#9407	#9408
Other Non-IBM	#9411	#9412	#9413	#9414	#9415	#9416	#9417	#9418

Table D: Line Protocol

Line Position	1	2	3	4	5	6	7	8
BSC	#9701	#9702	#9703	#9704	#9705	#9706	#9707	#9708
SDLC	#9711	#9712	#9713	#9714	#9715	#9716	#9717	#9718
Both (BSC and SDLC)	#9721	#9722	#9723	#9724	#9725	#9726	#9727	#9728

Table E: Host Application

Line Position	1	2	3	4	5	6	7	8
CICS/VS	#9741	#9742	#9743	#9744	#9745	#9746	#9747	#9748
IMS/VS	#9751	#9752	#9753	#9754	#9755	#9756	#9757	#9758
Other	#9761	#9762	#9763	#9764	#9765	#9766	#9767	#9768

Communications Facilities: See M2700 pages for communications facility requirements for these features.

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the System/38 communication attachment line interface and the external modem. **Prerequisites:** #3701.

IBM Modems: Each line position featured with EIA Interface (#3701) requires an external modem which meets the requirements desired. IBM modems which can be attached to System/38 via EIA Interface (#3701) are as follows:

Data Rate (bps)	Modem
2400	3863
4800	3864
9600	3865
2400/1200	3872

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communication capabilities, and product utilization.

MODEL CONVERSIONS

The upgrade purchase prices for model changes may be greater than purchase price differentials. The customer should carefully evaluate his future requirements when purchasing a system.

Replaced parts from any model upgrade become the property of IBM.

Note: Refer to *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for physical installation requirements.

ACCESSORIES

Keylock Keys: The 5381 with Power Keylock (#3210) is shipped with two keys. Additional keys (P/N 2546418) may be purchased from IBM. (Vendor will supply additional keys only to the original purchaser.) Key identification number must accompany each order. Allow 6-8 weeks for delivery.

Cables: To order cables see *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cable order requirements.

DDS Adapter Connector: A specially designed connector which allows the cables from a System/38 DDS Adapter to be connected to the cables from another DDS Adapter. This provides for the local connection of two devices without the use of modems or channel

5381 System Unit (cont'd)

service units. This is a purchase-only item. Allow 6-8 weeks for delivery. **Note:** Only one of these connectors is required per local connection. If already ordered with the mating adapter, do not order a second one. **Maximum:** One per DDS Adapter. **Specify:** P/N 4236967.

SUPPLIES

Diskettes And Diskette Magazines: For diskettes and diskette magazines, contact IBM. Two diskette magazines are required for installation of the Control Program Facility Licensed Program. 2D diskettes are required for Control Program Facility (CPF) save/restore operations. Diskette magazines and 2D diskettes are not included with the system. They may be ordered from IBM. 2D Diskette - P/N 1669045, Diskette magazine - P/N 2462521.

5412 PROCESSING UNIT

[NO LONGER AVAILABLE]

PURPOSE

The 5412 contains main storage and facilities for addressing main storage, arithmetic and logical processing of data, and controlling I/O units for System/3 model 12. Also includes the attachment for 3340 Direct Access Storage Facility model C2.

MODELS

Model	Processor Storage (Bytes)
B16	32,768
B17	49,152
B18	65,536
C19	81,920
C20	98,304

Maximum: Only one 5412 can be attached to a System/3 mdl 12.

Prerequisites: IBM Programming Systems support for the 5412 mdl C19 and mdl C20 requires the Dual Program (#3500). IBM's ability to service a mdl C19 or mdl C20 without the Dual Program feature will be impaired with an effect on systems availability.

When the mdl 12 SCP option of print spooling is used, either Dual Program (#3500) or the 5471 Printer-Keyboard (#4110) must be ordered.

Minimum Configuration: In addition to the 5412, a System/3 mdl 12 requires:

- 5203 or 1403 Printer
- 3340 Direct Access Storage Facility mdl C2
- Two 3348 mdl 70 Data Modules
- One of the following:
  - 1424 Multifunction Card Unit
  - 1442 Card Read Punch
  - 3741 Data Station directly attached

HIGHLIGHTS

CPU uses highly integrated Monolithic Systems Technology (MST) for logical circuitry. Memory is Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte, and a ninth bit is added for parity checking. Main storage cycle time is 1.52 microseconds. Instruction execution and I/O handling utilizes the "Cycle-Steal" technique, providing overlap of I/O and processing.

The direct attachment of the 3741 Data Station or 3741 Programmable Workstation provides input and output via magnetic media. This feature may reside with or without card I/O.

The Local Display Adapter provides local attachment of any mix of up to twelve 3277 mdl 1 or 2, 3284 mdl 1 or 2, 3286 mdl 1 or 2, 3287 mdl 1 or 2, and 3288 mdl 2. The 3271 Control Unit is not required if the devices are attached via the Local Display Adapter.

Communication with remotely located systems or terminals may be performed through the use of the Integrated Communications Adapter (ICA) or the Binary Synchronous Communications Adapter (BSCA) over data communications transmission facilities.

The system console uses a message display unit for simplified direct operator/system communication.

Customer Responsibilities: Customers must be advised that:

- They are responsible for making arrangements for installation, pricing, charges of the data communications facility, and attachment of selected data sets (modems).
- Toll charges, if required for installation and/or maintenance of the BSCA or ICA, are to be paid by the customer.
- The marketing representative must have from the customer a firm installation date for transmission services (including modems) before the order can be confirmed. For further information, see "Teleprocessing" in the GI section and the M2700 pages.

Publications: *System/3 Bibliography* (GC20-8080).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): Specify **#9903** for 208V or **#9905** for 230V.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Print Position Attachment: Specify **#9495** for a 5203 with 120 print positions or **#9496** for a 5203 with 132 print positions.
- I/O Unit Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- System Control Programming: 5705-SC1 should be ordered at equipment order entry time.
  See the System/3 programming for additional information.
- System Attachment Adapter: Specify **#9180** for a 5203 mdl 1 or **#9181** for a 5203 mdl 2.
- 3741 Direct Attachment: Specify **#9500** if either a 5424 or a 1442 is present or **#9501** if neither is present.
- Upending Kit: Specify **#9840**. This kit is furnished only as necessary and remains the property of IBM.
- 5412/5415 Frame Separation Kit: Specify **#9190**. Frame separation may be required at installation time at those locations where building dimensions (doorways, hallways, stairways, etc.) do not allow movement of the central processor as one unit. The local IBM Installation Planning Representative can determine if this kit is required. The Frame Separation Kit is not to be ordered when the Upending Kit (**#9840**) will suffice.
- 5410 to 5412 Conversion: For 5410 to 5412 conversion where an installed 5424 is to be moved to the new system, an MES must be submitted to remove the 5444(s) from the 5424. This MES must also delete **#9400**, and if a second 5444 is installed, **#9401** or **#9402** (all from the 5424).

SPECIAL FEATURES

Non-Communications Features

Dual Feed Carriage Control (#3480): Required for Dual Feed Carriage (#3475) on a 5203 Printer. **Field Installation:** Yes. **Prerequisites:** #3960, and #3970 or #3972.

Dual Program (#3500): Provides the capability to independently load and process two programs concurrently. Independent operator control of each program is provided so that either program may be initiated, restarted after a program halt, run to completion, or terminated without regard to the other program other than availability of main storage and I/O units. **Field Installation:** Yes.

5203 Printer Base Attachment (#3960): Required to attach a 5203 Printer mdl 1, 2, or 3. **Limitations:** Cannot be installed with 1403 Printer Base Attachment (#4160). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #9224 on the 5203.

5203 Printer Attachment, 100/200 lpm (#3970): To attach a 5203 Printer mdl 1 or 2. **Limitations:** Cannot be installed with 5203 Printer Attachment, 300 lpm (#3972). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3960.

5203 Printer Attachment, 300 lpm (#3972): To attach a 5203 Printer mdl 3. **Limitations:** Cannot be installed with 5203 Printer Attachment, 100/200 lpm (#3970). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3960.

Multifunction Card Unit Attachment, 250/60/60 cpm (#4100): To attach a 5424 Multifunction Card Unit mdl A1. **Limitations:** Cannot be installed with 1442 Mdl 6/7 Card Read Punch Attachment (#4130). **Maximum:** One. **Field Installation:** Yes.

Multifunction Card Unit Attachment, 500/120/120 cpm (#4101): To attach a 5424 Multifunction Card Unit mdl A2. **Limitations:** Cannot be installed with 1442 Mdl 6/7 Card Read Punch Attachment (#4130). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4100.

5471 Printer-Keyboard Attachment (#4110): To attach a 5471 Printer-Keyboard. **Maximum:** One. **Field Installation:** Yes.

1442 Mdl 6/7 Card Read Punch Attachment (#4130): To attach a 1442 mdl 6 or 7. **Limitations:** Cannot be installed with Multifunction Card Unit Attachments (#4100, #4101). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3950 on the 1442 and #5502 on the 5412.

1403 Mdl 5 Printer Attachment, 465 lpm (#4135): To attach a 1403 Printer mdl 5. **Limitations:** Cannot be installed with other 1403 printer attachments (#4140, #4150). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 on the 5412 and **#9185** on the 5421.

1403 Mdl 2 Printer Attachment, 600 lpm (#4140): To attach a 1403 Printer mdl 2. **Limitations:** Cannot be installed with other 1403 printer attachments (#4135, #4150). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 on the 5412.

1403 Mdl N1 Printer Attachment, 1,100 lpm (#4150): To attach a 1403 Printer mdl N1. **Limitations:** Cannot be installed with other 1403 printer attachments (#4135, #4140). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160.

1403 Printer Base Attachment (#4160): To attach a 1403 Printer mdl 2, 5, or N1 (#4135, #4140, or #4150 must be specified). **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with 5203 Printer Base Attachment (#3960). **Prerequisites:** A 5421 Printer Control Unit.

Basic Attachment (#4701): To attach either the Local Display Adapter (#4702) or 3411 Magnetic Tape Attachment (#7960) or both (#4702

5412 Processing Unit (cont'd)

and #7960 must be specified). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirements for additional expansion features.

Local Display Adapter (#4702): Permits direct local attachment (up to 2,000 feet) of up to three 3277 mdl 1 Display Stations, 3284 mdl 1 Printers, 3286 mdl 1 Printers, or 3287 mdl 1 and 2 Printers (with 480-character buffer) in any combination. A 3271 Control Unit is not required. The 3270 device cables will be attached directly to the Local Display Adapter. For attachment of additional 3270 devices (maximum of 12), see Display Increment (#4704). For attachment of the 3270 mdl 2 (1,920-character buffer) devices, see Mdl 2 Attachment (#4705). **Limitations:** Cannot be installed with the Integrated Communications Adapter (#4645) or with the Binary Synchronous Communications Adapter, Second (#2084). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4701.

Display Increment (#4704): Permits attachment of up to three more devices to the Local Display Adapter. **Maximum:** Three. **Field Installation:** Yes. **Prerequisites:** #4702.

Mdl 2 Attachment (#4705): Required if any 3277 mdl 2 Display Stations and/or any 3284/3286/3288 mdl 2 Printers and/or 3287 mdl 1 or 2 Printers (with 1,920-character buffer) are to be attached to the Local Display Adapter. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4702.

Power Supply Expansion I (#5501): Provides additional processing unit 6V power. Required when an MLTA RPQ is desired. **Maximum:** One. **Field Installation:** Yes.

Power Supply Expansion II (#5502): Provides additional processing unit 24V power. Required when 5424 is not attached. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion A (#5732): Provides additional processing unit power supply, connectors, and mounting space when required. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion B (#5733): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion C (#5734): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732 and #5733. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion D (#5735): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732, #5733, and #5734. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Serial I/O Channel (#7081): To attach a 1255 Magnetic Character Reader or a 3881 Optical Mark Reader. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features.

3411 Magnetic Tape Attachment (#7960): To attach a 3411 Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4701. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features.

3741 Attachment (#8220): To attach a 3741 mdl 1, 2, 3, or 4. **Limitations:** For 3741 mdl 3 or 4, System/3 does not support the Application Control Language (ACL). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5502 is required if the 5424 is not installed on the system. If attached with the 5424 Multifunction Card Unit or the 1442 Card Read Punch, #5732 is required. See "Processing Unit Expansion Configurator" for possible requirements for additional expansion features. **Specify: #9500** if either a 5424 or a 1442 is present or **#9501** if neither is present.

Universal Character Set Control (#8642): Required if any Interchangeable Train Cartridge with more than 48 different characters is to be used on the 5203 Printer. **Note:** This feature is not required if a 1403 mdl 2, 5, or N1 with UCS feature is attached to the 5412 through a 5421 Control Unit. **Prerequisites:** #8639 on the 5203.

Communications Features

Auto-Call (#1315, #1325): Permits the System/3 mdl 12, when attached to a switched network (**#9483** or **#9583**) via an appropriate modem and auto-call unit, to initiate (dial) through stored program control a data link connection to a remote BSC station (#1315 for #2074 and #1325 for #2084). Available with medium-speed adapters only. **Limitations:** Cannot be installed with Station Selection (#7477, #7487) or 1200 bps Integrated Modem (#4781, #4782). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084), one Voice Grade Transmission Rate from 600 to 4800 bps, and **#9483** or **#9583**. Requires appropriate cable order. See *Installation Planning Manual* (GA21-9084).

Binary Synchronous Communications Adapter (BSCA 1) (#2074): This feature, in conjunction with program control, permits System/3 mdl 12 to communicate in binary synchronous mode with other IBM systems and terminals. System/3 mdl 12 can operate on a multipoint line as either a control station or a tributary station, or on a point-to-point switched or leased communications line. Transmission rates are available from 600 to 50,000 bps. Auto-answer capability is standard in switched network version. To be effective, the modem must also have this capability. Any version can be selected to operate in EBCDIC or ASCII transmission code, but not both. A 1200 bps Integrated Modem is available as a special feature. Also see "IBM Modems". See the System/3 programming section for devices supported by IBM programming.

The BSCA 1 is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.

- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Maximum: One per 5412. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify:** See "Optional Specifications" for device attachment codes.

Binary Synchronous Communications Adapter, Second (BSCA 2) (#2084): Permits operation of two BSCAs simultaneously on System/3 mdl 12 and/or in two different configurations (speed, network attachments, line facility attachments, codes, etc.). This second adapter (#2084) is functionally identical to the first adapter (#2074). It will support the same sub-features, which require the same prerequisites as BSCA 1. The same options and limitations also apply to BSCA 2, with the following exception: #2084 is provided only in the medium-speed version (600 to 9600 bps) and does not support attachment to a wideband data link (**#9755**). Provision of a second adapter does not limit in any way the options on the first adapter.

The BSCA 2 is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.

- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Display Adapter (#4702) or ICA (#4645). There is no wideband attachment capability. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify:** See "Optional Specifications" for device attachment codes.

EIA Local Attachment (#3601, #3602): Permits attachment of one binary synchronous IBM control unit or terminal (EIA RS-232-C Type Interface) to System/3 mdl 12 without the use of a data communications line and modems at either device. This attachment may be used where the device is located within a distance to the 5412 that is reached by the device's EIA attachment cable (i.e., the cable normally used to attach to an external modem). This feature provides the

5412 Processing Unit (cont'd)

clocking signals for the System/3 mdl 12's BSCA and for the attached control unit's adapter; therefore, the System/3's Internal Clock (#4703, #4723) cannot be installed on the same adapter with this feature. Data transfer rates of 2400, 4800, and 8000 bps are supported by this feature. #3601 is for #2074, and #3602 is for #2084. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Internal Clock (#4703, #4723) or Auto-Call (#1315, #1325). Specification of Transfer Rates (**#9750, #9751, #9752, #9757, #9851, #9853, #9857**) is not permitted. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084); **#9753, #9754, #9758, #9853, #9854,** or **#9858**; **#9484** or **#9584**; and **#9391** or **#9381**. See appropriate machine pages for attached device prerequisites.

Integrated Communications Adapter (ICA) (#4645): This feature, in conjunction with its sub-features, provides up to three communications interfaces, two local and one remote. When more than one interface is present, only one can be active at a time as selected by the operator through a manual switch control.

The ICA is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.

- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Display Adapter (#4702) or BSCA 2 (#2084). **Maximum:** One per 5412. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify: #9070** for EBCDIC transmission code or **#9071** for ASCII. See description of interface features (#4801, #4802, and #6202) below. At least one must be specified.

Internal Clock (#4703, #4723): Generates synchronizing and timing signals for BSCA operation when they are not provided by the attached modem. When this feature is installed on System/3 mdl 12, all other BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. Contact IBM for determination of this feature's requirement with planned modems. #4703 is for #2074, and #4723 is for #2084. Will service rates 600, 1200, 2000, or 2400 bps. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Transfer Rates (**#9754, #9757**). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084) and one of the above-serviced transmission rate options.

1200 bps Integrated Modem (#4781, #4782): A modem for BSC data transmission at 1200 bps over nonswitched facilities or switched network. Available in two different versions: #4781 - nonswitched and #4782 - switched with auto-answer. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002 facility. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS type (or equivalent) provided by the user. The device communicating with System/3 mdl 12 must also be equipped with a 1200 bps integrated modem/line adapter. Available with medium-speed adapters only. **Limitations:** Cannot be installed with sub-features Auto-Call (#1315, #1325) or EIA Local Attachment (#3601, #3602). #4781 and #4782 cannot be installed together on the same BSCA. **Maximum:** Two; one per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084); #5201 or #5202; #4703 or #4723; and **#9751** or **#9851**.

8000 bps Local Interface (#4801): Permits local attachment of one binary synchronous IBM control unit or terminal (EIA RS-232-C Type Interface) to the 5412 without use of communications line or modems. The external modem cable of the attached terminal connects directly to the 5412 when this feature is installed. The feature provides clocking for the 8000 bps data transfer rate. **Limitations:** Data transfer rate is 8000 bps only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for attached device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

2400 bps Local Interface (#4802): Permits local attachment of one binary synchronous IBM terminal (EIA RS-232-C Type Interface) to the 5412 without the use of communications line or modems. The external modem cable of the attached terminal connects directly to the 5412 when this feature is installed. The feature provides clocking for the 2400 bps data transfer rate. **Limitations:** Data transfer rate is 2400 bps only. See the System/3 programming section for devices supported by IBM programming. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for attached device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

Modem Base (#5201, #5202): Provides for mounting of one 1200 bps Integrated Modem (#4781, #4782). #5201 is for #2074, and #5202 is for #2084. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084).

Synchronous Line, Medium-Speed (#6202): Provides one medium-speed BSC line interface to an external modem. The communications network attachment may be point-to-point (switched), point-to-point (nonswitched), or multipoint (control station). Maximum transmission rate is 4800 bps for switched operation and 9600 bps for nonswitched operation. The attached modem must provide the necessary data clocking. See "IBM Modems". Devices attached to the Synchronous Line, Medium-Speed have the same requirements as when attached to System/3 via BSCA 1 (#2074) with equivalent communications facilities and line speeds. **Limitations:** Half-duplex only. Cannot function as a multipoint tributary station. Modem clocking only. See the System/3 programming section for devices supported by IBM programming. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

Station Selection (#7477, #7487): Permits the System/3 mdl 12 to operate as a compatible member of the IBM family of BSC terminals on a multipoint communications line as a tributary station. #7477 is for #2074, and #7487 is for #2084. Control station operation on a System/3 mdl 12 BSCA with Station Selection installed is possible, but such operation cannot be performed concurrently with tributary station operation on that adapter. Additionally, a change in modems or in modem operation may be required to utilize the same adapter (at different periods of time) as a tributary station and as a control station adapter. Also, the network attachment option (**#9484** or **#9584**) must be specified when control station operation is to be performed whether Station Selection (#7477, #7487) is installed or not. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Auto-Call (#1315, #1325) or Line Facility Attachment (**#9391**). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084), **#9382** or **#9392**, and one of the Voice Grade Transmission Rates 600 to 9600 bps.

Text Transparency (#7850, #7851): Permits the System/3 mdl 12 to transmit or receive 8-bit binary data and EBCDIC-coded data. #7850 is for #2074, and #7851 is for #2084 or #4645. Available with medium-speed (600 to 9600 bps) and with wideband attachments (19,200 to 50,000 bps). **Limitations:** Cannot be installed with ASCII Transmission Code (**#9061, #9071**). Other limitations on the use of this facility exist and are described in *General Information - Binary Synchronous Communication* (GA27-3004). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084) or ICA (#4645) and **#9060** or **#9070**.

IBM Modems: One IBM modem can be attached to BSCA 1 (#2074) and/or one to BSCA 2 (#2084) or ICA (#4645) with Synchronous Line, Medium-Speed (#6202) as follows:

Modem	Nominal Speed (bps)
3872	2400/1200
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600
3868 mdl 3 or 4	9600

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities, and product utilization.

Note: Configuration requirements for IBM programming support must satisfy the minimum machine requirements. See the System/3 programming section.

See M2700 pages for additional information concerning communications facilities, machine attachment requirements, terminal intermix, and operating capabilities.

5412 Processing Unit (cont'd)

Processing Unit Expansion Configurator

Table A: To be used when either the 5424 MFCU or 1442 is attached.

	Communications											
I/O Unit Attachments	None	MLTA	BSCA 1	#4702 *	ICA	MLTA and BSCA 1	MLTA and #4702 *	MLTA and ICA	BSCA 1 and #4702 *	BSCA 1 and BSCA 2 or ICA	MLTA, BSCA 1 and #4702 *	MLTA, BSCA 1 and BSCA 2 or ICA
No additional above base **	N/A	#5732	#5732	#5732	#5732	#5733	#5733	#5733	#5732	#5732	#5733	#5733
3741	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5732	#5733	#5733
3741 and 3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5735	#5733
SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3741 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5735	#5734
3411 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5734	#5733
3741, 3411 and SIOC	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5735	#5734

* Local Display Adapter

** Base system includes CPU, printer, disk file, and a card reader (5424 or 1442).

Table B: To be used with cardless system (3741 directly attached and no card I/O).

	Communications											
I/O Unit Attachments	None	MLTA	BSCA 1	#4702 *	ICA	MLTA and BSCA 1	MLTA and #4702 *	MLTA and ICA	BSCA 1 and #4702 *	BSCA 1 and BSCA 2 or ICA	MLTA, BSCA 1 and #4702 *	MLTA, BSCA 1 and BSCA 2 or ICA
No additional above base **	N/A	#5732	#5732	#5732	#5732	#5733	#5733	#5733	#5732	#5732	#5733	#5733
3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5732	#5733	#5733
SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3411 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5734	#5733

* Local Display Adapter

** Base system includes CPU, printer, disk file, and the 3741 directly attached (no card I/O).

Optional Specifications: One selection must be specified for each of the following five categories for either BSCA 1 (#2074) or BSCA 2 (#2084). For ICA (#4645), categories 1 and 5 apply to all configurations; categories 2 through 4 do not apply unless #6202 is installed.

	#2074	#2084	#4645
1. Transmission Code			
EBCDIC	**#9060**	**#9070**	**#9070**
ASCII	**#9061**	**#9071**	**#9071**
2. Transfer Rate *			
600 bps	**#9750**	**#9850**	**#9850**
1200 bps	**#9751**	**#9851**	**#9851**
2000 bps	**#9752**	**#9852**	**#9852**
2400 bps **	**#9753**	**#9853**	**#9853**
4800 bps	**#9754**	**#9854**	**#9854**
7200/3600 bps	**#9757**	**#9857**	**#9857**
8000 bps	**#9758**	**#9858**	N/A
9600 bps	**#9759**	**#9859**	**#9859**
High-speed (19,200 to 50,000 bps)	**#9755**	N/A	N/A

* Contact IBM for information concerning modems attachable to the System/3 BSCA. Refer to M2700 pages for data on communication facilities.

**See *General Information - Binary Synchronous Communication* (GA27-3004) for potential problem areas and possible restrictions to application data when using certain modems at this or higher speeds.

3. Network Attachment

Point-to-point (nonswitched)	**#9481**	**#9581**	**#9581**
Point-to-point (switched)	**#9483**	**#9583**	**#9583**
Multipoint tributary	**#9482**	**#9582**	N/A
Multipoint control station *	**#9484**	**#9584**	**#9584**

* If multipoint tributary station use (with #7477/#7487) is to be implemented alternately with multipoint control station use on the same adapter, specify code **#9484/#9584** must be used.

4. Line Facility Attachment *

Duplex (4-wire only)	**#9391**	**#9381**	**#9381**
Half-duplex	**#9392**	**#9382**	**#9382**

* Where BSCA is used as a control station adapter, or when attached to a point-to-point (nonswitched) data link, the facility may be duplex (4-wire only) or half-duplex. Half-duplex facility must be specified for switched network attachments and for adapters implementing multipoint tributary station only operation.

5412 Processing Unit (cont'd)

5. One (or more if necessary) optional selection code must be specified from the following list, contingent upon planned device attachments:

	#2074	#2084	#4645
1130 System	#9572	#9672	#9672
2770 System	#9573	#9673	#9673
2780	#9574	#9674	#9674
2980	#9576	#9676	#9676
3270 System	#9577	#9677	#9677
3735	#9578	#9678	#9678
3741 mdl 2, mdl 4	#9579	#9679	#9679
5231 mdl 2	#9592	#9692	#9692
5280	#9598	#9698	#9698
6670 (as a 2770) *	#9596	#9696	#9696
* Requires a no-charge RPQ.			
Series/1	#9594	#9694	#9694
System/3	#9580	#9680	#9680
System/7	#9590	#9690	#9690
System/32	#9591	#9691	#9691
System/34	#9593	#9693	#9693
System/38	#9595	#9695	#9695
S/360 mdl 20	#9571	#9671	#9671
S/360 or S/370 (mdl 22 and up)	#9570	#9670	#9670

MODEL CONVERSIONS

Model conversions are field installable.
Replaced parts from any model upgrade become the property of IBM.

ACCESSORIES

Cables: BSCA (#2074, #2084) always requires an appropriate cable order unless EIA Local Attachment (#3601, #3602) is ordered.
ICA (#4645) requires a cable order only when #6202 is also ordered.
See *Installation Manual - Physical Planning* (GA21-9084).

SUPPLIES (None)

5415 PROCESSING UNIT

[No longer Available]

PURPOSE

The 5415 is no longer available. Model changes and special features may still be ordered. All other information is for reference only.

Contains main storage and facilities for addressing main storage, arithmetical and logical processing of data, and controlling I/O units for System/3 model 15.

MODELS

Models	Processor Storage (bytes)
B17	49,152
B18	65,536
B19	98,304
B20	131,072
C21	163,840
C22	196,608
C23	229,376
C24	262,144
D19	98,304
D20	131,072
D21	163,840
D22	196,608
D23	229,376
D24	262,144
D25	393,216
D26	524,288

Minimum Configuration:

System/3 mdl 15 with a 5415 mdl AXX, requires:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 5421 Printer Control Unit,
- A minimum of one 5444 Disk Storage Drive mdl A2,
- Either
  5424 Multi-Function Card Unit, or
  1442 Card Read Punch mdl 6 or 7, or
  2560 Multi-function Card Machine.

System/3 mdl 15s with 5415 mdl BXX through DXX, require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3340 Direct Access Storage Facility,
- 5421 Printer Control Unit,
- Either
  5424 Multi-Function Card Unit, or
  1442 Card Read Punch mdl 6 or 7, or
  2560 Multi-Function Card Machine.

Cardless System/3 mdl 15As require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 5421 Printer Control Unit,
- 5422 Disk Enclosure,
- Maintenance Support Package (**#9440**),
- Channel Terminator (#1601).

Cardless System/3 mdls 15B or 15C require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3741 mdl 1, 2, 3, or 4 with #3265 or #3266,
- 3741 Attachment (#8220),
- Power Supply Expansion B (#5502),
- 5421 Printer Control Unit,
- Maintenance Support Package (**#9441**),
- Channel Terminator (#1601).

Cardless System/3 mdl 15Ds require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3741 mdl 1, 2, 3, or 4 with #3265 or #3266,
- 3741 Attachment (#8220),
- Power Supply Expansion B (#5502),
- 5421 Printer Control Unit,
- Maintenance Support Package (**#9445**),
- Channel Terminator (#1601).

Note: Configuration requirements for IBM programming support must satisfy the minimum machine requirements. See the System/3 programming pages for additional information.

Maximum Configuration: Only one 5415 can be attached to a System/3 mdl 15.

HIGHLIGHTS

CPU uses Monolithic Systems Technology (MST) for logical circuitry. Memory is Metal Oxide Semiconductor Field Effect Transistor (MOSFET) with error correction and checking. Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. A ninth bit is added for parity checking. Main cycle time is 1.52 microseconds (on mdl 15D, instruction cycle time for certain non-I/O instructions is faster). Instruction execution and I/O data handling uses the cycle-steal technique. 5415 mdl A processors support attachment of 5444 Disk Storage Drives. 5415 mdl B or C processors support attachment of the 3340 Direct Access Storage Facility. 5415 mdl D processors support attachment of the 3340 Direct Access Storage Facility and the 3344 Direct Access Storage.

Additional standard features supporting a multiprogramming environment include:

- Three additional instructions.
- 512K memory addressing using Address Translation Table (ATT).
- Write/Fetch CPU storage protection in 2K byte segments.
- Program check Interrupt.
- Interval timer.
- Eight levels of interrupt.
- Mask interrupt capability.
- Privileged mode operation.
- Memory error correction:
  Corrects single bit errors,
  Detects double bit errors.
- Dual-byte data channel for disks.
- Operation-end interrupt for all I/O.
- Complete overlap of I/O operation.
- Additional Field Engineer controls.

The required 3277 Display Station with 78-key Operator Console Keyboard (#4632) provides enhanced operator-machine communications. An optional console printer (3284 mdl 1 or 3287 mdl 1, 2) is also available via 3284 attachment (#7901). The Display Adapter (#4601) provides direct local attachment of up to 30 3270 devices (CRTs and printers). Communications with remotely located systems or terminals may be performed through the use of binary synchronous communications. See BSCA (#2074, #2084) and BSCC (#2094) under "Special Features". On the 5415 mdl A, B, or C, two lines maximum. On the 5415 mdl D, four lines maximum. The Local Communications Adapter provides direct local attachment of one binary synchronous IBM control unit or terminal with EIA RS-232-C type interface.

Customer Responsibilities: The customer must be advised of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. See M2700 pages and "Teleprocessing Systems" in the GI section.

He is responsible for making arrangements for installation, pricing and charges of the data communications facility and attachment of selected modems.

Toll charges, if required for installation and/or maintenance of the BSCA, are to be paid by the customer.

The IBM Marketing Representative must obtain from the customer a firm installation date for transmission services (including modems) before the order can be confirmed. For further information see M2700 pages and "Teleprocessing" in the GI section.

Publications: *System/3 Bibliography* (GC20-8080).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Disk Configuration: If a second 5444 is ordered, specify **#9207** for 5444 mdl A3, or **#9208** for 5444 mdl A2.
- 3340/3344 Specify Configurator:

	Mdls Attached			Storage (MB) Main Data	Simulation	
5415	3340	3344	Total Drives	Area	Area	Specify Features
B,C,D	A2	--	2	81.59	19.66	**#9781**
B,C	A2 & B1	--	3	122.39	29.49	**#9781** & **#9782**
D	A2 & B1	--	3	122.39	24.58	**#9781** & **#9782**
B,C	A2 & B2	--	4	162.18	39.32	**#9781** & **#9783**
D	A2 & B2	--	4	162.18	29.49	**#9781** & **#9783**
D	A2	B2	4	447.23	58.98	**#9781** & **#9784**

- I/O Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- Configuration Codes: Required on the 5422 or 5424 dependent upon the 5444 configuration. See "Specify" in M5424 or 5422 pages.

5415 Processing Unit (cont'd)

- System Control Programming: 5704-SC1 or 5704-SC2, should be ordered at equipment order entry time. See the System/3 programming pages for additional information.
- Upending Kit: Specify **#9840** is furnished only as necessary and remains the property of IBM.
- 5412/5415 Frame Separation Kit: **#9190** if frame separation is required at installation time at those locations where building dimensions (doorways, hallways, stairways, etc.) do not allow movement of the central processor as one unit. The local Installation Planning Representative can determine if this kit is required. The Frame Separation Kit is not to be ordered when the Upending Kit (**#9840**) will suffice.

SPECIAL FEATURES

Auto-Call (#1315, #1325): Permits the System/3 mdl 15 when attached to a switched network (option **#9483** or **#9583**) via an appropriate modem and Auto-Call Unit to initiate (dial) through stored program control, a data link connection to a remote BSC station. #1315 for #2074 and #1325 for #2084. **Limitations:** Cannot be installed with Station Selection (#7477, #7487), or 1200 bps Integrated Modem (#4781, #4782). Available with medium speed adapters only. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, one voice grade transmission rate from 600 to 4800 bps, and **#9483** or **#9583**. Requires appropriate cable order. See *Installation Manual - Physical Planning* (GA21-9084).

Card Print Control (#1580): Controls necessary for an attached 2560 Multi-Function Card Machine mdl A1 equipped with Card Print (#1575, #1576, #1577). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8100 on the 5415, plus #1575 on the 2560.

Channel Terminator (#1601): Terminates Channel Bank No. 1 which eliminates the requirement for a 1442, 2560, or 5424. Provides cardless capability for mdl 15. **Limitations:** Cannot be installed with #4100, #4101, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Cardless mdl 15 A, B, C, or D.

Binary Synchronous Communications Adapter (#2074):

This feature in conjunction with program control permits System/3 mdl 15 to communicate in binary synchronous mode with other IBM systems and terminals. System/3 mdl 15 can operate on a multipoint line as either a control station or a tributary station, or on a point-to-point switched or leased communications line. Transmission rates are available from 600 bps to 50,000 bps. Auto-answer capability is standard (to be effective, the modem must also have this capability) in switched network version. Any version can be selected to operate in EBCDIC or ASCII transmission code, but not both. A 1200 bps Integrated Modem is available as a special feature. Also, see "Modems" below. See the System/3 programming pages for devices supported by IBM programming.

The BSCA is designed to operate on transmission facilities such as:

- Common Carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002-600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Communications Adapter (#4765). **Maximum:** One per 5415. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Field Installation:** Yes. **Prerequisites:** Refer to "Processing Unit Expansion Features Configurator" for possible requirement for additional Processing Unit Expansion features. **Specify:** See "BSCA-1 and BSCA-2 Optional Specify Codes" below for applicable specify codes.

See M2700 pages for additional information concerning modems, device speeds, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

Binary Synchronous Communications Adapter, Second (#2084): Permits operation of two BSCAs simultaneously on System/3 mdl 15 and/or in two different configurations (speed, network attachments, line facility attachments, codes, etc.). This second adapter (#2084) is functionally identical to the first adapter (#2074). It will support the same sub-features, which require the same prerequisites as the first BSCA. The same options and limitations also apply to the second BSCA, with the following exception: #2084 is provided only in the medium-speed version (600 to 9600 bps) and does not support attachment to a wideband data link, option **#9755**. Provision of a second adapter does not limit in any way the options on the first adapter. **Limitations:** No wideband attachment capability. Cannot be installed with Display Adapter (#4601). **Maximum:** One per System/3 mdl 15. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Field Installation:** Yes. **Prerequisites:** #2074 or #4765. See "Processing Unit Expansion Features Configurator" for possible requirement of additional Processing Unit Expansion features. **Specify:** See below and "Specify" section for applicable specify codes.

Modems: One IBM modem can be attached to the BSCA (#2074) and/or one to the BSCA, Second (#2084) as follows:

Modem	Nominal Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400/1200
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600
3868 mdl 3 or 4	9600

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities, and product utilization.

BSCA-1 and BSCA-2 Optional Specify Codes: One selection must be specified from each of the following five categories for each adapter.

	#2074	#2084
1. Transmission Code:		
EBCDIC	**#9060**	**#9070**
ASCII	**#9061**	**#9071**
2. Transfer Rate: *		
600 bps	**#9750**	**#9850**
1200 bps	**#9751**	**#9851**
2000 bps	**#9752**	**#9852**
2400 bps **	**#9753**	**#9853**
4800 bps	**#9754**	**#9854**
7200/3600 bps	**#9757**	**#9857**
8000 bps	**#9758**	**#9858**
High Speed (19,200 to 50,000 bps)	**#9755**	N/A
9600 bps	**#9759**	**#9859**

Notes:

* Refer to M2700 pages for data on communications facilities. For information concerning modems attachable to the System/3 BSCA, contact IBM.

** See SRL (GA27-3004) for potential problem areas and possible restrictions to application data when using certain modems at this or higher speeds.

3. Network Attachment:		
Point-to-point (nonswitched)	**#9481**	**#9581**
Point-to-point (switched)	**#9483**	**#9583**
Multipoint Tributary	**#9482**	**#9582**
Multipoint Control Station *	**#9484**	**#9584**

Note:

* If Multipoint Tributary Station with #7477 or #7487 is to be implemented alternately with Multipoint Control Station use on the same adapter, specify code **#9484** or **#9584** must be used.

4. Line Facility Attachment: *		
Duplex (4-wire only)	**#9391**	**#9381**
Half-Duplex	**#9392**	**#9382**

Note:

* Where BSCA is used as a Control Station adapter or when attached to a point-to-point (nonswitched) data link, the facility may be duplex (4-wire only) or half-duplex. Half-duplex facility must be specified for switched network attachments and for adapters implementing Multipoint Tributary Station only operation.

5. One (or more if necessary) optional selection codes must be specified from the following list, contingent upon planned device attachments:

1130 System	**#9572**	**#9672**
2770 System	**#9573**	**#9673**
2780	**#9574**	**#9674**
2980	**#9576**	**#9676**
3270 System	**#9577**	**#9677**
3600 *	**#9595**	**#9695**
3735	**#9578**	**#9678**
3741 mdl 2, mdl 4	**#9579**	**#9679**
5231 mdl 2	**#9592**	**#9692**
5280	**#9598**	**#9698**
6670 (as a 2770) *	**#9596**	**#9696**
Series/1	**#9594**	**#9694**
System/3	**#9580**	**#9680**
System/7	**#9590**	**#9690**

5415 Processing Unit (cont'd)

System/32	#9591	#9691
System/34	#9593	#9693
System/38	#9599	#9699
S/360 or S/370 (mdl 22 and up)	#9570	#9670
S/360 mdl 20	#9571	#9671

Note:
* Requires a no-charge RPQ.

Binary Synchronous Communications Controller (#2094): [System/3 mdl 15D] Provides the controller base for attachment of two additional binary synchronous communications lines. One or two additional lines are ordered as separate features (see under #4891 and #4892 below). BSCC can also provide the terminal polling function (depending on the terminal type attached) for the 1 or 2 lines and thereby reduce CPU loading. The BSCC can handle polling functions outboard of the mdl 15D CPU. Both lines operate independently in either a point-to-point or multipoint control station mode over nonswitched communication facilities at speeds up to 9600 bps. Point-to-point or multipoint control station mode of operation is selected during CCP generation. See the System/3 programming section for additional information. Text transparency is standard but applicable to EBCDIC coded data only.

BSCC Optional Specify Codes: One selection must be specified for each of the following four categories for each Line Base:

	#4891	#4892
1. Transmission Code:		
EBCDIC	#9080	#9090
ASCII	#9081	#9091
2. Line Speed:		
600 bps	#9300	#9400
1200 bps	#9301	#9401
2000 bps	#9302	#9402
2400 bps	#9303	#9403
4800 bps	#9304	#9404
7200 bps	#9305	#9405
9600 bps	#9306	#9406
3. Line Facility Attachment:		
2-Wire	#9310	#9410
4-Wire	#9311	#9411
4. Device Attachment (1 or more):		
3270	#9320	#9420
3600 *	#9321	#9421
3735	#9322	#9422
3740	#9323	#9423
5230	#9324	#9424
5280	#9332	#9432
5285	#9332	#9432
5288	#9332	#9432
Series/1	#9331	#9431
System/3	#9325	#9425
System/7	#9326	#9426
System/32	#9327	#9427
System/34	#9330	#9430
System/38	#9342	#9442
Other IBM	#9328	#9428
Other Non-IBM	#9329	#9429

Note:
* Requires no-charge RPQ.

Modems: One IBM modem can be attached to each Line Base (#3703 or #3704 required).

Modem	Data Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400
3864 mdl 1 or 2	4800, 9600
3868 mdl 2	4800

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities and product utilization.

Communication Facility Attachments: The BSCC is designed to operate on communication facilities such as:

- Common carrier leased telephone services (voice grade).

  Class 3002 (600 bps)
  1200 bps with Integrated Modem (#5803, #5804)
  2400 bps with IBM 3863 mdl 1 or 3872

  Class 3002 with C1 conditioning (4800 bps)

  Class 3002 with C2 conditioning (7200 bps)
- Private or private carrier facilities equivalent to the above.
- AT&Ts Private Line Data-Phone® Digital Service (#5813, #5814) to 9600 bps.

Reference: For additional information concerning modems and communications facilities, see M2700 pages. See also machines pages for devices planned for attachment.

Limitations: Cannot be installed with the MLTA RPQ (S40028). Operation on nonswitched facilities only. **Maximum:** One per 5415 mdl D. **Field Installation:** Yes. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Prerequisites:** See "Processing Unit Expansion Features Configurator" for possible expansion feature requirements.

EIA Local Attachment (#3601, #3602): Permits attachment of one binary synchronous IBM system, control unit, or terminal with EIA RS-232-C type interface to System/3 mdl 15 without the use of a data communications line and modems at either device. This attachment may be used where the device is located within a distance to the 5415 that is reached by the device's EIA attachment cable (i.e., the cable normally used to attach to an external modem). This feature provides the clocking signals for the System/3 mdl 15's BSCA and for the attached device's communications adapter therefore, the System/3's Internal Clock (#4703, #4723) cannot be installed on the same adapter with this feature. Data transfer rates of 2400, 4800, and 8000 bps are supported by this feature. See "Transfer Rate" above. #3601 for #2074 or #3602 for #2084. **Limitations:** Cannot be installed with Internal Clock (#4703, #4723), or Auto-Call (#1315, #1325). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, **#9753**, **#9754**, **#9758** or **#9853**, **#9854**, **#9858**, **#9484** or **#9584**, and **#9391** or **#9381**. See appropriate machines pages for attached device prerequisites.

EIA Local (#3603, #3604): Permits local attachment of one binary synchronous IBM system, control unit, or terminal with EIA RS-232-C type interface to the 5415 without the use of communications line or modem. The external modem cable of the attached device connects directly to the 5415 when this feature is installed. Data clocking for transfer rates of 2400 bps, 4800 bps, 7200 bps and 9600 bps is provided by this feature for both the 5415 and the attached device. The device must be capable of functioning as either a point-to-point or a multipoint tributary station at the transfer rate provided by this feature. **Limitations:** Cannot be installed on the same Line Base with EIA Interface (#3703, #3704) or 1200 bps Integrated Modem (#5803, #5804) or DDS Adapter (#5813, #5814). **Maximum:** One per Line Base. **Prerequisites:** #4891 for #3603, #4892 for #3604. One of four transfer rates: 2400 bps, 4800 bps, 7200 bps, or 9600 bps must be specified on the applicable Line Base.

EIA Interface (#3703, #3704): Provides an interface for attachment of an external modem meeting EIA RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy.

Modems: One IBM modem can be attached to each Line Base (#3703, #3704 required):

Modem	Data Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600

Limitations: Cannot be installed on the same Line Base with the 1200 bps Integrated Modem (#5803, #5804) or DDSA (#5813, #5814) or EIA Local (#3603, #3604). **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #3703 or #4892 for #3704. See "Cables" under "Accessories".

5415 Processing Unit (cont'd)

Multi-Function Card Unit Attachment 250/60/60 cpm (#4100): To attach a 5424 Multi-Function Card Unit mdl A1. **Limitations:** Cannot be installed with #1601, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes.

Multi-Function Card Unit Attachment 500/120/120 cpm (#4101): To attach a 5424 Multi-Function Card Unit mdl A2. **Limitations:** Cannot be installed with #1601, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4100.

1442 Mdl 6/7 Card Read Punch Attachment (#4130): To attach a 1442 mdl 6 or 7. **Limitations:** Cannot be installed with #1601, #4100, #4101, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A 5422 with 5415 mdls A17 through A20. #3950 on the 1442. #5502 must be ordered with mdl B, C, or D.

1403 Mdl 5 Printer Attachment 465 lpm (#4135): To attach a 1403 Printer mdl 5. **Limitations:** Cannot be installed with #4140 or #4150. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421 with **#9185**.

1403 Mdl 2 Printer Attachment 600 lpm (#4140): To attach a 1403 Printer mdl 2. **Limitations:** Cannot be installed with #4135 or #4150. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421.

1403 Mdl N1 Printer Attachment 1100 lpm (#4150): To attach a 1403 Printer mdl N1. **Limitations:** Cannot be installed with #4135 or #4140. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421.

1403 Basic Attachment Control (#4160): To attach all mdls of a 1403 Printer. **Maximum:** One. **Field Installation:** Yes.

Display Adapter (#4601): For direct local attachment of 3270 devices (3277 mdls 1, 2, 3284 mdls 1, 2, 3286 mdls 1, 2, 3287 mdls 1, 2, 3288 mdl 2) in any combination. Includes the basic control and interface for three devices. The 3270 device cables, maximum length 600m (2,000 feet) plug directly into the 5415 when this feature is installed. For attachment of additional 3270 devices (maximum of 30), see Device Interface (#4602). Programming support for the attached devices is provided by the Multiline/Multipoint interface and the Communication Control Program feature of the SCP. **Limitations:** Cannot be installed with BSCA-2 (#2084). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733. See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. **#9089** required on attached 3270 devices. See applicable machines pages for 3270 device ordering details.

Device Interface (#4602): Provides for attachment of three additional 3270 devices (3277 mdls 1, 2, 3284 mdls 1, 2, 3286 mdls 1, 2, 3287 mdls 1, 2, 3288 mdl 2) in any combination to the Display Adapter (#4601). **Maximum:** Nine, for a maximum of 30 attached devices. **Field Installation:** Yes. **Prerequisites:** #4601.

Internal Clock (#4703, #4723): Generates synchronizing and timing signals for BSCA operation when they are not provided by the attached modem. When this feature is installed on System/3 mdl 15, all other BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. See IBM, for determination of requirements with planned modems. #4703 for #2074 and #4723 for #2084. Will service rates 600 bps, 1200 bps, 2000 bps, or 2400 bps. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, and one of the rate options listed above, see "Transfer Rate".

Internal Clock (#4733, #4734): Provides business machine clocking at 1200 bps for the external or integrated modem operating at that line speed. This feature is always required for the 1200 bps Integrated Modem (#5803, #5804). **Limitations:** 1200 bps only. For use only when modem does not provide clocking. **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #4733, #4892 for #4734.

Local Communications Adapter (#4765): Permits local attachment of one binary synchronous IBM control unit or terminal with EIA RS-232-C type interface to a System/3 mdl 15. The external modem cable of the device will attach directly to the 5415 when this feature is installed. Data transfer rate is 2400 bps only. EBCDIC transmission code must be specified when applicable on the attached device. See the System/3 programming pages for devices supported by IBM programming. **Limitations:** Cannot be installed with BSCA-1 (#2074). Data exchange with attached device is non-transparent only. For data-transparent operation contact IBM. **Maximum:** One per 5415. **Field Installation** Yes. **Prerequisites:** Requires the same Processing Unit Expansion Features as BSCA-1 (#2074). See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. See appropriate machines pages for attached device prerequisites. **Specify:** See "BSCA-1 and BSCA-2 Optional Specify Codes" above for applicable device attachment codes.

1200 bps Integrated Modem (#4781, #4782): A modem for BSC data transmission at 1200 bps over nonswitched facilities or switched network. Available in two different versions: #4781 Nonswitched and #4782 Switched with Auto-Answer. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002 facility. Attachment to the switched network is via an IBM provided cable to FCC registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/3 mdl 15 must also be equipped with a 1200 bps Integrated Modem or line adapter. **Limitations:** Cannot be installed with sub-features Auto-Call (#1315, #1325) or EIA Local Attachment (#3601, #3602). #4781 and #4782 cannot be installed together on the same BSCA. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074, #5201, #4703 and **#9751**, or #2084, #5202, #4723 and **#9851**.

Line Base, 1st (#4891): For attachment of the first communications line to the BSCC (#2094) through one of the line interface features. One of the line interface features #3603, #3604, #3703, #3704, #5803, #5804, #5813, #5814, must be ordered for each Line Base depending on the type of communication facility and modem to be used. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2094. **Specify:** See "BSCC Optional Specify Codes" above for selection of transmission codes, line speeds, etc.

Line Base, 2nd (#4892): For attachment of the second communications line to the BSCC (#2094) through one of the line interface features. One of the line interface features #3603, #3604, #3703, #3704, #5803, #5804, #5813, #5814, must be ordered for each Line Base depending on the type of communication facility and modem to be used. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2094 and #4891. **Specify:** See "BSCC Optional Specify Codes" above for selection of transmission codes, line speeds, etc.

Modem Base (#5201, #5202): Provides for mounting of one 1200 bps Integrated Modem (#4781, #4782). #5201 for #2074 and #5202 for #2084. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 for #5201 or #2084 for #5202.

Power Supply Expansion A (#5501): Provides additional processing unit 6 volt power. Required when certain RPQs are attached. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes.

Power Supply Expansion B (#5502): Provides additional processing unit 24 V power. Required on mdls B, C, and D when 5424 is not attached, or if Channel Terminator Feature #1601 is installed. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion 1 (#5733): Provides additional processing unit power supply and connections. Refer to the "Processing Unit Expansion Features Configurator" below to determine requirements. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion 2 (#5734): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733.

Processing Unit Expansion 3 (#5735): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733 and #5734.

Processing Unit Expansion Features Configurator: [All mdls except D with BSCC]

	Communications						
I/O Unit Attachment	None	#2074 or #4765	#2084 & #2074 or #4765	#7081 & #2074 or #4765	#2084 & #7081 & #2074 or #4765	#7081	#4601 & #7081 & #2074 or #4765
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	-----	-----	#5733	#5733	#5733	-----	#5733
2501 (#8090)	-----	#5733	#5733	#5733	#5733	-----	#5733
2501 & 3411 (#8090 & #7951)	-----	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5733	#5733	#5733	#5733	#5733	#5733	#5734
3411 (#7951)	-----	#5733	#5733	#5733	#5733	-----	#5733
3411 & 3741 (#7951 & #8220)	-----	#5733	#5733	#5733	#5733	#5733	#5733
3741 (#8220)	-----	#5733	#5733	#5733	#5733	-----	#5733
3741 & 2501 (#8220 & #8090)	-----	#5733	#5733	#5733	#5733	#5733	#5733

5415 Processing Unit (cont'd)

Processing Unit Expansion Features Configurator: [Mdl D with BSCC]

I/O Unit Attachment	#2094	#2094 & #2074 or #4765	#2094 & #2084 & #2074 or #4765	#2094 & #7081 & #2074 or #4765	#2094 & #2084 & #7081 & #2074 or #4765	#2094 & #7081
			Communications			
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	-----	#5733	#5733	#5733	#5733	#5733
2501 (#8090)	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 (#8090 & #7951)	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5733	#5733	#5734	#5733	#5734	#5733
3411 (#7951)	#5733	#5733	#5733	#5733	#5733	#5733
3411 & 3741 (#7951 & #8220)	#5733	#5733	#5733	#5733	#5734	#5733
3741 (#8220)	#5733	#5733	#5733	#5733	#5733	#5733
3741 & 2501 (#8220 & #8090)	#5733	#5733	#5733	#5733	#5734	#5733

I/O Unit Attachment	#2094 & #7081 & #4601	#2094 & #2074 or #4765 & #4601	#2094 & #4601 & #7081 & #2074 or #4765
		Communications	
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	#5733	#5733	#5733
2501 (#8090)	#5733	#5733	#5734
2501 & 3411 (#8090 & #7951)	#5733	#5733	#5734
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5735	#5735	#5735
3411 (#7951)	#5733	#5733	#5733
3411 & 3741 (#7951 & #8220)	#5733	#5733	#5735
3741 (#8220)	#5733	#5733	#5735
3741 & 2501 (#8220 & #8090)	#5733	#5735	#5735

Note: If RPQs are on the 5415, contact IBM.

1200 bps Integrated Modem (#5803, #5804): A modem for data transmission at 1200 bps over nonswitched (2- or 4-wire) facilities. Attachment to the communication facility is via an IBM-provided cable directly to the common carrier Type 3002 channel or equivalent. All devices communicating with System/3 must be equipped with a compatible IBM 1200 bps Integrated Modem/Line Adapter. **Maximum:** One per Line Base. **Field Installation:** Yes. **Limitations:** Cannot be installed on the same Line Base with the EIAInterface (#3703, #3704) or DDSA (#5813, #5814) or EIA Local (#3603, #3604). Nonswitched facilities only. **Prerequisites:** #4733 for #5803 or #4734 for #5804. #4891 for #5803 or #4892 for #5804. See "Cables" under "Accessories".

DDS Adapter (#5813, #5814): An integrated adapter for attachment to the AT&T nonswitched Data-Phone® Digital Service network. The DDSA interfaces to a DDS channel service unit at the customer-site termination of the DDS network. Line speeds of 2400 bps, 4800 bps, and 9600 bps are available. **Limitations:** Cannot be installed on the same Line Base with Interface (#3703, #3704) or 1200 bps Integrated Modem (#5803, #5804) or EIA Local (#3603, #3604). **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #5813 or #4892 for #5814. One of the three line speeds: 2400 bps, 4800 bps, or 9600 bps, must be specified on the applicable Line Base. **#9311** or **#9411**. See "Cables" under "Accessories".

Serial I/O Channel (#7081): To attach a 1255 Magnetic Character Reader or a 3881 Optical Mark Reader. **Maximum:** One. **Field Installation:** Yes.

Station Selection (#7477, #7487): Permits the System/3 mdl 15 to operate as a compatible member of the IBM family of BSC terminals on a multipoint communications line as a tributary station. #7477 is for #2074 and #7487 is for #2084. Will service rates of 600 - 9600 bps. **Limitations:** Cannot be installed with Auto-Call (#1315, #1325). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, **#9382** or **#9382**, and one of the rate selections, 600 to 9600 bps. **Note:** Control station operation on a System/3 mdl 15 BSCA with Station Selection installed is possible, but such operation cannot be performed concurrently with tributary station operation on that adapter. Additionally, a change in modems or in modem operation may be required to utilize the same adapter (at different periods of time) as a tributary station and as a control station adapter. **#9484** or **#9584** must be specified when control station operation is to be performed whether or not Station Selection (#7477, #7487) is installed.

Text Transparency (#7850, #7851): Permits the System/3 mdl 15 to transmit or receive 8-bit binary data and EBCDIC coded data. #7850 for #2074 and #7851 for #2084. **Limitations:** Cannot be installed with ASCII Transmission Code (**#9061**, **#9071**). Available with medium-speed (600 to 9600 bps) and with wideband attachments (19,000 to 50,000 bps). Limitations on the use of this facility are described in SRL (GA27-3004). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, and **#9060** or **#9070**.

3284 Attachment (#7901): To attach a 3284 Printer mdl 1 or a 3287 Printer mdl 1 or 2. **Maximum:** One. **Field Installation:** Yes.

3411 Magnetic Tape Attachment (#7951): To attach a 3411 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733, #5734, or #5735 may be required dependent upon other features. Refer to "Processing Unit Expansion Features Configurator" to determine requirements.

2501 Attachment (#8090): To attach a 2501 Card Reader mdl A1 or A2. **Limitations:** 2501 and 5424, 2560, 1442, or Channel Terminator Feature #1601. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733, #5734, or #5735 may be required dependent upon other features. #3630 on the 2501. Refer to "Processing Unit Expansion Features Configurator" to determine requirements.

2560 Multi-Function Card Machine Attachment (#8100): To attach a 2560 Multi-Function Card Machine. **Limitations:** Cannot be installed with #1601, #4100, #4101, or #4130. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 5422 with 5415 mdls A17 through A20. #5502 must be ordered with mdl B, C, or D. **Specify: #9801** if 2560 mdl A1 is to be attached.

3741 Attachment (#8220): To directly attach a 3741 mdl 1, 2, 3, or 4. **Limitations:** For 3741 mdls 3 and 4, System/3 does not support the Application Control Language (ACL). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. #3265 or #3266 on 3741. #1601 on Cardless mdl B, C, or D.

MODEL CONVERSIONS

All model conversions are field installable. For a 5410 or 5415 mdl A to 5415 mdl B, C, or D conversion where an installed 5424 is to be moved to the new system, an MES must be submitted to remove the 5444(s) from the 5424. This MES must also delete **#9400**, and if a second 5444 is installed, **#9401** or **#9402** (all from the 5424). Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Cables: BSCA (#2074, #2084) and BSCC (#2094) require an appropriate cable order unless EIA Local Attachment (#3601, #3602) is ordered, see *Installation Manual - Physical Planning* (GA21-9084).

SUPPLIES (None)

5424 MULTI-FUNCTION CARD UNIT
Models A1, A2

PURPOSE

A multi-function card input/output unit for the 4331 Model Group 1 or 2 Processor or System/3 model 10, 12, 15 or System/38 ... uses the 96-column card.

MODELS

	Speed (Read/Punch/Print)
Model A1	250/60/60* cpm
Model A2	500/120/120* cpm

* **Print Speed:** Is at the maximum rate of 60 or 120 cards per minute when printing on any or all of the first three lines. Printing on the fourth (lower) line will cause reduction in throughput regardless of whether or not printing occurs on any or all of the first three lines. Resultant throughput is 48 cpm for a mdl A1 and 96 cpm for a mdl A2. Uses a cassette ribbon replaceable by the customer.

Limitations: Detailed disclosure specifications describing the 96-column card are available from the IBM Corp., Commercial Development Office, Armonk, New York. Card configurations or card stocks which do not conform to these specifications may result in unsatisfactory machine performance.

Cannot be attached to a System/3 Mdl 10 or Mdl 12 when a 1442 Card Read Punch is attached.

Cannot be converted to a System/3 Mdl 15 when a 1442 Card Read Punch or a 2560 MFCM is attached on the System/3 Mdl 15.

OCR type fonts for use with current line IBM Optical Character Reading equipment are not available.

Maximum: One 5424 can be attached to a 4321 or 4331 Processor. or a System/3 mdl 10, 12, 15 or System 38.

Prerequisites: A Multi-Function Card Unit Attachment (#3901) on the 4321 or 4331 Mdl Group 1 or 2 Processor, 4331 Attachment (#6510) on the 5424. A Multi-Function Card Unit Attachment (#4100 or #4101) on the 5410, 5412 or 5415 Processing unit. On System/38 an MFCU Attachment (#1220 or #1221) is required.

HIGHLIGHTS

Provides the combined functions of a card reader, punch, collator and interpreter in one unit. Permits collating, gangpunching, reproducing, summary punching, punching of calculated results, printing, and classifying of cards in a single pass of the cards. Card sorting is also possible using a multiple pass method under program control. In a disk oriented System/3 mdl 10 or mdl 15A, the 5444 Disk Storage Drives are housed in drawers beneath the front of the 5424 ... see "Specify."

Input Section: Separate primary and secondary card hoppers, each with a 2000 card capacity, feed cards independently to a common read station and on into separate wait stations. Depending upon the model, rated serial reading is at 250 or 500 cards/minute from either hopper. The common reading unit is checked for proper functioning on each read cycle. The card code read is 6 rows consisting of B, A, 8, 4, 2, 1 punches representing a 64-character set.

Output Section: From separate wait stations, cards are fed to a common punch station, through the punch and cornering stations to the print station, where up to 4 lines with up to 32 characters per line can be printed on the card. Line designation is determined by the stored program. Characters represented are the standard 64-character set corresponding to the 96-column card code. Printing is by engraved typewheel. Cards are then selected into any one of the 4 stackers, each with a 600-card capacity. Depending upon the model, rated serial punching is at 60 or 120 cards/minute.

Multi-Function: With the ability to move cards from either hopper under independent control to the punching station and with complete stacker selection flexibility, the common card functions of collating, reproducing, gangpunching, summary punching and selective stacking can be accomplished.

Bibliography: GA21-9167

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V or **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9066** (Pearl White) must be specified.

  For System/3, specify **#9041** for red, **#9042** for yellow, **#9043** for blue **#9045** for gray, or **9046** for white ... must be consistent with 5410, 5412, or 5415 color. For 5424 ordered with System/38, #9066 (Pearl White) must be ordered.
- Lower covers: System/3 mdl 10 or a System/3 mdl 15 only is if a 5444 is to be installed): **#9400** if one 5444 is to be installed ... **#9401** if two 5444s are to be installation ... **#9402** if a second 5444 is to be added to an installed system.

  Note: **#9400** or **#9401** can be plant or field installed ... **#9402** is for field installation only. MES orders for **#9400**, **#9401**, or **#9402** is for field installation only. MES orders for **#9400**, **#9401**, or **#9402** on a System/3 mdl 10 require the serial no. of the 5410 Processing Unit.

  Removal: If two 5444s are installed and one is to be removed from the system, the MES must indicate deletion of **#9401** or **#9402** and installation of **#9400** (one disk drive only). For conversion of a 5415A mdl CPU to a 5415B, 5415C, or 5415D mdl, or for conversion from a 5410 CPU, to a 5412 or 5415 the MES must indicate deletion of **#9400**, and if a second 5444 is installed, deletion of **#9401** or **#9402**.

SPECIAL FEATURE

System/38 Attachment (#6500): To attach a 5424 to System/38, **Field Installation:** No **Prerequisites:** MFCU Attachment (#1220/#1221) is required on System/38.

4331 Attachment (#6510): To attach a 5424 mdl A1 or A2 to a 4331. **Field Installation:** No. **Prerequisites:** #3901 on 4331.

MODEL CONVERSIONS

Model changes are field installable.

ACCESSORIES (None)

SUPPLIES (None)

5525 SYSTEM UNIT

PURPOSE

The 5520 Administrative System is a shared logic system designed to support text processing, file processing, and electronic document distribution services for a wide variety of organizations. Text-oriented hardware and a licensed program have been combined to provide facilities for document (including file) creation, revision, storage, retrieval, and printing as well as optional local and/or remote document distribution.

MODELS

Model 20	020
Model 21	021
Model 30	030
Model 31	031
Model 32	032
Model 40	040
Model 50	050
Model 51	051

Configuration Overview: [Mdls 20, 30, 40, and 50]

	20	30	40	50	Notes
Using Program 5611-SS1					1
# Display Station Lines	1-4	1-4	1-8	1-8	
# Display Stations Attachable	1-6	1-12	1-18	1-18	2, 3
Disk Storage Capacity (MB)	29	29	65	130	4
Online Diskettes	1	1	1	23	5
# Printer/ Communication Lines	0-2	0-4	0-8	0-16	6, 7, 8
# Printers Attachable *	0-3	0-6	0-10	0-12	6, 7, 8, 9
# Mag Card Units	0-1	0-1	0-1	0-1	10

* May include a single (in exceptional cases more than one) 6670.

Notes:

1. Licensed Program 5611-SS1 supports mdls 20, 30, 40, and 50. See 5520 programming pages for details.
2. One 5253 Display Station, to be designated as the primary display station, must be located within 6.1 meters (20 feet) of the System Unit and in the same room.

   Not more than seven 5253 display stationsor 5150 Personal Computers per line. 5254 Dual Display Stations count as two each. May be multidropped up to 1,524 cable-meters (5,000 cable-feet) from the System Unit.A 5150 should not be used as the 5520 primary or alternate display station. The customer service representative must use the 5253 as the master display station to perform diagnostics. See also the "Special Note" following.
3. When attached to the 5525 System Unit under control of licensed program 5611-SS1, the following characteristics apply to the 5150 emulating a 5253 or 5254:

Maximum line length	172 characters
Maximum page length	125 lines
Overall page character count maximum of approximately	7,000 characters

   Double underscore is obtainable under keyboard emulation. Blinking, reverse image, and non-display are under control of the program and not directly available to the operator.
4. Disk storage is used to hold the licensed program, a library of documents available for text processing functions, and transient storage of documents in process of distribution. The total document capacity will be influenced by a number of factors. See "Special Note" following.
5. The diskette drive supports Diskette 2D. Each customer-supplied diskette (2D) holds approximately one million bytes of information. However, since the diskettes are removable, the total offline storage is limited only by the number of diskettes available.
6. Each line must be designated as one of these types:
   - Local Device Control (LDC) (for attachment of 5219, 5257, 5258, 6670, and/or another 5525), no more than eight LDC lines per 5525.
   - Attachment to switched communication lines.
   - Attachment to nonswitched communication lines.

   Note: A dedicated nonswitched SDLC communications line may also be used to attach a 6670 Information Distributor as a remote printer.

   See 5520 programming pages for details of devices supported for remote attachment via communication lines.
7. For multi-line configuration, the lines are controlled by a distribution controller (except on mdl 50, which requires a second controller for optional lines 9 to 16).
8. The distribution controllers operate at specific numbers of bits per second and with specific number of receive buffers per line. The aggregate concurrent bps and concurrent buffer allocation requirements of devices attached to each controller should not exceed its specific capacities; see the "Special Note" below.
9. Printers may be multidropped up to 1,524 cable-meters (5,000 cable-feet) radially from the System Unit on an LDC line. Maximum eight on one line (5525 mdl-dependent). 5219, 5257, 5258, 6670 may be mixed on a single line. A 5525 System Unit may be substituted for a printer on any LDC line where the printer attaches via feature #1702 or #1704. In such a configuration the primary system unit controls the printers. . See also the "Special Note" following.
10. The Mag Card Unit may be up to 4.6 meters (15 feet) from the System Unit. It is supported by Release 2 or 3 of Licensed Program 5611-SS1.

Configuration Overview: [Mdls 21, 31, 32, and 51]:

	21	31	32	51	Notes
Using Program 5611-SS2					1
# Display Station Lines	1-4	1-4	1-4	1-8	
# Display Stations Attachable	1-8	1-12	1-15	1-36	2, 3, 12
Disk Storage Capacity (MB)	29	29	58	130	4
Online Diskettes	1	1	1	23	5
# Printer/ Communication Lines	0-2	0-4	0-8	0-16	6, 7, 8, 11
# Printers Attachable *	0-3	0-6	0-8	0-12	6, 7, 8, 9
# Mag Card Units	0-1	0-1	0-1	0-1	10

* May include a single (in exceptional cases more than one) 6670.

Notes:

1. Licensed Program 5611-SS2 supports mdls 21, 31, 32, and 51 with the functions of text processing and system management functions, electronic document distribution, and files processing and stored procedures. Also, document distribution support to a host S/370 (BSC), 3270 emulation and printer support for a 6670 Information Distributor (SDLC). See 5520 programming pages for details.
2. One 5253 Display Station, to be designated as the primary display station, must be located within 6.1 meters (20 feet) of the System Unit and in the same room.

   Not more than seven 5253 Display Stations, 5150 or 5160 Personal Computers per line. 5254 Dual Display Stations count as two each. May be multidropped up to 1,524 cable-meters (5,000 cable-feet) from the System Unit. A 5150 or 5160 should not be used as the 5520 primary or alternate display station. See also the "Special Note" following.
3. When attached to the 5525 System Unit under control of Licensed Program 5611-SS2, the following characteristics apply to the 5150 or 5160 emulating a 5253 or 5254:

Maximum line length	255 characters
Maximum page length	125 lines
Overall page character count maximum of approximately	8,000 characters

5525 System Unit (cont'd)

Double underscore is obtainable under keyboard emulation. Blinking, reverse image, and non-display are under control of the program and not directly available to the operator.

4. Disk storage is used to hold the licensed program, a library of documents available for text processing functions, and transient storage of documents in process of distribution. The total document capacity will be influenced by a number of factors. See "Special Note" following.
5. The diskette drive supports Diskette 2D. Each customer-supplied diskette (2D) holds approximately one million bytes of information. However, since the diskettes are removable, the total offline storage is limited only by the number of diskettes available.
6. Each line must be designated as one of these types:
   - Local Device Control (LDC) (for attachment of 5219, 5229, 5257, 5258, 6670, and another 5525 System Unit), no more than eight LDC lines per 5525 (mdl-dependent).
   - Attachment to switched communication lines.
   - Attachment to nonswitched communication lines.

   Note: A dedicated nonswitched SDLC communications line may also be used to attach a 6670 Information Distributor as a remote printer.

   See 5520 programming pages for details of devices supported for remote attachment via communication lines.
7. For multi-line configuration, the lines are controlled by a distribution controller (except on mdl 51, which requires a second controller for optional lines 9 to 16).
8. The distribution controllers operate at specific numbers of bits per second and with specific number of receive buffers per line. The aggregate concurrent bps and concurrent buffer allocation requirements of devices attached to each controller should not exceed its specific capacities; see the "Special Note" below.
9. Printers may be multidropped up to 1,524 cable-meters (5,000 cable-feet) radially from the System Unit on an LDC line. Maximum eight on one line (5525 mdl-dependent). 5219, 5229, 5257, 5258, and 6670 may be mixed on a single line. See "Special Note" following.
10. The Mag Card Unit may be up to 4.6 meters (15 feet) from the System Unit. It is supported by Licensed Program 5611-SS2.
11. 5525 System Units may be attached to other 5525 System Units on any LDC line via features #1702 and #1704. See following "Special Note".
12. It is strongly recommended that the 5520 Performance Estimator be run whenever more than 18 5253 displays or Personal Computers or a combination thereof are attached to a mdl 51. Out of the 36 display stations that can be attached, 24 can be concurrently active. (18 active if all are performing 3270 functions.) Displays can be designated as "reserved" or "contention". To reduce sign-on contention, displays should not be designated as reserved unless absolutely necessary.

Special Note:

The 5525 System Unit provides a large degree of configuration flexibility as already described, but there are some physical limitations as noted which must be applied, and also some practical limitations which must be respected for optimum performance of the system. System capacity and performance will be influenced by the nature of the work being undertaken, the format and content of documents being processed, and the incidence of concurrent activity.

Use of the Performance Estimator (AN5520) available under DBS is highly recommended for guidance as to the viability of a given configuration in a described workload environment.

Configuration consistency and guidance may be obtained by use of the 5520 Administration System Online Configurator (CF5520), also available under DBS.

Minimum Configuration:

- 5525 System Unit (mdl 20, 21, 30, 31, 32, 40, 50, or 51).
- 5253 Display Station or 5254 Dual Display Station.
- #4610 (92-character) Keyboard or #4611 (96-character) Keyboard.

HIGHLIGHTS

The 5525 System Unit is the heart of the 5520 Administrative System and all other devices are attachable to it. It contains the circuitry for controlling and processing information flowing through the system, and internal storage for holding the licensed program and active documents.

Attachable to the 5525 are:

- Multiple 5150 or 5160 Personal Computers (with the 5520 Administrative System's Personal Computer Attachment). If the 5150s or 5160s are connected to the 5525, the Personal Computer/Display Station Emulation Adapter (#2880) must be provided by the user.
- Multiple 5219s, 5229s (on mdls 21, 31, 32, and 51), 5257s (impact printers), 5258s (ink jet printers), and 6670 Information Distributors.
- Multiple 5253 Display Stations and 5254 Dual Display Stations. (The 5254 Dual Display Station has been withdrawn from marketing.)
- A single 5321 Mag Card Unit.
- A single 6670 Information Distributor (SDLC) used as a printer (may also be remotely located). Note: In exceptional cases multiple 6670s may be attached.
- Other 5525 System Units on an LDC line.

In addition, optional attachments and controls for communication lines are provided and the licensed programs (5611-SS1 for mdls 20, 30, 40, and 50; 5611-SS2 for mdls 21, 31, 32, and 51) are available to support the system.

Highlights include:

- Choice of eight mdls giving wide range of attachment capability, internal storage, and processing power.
- Multiple integrated processors and controllers to enhance performance and facilitate overlap capability.
- Integrated nonremovable disk storage standard on all mdls.
- Configuration flexibility through multiple local attachment lines and optional attachment of remote devices via communications lines for document distribution.
- Diskette read/write capability standard on all mdls to archive/retrieve documents for document distribution.
- Optional attachment for document distribution to switched and/or nonswitched communication lines operating at up to 4800 bps switched or up to 9600 bps nonswitched (with either BSC or SNA/SDLC protocols per line supported by Licensed Program 5611-SS1 for mdls 20, 30, 40, and 50 and by Licensed Program 5611-SS2 for mdls 21, 31, 32, and 51).
- Keylock option.
- Optional attachment of the 5321 Mag Card Unit (see 5520 programming pages for limitations).
- Modem flexibility:
  - Optional 1200 bps integrated modems both switched and nonswitched.
  - Optional EIA RS-232-C or CCITT V.24/V.28 recommended interface.
  - Optional business machine clocks to support modems which do not have clocking facility (1200 bps).
  - Auto-answer standard.
  - Auto-call feature option on all switched communication lines meeting the EIA RS-366 or CCITT V.24-200 series/V.25/V.28 recommended interface (not using the 1200 bps integrated modems).

Problem Determination Procedures: Problem determination and recovery procedures are provided by IBM with the 5525 supported by the 5520 Administrative Processing Programs (5611-SS1 and 5611-SS2), and include the use of the 5219, 5229, 5253, 5254, 5257, and 5258. These procedures help provide increased availability of the System Unit and of the system itself by assisting with problem determination and either recovery or work-around procedures for certain types of device or system problems. The procedures are described in material accompanying the attached units (see relevant sales manual pages for details) and in the HELPs and message facilities of the program as well as the following manuals:

IBM 5219/5229 Printer Operators Guide (GA23-1009)
IBM 5257 Printer Operators Guide (GA23-1004)
IBM 5258 Printer Operators Guide (GA23-1005)
IBM 5520 Administrative System:
- *Messages & Recovery Aids Manual* (SC23-0733) for 5611-SS1
- *Recovery Aids Manual* (SC23-0756) for 5611-SS2
- *Messages Manual* (SC23-0749) for 5611-SS2

IBM 5520/Personal Computer Attachment Program User's Guide (P/N **7033705**)

These procedures are designed to be easy to follow and use by the customer, and it is the customer's responsibility to follow them prior to calling for IBM service.

5525 System Unit (cont'd)

5525 System Unit: The System Unit consists of frames, covers, power supplies, cable, logic circuits, and processors. It is composed of a processing unit, disk storage, memory, a diskette drive, facilities for addressing storage and performing processing, standard I/O control, optional additional I/O control, and optional communications control.

Processing Unit:

- Multiple processors and controllers operate in parallel.
- Data and instructions are stored as EBCDIC characters (8-bit byte plus ninth bit for parity checking) in storage.
- I/O and processing are overlapped except for diskette and disk data transfer with other disk read/write operation.

Disk Storage:

- Integrated, nonremovable disk storage.
- Access time 27 millisecond average, excluding rotational delay.
- Up to 1.031 megabytes/second data transfer rate.

Diskette Drive: The diskette drive supporting Diskette 2D.

- Standard on mdls 20, 21, 30, 31, 32, and 40.
- Facilitates offline transfer of documents between 5525s.
- Archive/retrieve facility for offline storage, backup, or security of document library.
- Diskette affords the use of removable, economical high capacity reusable media.
- Read/write operations are overlapped with processing and other device functions except disk storage data transfer.
- Stores up to one million bytes of data per diskette in double-density recording.

Diskette Magazine Drive: The diskette drive supporting Diskette 2D.

- Standard on mdls 50 and 51.
- Transfers data at speeds up to 125KB per second.
- Accepts two 10-diskette magazines.
- Up to three diskettes may be manually loaded in addition to the magazines.
- Same functional benefits as for diskette drive.

Display Station Control:

- Standard on all mdls.
- Provides for 3270 Emulation for mdls 21, 31, 32, and 51 with Function Extension (#3270) on the 5253 Display Stationor on 5150 or 5160 Personal Computers emulating a 5253. **Note:** The only supported keyboard language group is English US (**#2956**).
- Provides for direct attachment of the 5150 or 5160 to the 5253 and the 5254.
- Up to 36 display stations are attachable (mdl-dependent).
- Four cable ports on mdls 20, 21, 30, 31, and 32 and eight on mdls 40, 50, and 51 are standard for the attachment of the display stations.
- Twinaxial cabling allows up to seven display stations to be connected to a single port (mdl-dependent).
- Maximum allowable cumulative length of each cable is 1,524 meters (5,000 feet).

Printer Attachment:

- Special features allow attachment of up to 12 printers (5525 mdl-dependent).
- 5219 and 5257 Printers providing high-quality impact print wheel printing.
- 5229 Printer provides high-quality impact print wheel printing requiring paper sizes up to 19 inches wide with a 17-inch writing line (mdls 21, 31, 32, and 51 only).
- 5258 Printer providing high-quality non-impact ink jet printing.
- 6670 Information Distributor (SDLC) providing high-quality non-impact laser printing. **Note:** Some means of creating Mag Cards is required to support this attachment.
- Twinaxial cabling allows up to eight intermixed 5219s, 5229s, 5257s, 5258s, and 6670s to be attached to a single port (mdl-dependent). **Note:** It is not recommended to intermix a 6670 with another printer on the same line where printer performance is a key concern.
- Maximum allowable accumulative length of each cable is 1,524 meters (5,000 feet). **Note:** A 5525 System Unit may be substituted for a printer on a line attached via features #1702 or #1704. This is an alternative to attaching a 5525 via communications line for document distribution. In such a configuration, the primary system unit controls any printers on that line. Note also that a 6670 Information Distributor (SDLC) may be remotely located as a printer to the system via a dedicated nonswitched SDLC communications line. Line speed options will normally be 4800 bps for the 6670 mdl 1 and 9600 bps for the 6670 mdl 2.

System Unit Attachment: 5525 System Units may be attached to other 5525 System Units on any LDC line via features 1702 or #1704 by using 5525 Cable-Thru (#2680). These features will also allow attachment of 5525 System Units on LDC lines shared with printers. However, in such a configuration the primary system unit controls any printers on that line.

Mag Card Attachment:

- Special feature allows attachment of a 5321 Mag Card Unit, cable-connected up to 4.6 meters (15 feet) from the 5525.
- Mag cards may be read or recorded (within limits) to assist, for example, with the conversion of existing mag card libraries. See 5520 programming pages for limitations.

Document Distribution: Control for Document Distribution Communications Facilities is provided by optional special features on the 5525 System Unit with Licensed Programs 5611-SS1 and 5611-SS2. Up to 16 communication lines are supported depending upon the mdl of the System Unit and number of lines allocated for printers. BSC and SNA/SDLC line protocols are provided.

- Point-to-point switched or nonswitched.
- Multipoint (nonswitched and SDLC only).
- Transmission rate up to 9600 bps (nonswitched) or 4800 bps (switched).
- 1200 bps integrated modems.
- Auto-answer or manual answer (modem-dependent).
- Optional Auto-Call feature for external modems meeting the EIA RS-366 or CCITT V.24-200 series/V.25/V.28 recommended interface.
- Optional EIA RS-232-C or CCITT V.24/V.28 recommended interface.
- BSC support to a variety of communicating IBM office machines and to a S/370 host.
- SNA/SDLC support to other 5525s or a S/370 host remotely attached (also to 5219s, 5229s, 5257s, 5258s, 6670s, and other 5525s locally attached).

Customer Responsibilities: The customer must be advised in writing of certain responsibilities related to the installation and maintenance of communications facilities/services as well as the IBM equipment. For further information, see M2700 pages and "Teleprocessing" in the GI section.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to Order Confirmation.

Customers should be reminded that they are responsible for conforming the use of the system to applicable statutes and regulations relating to the distribution of information both within the U.S. and also to, from, or between other countries.

Customers should be advised of their responsibility for problem determination of the 5150 or 5160 when using hardware feature #2887, or software features #2880, #2884, or #2888 for attaching the 5150 or 5160.

Publications: *IBM 5520 Administrative System Introduction* (GC23-0702), *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 for mdls 20, 30, 40, and 50; or GA23-1011 for mdls 21, 31, 32, and 51), *IBM 5520 Administrative System Messages* (SC23-0749), and *IBM 5520 Administrative System Recovery Aids* (SC23-0756 for mdls 21, 31, 32, and 51; or SC23-0733 for mdls 20, 30, 40, and 50).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9884** for 208V, **#9886** for 230V. A locking plug is provided (requires customer locking type receptacle).
- Power Cord: Standard power cord is 2.4 meters (8 feet), no specify required. Some localities restrict power cord length to 1.8 meters (6 feet). If this length is required, specify **#9986**.
- Color: Pearl White (no specify required).
- Cables: One modem cable is required for attaching the 5525 to each switched or nonswitched communications line when an external modem is used. Specify **#9152** for a 6 meter (19.7 foot)

5525 System Unit (cont'd)

EIA Interface cable, and **#9153** for a 12 meter (39.4 foot) EIA Interface cable.

One auto-call cable is required for each pair of auto-call lines attaching the 5525 with Auto-Call to each communication facility. Specify **#9154** for a 6 meter (19.7 foot) cable, and **#9155** for a 12 meter (39.4 foot) cable.

- Attachment: Attachment of 5219, 5229, 5257, 5258, 5321, 6670, and another 5525 requires special features. See "Special Features".

SPECIAL FEATURES

Non-Communications Features

5321 Mag Card Unit Attachment (#1100): Required to attach the 5321 Mag Card Unit mdl 1 to the 5525. A 4.6 meter (15 foot) attachment cable and connector is included with the 5321. **Maximum:** One. **Field Installation:** Yes.

Local Printer Attachment (#1105): [Mdls 20, 21, 30, 31, 32] Provided to attach 5219, 5229 (mdls 21, 31, and 32 only), 5257, 5258, and/or 6670 through a single port to a 5525 where document distribution is not required. Customer-supplied twinaxial cable and connector is required to attach the printers. **Note:** Due to speed limitations, this attachment is not recommended for the 6670 where printer performance is a key concern. **Limitations:** For mdls 20, 21, 30, 31, and 32 only. On mdls 20 and 21, the rated speed of the feature is 1200 bps and a maximum of three printers can be attached. On mdls 30, 31, and 32 the rated speed of the feature is 2400 bps and a maximum of six (eight on mdl 32) printers can be attached. Requires Local Device Control (#4710) and LDC Attachment (#4715) to attach the printers. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4650): Replaces on/off power switch to help protect against unauthorized use. Two keys are shipped with this feature. Additional keys may be purchased from IBM (vendor will supply additional keys only to original purchaser of the keys). See "Accessories" for order information. **Maximum:** One. **Field Installation:** Yes.

Local Device Control (#4710): [Mdls 20, 21, 30, 31, 32] Required to attach 5219, 5229 (mdls 21, 31, or 32 only), 5257, 5258, and/or 6670 to a 5525 System Unit. Requires LDC Attachment (#4715) and Local Printer Attachment (#1105). **Maximum:** One. **Field Installation:** Yes.

LDC Attachment (#4715): Cable and connector assembly for connecting 5219, 5229, 5257, 5258, and 6670 to the Local Device Control. See "Distribution Controllers" for specifics. **Maximum:** Two. **Field Installation:** Yes.

Communications Features

The communications features are designed to operate at line speeds up to 9600 bps (nonswitched) or 4800 bps (switched, point-to-point) on a common carrier facility or equivalent privately-owned communication facility.

In conjunction with licensed programs (5611-SS1 and 5611-SS2), optional distribution controllers and features permit the 5520 Administrative System to function for document distribution host communications and/or 3270 emulation on switched or nonswitched, either public or private, communications lines. The 5219, 5229 (for mdls 21, 31, 32, and 51), 5257, 5258, and 6670 or 5525 System Units are also attached via a twinaxial cable to the 5525 through these same controllers. These lines interface to the distribution controllers through line adapters. A single adapter provides both BSC and SDLC capability (each adapter can accommodate two lines and can function in any combination of BSC or SDLC) to a selected set of devices (defined by program control).

Each distribution controller (maximum of one in each of 5525 mdls 20, 21, 30, 31, 32, and 40, and maximum of two in each of 5525 mdls 50 and 51) has an aggregate data rate capability of 19.2K bps. This aggregate data rate allows flexibility in configuring the devices and communications facilities that attach to these controllers.

The distribution controllers will allow the 5520 Administrative System to communicate on nonswitched and/or switched point-to-point lines at speeds up to 4800 bps or 9600 bps if nonswitched. See M2700 pages for information on communication facilities. These distribution controllers will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be 2- or 4-wire half- or full-duplex facilities. Operation of the features will be overlapped at all transmission rates with processing and I/O device operations. Units at each termination or drop point of a data link to which the 5520 Administrative System is attached must use the same clocking source (modem or business machine clock) and must operate at the same transmission rate and use the same transmission code. Compatible modems must be used at all terminations. The switched network environment includes support for manual dial or Auto-Call (optional feature) and manual or auto-answer (where the attached modem supports this capability) operations.

The 5525 supports attachment of the following devices in remote environments for the purpose of document distribution only, as supported by Licensed Programs 5611-SS1 and 5611-SS2. See programming pages for more details.

- Another 5525 - SNA/SDLC.
- Office System/6 (6/420, 6/430, 6/440, 6/442, 6/450, 6/452) - BSC. *
- 6580 Displaywriter System - BSC. *
- 6640 Document Printer - BSC. *
- 6670 Information Distributor - BSC. *
- Mag Card II Typewriter - BSC. *
- 6240 Mag Card Typewriter - BSC. *
- Series/1 (suitably programmed) BSC. *
- System/32 with Word Processing (#6002) - BSC.
- System/34 (suitably programmed) BSC. *
- System/38 (suitably programmed) - BSC.
- Host S/370 (suitably programmed) - SNA/SDLC or BSC.

* See 5520 programming pages for limitations.

The 5525 can communicate via the EIA RS-232-C or CCITT V.24/V.28 recommended interface to external modems. The line protocol is BSC or SDLC as provided in the complementary communication feature at the remote device. Transmission speeds of up to 4800 bps (if switched) and up to 9600 bps (if nonswitched) are possible. These communications may be over switched or nonswitched facilities (point-to-point), and the switched lines can be manual or optionally auto-dial, manual, or auto-answer. For 1200 bps communications, 1200 bps Integrated Modems may be utilized in appropriate circumstances. They may attach to nonswitched facilities or the switched network.

Auto-Call (#1315, #1316): Provides for unattended initiation of transmission on the switched network communications lines. Provides functions for four lines. #1316 is for #1702 only. See "Specify" for cable ordering. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Distribution Controllers: The Communication/Printer-One (#1704) distribution controller is mutually exclusive with the Local Printer Attachment (#1105). #1702 provides an additional controller and additional ports for mdls 50 and 51 only, and requires Expansion Gate (#3600). These distribution controllers provide a variable number of printer/communication ports as shown in the table below, which also indicates the prerequisite controller features.

5525 System Unit (cont'd)

Distribution Controller Configurator

Feature	Available on 5525 Mdls								Number of Lines per System with Feature (Plus Prereqs.)	
	20	21	30	31	32	40	50	51	Min.	Max.
Local Print Attach (#1105)	X	X	X	X	X				1	1
Power Expansion (#5550) *				X	X	X	X	X		
Comm. Printer-One (#1704)	X	X	X	X	X	X	X **	X **	2	2
Line Adapters, Add'l (#4700)			X	X	X	X	X	X	4	8 ***
Expansion Gate (#3600)							X	X		
Dist. Controller, 2nd (#1702)							X	X	8	12
Line Adapters, Add'l (#4701)							X	X	10	16 ****

Notes:

* #5550 is a prerequisite for #1704 on mdls 31, 32, 50, 51. #5550 is required on mdl 40 for the second #4700.

** These mdls require one #4700 with #1704.

*** Maximum number of lines is mdl dependent. Each #4700 provides for attachment of 2 lines via #1704 (maximum of three #4700).

**** Each #4701 provides for attachment of 2 lines via #1702 (maximum of two #4701).

Those ports not used for printer attachment may be used for communications, except on #1105.

Distribution Controller, 2nd (#1702): Provides four additional printer/communication ports on the 5525 mdls 50 and 51. The number of ports may be expanded in increments of two to a maximum of eight by the inclusion of Line Adapters, Add'l (#4701). For printers (and/or another 5525) line attachment requires Local Device Control (#4712). For communication line attachment requires the EIA Interface (#3702) or a 1200 bps Integrated Modem (#5502, #5503). **Limitations:** A maximum of eight ports per 5525 may be allocated for printer attachment. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1704, #3600, three #4700s, and #5500.

Communications/Printer-One (#1704): Provides two printer or communications ports on all mdls of the 5525. Used on mdl 50 or 51 as a prerequisite to #4700 only. For printer (and/or another 5525) line attachment requires Local Device Control (#4711). For communication line attachment requires the EIA Interface (#3701) or a 1200 bps Integrated Modem (#5500, #5501). **Maximum:** One. **Field Installation:** Yes.

For features attachable to the distribution controllers, see "Feature Configurator" and the descriptions which follow.

Business Machine Clock (#1750, #1751): Provides communications clocking (timing) for two modems which do not provide the function. #1751 is for #1702 only. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

5525 Cable-Thru (#2680): Allows one or more 5525 System Units to be connected on an LDC line along with 5219, 5229 (for mdls 21, 31, 32, and 51), 5257, 5258, and 6670. This feature provides for connecting up to eight printers or 5525s in any sequence on a single LDC line. **Maximum:** One. **Field Installation:** Yes. **Note:** If the 5525 System Unit connected via this feature is the last in a line, a Screw-On Terminator is required (see "Accessories").

Expansion Gate (#3600): Required for the installation of the second distribution controller (#1702) on mdls 50 and 51 only. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701, #3702): Provides a cable (see "Specify") and interface for connecting low-/medium-speed modems meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. #3702 is for #1702 only. **Maximum:** See "Feature Configurator". Maximum number of EIA plus LDCs per controller is mdl-/feature-dependent. **Field Installation:** Yes.

Line Adapters, Add'l (#4700, #4701): Provides for attachment of additional pairs of lines on several 5525 mdls. #4700 provides for #1704 on mdls 30, 31, 32, 40, 50, and 51. #4701 provides for #1702 on mdls 50 and 51. Mdls 50 and 51 require a minimum of one #4700 with #1704. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Local Device Control (#4711, #4712): Required to attach 5219, 5229 (mdl 21, 31, 32, or 51), 5257, 5258, 6670, and/or 5525 System Units to a distribution controller (#4712 is for #1702 only). One per line. Requires LDC Attachment (#4715), one per up to four printer lines. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

LDC Attachment (#4715): Cable and connector assembly required for connecting 5219, 5229 (mdls 21, 31, 32, or 51), 5257, 5258, 6670, and/or 5525 System Units to the Local Device Control (#4711, #4712). One serves up to four printer lines. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Modem (#5500, #5501, #5502, #5503): An integrated modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched networks. Available in two different versions: #5500 and #5502 nonswitched, and #5501 and #5503 switched. #5502 and #5503 are for #1702 only. **Field Installation:** Yes. **Prerequisites:** #1750 or #1751 as appropriate.

Power Expansion (#5550): Provides additional power for communications on mdls 31, 32, 40, 50, 51. This feature is a prerequisite for #1704 on mdls 31, 32, 50, 51. #5550 is required on mdl 40 for the second #4700. **Maximum:** One. **Field Installation:** Yes.

5525 System Unit (cont'd)

Feature Configurator

Feature	Local Printer Attachment (#1105) Feature #	Max.	2nd Distribution Controller (#1702) (1) Feature #	Max.	Comm./Printer-One (#1704) (2) Feature #	Max.
Auto-Call (4 lines)			#1316	2	#1315	2
Business Machine Clock (2 clocks)			#1751	4	#1750	4
EIA Interface (3) (4)			#3702	8	#3701	8
Line Adapters, Add'l (2 lines) (8)			#4701	2	#4700	3
Local Device Control (3) (4) (5)	#4710	1	#4712	8	#4711	8
LDC Attachment (4 lines) (6)	#4715		#4715		#4715	
1200 bps Integrated Modem, Nonswitched (3)			#5502	3	#5500	3
1200 bps Integrated Modem, Switched (3)			#5503	3	#5501	3
EIA 6 meter (19.7 foot) Cable (7)			**#9152**		**#9152**	
EIA 12 meter (39.4 foot) Cable (7)			**#9153**		**#9153**	
Auto-Call 6 meter (19.7 foot) Cable (7)			**#9154**		**#9154**	
Auto-Call 12 meter (39.4 foot) Cable (7)			**#9155**		**#9155**	

Notes:

(1) Requires Expansion Gate (#3600). #1702 is shipped with four lines.

(2) Requires Power Expansion (#5550) as a prerequisite on mdls 31, 32, 50, 51, and on mdl 40 with second #4700. #1704 is shipped with two lines.

(3) Mutually exclusive (per line).

(4) The sum of the Local Device Controls and EIA Interfaces cannot exceed the number of available lines.

(5) Requires LDC Attachment (#4715). No more than eight LDC lines per 5525.

(6) Maximum two per system.

(7) Each line requires one if feature installed.

(8) One #4700 is required with #1704 on mdls 50 and 51.

Licensed Programs: Licensed Program 5611-SS1 (for mdls 20, 30, 40, and 50) and Licensed Program 5611-SS2 (for mdls 21, 31, 32, and 51) should be ordered at equipment order entry time. See Licensed Programs 5611-SS1 or 5611-SS2 for additional information.

The 5520 Administrative Processing Programs (5611-SS1 and 5611-SS2) are used for the selection of certain data communications characteristics such as answer tone control, line type, station address, etc.

References: See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, and operating capabilities. Refer to *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for physical installation requirements.

MODEL CONVERSIONS

Model conversions are field installable.

When the 5525 model changes, the licensed program must be reordered since it contains mdl-dependent code variations.

Any model upgrade that involves a disk storage capacity change may require replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customer should carefully evaluate future requirements when purchasing a system.

Replaced parts from any model conversion that includes disk storage capacity change become the property of IBM. Replaced or purchased parts from any special feature installation or removal remain the property of the customer.

ACCESSORIES

Cables: The cables and/or associated parts to attach a 5525 to a printer line on a primary 5525 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5525.

A modem cable is required for modems other than the 1200 bps Integrated Modem (#5500, #5501, #5502, #5503). See "Specify".

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one connector kit are required for each attachment cable. (Individual connectors P/N **7362229** are available for replacement.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector (P/N **6819750**): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from that used with the displays.

Screw-On Terminator (P/N **7362188**): One is required on the last 5525 System Unit on a shared LDC line for the last display station on a line if it is a 5150 or 5160.

Twinaxial T-Connector (P/N **6851187**): One is required for each 5150 or 5160 that is to be attached to the 5525. The use of this connector is discussed in the *IBM Personal Computer/Display Station Emulation Adapter Installation and Problem Determination Procedures Manual* (P/N **7033710**). A cable (P/N **7362267**), maximum length 30.5cm (1 foot) and minimum length 20.3cm (8 inches), must be supplied with the T-connector.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

5525 System Unit (cont'd)

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Installation Convenience Kit: May be ordered for connecting 5150 (#2890 P/N **6092541**) or 5160 (#2882 P/N **6109564**) Personal Computers to the 5525. The kit contains:

- Personal Computer/Display Station Emulation Adapter
- 5520/Personal Computer Attachment Program
- Twinaxial T-Connector P/N **6851187**
- Cable P/N **7362267**
- Plus all necessary manuals and 5-1/4 inch diskettes to install, diagnose, and use the 5520/PC attachment program.

These kits may be ordered as stand-alone feature codes or as features associated with personal computer orders. These kits are not to be associated with 5520 orders.

SUPPLIES

For ordering information, contact IBM.

Diskettes: Only diagnostic diskettes are shipped with the 5525. Diskettes for customer uses must be ordered separately.

Diskette Magazines: Diskette magazines may be ordered, P/N **2462521**. Diskettes are not shipped with the magazine.

IBM ISG

MACHINES

6126 CORRECTING SELECTRIC® RIGHT-TO-LEFT TYPEWRITER

PURPOSE

Any organization with right-to-left typing requirements can have the proven efficiency of the 6126 typewriter. It tabs and spaces the way Farsi, Hebrew, and Arabic are written.

MODELS

MODEL 856

Dimensions

Width: 520 mm (20.5 in.)
Depth: 396 mm (15.6 in.)
Height: 177 mm (7.0 in.)
Weight: 17 kg (38 lbs.)

HIGHLIGHTS

- Types the way the language is written, from right to left, and corrects errors at the time they are made.

SPECIFY

- Voltage: 115V AC, 60 Hz, 1.2 Amps.
- Keyboard Group:

Language	Code
Arabic	**#K481**
Farsi	**#K441**
Hebrew	**#K480**
Maghreb	**#K551**

- Color: Raven Black **(#C030)**
- Paper Feeds (1, 1-1/2, 2):

48-Tooth **#0083**
51-Tooth **#0085**
54-Tooth **#0070**

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6128 MEMORY 100 TYPEWRITER

PURPOSE

The 6128 Memory Typewriter has a built-in action file that enables storage of typed material. A dial on the keyboard gives access to the action file. The operator can store and recall up to 100 pages of typed material. By employing the memory capability, the operator can make revisions in typed documents with a minimum of retyping.

MODELS

Model 575 Maximum Operating Speed: 15.5 cps

Dimensions:

Width: 679.5mm (26.75 in.)
Depth: 457.2mm (18 in.)
Height: 190.5mm (7.5 in.)
Weight: 29.25kg (65 lbs.)

HIGHLIGHTS

- Copy correction capability speeds original typing.
- 4,000-character (1-page) memory simplifies complex typing tasks and revision.
- 100-page storage eliminates repetitive typing.
- Dual pitch.
- Standard Features are as follows:
  - Automatic Decimal Tabulation: Allows entry of nonaligned numerals in random length numeric fields. On playout, the logic behind an encoded decimal tab causes alignment of the numerals on their decimal points.
  - Acoustical Filter Hood: A plastic hood placed over the filter which greatly reduces the sound of the machine as it operates.
  - Automatic End-of-Ribbon Shutoff: A sensor incorporated into the ribbon mechanism helps prevent accidental playout of text when the ribbon end is reached. The ribbon end condition is sensed when there are from 50 to 700 character print positions left on the ribbon.
  - Automatic Paragraph Indent: Handles indented formats in adjusted playback. 14 levels of indention are standard.
  - Automatic Word Underscore: Eliminates time-consuming character-by-character underscoring. Allows the operator to underscore a complete word with only one recorded code. This helps to increase throughput speed and conserve space in the buffer.
  - Automatic Centering: Allows automatic centering, even on first draft.
  - Interchangeability of Type Style Elements: Interchangeable elements can be snapped on and off to give a new, fresh appearance to correspondence.
  - Selective Ribbon System: Designed to accept two types of ribbon systems: IBM High Yield Correctable Film Ribbon and IBM Tech III Ribbon System.
  - Electronic Right Margin and Tabs.

SPECIFY

- Voltage: 115V, 60 Hz, 1.3 Amps.
- Keyboard (88 characters unless otherwise specified):

  US **#K101**

- Color: Beige (no specify required).

SPECIAL FEATURES

Pin Feed Platen:

48-tooth ratchet **#0101**
54-tooth ratched **#0102**
24-tooth ratched **#0103**

Roll Paper Holder (#2480)

Security Lock Key (#6775)

Note: Effective January 1, 1983, features will be subject to availability and limited to field installation.

MODEL CONVERSIONS None

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6208 AUDIO TYPING UNIT

PURPOSE

The 6208 Audio Typing Unit is an audio typing aid for the use of persons with impaired vision. It is a field attachable unit which may be connected to an 6128 Memory 100 Typewriter. This typing aid enables a person to actually listen to what the typewriter is doing and saying, and to review and revise what the operator has accomplished. The unit provides audio support from the moment the keyboard is turned on until an error-free document is taken out of the typewriter.

MODELS

Model 001 Console and Key Pad

Dimensions:

Width: 660mm (26 in.)
Length: 825mm (32.5 in.)
Height: 846mm (33.25 in.)
Weight: 43kg (96 lbs)

HIGHLIGHTS

- Standard Features are as follows:
  - Two Headset Jacks - Allows both operator and supervisor to hear the Audio Typing Unit with speaker off.
  - Headset Volume Control.
  - Speech Rate Control.
  - Audio Modes Button - Selects the pronounce, spell, or punctuation mode of audio response.
  - Keyboard Modes Button - Controls the "echoing" of keys on the host machine.
  - Playback Button - Controls whether audio is off or on during playback.
  - Print Button - Controls whether the element strikes the platen or not.
  - Line Button - Initiates audio review of a line.
  - Word Button - Initiates audio review of a word.
  - Character Button - Initiates audio review of a character.
  - Line Back Button - Positions audio review to the beginning of the line.
  - Word Back Button - Positions audio review to the beginning of the previous word.
  - Character Back Button - Positions audio review to the beginning of the character.
  - Line Number - Indicates vertical position on the page.
  - Position - Tells the location of the element from the left margin and where the last buffer review point is.
  - Move Button - Aligns element position and buffer review point for corrections.
  - Expand - Initiates audio review of a character by speaking a keyword E.g., in the US A=ALPHA .

SPECIFY

- Voltage: 115 V AC, 60 Hz, 1.5 Amps.
- Keyboard Group:

  US **#K101**

- Color: Console -- specify **#C030** for Raven Black, **#C043** for Pebble Gray ... Key Pad -- specify **#C043** for Pebble Gray, **#C028** for Charcoal Gray.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6208 shipment to the customer will include the following:

- Installation Tool
- Operating Instructions
- Transcriber Cable Adapter

Contact IBM.

6212 MAG CARD COMPOSER READER/RECORDER

PURPOSE

The 6212 is a low console that uses standard 5,000 character magnetic cards for reading information from, or reading it to the composer memory. The 6212 will accept singly fed cards or a pack feed of up to 50 cards.

MODELS

Model 001

Prerequisites: Must be connected to a 6625 Mag Card Composer Printer

Dimensions:

Width: 30.5cm (12 in.)
Depth: 48.3cm (19 in.)
Height: 67.3cm (26.5 in.)
Weight: 34 kg (75 lbs.)

HIGHLIGHTS

- Low Profile Card Console with Pack Feed.
- Pack Feed - 50 cards.
- Unlimited Offline Storage.
- Single Card Feed Slot with Stacker.
- Reads Cards at 240 CPS.
- Records Cards at 200 CPS.
- Standard Features are as follows:
  - MC Console: The 6212 is cable-connected to the 6625 Mag Card Composer Printer. It houses the high speed pack-feed card deck, the control electronics, and the power supply. The unit can feed cards from a stack of up to 50 cards in the hopper or accept a card through the single card slot. It can read or record a card, eject it into the card stacker, or eject it out the card slot under control of the electronics.

SPECIFY

- Voltage: 115V AC, 60 Hz, 3.5 Amps.
- Color: Charcoal Black with Pearl White faceplate **#C041**

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6360 DISKETTE UNIT

PURPOSE

The Diskette Unit is used for loading programs into memory and for housing work diskettes for the 6580 Displaywriter. It is available with either one or two diskette drives for use with either Displaywriter Diskette 1 or 2D. Information created at the keyboard can be read onto the diskette.

MODELS

Model	**010**	Single Diskette Unit - uses Diskette 1 only
Model	**011**	Dual Diskette Unit - uses Diskette 1 only
Model	**020**	Single Diskette Unit - uses Diskette 1 or 2D
Model	**022**	Dual Diskette Unit - uses Diskette 1 or 2D

Limitations: The data formats of these diskettes are not compatible with other IBM diskettes.

Prerequisites: The customer must have at least Textpack 2 to use the Diskette 2D.

HIGHLIGHTS

Diskette Characteristics:

- Diskette 1 provides 284,160 bytes of customer-usable characters and control codes; up to 144 2,000-character pages.
- Diskette 2D provides 985,088 bytes of customer-usable characters and control codes.

Diskette Unit Configurations:

- Diskette 1 configuration - one or two diskette drives, 284,160 byte capacity per diskette.
- Diskette 2D configuration - one or two diskette drives, 985,088 bytes per diskette.

Benefits:

- Modular design accommodates left- or right-handed operators.
- Modular packaging provides for easy upgrading.
- Single-drive model provides low - cost option.
- Dual-drive model helps reduce diskette handling.
- Diskette 2D provides larger storage capactiy.

Physical Specifications:

Width: 254mm (10 in.)
Depth: 398mm (15.7 in.)
Height: 292mm (11.5 in.)
Weight (Single): 11kg (24 lb.)
(Dual): 16kg (35 lb.)
Cable Length: 1 meter (3.3 feet)

Customer Setup: Yes (Single or Dual Diskette Unit).

SPECIFY

- Color: Pearl White (no specify required).

SPECIAL FEATURES

Non-Communications Features

Modification Feature for Single Diskette Unit (#6990) and for Dual Diskette Unit (#6993): Available with 50 Hz or 60 Hz power. Designed to help protect the security of information being processed. Available for sales, delivery, installation and maintanance in the United States and to agencies of the United States Government located outside the US, and to governments of NATO countries plus Australia and New Zealand. There are no functional or operational differences between standard Displaywriter and those equipped with the modification. Information regarding Modification Features must not be released, reproduced or distributed outside the United States or divulged to non-US citizens other than those authorized by the US govenment. **Maximum:** One per device. **Field Installation:** No. (The power selected must match the electronics module power.)

Communications Features

Local Device Controller (LDC) (#1630): Allows limited distance Attachment up to 5,000 feet of Twinaxial® Cable to one other Displaywriter System on the 6670, for communication with Binary Synchronous Protocol at 2400 bps only. Both units must be equipped with an LDC. Customer is responsible for supplying, installing and maintaining the Twinaxial® cable and station protectors (if required). **Maximum:** One. **Field Installation:** Yes.

Add'l EIA Interface for External Modem (#3704): Provides an additional EIA interface for an external modem for either Binary Synchnonous, Asynchronous or SDLC (3270 Data Stream Compatibility) communications. **Limitations:** This device is for use only with the Local Device Controller (#1630) and cannot be used with the Single on Dual EIA Interface for external modems (#3705 or #3707). **Maximum:** One. **Field Installation:** Yes.

Dual EIA Interface for Two External Modems (#3707): Provides communications capability for Binary Synchronous, Asynchronous or SDLC (3270) Data Stream Compatability communications in one workstation. Similar to the single EIA interface, but includes an additional EIA interface to allow for two modems. See M6580 pages for information on the Single EIA interface (#3705). **Maximum:** One per workstation. **Field Installation:** Yes.

Modification Feature for Communication Interface (#4964): Designed to help protect the security of information being processed. Available for sales, delivery, installation and maintanance in the United States and to agencies of the United States Government located outside the US, and to governments of NATO countries plus Australia and New Zealand. There are no functional or operational differences between standard Displaywriter and those equipped with the Modification Feature. Information regarding Modification Features must not be released, reproduced or distributed outside the United States or divulged to non-US citizens other than those authorized by th US government. **Limitations:** Order one of these features in place of other communications interfaces. **Maximum:** One per device. **Field Installation:** No.

MODEL CONVERSIONS

From/To:	11	20	22
10	Y	Y	Y
11			Y
20			Y

ACCESSORIES (None)

SUPPLIES

IBM Displaywriter Diskette 1: Reorder No. 4498905. The diskette consists of a thin, flexible disk and a protective plastic jacket. The diskette is protected by a plasticized envelope when it is not in use. **Size:** Approximately 203.2mm x 203.2mm (8" x 8"). **Packaging:** Permanently enclosed in a protective envelope identified by a permanent gray label with a bold numeral 1. **Recording/Storage Capability:** 284,000 customer usable characters.

IBM Displaywriter Diskette 2D: Reorder No. 4498959. The diskette consists of a thin, flexible disk and a protective plastic jacket. The diskette is protected by a plasticized envelope when it is not in use. **Size:** Approximately 203.2mm x 203.2mm (8" x 8"). **Packaging:** Permanently enclosed in a protective envelope identified by a permanent terra cotta (burnt orange) label with a bold numeral 2D. **Recording/Storage Capability:** 985,000 customer usable characters.

Note: The IBM Displaywriter Diskettes 1 and 2D are pre-intialized diskettes for the IBM Displaywriter. Initialization is the prerecording of data which organizes a diskette into fields, tracks and sectors conforming to the unique logic of the IBM Displaywriter. If the customer desires un-intialized Diskettes 1 and 2D, which are commonly used in various IBM Products. See IBM.)

6361 MAG CARD UNIT

PURPOSE

Provides magnetic card input and output for the 6580 Displaywriter System.

MODELS

Model 001

Limitations: 50 magnetic card capacity.

Maximum: One Mag Card unit per 6580 System.

Prerequisites: Require Minimum of 192KB memory and Textpack 2.

Dimensions:

Width: 305mm (12 in.)
Depth: 483mm (19 in.)
Height: 673mm (27 in.)
Weight: 30kg (65 lbs.)
Cable Length: 4.5m (15 feet)

Note: The 6361 is a reconditioned product (not in new production) that does not qualify for new investment tax credit.

HIGHLIGHTS

Reads and records information using 50 track magnetic cards. Reading is at the maximum rate of 20 seconds/card (102 char/track). Recording is at the maximum rate of 30 seconds/card (102 char/track). Mag card products may be used to prepare the cards to be read by the 6361. Playback of the cards recorded by the 6361 can be on Mag Card Selectric® Typewriters, Mag Card 11, 6640 Document Printer, Mag Card/A, 6240 Communicating Mag Card Typewriter, and the 6670 Information Distributor. The input hopper holds a maximum of fifty cards and the output stacker a maximum of 200 cards.

Information on magnetic cards can be read and recorded on the 6580 Displaywriter System diskette for revision, printing, or storage. In some cases, information from magnetic cards may need to be edited before information is revised or printed.

Bibliography: See *KWIC Index* (G320-1621).

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Power Cord: 2.4 meters
- Color: Pearl White Covers with Black Face Plate (no specify required).

SPECIAL FEATURES

Modification Feature for Mag Card Unit (#6989): Order in addition to a Mag Card Unit. Available with 60 Hz 110V power only. The Modification Features are designed to help protect information being processed. These features are applicable to 6580 Displaywriter Systems equipped with 60 Hz power supplies and are available for sales, delivery, installation and maintenance in the United States, and to agencies of the United States Government located outside the US, and to governments of NATO countries plus Australia and New Zealand. Information regarding Modifications Features must not be released, reproduced, distributed outside the United States or divulged to non-US citizens other than those authorized by the US government.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Magnetic Cards: Only diagnostic magnetic cards are shipped with the 6361. Magnetic cards for customer applications must be separately ordered. For IBM magnetic cards and erase magnetics, see IBM.

6375 ELECTRONIC SELECTRIC® COMPOSER

PURPOSE

One-time typing with a "memory typewriter" can prove productive and convenient. The 6375 contains electronic modules that make up a working memory. This memory holds everything that's keyboarded, up to 8,000 characters and codes. While held in memory, text can be manipulated, and formats can be changed. Then, at the touch of a button, an error free, formatted final proof can be played out with little or no manual intervention.

MODELS

Model 001 Maximum Operating Speed: 14 cps

Dimensions:

Width: 62.5cm (24-5/8 in.)
Depth: 45.7cm (18 in.)
Height: 19.0cm (7-1/2 in.)
Weight: 26.7kg (59 lbs)

HIGHLIGHTS

- Self-contained device small enough to fit on a typing stand.
- Maximum paper width of 39.4 cm (15-1/2 in.).
- Typing line of 31.7 cm (12-1/2 in.).
- Easy and convenient typesetting with the help of electronics.
- Professional quality appearance of final printed material.
- Standard Features are as follows:
  - 8,000 Character Memory: A solid state memory that can store 8,000 characters, including all codes. The useful limit for the operator is slightly less because a 126-character buffer is reserved to guarantee correct operation in case additional carrier returns are created during entry mode playing of text.
  - Expanded Ribbon Supply: The 6375 is provided with an expanded ribbon mechanism. The 2122 type ribbon and the high-density deposit ribbon enclosed in an expanded cartridge are the two types of ribbon for use on the 6375.
  - End-of-Ribbon Shutoff: A sensor incorporated into the ribbon mechanism functions to prevent accidental playout of text when the ribbon end is reached. The ribbon end condition is sensed when there are from 50 to 700 character print positions left on the ribbon.
  - Language Capability: Whenever power is turned on, the composer will be automatically set to use the type font that is standard for the country where the composer is primarily used. If a foreign-language font or other non-standard font is to be used for some purpose, the composer can be electronically adjusted appropriately by typing Code-F plus the two-digit font identifier.

    Acoustical Filter Hood: A plastic hood placed over the acoustical filter which greatly reduces the sound of the machine as it operates. It must be removed by the operator in order to use the font tray option feature.
  - Ruling Feature: Ruling font RX-12 and Copperplate Gothic font CG-10-M may be used to make vertical and horizontal lines, of various weights, when devising forms or simply boxing a piece of text. As noted in the "Language Capability" paragraph, the composer operator adjusts the machine electronically so that (1) "vertical keys" do not advance the carrier, and (2) the typing head strikes the paper just hard enough.

SPECIFY

- Voltage: 115V AC, 60 Hz, 2 Amps.
- Color Charcoal Black with Charcoal Gray Keybuttons **(#C041)**.
- Keyboard Group:

  US **#K501**

SPECIAL FEATURES

Font Tray (#5523): Attaches to top of composer; holds nine fonts for extra convenience and accessibility.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6375 is shipped with one 2122 Solvent Ribbon, P/N 1136480. See SSD sales manual. Contact IBM.

6580 DISPLAY STATION

PURPOSE

The 6580 is the Display Station for the 6580 Displaywriter System. It consists of an Electronic Module (contains specified bytes of random access memory), a Display Module (either a 25-line display or a 66-line large display) and a Keyboard (either 96 or 92 characters).

The 25-line display has 80 characters per line. The 66-line large display has 100 characters per line.

Attachable to the 6580 Display Station are:

5215 Selectric® Element (15 cps) Printer, 5218 Printwheel Printer (40 or 60 cps) or 5228 Printwheel Printer - Wide Carriage (60 cps).

6360 Single or Dual Diskette Unit.

One 6361 Mag Card Unit per 6580.

Up to two other Display Stations may be attached to the master Display Station and thereby share one Printwheel printer.

MODELS

Model	Memory	Display Size
A0E	128KB	25-Line
A01	160KB	25-Line [WITHDRAWN]
A02	192KB	25-Line
A03	224KB	25-Line [WITHDRAWN]
A04	256KB	25-Line
A06	320KB	25-Line
A08	384KB	25-Line (Required to operate RPQ/PRPQ 3277 Device Emulation Adapter concurrently with Textpack 6.
A10	448KB	25-Line
B0E	128KB	Large Display
B02	192KB	Large Display
B04	256KB	Large Display
B06	320KB	Large Display
B08	384KB	Large Display (Required to operate RPQ/PRPQ 3277 Device Emulation Adapter concurrently with Textpack 6.
B10	448KB	Large Display

HIGHLIGHTS - 6580 DISPLAYWRITER SYSTEM

Displaywriter System consists of at least one workstation. Each workstation has a display station (a display module, a keyboard module, and an electronics module) and a diskette unit for reading and recording information on data diskettes. A printer is recommended for a full text processing system, but is not required. A Mag Card Unit is also available for organizations that already have mag card typewriters.

The Displaywriter System is a family of software-driven, key-to-display products, with several important concepts incorporated in its design:

- Shared resource system - Up to three workstations may share a single, high-speed printwheel printer, thus increasing throughput and reducing the cost per typing station.
- Designed to be easy-to-learn and use - Simple-language labelling, logical leading prompts, and straightforward presentation of menus all add to ease of learning and use, and help increase operator productivity.
- Modular architecture - Hardware components and software programs are packaged individually, allowing customers to select programs as needed.
- Ergonomically designed - Applying the science of adapting work and working conditions to the worker helps to reduce operator fatigue, make the system easier to use, and contribute to its attractive look.
- Designed to provide excellent price performance - The user buys only the hardware components and software programs needed, and expands the system as needs change.

Customer Objectives and Applications:

- Heavy original typing production
- Repetitive text production
- Heavy revision production
- Columnar and math operations
- Foreign-language spelling check
- Enhancement of IBM products
- Participation in a communications network
- Low cost per workstation
- Designed to provide excellent price performance
- Proofreading aid

Hardware:

The Displaywriter System hardware consists of several modules, cable-connected by the user:

- Workstation
  - Electronics Module
  - Display
  - Keyboard
  - Diskette Unit
- Printers
  - Selectric Element (15 cps)
  - Printwheel (40 or 60 cps)
  - Printwheel - Wide Carriage (60 cps)
- Optional equipment
  - Sheet-Feed Paper Handler - Available for the Printwheel Printers
  - Tractor Feed - Available for the Printwheel Printers
  - Mag Card Unit

Software:

Tasks are performed through licensed programs, available for a license fee. Programs are packaged on program diskettes, and may be obtained as the customer needs them. Although the programs themselves cannot be modified by the customer, formatting defaults and the Spelling Dictionary may be personalized.

Benefits:

The highly modular nature of the hardware and software offers several user benefits:

- Logical configuring to meet current needs
- Flexible system upgrading and expansion in the field as customer needs change
- Fast and convenient field hardware maintenance
- Good system price performance
- Convenient placement of system modules

COMMUNICATIONS

Communications on the 6580 System is available with the following licensed programs:

- Asynchronous Communication, 5608-SR1
- Binary Synchronous Communication, 5608-SR2
- IBM 3270 Data Stream Compatibility, 5608-SR6

Using one of the licensed programs and the communications feature, the 6580 System can send information from another 6580 System workstation or other compatible communication equipment, including a suitably programmed host computer. The equipment involved in the 6580 System communication process can be located in the office next door or on another continent.

Communications on the 6580 System is an important capability because:

- Documents that are typed and stored can be translated into electronic signals sent over telephone lines at transmission speeds up to 9600 bps.
- Documents that are received at a 6580 System workstation can be stored and printed or can be revised by the operator. (Documents received from compatible communication equipment may need additional editing or reformatting if revisions are necessary.)
- With the Asynchronous, Binary Synchronous, and communication programs, text and control codes can be created and edited offline on the 6580 System. This ensures faster, more accurate transmission and can reduce line and computer connect charges. (The 3270 Data Stream Compatibility licensed program allows the operator to communicate while directly connected and online to a host computer.)
- When the communication program is not needed, the 6580 System can be used to perform other word processing applications.

Equipment Required

The communication function requires a:

- Licensed text program
- Communication adapter on the 6580 System (includes a 3.8 meter/12.5 foot EIA cable)
- Licensed communication program

6580 Display Station (cont'd)

- An external modem (depending on the modem selected, a data coupler may be required)
- Communication line

The 6580 System can optionally support two external modems. The modem is selected by menus provided by the licensed program. Each modem can support a different linespeed and/or protocol. Only one modem and communication licensed program can be active at one time.

Security Capabilities

An optional security keylock may be installed to prevent unauthorized access to the communication function.

The 3845/3846 encryption devices support the 6580 System. When connected between the 6580 System and the external modem at each end of a communication line, these devices secure the privacy of the data transmitted by automatically encrypting (scrambling) and decrypting (unscrambling) the data.

In addition to these optional security features, a terminal identifier (terminal ID) may be preset by the customer. Depending on the licensed product, user IDs are also available and may be assigned for additional communication security.

Communication Protocols

Three communication protocols, Asynchronous, Binary Synchronous, and SNA/SDLC Communications, are available.

The Asynchronous Communication licensed program uses the asynchronous protocol. The Binary Synchronous Communication licensed program uses binary synchronous protocol. The 3270 Data Stream Compatibility licensed program uses the SNA/SDLC protocol.

Asynchronous Communication

In most applications, Asynchronous Communication is used for interactive terminal operations; however, it can also be used for batch communications because data can be stored in advance on diskette and received to diskette. During an active communication session, both interactive and batch communications can be intermixed.

The 6580 System provides three operating modes that emulate the characteristics of the following asynchronous devices:

- IBM Communicating Mag Card Selectric Typewriter
- IBM 2741 Communications Terminal
- Teletypewriters similar to the Teletype 33, 35, or 43 KSR (Keyboard Send-Receive) mdls.

Binary Synchronous Communication

In Binary Synchronous Communication (BSC) protocol, the 6580 System emulates the characteristics of either a 2770/3780 or 2780 terminal. This communication function enables the 6580 System to communicate with the following:

- Mag Card II Typewriter - Communicating
- 6240 Mag Card Typewriter - Communicating
- 6640 Document Printer - Communicating
- Office System/6 - Communicating
- 6670 Information Distributor
- 5520 Administrative System
- 6580 Displaywriter System - Communicating
- System/36
- A suitably programmed computer.

Binary Synchronous Communication licensed program utilizes batch transmission of data. All information, including any necessary control language, is prepared before beginning the communication session. After the session has begun, the information is sent and received with minimal operator intervention.

3270 Data Stream Compatibility

The 3270 Data Stream Compatibility licensed program allows a 6580 System to access suitably programmed IBM host computer systems using 3270 application programs. (In most cases, no changes to the computer application programs are required.) Communications to the suitably programmed IBM host is through SNA/SDLC communication protocol.

A communicating 6580 System using the 3270 Data Stream Compatibility licensed program appears as a 3270 Information Display System to the following suitably programmed IBM host systems:

- System/370
- 3031/3032/3033/3081 Processor Complexes
- 4300 Processors

The 3270 Information Display System emulated consists of a single 3278 mdl 2 or 4 Display, a 3274 mdl 51C Controller, and, optionally, a single 3287 Printer.

HIGHLIGHTS - 6580 DISPLAY STATION

STANDARD FEATURES

Electronic Module:

The Electronics Module, a component of the Display Station, contains most of the logic for the Displaywriter System. This module includes replaceable plug-in cards which provide the system with specific functional capabilities. Some of these cards are:

- Microprocessor - The powerful high-speed microprocessor provides each workstation with independent intelligence. Its technology allows sophisticated system architecture and true foreground/background concurrency. This means that printing can take place in the background, while keyboarding or revising occur in the foreground.
- ROS Memory - The Basic Assurance Test and the logic necessary to load programs into memory from program diskettes are contained in Read-Only Storage (ROS).

Main Storage Memory Card:

This card contains the Random Access Memory (RAM) for the system. Minimum RAM capacity is 128K bytes, and it is expandable in 64K-byte increments. RAM is used for storage of both program instructions and customer information. RAM is a volatile memory; its contents are lost when the power is turned off.

Highlights of the Electronic Module

- Processing capability provides good performance and the capability for system expansion.
- Logic is at the workstation level, independent of other stations.
- Concurrency of foreground and background tasks to increase operator productivity.
- ROS memory provides system checkout functions and start-up procedures, to help reduce setup time.
- RAM accommodates programs and customer information.
- Ergonomic design provides low levels of heat and noise.
- Flexibility accommodates a variety of hardware modules and software licensed programs.

Specifications of Electronic Module

Width: 483mm (19 in.)
Depth: 356mm (14 in.)
Height: 178mm (7 in.)
Weight: 14kg (30 lbs.)

Display:

A display is the primary means of visual interaction between the operator and the system. There are two models available: a 25-line display and a 66-line large display. The 6580 Display's ergonomic design and functional features help to enhance the system's effectiveness and minimize operator fatigue. The Display, a component of the 6580 is used to:

- Present menus
- Prompt the operator
- Give messages
- Provide system status information
- Display information

Functional Characteristics:

- Horizontal segmentation up to 255 characters, with 20-character overlap
- Vertical scrolling across page boundaries
- One level of Half Index
- Character brightening when cursored
- Video-reversing of unrecognized words following spelling checking

Physical Characteristics of Display Station:

- 25-line capacity, 80 characters per line or 66-line capacity, 100 characters per line
- Operator-adjustable contrast and brightness (25-line display)
- Operator-adjustable brightness (66-line display)
- 30-degree rotate range

6580 Display Station (cont'd)

- 20-degree vertical tilt
- 8x16 dot character box
- Monopitch
- Symbol graphics displayed

Specifications of 25-Line Display:

Width: 381mm (15 in.)
Depth: 348mm (13.7 in.)
Height: 292mm (11.5 in.)
Weight: 6.6kg (15 lbs.)
Cable Length: 610mm (24 in.)

Specifications of 66-Line Large Display:

Width: 316mm (12.4 in.)
Depth: 404mm (15.9 in.)
Height: 404mm (15.9 in.)
Weight: 17.55kg (39 lbs.)
Cable Length: 483mm (19 in.)

Keyboard:

The Keyboard, a component of the 6580 is the primary means of entering new information into the system. The 6580 Keyboard's logical layout is designed to be easily learned and productively used.

Physical Characteristics:

- Standard 96-character, optional 92-character
- Minimal inboard coding
- Function keys grouped and labelled logically

Keyboard Specifications:

Width: 538mm (21 in.)
Depth: 213mm (8 in.)
Height: 101mm (4 in.)
Weight: 5kg (11 lbs.)
Cable Length: 1m (3.3 ft.)

ATTACHABLE COMPONENTS

DISKETTE UNIT

The Diskette Unit is used for loading programs into memory and for housing work diskettes for the 6580 Displaywriter. It is available with either one or two diskette drives for use with either Displaywriter Diskette 1 or 2D. Information created at the keyboard can be read onto the diskette. See M6360 pages for details.

PRINTERS

Selectric Element Printer

- Rated burst speed of up to 15.5 cps.
- Well suited for standalone workstation configuration.
- Compatible with many Selectric Typewriter 10 and 12 pitch elements.
- System software provides "Trail Printing" capability allowing playout of one job, while another is being keyed.
- The Selectric Element Printer is a reconditioned product and may not qualify for new investment tax credit. This statement should be included in all proposals.

See M5215 pages for details.

Printwheel Printers

- Rated burst speeds of up to 40 or 60 cps (in 10 pitch).
- Prints with 10 pitch, 12 pitch, PSM, or 15 pitch printwheels.
- System software and a hardware prerequisite allow a "shared resource" arrangement with up to three workstations.
- Snap-in ribbon cartridge and printwheel cartridges are designed for easy insertion and removal of printwheels and ribbons.
- Bidirectional printing.

See M5218 and M5228 pages for details.

Mag Card Unit

- 50 magnetic card capacity.
- Serves as added information resource by taking information from magnetic cards.
- Functions as a media link with compatible IBM mag card products.
- The Mag Card Unit is a reconditioned product that does not qualify for new investment tax credits. This statement should be included in all proposals.

See M6361 pages for details.

Customer Setup Responsibilities for CSU designated products:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement.
- Physical setup, connection of cables to TP lines/modems.
- Notify IBM of intent to relocate, advise IBM of the new location and follow IBM instructions for relocation.
- Other specific responsibilities as outlined in the IBM Planning and Site Preparation Guide.
- Attend Customer Orientation Seminar for demonstration setup.
- Notify IBM in advance if setup assistance is required.

Bibliography: See *KWIC Index* (G320-1621).

SPECIFY

- Voltage: 110V 60 Hz, grounded receptacle, 15 amp, single phase. Power cord: 3 meter (9.8 ft).
- Color: Pearl White with Pebble Gray (no specify required).

The Display and Keyboard Module which are available above as a feature for the Display Station need not be installed on the same terms as the Electronics Module and are available separately. See 6580 Displaywriter System elements in Country Keyboards section.

SPECIAL FEATURES

Non-Communications Features

Communication Keylock (#6500): Allows a level of security to help prevent unauthorized personnel from using the communication feature. **Maximum:** One. **Field Installation:** Yes.

Chartpack Display Adapter (#6955): Required to support Chartpack licensed program (PP 5608-SRA) with either 25-line or large display. **Maximum:** One per displaystation. **Field Installation:** Yes, by CSD. **Customer Setup:** Yes, if shipped with the display station.

Modification Feature for Electronics Module Mdls A0(x) (#7022) and for 25-Line Display Module (#4961): Order in addition to an Electronics Module. Available with 50 Hz or 60 Hz power. Designed to help protect the security of information being processed. These features are available for sales, delivery, installation and maintenance in the United States, and to agencies of the United States Government located outside the US, and to governments of NATO countries plus Australia and New Zealand. There are no functional or operational differences between standard Displaywriters and those equipped with Modification Feature. Information regarding Modification Features must not be released, reproduced, or distributed outside the United States or divulged to non-US citizens other than those authorized by the US government. **Maximum:** One per device. **Field Installation:** No.

Note: It is IBM's opinion based upon test data filed with the US Government*, that the Keyboard Module (features #5330, #5331, or #5349), Printer Sharing Feature, and its associated cables do not require modification for use in an environment requiring Modification Features.

* It is IBM's opinion and not a warranty that these components do not require modification. This shall be communicated orally and in writing prior to accepting an order from the customer. If a customer does not have access to the US Government classified test data, IBM may be unable to sell the Modification Features because the customer cannot obtain the necessary data that is required to support a buying decision.

Printer Sharing Prerequisite (#7997): A logic card that is placed in a designated master 6580 Display Station that will assume control of the printer in a shared printer configuration with up to three workstations. **Specify: #7998** for a 60 meter (196.8 ft) cable, and **#7992** for a 30 meter (98.4 ft) cable, and **#7999** for a 5 meter (16.4 ft) cable to connect the second or third workstation to the designated master workstation in a printer sharing environment. **Maximum:** For printer sharing only, one prerequisite in the master workstation is required. A second prerequisite may be installed as backup if desired in one of the other two Display Stations. **Field Installation:** Yes. **Customer Setup:** Yes.

3274/3276 Attached Workstation Adapter (#8332): Permits dual coaxial cable attachment of the Displaywriter workstation to a 3274 or 3276 Control Unit, in order to emulate the 3278 Display and 3287 Printer. Refer to the 3270 Attached Workstation licensed program (PP 5608-SR9) for description of the capabilities. May coexist with feature #3705 in display station and feature #3707 in diskette unit, but can *not* coexist with printer sharing feature (#7997) or DW-3277-DE RPQ (#8D0098). **Maximum:** One per display station ,but not in master display station in printer sharing environment. **Field Installation:** Yes, by CSD. **Customer Setup:** Yes, if shipped with display station.

Communications Features

Single EIA Interface for External Modem (#3705): Provides communication capability in either Asynchronous, Binary Synchronous or SDLC (3270 Data Stream Compatibility) modes. It includes an EIA interface attachment for an external modem. This attachment requires a customer provided modem. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

6580 Display Station (cont'd)

MODEL CONVERSIONS

Electronic Module: Field upgradeable in size of RAM (in 32K byte or 64K byte increases) and from model A to model B.

ACCESSORIES

Display Station Platform (#3000): Facilitates installation of Displaywriter workstations on desks with limited space (minimum 18 in. depth). Incorporates cable raceway and includes rear cover for electronics module to conceal external cables and connectors. Keyboard can be tilted and locked up when not in use. **Color:** Pebble Gray. The Display Station Platform may be ordered with initial machine order. **Field Installation:** Yes. **Customer Setup:** Yes. For pricing and followon order contact IBM.

Displaywriter Work Station Standard Configuration (#3001-#3003): This configuration consist of an adjustable terminal base, a rectangular extension, and a printer stand. The configuration may be ordered with the initial machine order. Specify **#3001** for Pearl White, **#3002** for Oak, or **#3003** for Walnut coloring. **Adjustable Terminal Base:** Has separate platforms for the Displaywriter unit and keyboard. Each platform can be raised or lowered individually by simple controls. In addition the keyboard can be moved toward or away from the operator. **Rectangular Extension:** This height adjustable extension attaches to the Adjustable Terminal Base for extra work-space and is used to support the Displaywriter Diskette Drive. **Printer Stand:** Supports any of the 6580 attachable printers. The stand is designed so that the operator can operate the printer and view printed output from a seated position. **Field Installation:** Yes. **Customer Setup:** Yes.
Workstations are also available with triangular extensions. For variations, individual P/N, specifications, prices and followon orders contact IBM.

SUPPLIES

Starter Pac (#5879): 6580 "Selectric" Element Printer/Low Density Diskette Unit. Each starter Pac contains 30 diskettes (6580 Diskette 1) with protective envelopes packaged in sturdy diskette "Fiftifile" with durable tab dividers and job identifier labels. It also includes 1/2 dozen IBM Tech III Ribbons.

Starter Pac (#5884): 6580 "Selectric" Element Printer/High Density Diskette Unit. Each starter Pac contains 30 diskettes (6580 Diskette 2D) with protective envelopes packaged in sturdy diskette "Fiftifile" with durable tab dividers and job identifier labels. It also includes 1/2 dozen IBM Tech III Ribbons.

Starter Pac (#5885): 6580 Printwheel Printer/Low Density Diskette Unit. Each starter Pac contains 30 diskettes (6580 Diskette 1D) with protective envelopes packaged in sturdy diskette "Fiftifile" with durable tab dividers and job identifier labels. It also includes one dozen 463 Ribbons.

Starter Pac (#5886): 6580 Printwheel Printer/High Density Diskette Unit. Each starter Pac contains 30 diskettes (6580 Diskette 2D) with protective envelopes packaged in sturdy diskette "Fiftifile" with durable tab dividers and job identifier labels. It also includes one dozen 463 Ribbons.

Contact IBM.

6625 MAG CARD COMPOSER PRINTER

PURPOSE

The 6625 is an automated typesetting machine with an attached external storage device.

MODELS

Model 001 Maximum Operating Speed: 14 cps

Prerequisites: Must be connected to a 6212 Mag Card Composer Reader/Recorder.

Dimensions:
Width: 67.6 cm (26-5/8 in.)
Depth: 45.7 cm (18 in.)
Height: 19.0 cm (7-1/2 in.)
Weight: 25 kg. (55 lbs.)

HIGHLIGHTS

- Three Pitch Composer Printer.
- Page-sized Memory Unit 8,000 characters.
- Electromechanical Keyboard.
- Field Effect Transistor Electronic Control Logic to perform automated typesetting functions.
- Power Supply and Special Circuits.
- Standard Features are as follows:
  - Scan: This function permits the rearrangement of text in memory to incorporate revisions, provide copyfitting capability, and alternate text formats.
  - Minimum Interword Space: For some special applications and as an alternative to the standard 3 unit minimum interword space, the operator has the ability to set the minimum space at a value between 3 and 9 units.
  - Decimal Period/Comma Tabulation: This capability provides for numeric alignment on decimal or comma positions. Entry copy is formatted similar to final copy providing for easier proofing.
  - Automatic Centering About A Point: A second method of centering provides for centering at a specific point or when it would be advantageous to have entry copy appear centered similar to final copy.
  - Verify Print: This capability serves as a diagnostic aid to both the operator and Customer Engineer. It provides printed copy of all the characters and code in memory.
  - Page-sized Memory: A solid state memory that can store 8,000 characters including all codes. The useful limit for operator keying is 7,899 characters. The 101 character difference is reserved to guarantee correct operation in case additional carrier returns are created during entry mode playing of text.
  - Alternate Section: The alternate section capability allows the memory to be divided into two independent segments. The separator code defines the floating boundary between the sections, and the only restriction on capacity is that total text in both sections cannot exceed the memory capacity.
  - Ribbon Supply: The Composer cartridge is used on the MC Composer. The high deposit ribbon is also available for special applications.
  - End-of-Ribbon Shutoff: A sensor incorporated into the ribbon mechanism functions to prevent accidental playout of text when the ribbon end is reached. The ribbon end condition is sensed when there are from 50 to 700 character print positions left on the ribbon.
  - Required Tab: The required tab-code command by a 6625 operator causes the carrier to automatically indent to the tab position at the start of each new line until the operator dissolves the command.
  - Electronic Tab Memory: When a tab has been set, the 6625 "remembers" that the tab is a certain distance from the left margin, regardless of how much the operator may adjust that margin to handle varying kinds of work.
  - Language Capability: Whenever power is turned on, the 6625 will be automatically set to use the type font that is standard for the country where the 6625 is primarily used. If a foreign-language font or other non-standard font is to be used for some purpose, the 6625 can be electronically adjusted appropriately by typing Code-F plus the two-digit font identifier.
  - Acoustical Filter Hood: A plastic hood placed over the acoustical filter which greatly reduces the sound of the machine as it operates. It must be removed by the operator in order to use the font tray option feature.
  - Ruling Feature: Ruling font RX-12 and Copperplate Gothic font CG-10-M may be used to make vertical and horizontal lines, of various weights, when devising forms or simply boxing a piece of text. As noted in the "Language Capability" paragraph, the 6625 operator adjusts the machine electronically so that (1) "vertical keys" do not advance the carrier, and (2) the typing head strikes the paper just hard enough.

SPECIFY

- Voltage: 115V AC, 60 Hz, 3.5 Amps. **(#7906)**
  Note: The 6625 is cable-connected to the 6212 for it's power supply.
- Keyboard Group:
  US **#K501**
- Color: Specify **#C041** for Charcoal Black with Charcoal Gray keybuttons

SPECIAL FEATURES

Font Tray (#5523): Attaches to top of the 6625. Holds 9 fonts for extra convenience and accessibility.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6670 INFORMATION DISTRIBUTOR

PURPOSE

The 6670 Information Distributor is a multi-function machine which can operate as a text formatter, text printer, communications terminal, and a convenience copier (Models 001 and 002 only).

MODELS

Model 001 Communication speeds up to 4,800 bps for BSC and 7,200 bps for SNA/SDLC. Must specify US or World Trade version. Includes convenience copy function.

Model 002 Communication speeds up to 9,600 bps for BSC and SNA/SDLC. Includes font availability function which supports font downloading, and convenience copy function.

Model 003 Communication speeds up to 9,600 bps for BSC and SNA/SDLC. Includes font availability function which supports font downloading. No convenience copy function.

Limitations: Font availability function is only available on model 002 and model 003. Optional collator, semi-automatic document feed, and convenience copier are only available on model 001 and 002.

Dimensions: (All Models)

Width: 198cm (78 in.)
Depth: 70cm (27.5 in.)
Height: 102cm (40 in.)
Weight: 653kg (1,440 lbs.)

HIGHLIGHTS

The 6670 Information Distributor operates as a remote batch terminal when communicating with a host system. It cannot be channel attached. Host systems input may be read into the 6670 from magnetic cards for communication to a host system. Output from the host system may be sent directly to the printer, or to the internal diskette for later recording on magnetic cards.

Standard 11 x 14-1/2 inch computer reports can be printed on 8-1/2 x 11 inch paper. Specially designed fonts print lines 132 characters wide (13.3 cpi) and 66 lines per page (8.57 lpi). With suitable programming in the host system, the 6670 can be an intelligent remote printer providing duplex printing, multiple font selection, multiple sets of output documents, and other printing functions which can be invoked by 6670 Operator Control Language (OCL). Documents formatted by a host system text formatting program, such as the ATMS III formatter or the SCRIPT/VS component of the Document Composition Facility, can be readily printed by the 6670.

The 6670 also operates as a printer for compatible Word Processing systems. Additionally, information may be communicated from a 6670 to another 6670 or to a compatible Word Processing system.

Printer: (All Models)

- Prints from magnetic cards or communications line.
- Utilizes stored formats (see "internal storage diskette").
- Laser printhead directs proper imaging on photoconductor.
- Print exit pocket, capacity 2,700 sheets/20 pound bond (or 75g/sq.m).
- Jobs or sets within jobs may be selectively offset 1/2 inch for easy separation.
- Duplexed printing (printing on both sides of the page).
- Primary paper drawer, 2,100 sheets/20 pound paper (or 75g/sq.m).
- Alternate paper drawer, 600 sheets/20 pound paper (or 75g/sq.m).
- Both paper drawers support a variety of paper sizes, but only one size at a time.
- Duplex tray capacity, 75 sheets.
- Four hardware fonts are standard; two additional hardware fonts or software fonts are optional.
- An optional Font Library is available for selected host operating systems for downloading fonts to mdl 002 and 003.
- Up to four type styles per page, and up to six per document.
- Self-advancing photoconductor.

Internal Storage Diskette: (All Models except as noted)

- Mdl 001 provides for approximately 210,000 characters of temporary storage for user data. Mdl 002 and 003 provide approximately 241,000 characters of temporary buffered storage for user data and downloaded fonts.
- Customer Engineer diagnostics.
- Contains control program.
- Contains stored formats (defined by customer) to control text formatting and communications.
- Eight text processing formats
- Two communications formats.

Magnetic Card Reader/Recorder: (All Mdls.)

- Identical to reader/recorder on Mag Card II Selectric Typewriter.
- Reads at up to 240 cps.
- Records at up to 200 cps.
- Data to be recorded can be from mag cards or from communications.

Copier: (Mdls 001 and 002 only)

- Similar to Series III mdl 10.
- First copy speed - 7.5 seconds.
- Subsequent copies - 1.65 seconds each (36 copies/minute).
- Exit tray capacity - 300 sheets.

Optional collator: Available [mdls 001, 002] (see "M6671 page")

Control Panel: (All Models except as noted)

- Used to control copy functions (Models 001 and 002 only).
- Used in conjunction with OCL and magnetic cards to control printing and communication.
- Lighted pushbuttons, lighted messages and LED display.

Font (Type Styles):

- **Group I Fonts:** These are hardware fonts, which are paired as shown in Group I listing in the "SPECIFY" section. Four type styles (two per font card) resident as standard with the 6670. Two additional type styles may be selected as an option at an extra charge (at time of order or via MES). Selection is made from the Group I font pairings, shown in the "SPECIFY" section below.

* **Group II Fonts:** These are software fonts, and may be ordered individually, as an option at extra charge, by numbers shown in the "SPECIAL FEATURES" section below. **Prerequisites:** Font Storage #8400 and Font Storage Microcode #8401.

- **Group III Fonts:** [Mdl 002 and 003 only]. These are host downloadable fonts. **Prerequisites:** Font Storage #8400 and Font Storage Microcode #8401. See "SPECIAL FEATURES" section below for fonts provided.

Communications Facilities: (All Models except as noted). Support is provided for BSC (Binary Synchronous Communications) or SDLC (Synchronous Data Link Control). These protocols are not co-resident; only one is installed per machine and must be specified at order entry. In addition, one of the communications Special Features must be ordered. An MES is available for converting from BSC to SDLC (and vice versa). This MES is field installable by the Customer Service Representative. To order,use the RTOE system and the appropriate code number for the protocol required, found in the "Speciy Section" below.

- **BSC Capabilities:**
  - 6670 BSC support is as a 2770, 3770, or 3780.
  - The following host systems and processors support the 6670: S/360, S/370, 30XX, 43XX, System/3, System/32, System/34, System/36, System/38, and Series 1.
  - The communications adapter on the 4331 may be used.
  - 6670 to 6670 and Displaywriter.
  - Can transmit or receive data without interruption while copying, (copying only on mdl 001 and 002).
  - Communication line speeds for mdl 001 are 600 to 4,800 bps. For Mdl 002 and 003, line speeds supported are 600 to 9,600 bps.
  - Switched communication line operation, which includes the capability for the 6670 to automatically answer and disconnect via a suitable modem.
  - Non-switched communication line operation, which includes the capability for the 6670 to operate in switched network backup mode with appropriate modems.
  - Synchronous clocking, which provides the 6670 with its own timing signals for operating at 1,200 or 600 bps in case the modem used does not provide signals.
  - Half-speed operation, which, with the appropriate modem, enables the 6670 to operate at half the normal transmission speed.
  - Transparency, which enables the 6670 to send and receive all EBCDIC control and graphic codes.
  - Space expansion, which allows the 6670 to insert the specified number of spaces in compressed data as it is received.
  - Variable block size which is specified through OCL as 128, 256 or 512 bytes.
  - Buffered send, which allows the 6670 to transmit data from internal storage.
- **SDLC Capabilities:**
  - SDLC support is as a logical unit type 4 under SNA. The following host systems and processors support 6670 as an SDLC device: S/370, 30XX, 43XX, 8100 and 5520.
  - The communications adapter on the 4331 may be used.
  - SDLC communications requires a 3705 communications controller.
  - 6670 to 6670 may be SDLC.
  - Can transmit or receive data without interruption while copying, (copying only on mdls 001 and 002).

6670 Information Distributor (cont'd)

- Switched communication line operation which includes the capability for the 6670 to automatically answer and disconnect via a suitable modem.
- Non-switched communication line operation, which includes the capability for the 6670 to operate in switched network backup mode with appropriate modems.
- Synchronous clocking, which provides the 6670 with its own timing signals for operating at 1,200 or 600 bps in case the modem used does not provide signals.
- Half-speed operation, which, with the appropriate modem, enables the 6670 to operate at half the normal transmission speed.
- Space and character expansion, which allows the 6670 to insert the specified number of spaces or characters compressed data as it is received.
- Block size fixed at 256 bytes.
- Buffered send, which allows the 6670 to transmit data from internal storage.

- **Transmission Codes:** The 6670 communication facility operates with any of two transmission codes, depending on the application. These are: the Extended Binary Coded Decimal Interchange Code (EBCDIC), and the American National Standard Code for Information Interchange (ASCII).

Bibliography: G544-1006.

SPECIFY

- Voltage: 208V 60 Hz, two or three phase, 30 amp, dedicated line, 4-wire including ground and neutral ... 240V 60 Hz, single phase, 30 amp, dedicated 4-wire including ground and neutral.

- Control Panel Group:
  English Language **#A135**
  International Symbol **#A136**

- Communication Protocol:
  Binary Synchronous (BSC) **#1525**
  Synchronous Data Link Control (SDLC) **#1526**
  In order to use the communications capabilities of the 6670, one of the communication special features must be ordered. See "SPECIAL FEATURES" for details. For Protocol Conversion on Installed Machines: To convert from one protocol to the other (BSC to SDLC, or vice versa), specify the appropriate code shown above. Conversions are field installable by the Customer Service Representative through an MES.

- Color: Pebble Gray and Pearl White (no specify required).

- Paper Group:
  Group 1 **#P876** *
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)
  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)
  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)
  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)
  * Supplied as standard if no other paper group is specified.
  Non US paper sizes will not be supported on mdl 003.

- Font Selection: Hardware fonts, select two pairs from Group I fonts in listing shown below. All mdls of the 6670 provide four fonts (type styles) as standard. These fonts are resident in hardware and are paired in pre-determined sets. They are shown below as Group I fonts.

  Group I Type Styles: (US character sets)

1.	Courier Prestige Elite	10-pitch 12-pitch	**#A490**
2.	Data 1 Rotated Symbol	13.3-pitch, dual case 12-pitch	**#A491**
3.	Prestige Pica Letter Gothic	10-pitch 12-pitch	**#A492**
4.	Essay Standard Essay Italic	PSM PSM	**#A493**
5.	Essay Standard Essay Bold	PSM PSM	**#A494**

  Group I Type Styles: (World Trade Character Sets)

1.	Courier Data 1 Rotaded	10-pitch 13.3 pitch	**#A495**
2.	Prestige Elite Symbol	12-pitch 12-pitch	**#A496**
3.	Essay Standard Essay Italic	PSM PSM	**#A497**
4.	Essay Bold Letter Gothic	PSM 12-pitch	**#A498**
5.	Prestige Pica Data 1 Rotaded	10-pitch 13.3 pitch	**#A499**
6.	Essay Bold Essay Standard	PSM PSM	**#A500**

SPECIAL FEATURES

Communication Facilities

Limited Distance Control (LDC) (#3711): Provides capability to locally attach a 6670 (all mdls) to a 5520 operating under SNA/SDLC protocol or to a 6580 Displaywriter operating under BSC.

Integrated Modem Interface (#5501, #5508, #5510): Provides for an integrated modem to be installed within the 6670 to allow operation at 1,200 bps or 600 bps (half-speed operation). Specify #5501 for Integrated Modem, switched line with automatic answer or, #5508 for Integrated Modem, non-switched line and switched line backup with automatic answer or, #5510 for Integrated Modem, non-switched line. **Field Installation:** An MES must be submitted through IBM.

External Modem Interface (#9420, #9421): Provides the ability to attach the 6670 to an external modem. This feature is RS-232-C/CCITT V.24 interface. There are two cable specify codes: (#9420) for a 6.1m (20 ft.) cable or (#9421) for a 12.2m (40 ft.) cable. **Field Installation:** An MES must be submitted through IBM .

Digital Data Service Adapter (DDSA) (#9422, #9423): Provides the ability to attach the 6670 (all mdls) to the AT&T Dataphone ® digital service non-switched network for operation at speeds of 2,400 bps or 4,800 bps. There are two cable specify codes: a 6.1m (20 ft.) cable (#9422) and a 12.2m (40 ft.) cable (#9423). **Field Installation:** An MES must be submitted through IBM .

None Communication Facilities

Collator Attachment (#A132): [Mdl 001, 002] Provides the ability to attach a 6671 Collator to the 6670. See M6671 page for details.

Fonts - Optional Hardware Type Styles: Four type styles can be selected and installed as a standard feature. Two additional type styles can be selected and installed in another pair of hardware fonts with the Optional Type Style Feature. Any of the pairs of the US and World Trade type styles shown in the "Group I Fonts" in the "SPECIFY" section above may be ordered for either a US or a World Trade 6670. Use the Feature Code numbers shown with the requested pairing to order the Optional Type Style.

Note: RPQ 977008 or 977888 is a prerequisite for use of the World Trade fonts. (See RPQs below for details).

Group II Fonts (#3456-#3483, #8362-#8393, #8400-#8401:) All mdls of the 6670 may support with the proper prerequisite features installed (see below), an additional one or two software fonts. These Group II fonts are an Option and take the place of the Optional Group I font pair. Any Group I font may be ordered as a Group II font. **Prerequisites:** Font Storage (#8400): Provides the memory for the software fonts; Font Storage Microcode (#8401): Provides one or more media which contain the requested Group II fonts. **Field installation:** Yes.

Group II Type Styles:

Type Style	Code	Type Style	Code
Orator	#3456	Courier 12 Extended UK	#3481
Orator Bold	#3457	Courier 10 Extended Belgian	#3482
US Prestige Elite Bold	#3458	Courier 12 Extended Belgian	#3483
US Prestige Elite Italic	#3459	APL Extended	#8362
W.T. Prestige Elite Bold	#3460	Courier 10 Extended	#8363
W.T. Prestige Elite Italic	#3461	Courier 12 Extended	#8364
6670 Symbol 10 Pitch	#3463	Courier 10 Overstrike/ Hyphen	#8365
		US Essay Standard	#8366

6670 Information Distributor (cont'd)

OS/6 Symbol	#3464	US Essay Italic	#8367
Data 1 Extended	#3465	US Courier 72	#8368
Data 1 Extended Bold	#3466	US Prestige Elite	#8369
Data 1 Extended Italic	#3467	US Data 1	#8370
Courier 10 Extended German	#3468	6670 Symbol 12 Pitch	#8371
Courier 12 Extended German	#3469	US Prestige Pica	#8372
Courier 10 Extended Swiss	#3470	US Letter Gothic	#8373
Courier 12 Extended Swiss	#3471	US Essay Bold	#8374
Courier 10 Extended Dutch	#3472	W.T. Essay Standard	#8375
Courier 12 Extended Dutch	#3473	W.T. Essay Italic	#8376
Courier 10 Extended French	#3474	W.T. Prestige Elite	#8377
Courier 12 Extended French	#3475	W.T. Data 1	#8378
Courier 10 Extended Italian	#3476	W.T. Letter Gothic	#8379
Courier 12 Extended Italian	#3477	W.T. Essay Bold	#8381
Courier 10 Extended Nordic	#3478	Courier 10 with Elongated Hyphen Overstrike	#8382
Courier 12 Extended Nordic	#3479	Essay Light	#8383
Courier 10 Extended UK	#3480	Essay Light with Elongated Hyphen Overstrike	#8384
		Document	#8385
		Letter Gothic Bold	#8386
		Boldface	#8387
		Boldface Italic	#8388
		Essay Light Extended	#8389
		Document Extended	#8390
		Letter Gothic Bold Extended	#8391
		Boldface Extended	#8392
		Boldface Italic Extended	#8393

Field installation: An MES must be submitted through IBM.

Font Library - Group III Fonts: These fonts are supported only by mdl 002 and 003 (which support the host download capability). These fonts are provided on various media for loading on a variety of host operating systems. The following Group II fonts are provided along with the Group III fonts (listed below) when the appropriate font library medium is ordered. **Prerequisites:** Font Storage (#8400), Font Storage Microcode (#8401). See above.

Group II Fonts included in the Font Library:

APL Extended	Courier 10 Overstrike Hyph.
Boldface	Data 1 Extended
Boldface Italic	Data 1 Extended Bold
Courier 10 Extended	Data 1 Extended Italic
Courier 12 Extended	Document
Courier 10 Extended Belgian	Essay Light w/Elong. Hyph. Overstrike
Courier 12 Extended Belgian	Letter Gothic Bold
Courier 10 Extended French	Orator
Courier 12 Extended French	Orator Bold
Courier 10 Extended German	Symbol (OS/6)
Courier 12 Extended German	US Courier 72
Courier 10 Extended Italian	US Data 1 Rotated
Courier 12 Extended Italian	US Essay Bold
Courier 10 Extended Netherlands	US Essay Italic
Courier 12 Extended Netherlands	US Essay Standard
Courier 10 Extended Nordic	US Letter Gothic
Courier 12 Extended Nordic	US Prestige Elite
Courier 10 Extended Swiss	US Prestige Elite Bold
Courier 12 Extended Swiss	US Prestige Elite Italic
Courier 10 Extended UK	US Prestige Pica
Courier 12 Extended UK	6670 Symbol 10 Pitch
Courier 10 w/Elong. Hyph. Overstrike	6670 Symbol 12 Pitch

Group III Fonts:

APL Rotated, 13.3 pitch	Gothic Text Roman Medium, 12 pitch
Arabic, 12 pitch	Gothic Text Roman Underscore, 12 pitch
Benzene Symbol, 10 pitch	Graph 241, 13.3 pitch*
Bookface, 10 pitch	Graph 242, 13.3 pitch*
CB 12, 12 pitch **	Katakana, 10 pitch
Courier Bold, 10 pitch	Katakana, 12 pitch
Courier Italic, 10 pitch	Overstrike, 12 pitch
Courier Underscore, 10 pitch	Orator Presentor, 10 pitch
Cyrillic, 10 pitch	Prestige Elite Elongated Overstrike, 12 pitch
Format (FM 10), 10 pitch	Serif Overstrike, 12 pitch
Format (FM 12), 12 pitch	Serif Text Italic Medium, 12 pitch
Gothic Text Italic Medium, 12 pitch	Serif Text Roman Bold, 12 pitch
Gothic Text Roman Bold, 12 pitch	Serif Text Roman Medium, 12 pitch

Note: * Graph 241 and Graph 242 are fonts used in conjunction with Field Developed Program (FDP) **#5798-CRB**, Business Graphing on the 3800. For additional information, see Availability Notice GB21-2167-0, dated December 1977.

** CB12 is a font used in conjunction with Installed User Program (IUP) **#5796-PPA**, Panel2. See Availability Notice G320-6420, dated March 1981 for additional information.

The data stream from these two program offerings must be modified before it is sent to the 6670. There are two alternative methods to do this:

1. The customer can write a program to modify the data stream to include the necessary OCL for font switching and for a user-defined custom keyboard character set; or,
2. The customer can install and use the Field Developed Program (FDP) **#5798-DKB**, The 6670 Information Distributor Preprocessor, to modify the data stream. See Availability Notice GB21-2974-0, dated August 11, 1982, for additional information.

Field Installation: An MES must be submitted through IBM.

Operating Systems Supported for Font Library:

Operating System	Program Number	Feature No./Description
OS/VS2 (MVS)	5799-BGK	029/9 Track, 1,600 bpi 9031/9 Track, 6,250 bpi
VM/370	5799-BGQ	9029/9 Track, 1,600 bpi 9031/9 Track, 6,250 bpi
DOS/VSE	5799-BGL	9029/9 Track, 1,600 bpi 9031/9 Track, 6,250 bpi
System/34	5799-BGN	9041/Diskettes, T-1 Format
System/38	5799-BGN	9041/Diskettes, T-1 Format
8100	5799-BGN	9141/Diskettes, T-1 Format

Field Installation: An MES must be submitted through IBM.

MODEL CONVERSIONS

6670 MES upgrade to model 002 from a model 001. This feature provides the capability of an installed 6670 user to upgrade to a 6670 model 002 in order to satisfy the customer's application needs by utilizing the additional features and functions the model 002 offers. Order as a model upgrade 001 to 002.

PROTOCOL CONVERSIONS

A conversion from BSC to SDLC may be made by ordering new protocol required as an MES. Use the code numbers found in the "SPECIFY" section. The MES is field installable by the Customer Service Representative.

RPQs

External Modem Switch (RPQ 087056): Permits selection between one of two clocking signals; either the 1,200 bps signal generated by the 6670, or the signal that is generated by the external modem. This switch is located on the EIA cable, which is 3.7m (12 ft.) long for this configuration. Ordered through normal MES procedure using RPQ 087056.

Essay Bold/Essay Italic (ROS Fonts) (RPQ 100027): Provides a ROS font pairing of these two proportional fonts. Ordered through normal MES procedure using RPQ 100027.

Third Party Meter System Interface (RPQ 280002): [Mdl 001, 002 only] This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter system to the 6670. Ordered through normal MES procedure using RPQ 280002.

Front Door Lock (RPQ 773123): This feature provides a front door lock permitting access to the inside of the 6670 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

International Fonts (BSC) (RPQ 977008): Allows any of the international keyboard character sets (59) to be specified on a US 6670 mdl I BSC machine.

- –Provides a World Trade program diskette for a US mdl 001
- –Provides support for all 59 6670 keyboard character sets (US and W.T.)
- –Allows printing of W.T. characters from W.T. fonts without the need for the "keyboard" command.
- –Will be useful when the input device has a W.T. keyboard.
- –Eliminates the need to use the "keyboard" command.

Ordered through normal MES procedure using RPQ 977008.

Meter System (RPQ 977047): [Mdl 001, 002] With this feature, the copying function is inhibited until a meter is inserted into a receptacle. This system consists of any number of meters and one meter receptacle. Each meter automatically records the number of copies that are made while it is in the receptacle. (The printing function of the 6670 is not affected by this feature.) Ordered through normal MES procedure using RPQ 977047.

6670 Information Distributor (cont'd)

Up-Ending Kit (RPQ 977064): Allows the 6670 to be moved in a 90 degree vertical position. Ordered through normal MES procedure using RPQ 977064.

International Fonts (SNA) (RPQ 977888): Allows international fonts to be used on a 6670 mdl 001 SNA machine. Ordered through normal MES procedure using RPQ 977888.

Optional periods of maintenance service: Service for the 6670 beyond the normal working hours is available through CDS. CDS is responsible for order entry and control of these requests. (For information on administrative processing and procedures, see Information Only RPQ #8A5000.) The following are the prices for this maintnance service.

	Hours of coverage		
Days of service	9	18	24
Monday-Friday	-	$67	$123
Saturday	$26	$41	$51
Sunday	$31	$51	$67
Monday-Sunday	--	--	$200

Program Support

Field Developed Programs (FDP's):

1. **6670 Information Distributor Preprocessor (FDP 5798-DKB):** Supports all models of the 6670, bisync or SDLC. Provides an interface between DCF and the 6670 which offers faster processing of output, a simple font switching capability, eliminates device dependencies in source files, handles justification of proportional and mixed-pitch fonts, and provides virtual font capability. For additional information see Availability Notice GB21-2974, dated August 1982, and *Program Description/Operations Manual*, SB21-2975.

2. **File Conversion for Word Processors.** This FDP provides the capability of converting data processing data sets to a form that can be printed by the 6670, by performing the following functions: ... inserting OCL at the beginning of the data set ... qualifying records based on the contents of a field ... converting and editing packed decimal, EBCDIC, and binary fields ... converting uppercase fields to a mixture of uppercase and lowercase characters ... substituting data, based on the contents of a field ... deleting trailing blanks in an alphabetic field ... deleting leading zeroes in a numeric field ... and inserting delimiters, such as switch codes, between fields. For additional information, see Program No. 5798-DFY, and its *Program Description/Operations Manual*, SB21-2882.

3. **IBM Manyfont:** Users who format data containing many type style changes, especially those documents with equations, may want to make use of this Installed User Program. Manyfont extends the capabilities of SCRIPT/VS in two ways: ... it provides a simple means to change the font for a single character ... and it supports a wide variety of output devices for text that have many type styles. For additional information, see Program No. 5796-PPE, and its *Program Description/Operations Manual*, SH20-2607.

4. **Panel2:** This Installed User Program is a line art program that is used to develop flowcharts, HIPO charts, foils, and simple drawings. **Prerequisites:** This IUP requires the use of the 6670 font, CB12, which is available as a Group III font in the 6670 Font Library option. For additional information, see Availability Notice G320-6420 and PANEL2 Users Guide - Program No. 5796-PPA.

5. **Business Graphing on the IBM 3800:** This Field Developed Program provides the capability to use 6670 to print a variety of graphs, e.g., bar charts, histograms. **Prerequisites:** This program requires the use of the 6670 fonts Graph 241 and Graph 242, which are available as Group III fonts in the 6670 Font Library option. For additional information, see Availability Notice GB21-2167-0.

6. **Font Editing System:** This Field Developed Program provides the capability to create and/or edit fonts for the 6670. For additional information, see *Program Description/ Operations Manual*, SB11-5744) and Program No. 5785-FAW.

7. **System/38 OFFICE/38 Text Management Licensed Program:** This licensed program provides the capability for System/38 users to create, store, retrieve, revise and print documents. The 6670 is supported as an output device with the following formatting options able to be specified: headers and footers on a page, number of copies, page length, line numbering, flagging changes, and font downloading (mld 002 and 003 only). For additional information, see Program No. 5714-WP2, and Getting Started with System/38 Office/38 - Text Management.

8. **System/36 Text Management System Licensed Program:** This program provides the user with a library of programs that provide document creation, revision, viewing, merging, with user data files, spelling aids, and printing functions. The 6670 is supported as an output device. For additional information, see Program No. 5727-TX1, and *Text/Office Brochure* G580-0454.

SUPPLIES

IBM High Yield Toner: Reorder P/N 1669081.

6671 COLLATOR

PURPOSE

Collator for the 6670 [Models 001, 002]. It is designed to simplify paper handling by automatically assembling sets of copies in sequential order.

MODELS

Model 001 20 bin collator.

Dimensions:

Width: 69cm (27 in.)
Depth: 46cm (18 in.)
Height: 102cm (40 in.)
Weight: 61kg (135 lbs.)

HIGHLIGHTS

The collator sequences the copier output. It contains 20 bins, each of which can hold up to 100 sheets of 9 kg (20 pound) paper.

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSION (None)

ACCESSORIES (None)

SUPPLIES (None)

6700 SELECTRIC III TYPEWRITER

PURPOSE

The 6700 Selectric III Typewriter is a single pitch correcting typewriter, with a 343mm (13.5 in) paper capacity.

MODELS

Model A01

Dimensions:

Width: 470mm (18.5 in.)
Depth: 396mm (15.6 in.)
Height: 178mm (7.0 in.)
Weight: 16kg (36 lbs.)

HIGHLIGHTS

- Ribbon cassette mechanism resulting in high character yield per ribbon.
- The following features are standard:
  115V, 60 Hz motor, (double insulated with 2-wire cord); 92 character US Correspondence Keyboard; 12 Pitch machine; 54-Tooth Ratchet; Prestige Elite Element; Color: Topaz Bronze with Raven Black Bottom Cover

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6700 shipment to the customer will include the following: One IBM #210 Correctable Ribbon Cassette (Black), one Lift-Off Tape, one Prestige Elite Element.

6701 SELECTRIC III TYPEWRITER

PURPOSE

The 6701 Selectric III Typewriter is a single pitch, non-correcting fabric ribbon typewriter, with a 343mm (13.5 in) paper capacity.

MODELS

Model 001

Dimensions:
Width: 470mm (18.5 in.)
Depth: 396mm (15.6 in.)
Height: 178mm (7.0 in.)
Weight: 16kg (36 lbs.)

HIGHLIGHTS

- Fabric Ribbon mechanism resulting in high character yield per ribbon.
- The following features are standard :

  115V, 60 Hz motor, (double insulated with 2-wire cord); 92-character US Correspondence Keyboard; 54-tooth ratchet; Element: Courier 10 on 10 pitch machine and Prestige Elite on 12 pitch machine; Color: Topaz Bronze with Raven Black Bottom Cover; for selection of Pitch see "Specify" below.

SPECIFY

- Pitch: Specify 10 or 12 pitch.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6701 shipment to the customer will include the following: One Fabric Ribbon Cartridge, one Courier 10 Element for 10 pitch machine or Prestige Elite Element for 12 pitch machine.

6705 SELECTRIC III TYPEWRITER

PURPOSE

The 6705 Selectric III Typewriter is a dual-pitch, correcting typewriter, with a 394mm (15.5 in.) paper capacity.

MODELS

Model ANN Standard
Model A01 Standard
Model B01 *
Model K01 Custom

* Not for commercial sale, subject to sales restrictions in Product Announcement 382-098 and GSA contract GS-005-63046.

Dimensions:
Width: 521mm (20.5 in.)
Depth: 396mm (15.6 in.)
Height: 178mm (7.0 in.)
Weight: 17kg (39 lbs.)

HIGHLIGHTS

- The 6705 utilizes the Ribbon Cassette Mechanism resulting in high character yield per ribbon except for mdl B01 which utilizes the Selective Ribbon Mechanism.
- The following are standard features:
  - **Voltage:** 115V, 60 Hz motor for mdls A01, ANN, B01 and K01. Note: For mdl B01 and K01 this motor is for Federal Government only, for alternate motors see "Special Features". below.
  - **Keyboard:** 92-character US keyboard for mdls A01, ANN and B01.
  - **Linecord:** 2-wire double insulated for all mdls.
  - **Paper Feed:** 1, 1.5, 2 (54-tooth ratchet) for all mdls.
  - **Pitch:** Dual pitch (10 and 12) for all mdls.
  - **Element:** Prestige Elite and Courier 10 for mdls A01, ANN, and B01. Note: Mdl B01 is for Federal Government only, see "Specify" below for alternate elements.
  - **Sound Package:** For all mdls.
  - **Color:** Deep Charcoal for mdl ANN, Topaz Bronze for mdls A01 and B01. For mdl K01 see "Specify" below.

SPECIFY

- Keyboard: [Mdl K01] The following keyboards are available at no additional charge:
  92-character US **(#K001)** -- 96-character US **(#K443)** -- 96-character Latin American Abbreviated **(#K110)**

  The following keyboards are available with additional charge:

Name	Keybutton Engraving	Code
92 Library	English	**#K102**
92 Trilingual	French, Spanish, English	**#K116**
96 Trilingual	French, Spanish, English	**#K010**
96 Brazil	Brazilian	**#K445**
96 Canada Bilingual	French, English	**#K447**
96 Czechoslovakia	Czech	**#K449**
96 Czechoslovakia	Slovak	**#K450**
96 Denmark	Danish	**#K451**
96 France/Belgium	French	**#K452**
96 German/Austria	German	**#K453**
96 Greece	Greek	**#K454**
96 Italy	Italian	**#K457**
96 Netherlands	Dutch	**#K461**
96 Norway	Norwegian	**#K463**
96 Poland	Polish	**#K464**
96 Portugal	Portuguese	**#K465**
96 Spain	Spanish	**#K468**
96 Sweden/Finland Transition	Swedish	**#K469**
96 Sweden/Finland	Swedish	**#K597**
96 Switzerland	French	**#K470**
96 Switzerland	German	**#K471**
96 UK	English	**#K473**
96 USSR	Russian	**#K557**

- Elements: [Mdl B01] Federal Government only, any two of the following:

Typestyle	Device Code	P/N
Adjutant	**#7303**	**1352924**
Advocate	**#7117**	**1352007**
ANSI OCR A	**#7202**	**1352919**
ANSI OCR A (UC)	**#7160**	**1352027**
Artisan	**#7304**	**1352004**
Auto Elite	**#7305**	**1352020**
Brookfare Academic	**#7119**	**1352904**
Courier 10	**#7149**	**1352002**
Courier 12	**#7324**	**1352908**
Courier 12 Italic	**#7328**	**1352005**
Courier 10 Legal	**#7150**	**1352019**
Delegate	**#7184**	**1352912**
Dual Gothic	**#7330**	**1352001**
Elite	**#7346**	**1352913**
Large Elite	**#7349**	**1352008**
Letter Gothic	**#7367**	**1352909**
Light Italic	**#7391**	**1352922**
Manifold	**#7197**	**1352914**
Orator	**#7274**	**1352906**
Orator Presentor		**1352029**
Olde World		**1352953**
Pica	**#7295**	**1352907**
Prestige Elite	**#7419**	**1352003**
Prestige Elite Legal	**#7421**	**1352937**
Prestige Pica	**#7300**	**1352905**
Printing & Publ. #3 OCR	**#7302**	**1352921**
Scribe	**#7426**	**1352009**
Script	**#7129**	**1352923**

Elements: [Mdl K01] Choice of two elements, including "Custom Element Program" (additional charge).

- Color: [Mdl K01] Autumn Red, Cocoa Brown, Laurel Green, Marlin Blue, Pebble Gray, Raven Black, Sable Brown, or Topaz Bronze.

SPECIAL FEATURES

- **Motor:** [Mdls K01, B01] Federal Government only.

50 Hz	60 Hz
112.5V **#E034**	115V Security **#E038**
112.5V Security **#E039**	
220V **#E028**	
220V Security **#E040**	

Motor: [Mdl K01] Commercial only.
115V, 60 Hz **#E038**.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6705 [Mdl B01] shipment to the customer will include the following:
- For Federal Government only: One Selective Ribbon Cartridge (Black), one lift-off tape and choice of 2 elements.
- For state, local and qualifying education per Product Announcement 382-098 only: One Selective Ribbon Cartridge , one lift-off tape, one Courier 10 element, and one Prestige element.

Each 6705 [Mdls ANN, A01] shipment to the customer will include the following:
- One Ribbon Cassette (black), one lift-off tape, a Prestige Element and a Courier 10 Element.

Each 6705 [Mdl K01] shipment to the customer will include the following:
- One Ribbon Cassette (black), one lift-off tape and two specified elements.

6713 ELECTRONIC TYPEWRITER 50/60/75

Orders accepted on ''as available'' basis only.

PURPOSE

The 6713 Electronic Typewriter mdls 50, 60 and 75 combine single-element (but interchangeable element) typing technology, correction capability, and electronic text management with a 393.7mm (15.5 in.) paper capacity.

MODELS

Model A50	Standard 50
Model K50	Custom 50
Model A60	Standard 60, 736-character memory
Model K60	Custom 60, 736-character memory
Model A75	Standard 75, 15,500-character memory
Model K75	Custom 75, 15,500-character memory

Dimensions:

Width: 536.0mm (21.1 in.)
Depth: 447.0mm (17.6 in.)
Height: 165.1mm (6.5 in.)
Weight: 22.7kg (50 lbs.)

HIGHLIGHTS

- Mdl 75 has a standard 15,500-character storage capacity to be shared by document and phrase storage.
- Document storage allows the typist to temporarily store documents for later revision, thus eliminating much retyping.
- Phrase storage allows phrases, sentences, paragraphs and documents to be stored and played out error free. 99 storage areas are available to store up to 15,500 characters.
- Proportional spacing in addition to 10 and 12 pitch.
- Format storage.
- Electronic column layout.
- Ribbon cassette system.

SPECIFY

- Voltage: 115V AC, 60 Hz, 2.3 Amps.
- Keyboard Group:

  US **#K660**

- Color: Specify **#C055** for Autumn Red, **#C052** for Cocoa Brown, **#C054** for Laurel Green, **#C053** for Marlin Blue, **#C043** for Pebble Gray, **#C030** for Raven Black, **#C051** for Sable Brown, **#C038** for Sandstone Beige, and **#C034** for Topaz Bronze.
- Paper Feeds:

  (1,2,3) Mdls A50/K50/A60/K60:

  46-Tooth **#0087**
  51-Tooth **#0089**
  54-Tooth **#0100**

  (1,1.5,2,3) Mdls A75/K75:

  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**

SPECIAL FEATURES

Memory Protection (#5931): [Mdl A75, K75] Provides battery backup with approximately 25 minutes protection against power failure.
Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6714 ELECTRONIC TYPEWRITER 65/85

PURPOSE

The 6714 Electronic Typewriters 65 and 85 are phrase/document typewriters with 393.7mm (15.5 inch) paper capacity.

MODELS

Model B65	Standard 65, 7,400 characters memory.
Model K65	Custom 65, 7,400 characters memory.
Model B85	Standard 85, 15,500 characters memory.
Model K85	Custom 85, 15,500 characters memory.
Model ANN	Standard 85, fiftieth anniversary (available until December 31, 1983)

Dimensions:

Width: 549.4mm (21.6 in.)
Depth: 453.2mm (17.8 in.)
Height: 177.8mm (7.0 in.)
Weight: 20.6kg (45.5 lbs.)

HIGHLIGHTS

- Mdls B65 and K65 contain 7,400 characters of memory, and mdls B85 and K85 contain 15,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Proportional spacing in addition to 10 and 12 pitch.
- Right margin justification on playout in any pitch.
- Electronic keyboard.
- Resident diagnostics.
- Communications:

  The 6714 mdls B85 and K85 may be upgraded to include asynchronous communication capability by installing the Typewriter Modularity Option and connecting the 6714 to a 6733 Typewriter Communication Module. See M6733 page for details.

SPECIFY

- Voltage (120V, 60 Hz, 1 phase): **#E001**
- Paper Feeds (1, 1.5, 2, 3):
  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**
- Keyboards (96 characters unless otherwise specified):

	Keybutton Engraving	Code
Latin American Abbreviated	Spanish	**#K110**
US Correspondence	English	**#K001** *
US Correspondence	English	**#K443**

* standard 92 character

- Elements: [Mdls K65, K85] choice of two elements, including "Custom Element Program" (additional charge).
- Color: [Mdls K65, K85] Specify **#C026** for pearl white, **#C034** for topaz bronze, **#C043** for pebble gray, **#C053** for marlin blue, or **#C062** for deep charcoal. **#C043** (pebble gray) is standard.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Motor (#E034, #E093): [Federal Government Only] 112.5V 50 Hz Motor **(#E034)**, 220V 50 Hz Motor **(#E093)**. **Field Installation:** Yes.

Memory Protection (#5931): [Mdl K65, K85] Provides battery backup with approximately 25 minutes protection power failure. **Field Installation:** Yes. (Mdls B65, B85 field installation only).

Typewriter 65/85 PC Attachment (#8566, #8569, #8570: Allows all mdls of the 6714, except mdls B85 and K85, that have the Modularity Option installed, to be attached to an IBM Personal Computer and used as a printer. The attachment does not allow direct keyboarding from the 6714 to the PC. When not being used as a printer, the 6714 will continue to operate as a standard electronic typewriter. The 65/85 PC attachment device (#8566) consist of a 6.5 foot cable and electronics board installed in the typewriter. **Prerequisites:** A 5150 Personal Computer or a 5160 Personal Computer XT with: a minimum of 64KB of of memory; one diskette drive; a 5151 Monochrome Display and Printer Adapter or printer adapter card; a 65/85 PC IPL/Diagnostic Diskette (#8569). The PC must operate under DOS version 1.0, 1.1 or 2.0. **Field Installation:** Only, and must be installed by IBM CSR. **Order Procedure:** Contact IBM.

COMMUNICATIONS FEATURES

Modularity Option (#8560) [Mdls B85, K85]: Provides the interface between the 6714 and the 6733 Typewriter Communication Module. **Field Installation:** [Mdl K85] Yes (MES 1305501). Mdl B85 field installable only.

MODEL CONVERSIONS

Field upgradable from model 65 to 85, specify **#8520**. Upgrading includes an additional 8,000 characters of memory, return and advance keybuttons, semi-automatic paper insert lever and lighted carrier position indicator. **Note:** Field upgrades require the removal of certain parts which becomes the property of IBM. Order through normal MES procedure.

ACCESSORIES (None)

SUPPLIES

Standard: Each 6714 shipment to the customer will include the following: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, for mdls B65 and B85: One Title Element (P/N **1352902**), and one Prestige Elite Element (P/N **1352003**), for mdl K65, K85: two specified elements.

6723 ELECTRONIC TYPEWRITER 50/75

Orders accepted on ''as available'' basis only.

PURPOSE

The 6723 Electronic Typewriter mdls 50 and 75 combine single-element (but interchangeable element) typing technology, correction capability, and electronic text management with a 485.1mm (19.1 in.) paper capacity.

MODELS

Model A50 Standard 50
Model K50 Custom 50
Model B75 Standard 75, 15,500-character memory
Model K75 Custom 75, 15,500-character memory

Dimensions Mdls 50/75:

Width: 536.0mm (21.1 in.)
Depth: 447.0mm (17.6 in.)
Height: 165.1mm (6.5 in.)
Weight: 22.7kg (50 lbs.)

HIGHLIGHTS

- Mdl 75 has a standard 15,500-character storage capacity to be shared by document and phrase storage.
- Document storage allows the typist to temporarily store documents for later revision, thus eliminating much retyping.
- Phrase storage allows phrases, sentences, paragraphs and documents to be stored and played out error free. 99 storage areas are available to store up to 15,500 characters.
- Proportional spacing in addition to 10 and 12 pitch.
- Format storage.
- Electronic column layout.
- Ribbon cassette system.

SPECIFY

- Voltage: 115V AC, 60 Hz, 2.3 Amps.
- Keyboard Group:

  US **#K660**

- Color: Specify **#C055** for Autumn Red, **#C052** for Cocoa Brown, **#C054** for Laurel Green, **#C053** for Marlin Blue, **#C043** for Pebble Gray, **#C030** for Raven Black, **#C051** for Sable Brown, **#C038** for Sandstone Beige, and **#C034** for Topaz Bronze.
- Paper Feeds:

  (1,2,3) Mdls A50/K50:
  46-Tooth **#0087**
  51-Tooth **#0089**
  54-Tooth **#0100**

  (1,1.5,2,3) Mdls B75/K75:
  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**

SPECIAL FEATURES

Memory Protection (#5931): [Mdl B75, K75] Provides battery backup with approximately 25 minutes protection against power failure.
Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6724 ELECTRONIC TYPEWRITER 65/85

PURPOSE

The 6724 Electronic Typewriters 65 and 85 are phrase/document typewriters with a 485.1mm (19.1 inch) paper capacity.

MODELS

Model K65 Custom 65, 7,400 characters memory.

Model K85 Custom 85, 15,500 characters memory.

Dimensions:

Width: 641.0mm (25.2 in.)
Depth: 453.2mm (17.8 in.)
Height: 177.5mm (7.0 in.)
Weight: 22.4kg (49.5 lbs.)

HIGHLIGHTS

- Mdl K65 contains 7,400 characters of memory, and mdl K85 contains 15,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Proportional spacing in addition to 10 and 12 pitch.
- Right margin justification on playout in any pitch.
- Electronic keyboard.
- Resident diagnostics.
- Communications:

  Mdl K85 may be upgraded to include asynchronous communication capability by installing the typewriter modularity option and connecting the typewriter to a 6733 Typewriter Communication Module. See M6733 page for details. **SPECIFY**
- Voltage (120V, 60 Hz, 1-phase): **#E001**
- Paper Feeds (1, 1.5, 2, 3):
  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**
- Keyboards (96 characters unless otherwise specified):

	Keybutton Engraving	Code
Latin American Abbreviated	Spanish	**#K110**
US Correspondence	English	**#K001** *
US Correspondence	English	**#K443**

* Standard 92 character

- Elements: Choice of two elements ,including "Custom Element Program" (additional charge).
- Color: Specify **#C026** for pearl white, **#C034** for topaz bronze, **#C043** for pebble gray, **#C053** for marlin blue, or **#C062** for deep charcoal. **#C043** (pebble gray) is standard.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Motor (#E034, #E093): [Federal Government Only] 112.5V 50 Hz Motor **(#E034)**, 220V 50 Hz Motor **(#E093)**. **Field Installation:** Yes.

Memory Protection (#5931): [Mdl K65, K85] Provides battery backup with approximately 25 minutes protection against power failure. **Field Installation:** Yes.

6724 PC Attachment (#8566, #8569, #8570): Allows all mdls of the 6724, except mdl K85, that has the Modularity Option installed, to be attached to an IBM Personal Computer and used as a printer. The Attachment does not allow direct keyboarding from the 6724 to the PC. When not being used as a printer, the 6724 will continue to operate as a standard electronic typewriter. The PC attachment device (#8569) consist of a 6.5 foot cable and electronics board installed in the typewriter. **Prerequisites:** A 5150 Personal Computer or a 5160 Personal Computer XT with: A minimum of 64KB of of memory; one diskette drive; a 5151 Monochrome Display and Printer Adapter or printer adapter card; a 65/85 PC IPL/Diagnostic Diskette (#8569). The PC must operate under DOS version 1.0, 1.1 or 2.0. **Field Installation:** Only, and must be installed by IBM CSR. **Order Procedure:** Contact IBM.

COMMUNICATIONS FEATURES

Modularity Option (#8560): [Mdl K85] Provides the interface between the 6724 and the 6733 Communication Module. **Field Installation:** Yes (MES 1305501).

MODEL CONVERSIONS

Field upgradable from model K65 to K85, specify **#8521.** Upgrading includes an additional 8,000 characters of memory, return and advance keybuttons, semi-automatic paper insert lever and lighted carrier position indicator. Note: Field upgrades require the removal of certain parts which becomes the property of IBM. Order through normal MES procedure.

ACCESSORIES (None)

SUPPLIES

Each 6724 shipment to the customer will include the following: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, and two specified elements.

6733 TYPEWRITER COMMUNICATION MODULE

PURPOSE

The 6733 adds asynchronous communication function to the Electronic Typewriters 6714 [models B85 and K85] and 6724 [model K85].

MODELS

Model 001 Operates asynchronously in CPT-TWX 33/35 or 128 character ASCII mode. It can use half-duplex or duplex data transmission over switched point-to-point public telephone networks or directly connected systems/terminals using a null modem.

Prerequisites: The 6714 or 6724 requires installation of Modularity Option **(#8560)**.

Dimensions:

Width: 13.1cm (5.2 in.)
Depth: 33.6cm (13.2 in.)
Height: 17.6cm (6.9 in.)
Weight: 4.6kg (10.15 lbs.)

HIGHLIGHTS

- The 6733 Typewriter Communication Module is a desk top unit which links the Electronic Typewriter 6714 or 6724 to a data communication facility via a modem. The 6733 can interface with the following customer-supplied Western Electric (or equivalent) 2-wire, duplex modems:
  - Western Electric Type 103J--dual (answer/originate) mode, with or without auto answer.
  - Western Electric Type 113C--originate mode only.
  - Western Electric Type 113D--answer only, with or without auto answer.
  - Western Electric Type 212A--dual speed (low speed up to 300 bps or high-speed at 1200 bps), with or without auto answer, answer or originate mode.

  The customer must ensure that the modem is compatible with the Communication Module.
- Asynchronous TTY line protocol.
- Full 128 ASCII character set.
- Modem interface: EIA RS-232-C.
- Operator-selectable transmission speed: 110, 150, 300 or 1200 bps.
- Auto answer and unattended document reception.
- Background reception to a 14,000 character buffer.
- Electronic Typewriter 6714/6724 offline operation including all word processing functions and quality printing while the 6733 auto answers and receives documents.
- Pacing by line and standard pacing under remote terminal or system control.
- Transfer documents from 6733 receive buffer directly to 6714/6724 document storage for delayed printing or print (and optionally store) while transferring.
- Transfer documents from the 6714/6724 storage to the communication facility with or without printing.
- Customer setup: Yes.
- Cables included: a link cable to the 6714 or 2724; an EIA RS-232-C modem cable.

Bibliography: *Installation and Operating Instruction*, S544-4011; *Technical Description for host systems and applications programmers*, S544-4013.

SPECIFY

- Voltage: 120V AC, 1-phase, 60 Hz **(#E001)**
- Power Cord: 3-wire grounded. (No specify required).
- Color: Pearl White. (No specify required).

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

6800 COPIER I

[NO LONGER AVAILABLE]

PURPOSE

With one control setting, the 6800 Copier I makes from 1 to 10 copies of a piece of text and/or artwork. The original to be copied may be one side of a loose sheet or one page in a bound document. This machine makes copies on letter-size or legal-size sheets automatically cut from a roll of good quality plain paper.

MODELS

Model 001

Dimensions:

Width: 88.9cm (35 in.)
Depth: 63.5cm (25 in.)
Height: 101.6cm (40 in.)
Weight: 229.3kg (665 lbs.)

HIGHLIGHTS

- Delivery Speed: First copy of an original in 15 seconds. Subsequent copies of same original in 6 seconds. Copies per hour -- 600 (rated speed).
- Reproduces (full size*) an image as large as 215.9 x 330.2mm (8-1/2 x 14 in.), approximately the size of the document glass.
  * No provision for photo-reduction.
- Provision for overhang of material to be copied enables the "copy-board" to accommodate an original measuring 355.6 x 431.8mm (14 x 17 in). Bound-document originals such as manuals or magazines may be as thick as 25.4mm (1 in).
- By simply pressing one of two buttons, the machine operator selects an output page size 215.9 x 279.4mm (8-1/2 x 11 in.) or 215.9 x 355.6mm (8-1/2 x14 in.).
- Document cover door latches down to hold material to be copied. Document cover automatically unlatches and springs up when last copy has been made.
- Has a sliding selector switch to set the machine to make from 1 to 10 copies.
- Exit Pocket Capacity: Approximately 75 copies.
- Copy paper is a roll of plain bond (watermark bond available) that yields approximately 600 letter-size copies.
- Machine warm-up is part of first copy cycle.

Bibliography: *Copier Key Operator Instructions*, S548-0501

SPECIFY

- Voltage: For standard requirement, specify code **#A881** which calls for a dedicated 115V, 60 Hz, 15 amp, with provision for grounding. The required receptacle is a Hubbell 5262 or equivalent, NEMA 5-15R. If the light document feature is installed, specify code **#A883** which calls for a 115V, 60 Hz, 20 amp, with provision for grounding. The required receptacle is a Hubbell 5361 or equivalent, NEMA 5-20R. **Field installation:** No.
- Color: Pearl White top, Charcoal Gray panels. (No specify required).

SPECIAL FEATURES

Light Document Feature: Pressing the light document button turns on, or turns off a mechanism that causes the machine to make darker than ordinary copies, a convenience when a copying task sometimes involves unusually light originals. The light-document button is illuminated when the feature is active. **Prerequsites:** Use special toner (the kind for Copier II), P/N 1162144, green label. **Field installation:** Yes.

Meter System (#A895): The copy meter mounts under the document glass and counts each copy cycle. The meter itself is a plug-in unit **(P/N 1245230)**, a number of which could be separately identified with various copier-user groups. A customer's key operator can substitute one meter for another in accordance with which group is making nearly exclusive use of the machine at a particular time. **Maximum:** one system per machine. Any number of meters may be used separately. **Prerequisires:** A meter must be plugged in to enable the copier to run. **Note:** The meter receptacle may or may not accept non-IBM meters that a customer may have on hand. Similarly, IBM meters may or may not be compatible with non-IBM copiers. **Field installation:** Yes.

Radio Frequency Interference Elimination Filter (RFI) (#A120 - #A121): This feature reduce radio frequency static that may be produced by the machine. Specify #A120 for 60 Hz current or #A121 for 50 Hz current. **Field installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

All supplies should be ordered from IBM.

6801 COPIER II

PURPOSE

The 6801 Copier II can handle pages in books of any thickness, and portions of oversized originals that can be rolled up or folded, such as engineering drawings or maps.

MODELS

Model 001

Dimensions:

Width: 107.3cm (41 in.)
Depth: 74.9cm (28 in.)
Height: 118.1cm (43 in.)
Weight: 371.3kg (825 lbs.)

SPECIFY

- Volatage: Dedicated 120/240V, 120/208V, 30 Amps. 60 Hz.
- Paper Group:

Width	Length	Alternate Length	Code
203mm (8 in.)	267mm (10.5 in.)	343mm (13.5 in.)	**#A002**
203mm (8 in.)	254mm (10 in.)	330mm (13 in.)	**#A003**
210mm (8.268 in.)	270mm (10.6 in.)	297mm (11.6 in.)	**#A004**
210mm (8.268 in.)	297mm (11.6 in.)	356mm (14 in.)	**#A005**
216mm (8.5 in.)	279mm (11 in.)	356mm (14 in.)	**#A001**
216mm (8.5 in.)	279mm (11 in.)	330mm (13 in.)	**#A006**

- Language Group: The language group consists of preprinted instructions which appear on the machine such as "Lift Cover", "Remove Copies", "Not Ready", " Add Paper", etc.

  English US **#2265**

SPECIAL FEATURES

Radio Frequency Interference Elimination Filter (#A120, #A121: Specify **#A120** for 60 Hz, **#A121** for 50 Hz. **Field Installation:** Yes.

Carpet Rails (#A138): Field Installation: Yes.

Meter Control System (#A230, #A895, #A995: Specify **#A230** for the meter, **#A895** for 60 HZ receptacle, **#A995** for 50 HZ receptacle. **Field Installation:** Yes.

Convenience Collator (#3154, #3155: Specify **#3154** for 50 Hz, **#3155** for 60 Hz. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

SUPPLIES

Contact IBM.

SERs

Adjustable Copy Number Selector **(SER 472076)**
Coin Meter 60 Hz **(SER 572376)**
Coin Operation Device **(SER 472192)**
Dual Letter Page Size 10 1/2 -11 -14 in. **(SER 472253)**
Dual Legal Page Size 10 1/2 - 13 -14 in. **(SER 972027)**
Dual Legal Page Size 11-13-14 in. **(SER 972026)**
External Keylock **(SER 272001)**
External Billing Meter (60 Hz) **(SER 372035)**
External Keylock Controlled Meter **(SER 572020)**
External Key Controlled Multi/Single Copy **(SER 572447)**
Flexible Document Cover **(SER 572351)**
Foot Control (parallels "B"button) **(SER 272017)**
Line Cord: 11 through 30 feet **(SER 372102)**
Painted Covers:
- Classic Blue **(SER 972019)**
- Emerald Green **(SER 972009)**
- Garnet Rose **(SER 972012)**
- Pearl White **(SER 972017)**
- Raven Black **(SER 972011)**
- Sandstone Beige **(SER 972008)**
- Topaz Bronze **(SER 972014)**
- Willow Green **(SER 972013)**

Paper Length: 12/14 in. **(SER 372119)**

Contact IBM for particulars.

6802 SERIES III Mdl 10

PURPOSE

The 6802 Copier III model 10 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, and collate the output.

MODELS

Model 004 6802 Copier III

Dimensions:

Width: 106.7cm (42 in.)
Depth: 68.6cm (27 in.)
Height: 116.8cm (46 in.)
Weight: 463.5kg (1,030 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 215.9mm x 355.6mm (8-1/2 x 14 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 400 sheets.

Automatic machine misfeed recovery, side one only.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,500.

SPECIFY

- Voltage Dedicated 115 Volt, 30 amp.
  Voltage Dedicated 208-230 Volt, 30 amp.
  Note: When a collator is attached to a 115 volt 30 amp unit, the collator requires a separate additional outlet with 115 volt 15 amp dedicated circuit.

- Paper Group:

  Group 1 **#P876***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. **Note**: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation**: Yes.

Resetable Billing Meter (#A278): Allows the user to count number of copies. The meter can manually be set to zero. **Field Installation**: Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation**: An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI)
Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation**: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6802 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6802 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6802 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6802 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6802 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Third Party Interface (RPQ 673027): Is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6802. Ordered through normal MES procedure using RPQ 673027.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6802 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6802 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6803 SERIES III MDL 20

PURPOSE

The 6803 Copier III model 20 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwiedly documents to letter page size, and collate the output.

MODELS

Model 004 6803 Copier III model 20.

Dimensions:

Width: 116.8cm (46 in.)
Depth: 68.6cm (27 in.)
Height: 116.8cm (46 in.)
Weight: 513.0kg (1,140 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 304.8mm x 381mm (12 x 15 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 400 sheets.

Automatic machine misfeed recovery, side one only.

Provides the ability to reduce originals 26% or 35%.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,500.

SPECIFY

- Voltage Dedicated 115 Volt, 30 amp.
  Voltage Dedicated 208-230 Volt, 30 amp.
  Note: When a collator is attached to a 115 volt 30 amp unit, the collator requires a separate additional outlet with 115 volt 15 amp dedicated circuit.

- Paper Group:

  Group 1 **#P876***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Resetable Billing Meter (#A736): Allows the user to count number of copies. The meter can manually be set to zero. **Field Installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI) Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6803 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6803 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6803 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6803 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6803 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6803 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

Third Party Interface (RPQ 973024): Is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6803. Ordered through normal MES procedure using RPQ 973024.

SUPPLIES

Each 6803 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6805 SERIES III MDL 30

PURPOSE

The 6805 Copier III model 30 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, and collate the output.

MODELS

Model 001 6805 Copier III model 30

Dimensions:

Width: 107.3cm (42-1/4 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 118.1cm (46-1/2 in.)
Weight: 477.0kg (1,050 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

The document feed will accept single sheets size of 216mm x 356mm (8-1/2 x 14 in.) maximum.

Exit Pocket Capacity: Approximately 250 copies.

Automatic job recovery.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,200

SPECIFY

- Voltage Dedicated 120/208 Volt, 30 amp.

- Paper Group:

  Group 1 **#P876 ***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US #2265

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5-digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6805. **Field installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI)
Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA. **Collator** 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6805 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6805 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6805 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6805 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6805 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to zero. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6805 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6805 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6806 SERIES III MDL 40

PURPOSE

The 6806 Copier III model 40 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwiedly documents to letter page size, and collate the output.

MODELS

Model 001 6806 Copier III model 40.

Dimensions:

Width: 120.6cm (47-1/2 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 118.1cm (46-1/2 in.)
Weight: 544.0kg (1,200 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 304.8mm x 381mm (8-1/2 x 14 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 250 sheets.

Automatic job recovery.

Provides the ability to reduce originals 26% or 35%.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,200.

SPECIFY

- Voltage Dedicated 120/208 Volt, 30 amp.
- Paper Group:

  Group 1 **#P876***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. **Note:** If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5 digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6806. **Field installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI) Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6806 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6806 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6806 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6806 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 paper size (RPQ 174011): Allows the 6806 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to zero. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6806 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6806 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6808 SERIES III MDL 60

PURPOSE

The Copier III is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwieldy documents to letter page size, and collate the output.

MODELS

Model 001

Prerequisites: Feature SADF (#A150) or ADF (#A151) and Non-Reduction Feature (#5977) or Reduction Feature (#5978) must be specified. See "Special Features".

Dimensions:

Width: 124.5cm (49 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 120.0cm (47-1/4 in.)
Weight: 544.0kg (1,200 lbs.)

HIGHLIGHTS

- The 6808 represents a modular copier concept that is a significant addition to the Copier III family of copier products. It allows customers to add features to their basic machine, in their office, as they need them or remove features as their needs change.
- Single sheets are automatically fed on the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.
- Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.
- Single Original Automatic feed Maximum size: 304.8 x 381mm 8-1/2 x 14 in.) When Automatic Feed is not used maximum size is 304.8 x 431.8mm (12 x 17 in.)
- Exit Pocket Capacity : Approximately 250 sheets.
- Job Interrupt Feature allows the operator the convenience of interrupting a job for priority copies. At the completion of the priority job, machine recalls the instructions of the original job and resumes where it was interrupted.
- Automatic Checkout Capability allows the CE to quickly verify that the machine is working properly at the completion of a service call, which improves machine serviceability.
- Provides the ability to reduce originals 26% or 35%.
- Provides the ability to make copies lighter or darker.

  Has a push button copy quantity selector ranging from 1 to 999 copies.
- Copy paper is stored in two trays with a total capacity of about 2,700 sheets.
- Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies 1.6 seconds intervals copies per hour (rated speed) 4,200.

SPECIFY

- Voltage ... 120 Volt AC, 30 amp, grounded dedicated lines; 120/208 Volt AC, 30 amp, grounded; 120/240 Volt AC, 30 amp, grounded.

- Paper Group:

  Group 1 **#P876**
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

- Language Group: The language groups consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Pearl White, Charcoal Gray end covers (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Semi-Automatic Document Feed (SADF) (#A150): The horizontal SADF entry tray provides enhanced application flexibility and improved reliability. **Field Installation:** Yes.

Automatic Document Feed (ADF) (#A151): The ADF automatically feeds a stack of up to 50 originals ranging in size from 203mm x 254mm (8 x 10 in.) to 297mm x 420mm (11.69 x 16.54 in.), and weight from 60 to 105g/sq.m (16-20 lbs) originals. However, each stack of originals placed in the ADF must be of the same size and weight. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5 digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Non-reduction Feature (#5977): Field Installation: Yes.

Reduction Feature (#5978): Provides for reducing originals 26% or 35% in size. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6808. **Field installation:** Yes.

Meter System and Receptacle) (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The Meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO USA.

Radio Frequency Interference Elimination Filter (RFI)
Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6808 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6808 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6808 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6808 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

6808 Series III mdl 60 (cont'd)

A 4 Paper Size (RPQ 174011): Allows the 6808 to feed "A 4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to 0. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6808 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6808 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6852 COLLATOR

PURPOSE

Collator for the copier III machines.

MODELS

Model 004 20 bin 60 Hz (Primary model)
Model 003 20 bin 60 Hz (Secondary model additional 20 bin)
Model 014 20 bin 50 Hz (Primary model)
Model 013 20 bin 50 Hz (Secondary model additional 20 bin)

Prerequisites: The 6802 or 6803 copiers must be equipped with the Collator Attachment Feature **#A132** to enable it to accept a collator.

Dimensions:

Primary (20 bins)	Secondary (for total of 40 bins)
Width: 46cm (18 in.)	Width: 46cm (18 in.)
Depth: 68cm (27 in.)	Depth: 68cm (27 in)
Height: 105cm (41-1/2 in.)	Height: 96.5cm (38 in.)
Weight: 81kg (180 lbs.)	Weight: 61kg (135 lbs.)

HIGHLIGHTS

The collator is designed to simplify paper handling by automatically assembling sets of copies in sequential order. Each collator bin holds approximately 100 sheets of 20 lb. bond paper.

SPECIFY

- **Collator Attachment Feature (#A132):** The 6802 or 6803 copiers must be equipped with this feature to enable it to accept a collator. This feature is ordered with the 6802 or 6803 collator.
- Color: Charcoal gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A137): Carpet rails for the secondary collator. Carpet rails (#A134) for base machine and the primery collator is a prerequisite. See appropriate machine pages for the base machine.

MODEL CONVERSIONS

Compatibility Feature (#C056): Allows conversion of a currently installed collator on 6802 or 6803 to be attached to the 6805 or 6806 copier.

Compatibility Feature (#C069): Allows conversion of a currently installed collator on 6805 or 6806 to be attached to the 6808 copier.

ACCESSORIES (None)

SUPPLIES (None)

7361 GRAPHICS PROCESSOR UNIT

PURPOSE

Provides the logic, memory, disk storage, and I/O control capabilities for the 7361 Fastdraft System. When loaded with the 7361 Fastdraft licensed program, enables and controls user's interaction with the 3251 model 2 Display Station and the 7374 or 7375 Color Plotter. As the key element, with the Fastdraft licensed program, of the 7361 Fastdraft System, offers graphics functions for use by drafting personnel untrained and inexperienced in computer or programming disciplines.

MODELS

Model 1 001

Prerequisites: There are no prerequisites for the 7361 GPU. The following elements are, however, required when using the 7361 as part of the 7361 Fastdraft System:

- The 7361 Fastdraft licensed program (5719-GP1).
- A 3251 mdl 2 Display Station with Alphameric Keyboard (#4621) and Light Pen (#4750).
- A 3101 mdl 100 or 23A Display Terminal, as a console [without 3m (10 foot) modem cable].

Customer Setup: No.

HIGHLIGHTS

A floor-standing unit mounted on casters for easy installation and service access.

Contains:

The processor.

256K bytes of storage.

A 13.9 megabyte disk file.

A diskette drive ... can accommodate up to 1.2 megabytes, dependent upon format.

Workstation controller

Power supplies.

A processor control panel.

Interfaces to one or two 3251 mdl 2 Display Stations, a 3101 mdl 100 or 23A Display Terminal console (without modem cable), and a 7374 or 7375 Color Plotter. Provides the logic, storage and I/O control capabilities to handle graphics application functions for drafting personnel.

Description: The 7361 Graphics Processor Unit (GPU), with the Fastdraft licensed program Version 1, Mod 1 installed, offers complete "menus" of functions to the drafter.

Some of these features/functions are:

Isometric drawing and assembly capabilities.

Circle/arc intersect and tangent.

Ability to draw lines tangent to circle/arc.

User-defined units of measure (millimeters and inches).

Scalable views.

Spline.

Dimensions in decimal inches and angles in degrees, minutes and seconds. Also decimal millimeters and degrees.

Addressability of eight pen positions.

Coordinate selection by light-pen and key entry.

Dynamic read-out of coordinates as the tracking-cross moves.

Feet/inch/fraction units to 1/64th inch.

Drawing construction at user defined scales.

Plot merge by view.

Plotting concurrently with graphic creation at both 3251 mdl 2s.

Chamfer

Cross-Hatch option for Pouche'.

See *IBM 7361 Fastdraft Workstation Reference* (SC34-0516), and related publications for a full explanation of the functions and features.

Usability: The 7361 user does not need computer or programming background. Users rapidly learn to use the system. Interaction with the logic and controlling application in the 7361 is via a 3251 mdl 2 Display Station equipped with a special keyboard and a light-pen. A training guide steps the user through the functions offered. The screen is analogous to the drafting table. The light-pen acts like a drafting pencil. Disk storage capability in the 7361 permits storage of the drawing in process for rapid access. Diskettes are the loading media for the program product and for drawings written in a previous work session or from other 7361 systems. The user selects the "Options" or functions required from a list of options displayed in menu form on the screen. Prompts direct the user to the next action required. No computer jargon is used. The 7361 has no dependency on host systems attachments or host systems programming support.

Customer Responsibilities: The customer is responsible for site preparation, for the provision of the required electrical service and facilities, and for installation of the 7361 Fastdraft licensed program (5791-GP1).

Installation: The 7361 will be installed by a Customer Engineer.

Physical Specifications:

Width	760 mm (29.92 inches)
Depth	722 mm (28.43 inches)
Height	1,525 mm (60.04 inches)
Weight	250 kg (550 pounds)

Operating Environment:

Temperature	15 to 32.2 degrees C (60 to 90 degrees F)
Relative Humidity	8% to 80%
Wet Bulb	22.8 degrees C (73 degrees F) max.
Altitude	0 to 2,135 meters (7,000 feet)

Publications: *IBM Fastdraft System Guide* (SC34-0514), *IBM Fastdraft Training Guide* (SC34-0515), *IBM 7361 Fastdraft Workstation Reference* (SC34-0516).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Power Cord Length: 1.8 meters (6 feet).
- Power Plug: Standard "Eagle", or equivalent.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Diskettes: [Available December, 1983] Available from IBM.

7374 COLOR PLOTTER

PURPOSE

Provides large format, multicolor, high-resolution vector plotting capabilities. Can plot drawings created on the 7361 Fastdraft System on paper, vellum, or polyester sheets with highly accurate registration and repeatability.

MODELS

Model 1 001

Prerequisites: A 7361 Fastdraft System. The 7374 attaches to a standard EIA RS-232-C port in the 7361. **Note:** Because the 7374 has been tested for use only with the 7361 system, it is made available for use only in that specified environment.

Customer Setup: No.

HIGHLIGHTS

Multicolor Graphics Printing Capability:

- By programmed or manual selection of up to eight pens from one of three (each with pens of a specific type ... fiber tip, roller ball, or liquid ink drafting) manually interchangeable pen carousels.
- Each pen carousel type is electronically sensed to set default values for pen speed and writing force whenever the carousel is changed.
- User may plot working drawings and follow quickly with final liquid ink finished quality drawings by simply changing carousel type and final drawing media (e.g., paper to vellum, or to double matte polyester sheets).
- Pen types handled are:

  Fiber Tip (inexpensive, choice of widths, wear quality, etc.)

  Roller Ball (fine lines, fast drawing, hard wearing)

  Liquid ink drafting pens (highest quality for final work)
- Plotter senses which "stables", of the eight in a carousel, contain a pen. Subsequent checking whenever a pen-select command is received determines whether a pen was/was-not in that stable at carousel loading time, whether pen holder already has a pen and has been commanded to return it to the appropriate stable, whether the holder is empty and the selected pen is actually in position to be picked, and, finally, whether the newly selected pen has been picked and is in the holder.
- Automatic capping of pens unused for a predetermined time retards pen drying problems and increases the life of the pen.

Paper, Vellum, Polyester Media Control:

- Media is gripped between pressure wheel and aluminum oxide coated grit wheel (at back of media) for precise X-axis media motion.
- Thousands of minute grit impressions are made on the back of the media on the first pass of the drawing. As drawing moves along X-axis, each impression tends to realign itself with its originating grit particle. The effect is that of an ultra-precise, built-in miniature sprocket drive system.
- Media drapes over, and is vacuum drawn against, a platen to maintain resolution not only at the grit wheel pinched edges, but all along the media surface.
- Expensive sprocket hole media is not required.
- Plots on media sizes from 203.2 mm x 266.7 mm (8 inches x 10.5 inches) to 622.3 mm x 1231.9 mm (24.5 inches x 48.5 inches).

Controls: A front panel on the 7374 provides local, manual control facilities. A joystick controls pen movement at slow, medium, and fast speeds according to the pressure and inclination selected by the operator. Of the 22 keys on the panel, 13 control pen selection, up/down conditions, speed, and force. The pen selected, its speed, and its force values are displayed on a 3-digit display on the panel. Other indicators show the current operating mode of the plotter, I/O or graphics error indications, whether 90 degree rotation is in effect, etc. Refer to *IBM 7361 Fastdraft System Guide* (SC34-0514), for further information.

Customer Responsibility: The customer is responsible for site preparation and for the provision of appropriate power facilities ... see *IBM 7361 Fastdraft System Guide* (SC34-0514), for installation and physical planning information.

Installation: The 7374 will be installed by a Customer Engineer.

Physical Specifications:

Width	1,087 mm (42.8 inches)
Depth	557 mm (21.9 inches)
Height	1,188 mm (46.8 inches)
Weight	59 kg (130 pounds)

Operating Environment:

Temperature	0 to 55 degrees C (32 to 131 degrees F)
Relative Humidity	5% to 95% [0 to 40 degrees C (32 to 104 degrees F)]

Publications: *IBM Fastdraft System Guide* (SC34-0514), *IBM Fastdraft Training Guide* (SC34-0515), *IBM Fastdraft Workstation Reference* (SC34-0516).

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): No specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Supplies will be available from IBM.

7375 COLOR PLOTTER

PURPOSE

A floor-standing, multicolor, multimedia, high-resolution vector plotter. It provides the capability to plot up to E/AO size drawings on paper, vellum, or polyester sheets with highly accurate registration and repeatability. The 7375 connects via cable to the 7361 Fastdraft System.

MODELS

Model 1 001

Prerequisite Operating Environment: The 7375 cable-attaches to the 7361 Fastdraft System. The IBM Fastdraft Licensed Program Release 1.0 or later (Program 5719-GP1 R1.0 or R1.1) will support the 7375. However, Program 5719-GP1 can support only one plotter, either a 7375 or 7374, at any one time. The 7375 attaches to a standard EIA RS-232-C port or a IEEE488 standard port via a 6.1 meter (20 foot) cable.

Note: Because the 7375 has been tested for use only with the 7361 Fastdraft System, it will be supported only when attached to a 7361.

For further information on the use of the 7375 plotter with the Fastdraft System, see the *IBM Fastdraft System Guide* (SC34-0514-1 level or later).

HIGHLIGHTS

- Provides ability to plot up to E/AO size drawings 841mm x 1,189mm (34 inches x 44 inches). Other standard size drawings that can be accommodated are:

A 8-1/2 x 11 inches	A4	210 x 297mm
B 11 x 17 inches	A3	297 x 420mm
C 17 x 22 inches	A2	420 x 594mm
D 22 x 34 inches	A1	594 x 841mm

- The 7375 is an 8-pen plotter that allows the drafter to choose pens, colors and line widths to match application requirements.
- Three pen types are handled:

  Fiber Tip (inexpensive, choice of widths, wear quality, etc.)

  Roller Ball (fine lines, fast drawing, long wearing)

  Liquid ink drafting pens (highest quality for final work)
- Each pen type has its own 8-pen carousel and the three carousels are manually interchangeable.
- Pen speeds and force will automatically be set to default values appropriate for "just loaded" pen types whenever the carousel is changed.
- Automatic pen-capping is provided.
- Paper, vellum, or double-matte polyester sheets can be selected as the drawing media as application requires.
- Media size ranges are:

  Width 267mm (10.5 inches) to 298mm (11.75 inches), that include standard sizes A4/A and A3/B; and 546mm (21.5 inches) to 927mm (36.5 inches), which includes standard sizes A2/C, A1/D, A0/E, and architectural size E.

  Length 203mm (8 inches) to 1,231.9mm (48.5 inches)

  Paper size is electronically sensed to establish plot limits.
- Ultra-precise media control yields superior repeatability and accuracy.
- Simple and convenient pushbutton control is designed into the plotter.

Installation: The 7375 will be installed by an IBM Customer Service Representative.

Physical Specifications:

Width	1,392mm (54.8 inches)
Depth	557mm (21.9 inches)
Height	1,188mm (46.8 inches)
Weight	70.4kg (155 pounds)

Environmental Specifications:

Operating:

Temperature	15 to 32.2 degrees C (60 to 90 degrees F)
Relative Humidity	8% to 80%
Max Wet Bulb	22.8 degrees C (73 degrees F)]
Altitude	2,135 meters (7,000 feet) Maximum

Non-Operating:

Temperature	10 to 43 degrees C (50 to 110 degrees F)
Relative Humidity	8% to 80%
Max Wet Bulb	26.7 degrees C (80 degrees F)]

Shipping:

Temperature	-40 to 60 degrees C (-40 to 140 degrees F)
Relative Humidity	5% to 100%
Max Wet Bulb	29.4 degrees C (85 degrees F) No Condensation

Publications:

1. Two publications will be shipped with the 7375:
   - *IBM 7375 Color Plotter Maintenance Information* (SY34-0339)
   - *IBM 7375 Color Plotter Parts Catalog* (S134-0069)
2. General Fastdraft information:(At -1 level or later. Includes information relative to the 7375.)
   - *IBM Fastdraft System Guide* (SC34-0514)
   - *IBM Fastdraft Training Guide* (SC34-0515)
   - *IBM Fastdraft Workstation Reference* (SC34-0516)
3. Education: (No formal Classroom training is required.)
   - *IBM 7361 Fastdraft Training Guide* (SC34-0515), this self-study guide addresses the use of the 7375 when attached to a Fastdraft System, and will be available in December, 1983.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): No specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Supplies will be available from IBM.

7426 TERMINAL INTERFACE UNIT

PURPOSE

An ASCII to SDLC protocol converter for attachment of 3101 display units and TTY compatible terminals to the S/370, 43XX, 30XX processors and the 8100 System.

MODELS

Model 1	001	Designed for connection to the 8100, 4321 and 4331 systems via a direct-attached or data link-attached loop.
Model 2	002	Designed for connection to the S/370, 43XX, 30XX or 8100 systems via SDLC communication link.

Prerequisites: The 7426 requires a downstream microcode load from the host processor to which it communicates. Therefore, the downstream load microcode data set (distributed via magnetic media) must be installed on the host processor.

When connected to the 8100 Processor, the 7426 operates under DPPX or DPCX using the same programming support as provided for the 3276 mdl 12. The 7426 cannot be used for installation of DPPX/DPCX programming system in lieu of the 3276.

When connected to the S/370, 43XX or 30XX processors, the 7426 requires the Downstream Load Utility program product (5668-006) to be installed on the processor.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

Terminal attachment to the 7426 is via asynchronous EIA RS-232-C interface or EIA RS-422-A interface. Logical appearance of 7426 to processors is that of 3276-12 control unit with up to four 3278 displays and/or 3287 printers.

The 3276 emulation capability of the 7426 allows 3101 displays and TTY-compatible terminals to utilize the existing 3270 programming support. (Subject to the limitations of attached devices.) Terminal connection to the 7426 can be by direct connection, or via nonswitched or switched network. The 7426 provides auto-answer support for its downstream connected terminals.

In addition to protocol conversion, the 7426 provides a 4,800-byte storage area for storing of pre-formatted display information. The capability to store frequently used formats in the 7426 reduces the volume of data transfers between the 7426 and its host system.

Operation of the 7426 is dependent on downstream loading of microcode from the host system to the 7426. Microcode for the 7426 is distributed by IBM to the customer's host site on a magnetic media; IBM Diskette 2D is used for an 8100 processor, and IBM Distribution Tape Reel (DTR) is used for the S/370, 43XX or 30XX processors. The microcode is installed on the host system by transferring the contents of diskette/tape into permanent disk storage. A downstream load from the host to the 7426 is initiated automatically when the 7426 is powered on.

Attachable Devices: 3101 mdls 10 and 13, 3101 mdls 20 and 23 operating in character mode, 3102 printer (connected to 3101 port), 3101-837 Display RPQ 8J0002, 7485-531 RPQ display, IBM Personal Computer with 3101 Emulation Program (6024042) and Asynchronous Communications Adapter, 4975-01A Printer RPQ D09033, certain non-IBM TTY-compatible displays and printers. **Note:** An RPQ must be submitted for attachment of non-IBM, TTY-compatible terminal(s).

Device Attachment: The 7426 supports both EIA RS-232-C and RS-422-A interface for attaching devices. For direct connection, the distance between the 7426 and the attaching device is dependent on the device interface, up to 12 meters (40 feet) for EIA RS-232-C Connection, and up to 1,220 meters (4,000 feet) for EIA RS-422-A connection. TP attachment via nonswitched or switched lines requires an asynchronous external modem with RS-232-C interface. The data set ready signal from the modem alerts the 7426 to an incoming call.

Communications: The 7426 mdl 1 communicates with 8100, 4321 and 4331 direct-attached loops at transmission speeds of up to 38,400 bps, and data link attached loops at up to 9600 bps. The 7426 mdl 2 uses the SDLC communications link to operate in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of up to 9600 bps. Terminal communication with the asynchronous downstream ports of the 7426 is at speeds of up to 9600 bps. See M2700 pages for communication facilities.

Customer Problem Analysis and Resolution (CPAR): Self-test diagnostics has been designed into the 7426 to enhance availability to the customer. CPAR routines and procedures are documented in the *7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution Manual,* GA23-0078. See "Customer Responsibilities" below.

Customer Setup (CSU): The 7426 is designated a customer setup machine. Setup instructions are included with each machine.

Initialization: Initialization of the 7426 is performed after Customer Setup. A 3101 display or an IBM Personal Computer with 3101 emulation program and asynchronous communications adapter is required for initialization. During initialization, parameters such as loop carrier and data rates, parity selection and number of transmit bits are specified to customize the 7426 for a specific operational environment. See "Customer Responsibilities" below.

IBM Repair Center Service: The 7426 is eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge.

If maintenance agreement coverage is not contracted for immediately following expiration of the warranty and the customer subsequently wants maintenance coverage, the machine(s) must be inspected by IBM.

IBM repair center service is available under the terms and conditions of the Agreement for Purchase of IBM Machines and after warranty expiration under the IBM Maintenance Agreement and the IBM Repair Center Maintenance and Machine Element Replacement Service Amendment or on a Time-and-Material Basis.

On-Site Assistance: If the customer desires assistance to perform CPAR, the local FE branch office may be called for customer engineering assistance. The CE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. Customer-owned spare 7426s will be installed by the CE upon request. Shipping of defective 7426s to the repair center is a customer responsibility. CE assistance is available on a per-call basis at the applicable hourly rate.

Customer Responsibilities: the Customer is responsible for:

- Adequate site, system and other vendor preparation. *
- Obtaining communication cables.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Setup of unit, connection of cables to communication lines, modems and processors, switch settings, and checkout.
- Initialization of the 7426.
- Price quotations, installation and cost of common carrier equipment and service.
- Determination of the required number of spares.
- Performing Customer Problem Analysis and Resolution.
- Returning failing 7426 to repair center with a completed Repair Authorizations form.

* Each customer should order the *IBM 7426 Terminal Interface Unit Description, Site Planning and Programming Guide,* GA23-0077, for installation and planning work.

Spares: It is recommended that the customer order a sufficient number of spares to meet the operational requirements of his site. The recommended number of spares is:

Number of 7426s Installed	Recommended 7426 Spares
1-15	1
30	1
50	1
75	2
100	2
200	3
300	3
500	5
700	6
1000	7

The customer should be advised to test spares for correct operation before putting them on the shelf.

Warranty Service and Maintenance: The normal procedure will be for the customer to isolate the failure to a 7426 and ship it to the designated IBM Repair Center. All maintenance, parts replacement, adjustments, and repair shall normally by performed at the designated IBM Repair Center.

When maintenance is required, it shall be the customer's responsibility to determine the failing 7426, pack the 7426 in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will ship the repaired machine prepaid. There is no regularly scheduled preventive maintenance recommended by IBM on these machines.

Repair center service is available under the IBM Maintenance Agreement and the IBM Repair Center Maintenance and Machine Element Replacement Service Amendment (Z120-2240-5), or on a Time-and-Material basis.

Customers with machines not under an IBM Maintenance Agreement must have the option to ship the machines to the designated IBM

7426 Terminal Interface Unit (cont'd)

Repair Center for repair. The IBM Machine Repair Authorization Form is to be completed with all shipments to the repair center. Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, estimating of repair charges, and return shipping charges.

Publications:

IBM 7416 Terminal Interface Unit Description, Site Planning, and Programming Guide, GA23-0077.
IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution, GA23-0078. (Shipped with each unit.)

SPECIFY

Unless indicated otherwise, the following specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Power cable 1.8 meters (6 foot), non-locking plug.
- **Magnetic Media**: One copy of magnetic media (i.e., downstream load microcode) is needed for each 8100, S/370, 43XX, or 30XX system to which the 7426 attaches; i.e., on a single system attaching multiple 7426s, only one 7426 must specify the magnetic media. An MES order will be processed for a 7426 that did not specify magnetic media on the original order.
- When ordering magnetic media, specify as follows:

  For the first 7426 on each 8100 Processor, specify **#9491** to order Diskette 2D.

  For the first 7426 on each S/370, 43XX or 30XX processor, specify **#9491** plus one of the following tape specify codes: **#9412** for 9/800 magnetic tape, **#9413** for 9/1600 magnetic tape, or **#9414** for 9/6250 magnetic tape.

  Supplemental specification is to be entered exactly as follows to indicate the shipping address to which the initial copy and any EC updates of the magnetic media will be sent. This may be either the 8100, S/370, 43XX, or 30XX processor address or any address designated by the customer for receipt of initial copy of magnetic media and any subsequent EC updates. EC updates will be sent only to customers with an IBM Maintenance Agreement -- others must submit an MES.

  For 8100 System:

  Line 1 - Name of Customer
  Line 2 - Street Address (or P.O. Box)
  Line 3 - City, State, Zip Code
  Line 4 - Attn: Data Processing Manager

  For S/370, 43XX or 30XX System:

  Line 1 - IBM Programming Center Representative
  Line 2 - c/o (Name of Customer)
  Line 3 - Street Address (or P.O. Box)
  Line 4 - City, State, Zip Code

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: Device attachment cables are not provided with the 7426 and must be ordered separately. Order by part number and specify the desired cable length. Procurement of cables for non-IBM TTY compatible devices is a user responsibility.

P/N	Description
2720173	Direct connect 3101, EIA RS-232-C. Maximum Length: 12m (40 ft.)
2720150	Direct connect 3101, EIA RS-422-A. Maximum Length: 1,220m (4,000 ft.)
2720399	Direct connect 4975, EIA RS-232-C. Maximum Length: 12m (40 ft.)
2720174	Modem Connection EIA RS-232-C. Maximum Length: 12m (40 ft.)
6235645	Direct Connect IBM Personal Computer, EIA RS-232-C. Maximum Length: 12m (40 ft.)

SUPPLIES (None)

8101 STORAGE and I/O UNIT MDLS A10 - A13

[NO LONGER AVAILABLE]

PURPOSE

Provides additional disk storage and device attachment capability for the 8100 Information System.

MODELS

Model A10	Device attachment capability
Model A11	29MB (29,327,360 bytes) - movable heads only and device attachments
Model A13	64MB (64,520,192 bytes) - movable heads only and device attachments

Maximum: Two per 8100 Information System with an 8130-AXX, three with an 8130-BXX Processor. One of the 8101s may be configured with Communication or Display/Printer features Type I or Type II. Four with an 8140 or 8150 Processor. Two of the 8101s may be configured with Communication or Display/Printer features Type I or Type II for 8140 Mdls A3X to A7X. Only one with 8140 mdls B5X to B7X or C72 to C92 or 8150. The maximum is one if the 8809 Magnetic Tape Unit mdl 1B is attached to the 8130-AXX Processor, two for the 8130-BXX Processor or three if the 8809 Magnetic Tape Unit mdl 1B is attached to the 8140 or 8150 Processor. See Table 2 for 8100 System maximums.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8101 Storage and Input/Output Unit provides additional disk storage and device attachment capabilities for the 8100 Information System. The 8101 Storage and Input/Output Unit attaches to the I/O bus of the 8130, 8140 or 8150 Processor.

Disk storage for the 8101 Storage and I/O Unit mdls A11 and A13 is provided by a non-removable high speed direct access storage. Depending on the mdl selected, disk storage of up to 64 million bytes with movable heads is available. The disk storage operates at a data rate of 1,031,000 bytes per second. The average access time is 27 milliseconds with a average rotational delay of 9.6 milliseconds. Removable diskette storage of up to 1MB (985,088 bytes) is available and operates at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370 or 4341 processor via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 System can attach to the ICA of the 115, 125, 135, or 138 Processors for BSC line control. The 8100 System can attach to the Communications Adapter of the 4321 or 4331 Processor for BSC and/or SDLC line control. For specific attachment, see M2700 pages.

The 8101 Storage and I/O Unit extends the capability of the 8100 Information System by providing for the attachment of a variety of input/output devices. These devices consist of Displays, Printers, Magnetic Tape, Controllers and Data Collection Units. The devices may be attached to the 8101 loops, data link attached loops, communication ports or direct attachment to the 8101.

Designated Customer Setup: The 8101 Storage and I/O Unit is designated as a customer setup unit thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to enable the 8101 to be properly ordered and configured. Setup procedures for the customer will be shipped with each machine. An 8101 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, and *Installation Guide,* GA23-0039, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Selected Configuration: To ease the selection, configuring, ordering and installation of 8101 Storage and Input/Output Units several selected configurations have been developed. These selected configurations are designed to be applicable for the majority of customer installations, both DPPX and DPCX are supported. The use of selected configurations is recommended. Traditional configuration selection and ordering should be used for configurations not included in the selected configurations.

Prerequisites: 8130, 8140 or 8150 Processor for the mdls A10, A11 or A13. The 8101 mdl A10 requires one Display and Printer Attachment Type I (**#9941**) or Communication Attachment Type I (**#9943**).

Bibliography: GC20-8100.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for non-locking plug or **#9890** for locking plug. If 4.3 meter (14 foot) is not desired, specify **#9986** for 1.8 meter (6 foot) cable.

  Japan only, specify **#9890** for locking plug or **#9891** for non-locking plug. If **#9890** or **#9891** are not specified, a cord without a plug will be shipped unless a country RPQ is initiated.

- Color: Pebble gray is the only color available.

- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 system to another, the user must consider address compatibility of the processor and its attachments. For further information see *IBM 8100 Information System Site Planning Guide,* GA27-2884. For relocation/replace kit ordering see Relocate/Replace, in the M8130, 8140 or 8150 Accessories section.

- Cabling: For loop cabling information see the M8130, 8140 or 8150 Accessories section and the *IBM Multiuse Communication Loop-Planning and Installation Guide,* GA27-3341. For communication cable information See *IBM Information System Site Planning Guide,* GA27-2884.

  Communication cables must be ordered separately from the communication adapter features.

- Processor Attachment: Specify **#9931** for 8130, **#9932** for 8140 or **#9933** for 8150. **Field Installation:** Yes.

- System Attachment: Each 8101 requires a specify code to identify one of four sets of I/O addresses. Specify one of the following codes for each 8101 attaching to the same processor: **#9921, #9922, #9923** or **#9924**. These specify codes may be selected in any sequence. Duplicate codes are not permitted within a system. **Field Installation:** Yes.

- Device or Communication Attachment: Must specify one only for the 8101 mdl A10. The 8101 mdl A10 provides as part of the basic machine, the capabilities to attach Display/Printer or Communication facilities. On initial orders for the 8101 mdl A10, one of these capabilities must be specified. Further expansion of the 8101 mdl A10 is provided by special features. These same capabilities are provided by special features for the 8101 mdl A11 or A13. See Table 1 for additional configuration information.

  Display and Printer Attachment Type I (**#9941**): Provides, in conjunction with features #1505 and #1506, the capability for the attachment of 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to a maximum of 24. **Field Installation:** Yes.

  Communication Attachment Type I (**#9943**): Provides the capability for the attachment of loops and communication facilities in any combination up to a maximum of four. Additional special features for line control, communication interface and modems are required to complete each communication port selected (See "System Attachment"). **Field Installation:** Yes.

- Terminal Requirements: For attachment of 3640 family of terminals, see "Terminal Requirements" in M8130, 8140 or 8150 pages.

SPECIAL FEATURES

Performance: The maximum number of Features for Attaching Communications **(FAC)** capable of concurrent operation is a function of the speed of the line, the communication facility, the operating system installed and the application work load. The maximum number of communications features which can be physically installed can exceed the operational capability. Increased processor utilization will result from sustained operation of BSC (#1603 and #1604) at the maximum aggregate data rate and may cause degradation of activity operating at lower priority levels. Analysis should be performed to determine the impact.

Note Use of BSC 8101-A2X feature #1605 or 8140-C features #1622, #1623, or 8150 features #1763 or #1764 or #1623 instead of features #1603 or #1604 will significantly reduce processor utilization.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System Publications are dependent on the presence of functional support modules provided by Distributed Processing Programming Executive (DPPX), Distributed Processing Control Executive (DPCX). Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Display And Printer Attachment Type I (#1501): Provides in conjunction with feature #1505 and #1506 the capability for the attachment of 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to a maximum of

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

24. **Limitations:** Not available with 8101 mdl A10. Not available with Communication Attachment Type I (#1503), Communication Attachment Type II (#1504) or Display And Printer Attachment Type II (#1502). See Table 1 for additional information. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes.

Display And Printer Attachment Type II (#1502): Provides in conjunction with feature #1505 and #1506 the capability for the attachment of 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to a maximum of 24. **Limitations:** Not available with Display And Printer Attachment Type I (#1501 or **#9941**) or Communication Attachment Type II (#1504). See Table 1 for additional information. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. Field installation by purchase customer, see Note 2 under Table 1. **Prerequisites:** #1503 or **#9943**.

Communication Attachment Type I (#1503): Provides the capability for the attachment of loops and communication ports in any combination up to a maximum of four. Additional special features for line control, communication interface and modems are required to complete each communication facility selected. **Limitations:** Not available with 8101 mdl A10. Not available with Display And Printer Attachment Type I (#1501). See Table 1 for additional information. Only available with port positions one through four. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. Field installation by purchase customer, see Note 2 under Table 1.

Communication Attachment Type II (#1504): Provides the capability for the attachment of loops and communication ports in any combination up to a maximum of four. Additional special features for line control, communication interface and modems are required to complete each communication facility selected. **Limitations:** Not available with Display and Printer Attachment Type II (#1502) or Display and Printer Attachment Type I (#1501 or **#9941**). See Table 1 for additional information. Only available with port positions five through eight. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1503 or **#9943**.

Display And Printer Adapter (#1505): Provides for the attachment of the first four 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1501, #1502 or **#9941**.

Display And Printer, Add'l (#1506): Provides for the attachment of additional 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to a maximum of four. **Maximum:** Five. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1505.

Table 1

When configuring the 8101 for Display/Printer and Communication Features, the Type I Feature requirement should be determined first. The Type II should then be configured if so required. The table below shows the combinations of these features that may be configured.

8101 Mdl A10

Type I	Type II
#9941 or **#9943** with	#1502 or #1504

8101 Mdl A11 or A13

Type I	Type II
#1501 or #1503 with	#1502 or #1504

Note 2: Purchase customer must submit an RPQ for field installation of **#9943** with #1502 concurrent with removal of **#9941** or field installation of #1503 with #1502 concurrent with removal of #1501.

Diskette Drive And Magnetic Tape Attachment (#1507): Provides the capability for the attachment of one Diskette Drive 2D (#4520) and one Magnetic Tape Attachment (#4521). **Limitations:** Only available with 8101 mdl A10. See special features #4520 and #4521 for Diskette Drive and Tape Attachment for the mdl A11 and A13. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes.

Diskette 2D Drive (#4520): Provides 1MB (985,088) of removable diskette storage for the 8101 mdl A10, A11 or A13 operating at a data rate of up to 62KB per second. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1507 for mdl A10.

Magnetic Tape Attachment (#4521): Provides for the attachment to the 8101 mdl A10, A11 or A13 of up to four 8809 Magnetic Tape Units, consisting of one 8809 mdl 1A plus two mdl 2s and one mdl 3. **Limitations:** Not available if the 8130, 8140 or 8150 Processor has the 8809 Magnetic Tape Unit mdl 1B attached or if the 8140 mdl BXX or CXX has Magnetic Tape Attachment (#4901). **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1507 for mdl A10.

Security Cover Locks (#6555): This feature provides key-operated security locks for the machine covers, restricting access to the machine interior and external cable connector area. See Security Lock, Diskette (#6566) if diskette security is required. Additional or replacement keys are not available from IBM. They maybe purchased from a local locksmith. **Maximum:** One. **Field Removable:** No. **Field Installation:** Yes.

Security Lock, Diskette (#6566): This feature provides a key-operated security lock to restrict access to the diskette magnetic media. It is accessible only by opening the front cover. For maximum system security, the Security Cover Lock (#6555) must be used in addition to the Diskette Security Lock. Additional or replacement keys are not available from IBM. They maybe purchased from a local locksmith. **Maximum:** One. **Field Removable:** No. **Field Installation:** Yes.

Selected Configurations

The following table lists the appropriate selected configuration codes for each mdl and the communication capabilities for each selected configuration.

	CODE								
	1 0 0 0	1 0 0 2	1 0 0 3	1 0 0 4	1 0 0 5	1 0 0 6	1 0 0 8	1 0 0 9	1 0 1 0
Description									
8101 mdl A10	-	X	X	X	X	X	X	X	X
8101 mdls A11, A13	X	X	X	X	X	X	X	X	X
Port 1 Dir Att Loop									
– 38.4KB	-	X	X	X	X	X	-	-	-
– 9.6KB	-	-	-	-	-	-	X	-	-
Port 2 Dir Att Loop									
9.6KB	-	X	X	-	X	X	X	X	X
Port 3 Data Link									
9.6KB	-	X	X	X	X	X	X	X	X
Port 4 Data Link									
9.6KB	-	-	-	X	X	X	-	X	X
Port 5 Data Link									
9.6KB	-	-	-	-	-	-	-	-	X
Port 6 Dir Att Loop									
9.6KB	-	-	X	-	-	X	-	-	-

Notes:

1. Magnetic tape attachment to 8130 or 8140.
   - use 8809 mdl 1B.
2. Recommended DPPX configurations:
   - No less than 512K processor storage
   - No less than 58MB disk storage
   - Fixed Head feature in processor disk
3. When attached to an 8140 mdl C processor with communication port features #1610, #1611, #1612, #1613 or #1614, or when attached to an 8150 processor with communication ports 1-4 or 9-12, Selected Configurations with 38,400 bps Loops are not available.

Selected Configuration Attachment (#1000): No communications available, mdls A11 and A13 only. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1002): Provides for selection and attachment on one single-lobe 38.4K bps loop in port 1, one 9600 bps single-lobe loop in port 2, and one SDLC link up to 9600 bps in port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1003): Provides for selection and attachment of one single-lobe 38.4K bps loop in port 1, one 9600 bps single-lobe loop in port 2, one SDLC link up to 9600 bps in port 3, and one single-lobe 9600 bps loop in port 6. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1004): Provides for selection and attachment of one single-lobe 38.4K bps loop in port 1 and one SDLC link up to 9600 bps in port 3 and port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1005): Provides for selection and attachment on one single-lobe 38.4K bps loop in port 1, one 9600 bps single-lobe loop in Port 2, one SDLC link up to 9600 bps in port 3

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

and port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1006): Provides for selection and attachment on one single-lobe 38.4K bps loop in port 1, one 9600 bps single-lobe loop in port 2, one SDLC link up to 9600 bps in port 3 and port 4, and one single-lobe 9600 bps loop in port 6. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1008): Provides for selection and attachment of one single-lobe 9600 bps loop in port 1, one 9600 bps single-lobe loop in port 2, and one SDLC link up to 9600 bps in port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1009): Provides for selection and attachment of one 9600 bps single-lobe loop in port 2, one SDLC link up to 9600 bps in port 3 and port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Selected Configuration Attachment (#1010): Provides for selection and attachment of one 9600 bps single-lobe loop in port 2, and one SDLC link up to 9600 bps in port 3, port 4, and port 5. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Tables 4 and 5.

Communications And Loops:

CCITT V.35 Interface (#1550): Provides interface to external modems/ data communication equipment at up to 56,000 bps or Direct Connection at speeds of up to 56,000 bps. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC code 21 or two FAC codes 08, 09 or 8140 mdl C processor with #1610, #1611, #1612, #1613 or #1614, or 8150 processor with ports 1-4 or 9-12, and is not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** For speeds up to 9600 bps, one per selected Communication feature (#1601 or #1602). For operation at speeds greater than 9600 bps, one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisites:** #1601, 1602 or #1602 and #5200. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

SDLC Communications With Business Machine Clock (#1601): Provides control for EIA RS-232-C interface, integrated modems, direct connection and CCITT V.35 Interface. **Limitations:** In an 8100 System only ten Loops or SDLC communication ports may be active at one time, except for the 8150. The 8150 can support ten per Processing and Control element (PCE). **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1602, #1603 or #1604) selected. **Field Installation:** Yes. **Prerequisites:** #1503, #1504 or **#9943**. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications Without Business Machine Clock (#1602): Provides control for EIA RS-232-C or Digital Data Service Adapter (DDSA) Interface, CCITT V.35 Interface and Loop Adapter. **Limitations:** In an 8100 System only ten Loops or SDLC communication ports may be active at one time, except for the 8150. The 8150 can support ten per Processing and Control element (PCE). **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1603 or #1604) selected. **Field Installation:** Yes. **Prerequisites:** #1503, #1504 or **#9943**. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC/SS Communications With Business Machine Clock (#1603): Provides control for EIA RS-232-C Interface, integrated modems or direct connection. **Limitations:** Start/Stop Communications are not available with integrated modems. An 8101 with an 8130 Processor attached, has a maximum aggregate BSC data rate of 9600 bps and 330 bps for Start/Stop. With an 8140 Processor attached, the maximum aggregate BSC data rate is 19,200 bps and 660 bps for Start/Stop. Mutually exclusive with the 8101-A2X feature #1605 or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1602 or #1604) selected. **Field Installation:** Yes. **Prerequisites:** #1503, #1504 or **#9943**. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC Communications Without Business Machine Clock (#1604): Provides control for EIA RS-232-C or Digital Data Service Adapter (DDSA) Interface and direct connect. **Limitations:** An 8101 with an 8130 Processor attached, has a maximum aggregate BSC data rate of 9600 bps. With 8140 Processor attached, the maximum BSC aggregate data rate is 19,200 bps. Mutually exclusive with 8101-A2X feature #1605 or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1602, or #1603) selected. **Field Installation:** Yes. **Prerequisites:** #1503, #1504 or **#9943**. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

EIA RS-232-C Interface (#3701): Provides interface to external modems/ data communication equipment direct connection at speeds of up to 9600 bps. **Maximum:** One per selected Communication feature (#1601, #1602, #1603 or #1604). **Field Installation:** Yes. **Prerequisites:** #1601, #1602, #1603, #1604, #1602 and #5200, or #1604 and #5200. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter (#4830): Provides for the direct attachment of a single-lobe loop at 9600 or 38,400 bps. **Maximum:** One per selected Communication feature (#1602). Only one of these features may operate at 38,400 bps in an 8130/8101, two in an 8140/8101, or 8150/8101 without ports 1-4 or 9-12 in the 8150. See Table 2 for system maximums. The maximum is reduced by one for each selected communication facility attached to the 8101. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Maximum:** One per Communication Attachment Type I or II (#1503, #1504, or **#9943**). See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #4830. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Multi-Speed Clock (#5200): Provides business machine clocking at 2400, (FAC 44 only) 4800, 9600 and 56,000 bps for direct connection. Can provide multiple speeds simultaneously. **Maximum:** One with Communication Attachment Type I (#1503, or **#9943**) for port positions one through four and one with Communication Attachment Type II (#1504) for port positions five through eight. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1503, #1504 or **#9943**) and either #1602 or #1604. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Nonswitched (#5500): Provides interface to or common carrier leased facilities at 600 or 1200 bps. **Limitations:** Not available for Start/Stop Communication Facilities. **Maximum:** One per dselected Communication feature (#1601 or #1603). **Field Installation:** Yes. **Prerequisites:** #1601 or #1603. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Switched (#5501): Provides interface to or common carrier switched facilities with auto answer at 600 or 1200 bps. **Limitations:** Not available with Start/Stop communication facilities. **Maximum:** One per selected communication feature (#1601). **Field Installation:** Yes. **Prerequisites:** #1601. **Note:** Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Digital Data Service Adapter (DDSA) (#5660): Provides interface to AT&T Dataphone® Digital Service Network for transfer of digital data at speeds of 2400, 4800, 9600 or 56,000 bps in point-to-point or multipoint configurations, **Limitations:** Operation at 56,000 bps is mutually exclusive with FAC codes 26, 28, 29 or two FAC codes 08, 09, 8140 mdl C processor with #1610, #1611, #1612, #1613 or #1614, or 8150 processor with ports 1-4 or 9-12, and is not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** For speeds up to 9600 bps one per selected communication feature (#1602 or #1604). For operation at 56,000 bps, one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisites:** #1602 for operation to 56,000 bps or #1604 for operation to 9600 bps. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

8100 System Maximums: The following table lists the system maximums common to the 8130, 8140, 8150 and 8101. Depending on the processor and special features selected, these maximums may not be possible. See the appropriate machine pages for additional feature information.

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

Table 2

Machine/Feature Function	System Processor..... 8130 A21-A22 A23-A24	8130 B23 B24	8140 A31 A34	8140 A41 A44
8101 *Note*	2	3	4	4
Disp/Prt Attch #1501,#1502, #9941	1	1	1	1
Disp/Prt Adpter #1505	1	1	1	1
Disp/Prt Add'l #1506	5	5	5	5
Communication Attch #1503, #9943	1	1	2	2
Communication Attch #1504	1	1	2	2
Diskette Drive	2	2	2	2
Tape Attachment	1	1	1	1
Communication Ports (SDLC, BSC/SS, Loop)	14	14	19	18
Loop at 38.4K bps	1	2*	2*	2*
Loop 2nd lobe	5	5	6	6
TP Link Greater than 9600 bps	0	1*	1*	1*
Multi-Speed clock	3	3	5	5

Machine/Feature Function	System Processor..... 8140 A51-A54 A61-A64 A71-A74	8140 B51-B52 B61-B62 B71-B72	8140 C72 C82 C92	8150 B20 B40 B60
8101 *Note*	4	4	4	4
Disp/Prt Attch #1501,#1502, #9941	1	1	1	1
Disp/Prt Adpter #1505	1	1	1	1
Disp/Prt Add'l #1506	5	5	5	5
Communication Attch #1503, #9943	2	1	1	1
Communication Attch #1504	2	1	1	1
Diskette Drive	2	2	2	2
Tape Attachment	1	1	1	1
Communication Ports (SDLC, BSC/SS, Loop)	16	19	18	20
Loop at 38.4K bps	2*	2*	2*	6**
Loop 2nd lobe	4	5	4	6
TP Link Greater than 9600 bps	1*	1*	1*	8**
Multi-Speed clock	4	5	4	4

* Either two loops at 38.4K bps or one loop at 38.4K bps and one TP Link greater than 9600 bps.

** Only if all ports are in the 8150 processor, otherwise the maximum is the same as the 8140 processors.

Note: Only one 8101 may have Communication and Display/Printer features with the 8130 Processor, 8140 Processor mdls BXX, CXX and and 8150 Processor mdl BXX. Only two 8101 units may have Communication and Display/Printer features with the 8140 Processor, mdls A3X, A4X, A5X, A6X and A7X.

MODEL CONVERSIONS

Field conversion is possible for models A10 to A11, A10 to A13 and A11 to A13.

ACCESSORIES

For accessories see the M8130, 8140 or 8150 Accessories section. For prices, see the Hardware Price List section.

SUPPLIES (None)

COMMUNICATION CAPABILITIES

There are a variety of Communication Facilities (see M2700) supported by the 8101 Features for Attaching Communications (**FAC**) differing in speed, protocol and attachment interfaces. These FAC codes have been categorized as Loop, SDLC, BSC and Start/Stop. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation FAC No.) for additional details. Reference to switched communications in the FAC codes, refers to the communication link between the 8100 System and the S/370 or 4300 processors.

The 8101 special features allow a maximum of eight communication capabilities to be configured and designated as communication ports. Each communication port position (1 through 8) must consist of a communications feature for SDLC, BSC or Start/Stop.

The SDLC communications feature is available with and without business machine clock (#1601, #1602). The BSC/SS communications feature (#1603) is available with business machine clock and the BSC communications feature (#1604) is available without business machine clock. If an 8101 communication port is to provide the attached facility with business machine clock at speeds of 2400 bps or greater for FAC 44, or 4800 bps or greater for other FAC codes, the multi-speed clock feature (#5200) is required.

In addition to selecting a communications feature (#1601, #1602, #1603, #1604) for each port configured in an 8101, a communication interface or integrated modem must be selected to support the Communication Facility attaching to that port. Direct connect at 2400 (FAC 44 only), 4800, 9600 and 56,000 bps require the multi-speed clock feature (#5200). Each port of the 8101 also requires the selection of a specify code to indicate the System 8100 FAC Code selected for that port. Certain System 8100 FAC codes will require a second specify code to select options available within that facility: 2/4-wire or line speed.

Note: Within a given FAC, the selected option (2/4-wire LPDA or line speed) can be changed in the field by Field Engineering. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory.

Specify And FAC Code Descriptions: A specify code number is required to identify the selected FAC code and its physical port position. Communication Attachment Type I (**#9943**, #1503) is specified as port positions one through four and Communication Attachment Type II (#1504) is specified as port positions five through eight. The specify code is constructed by concatenating the selected FAC and its port position to the numeral **9**, e.g.:

#9ABC where AB = FAC No. and C = Port Position.

FAC codes range in number from 08 to 61 resulting in FAC specify codes ranging in number from **#9081** to **#9618**. Additional codes must be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual,* GA27-2876, will aid in assigning the port positions.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two lobe at 38,400 bps
FAC 10	Loop, single-lobe at 9600 bps
FAC 11	Loop, two-lobe at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. **Limitations:** If two 08 FAC codes are specified, FAC codes 09, 21, 26, 28, 29 are not available. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8130/8101, two in an 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9081**	**#9082**	**#9083**	**#9084**	**#9085**	**#9086**	**#9087**	**#9088**

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** If two 09 FAC codes are specified, FAC codes 08, 21, 26, 28, 29 are not available. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8130/8101, two in an 8140/8101. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9091**	**#9092**	**#9093**	**#9094**	**#9095**	**#9096**	**#9097**	**#9098**

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

FAC 10 Loop, Single-Lobe: Required for operating a loop at 9600 bps. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9101**	**#9102**	**#9103**	**#9104**	**#9105**	**#9106**	**#9107**	**#9108**

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** One for ports one through four and one for ports five through eight. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9111**	**#9112**	**#9113**	**#9114**	**#9115**	**#9116**	**#9117**	**#9118**

SDLC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 12	600 or 1200 bps (External modem)
FAC 13	Up to 9600 bps (External modem)
FAC 15	600, 1200 or 2400 bps Direct connect with clock (No modem)
FAC 16	4800 or 9600 bps Direct connect with clock (No modem)
FAC 17	Direct connect without clock to 9600 bps
Integrated Modem	
FAC 18	600 or 1200 bps nonswitched
FAC 19	600 or 1200 bps switched with auto answer
AT&T Dataphone® Digital Service	
FAC 20	2400, 4800 or 9600 bps nonswitched
FAC 21	56,000 bps nonswitched
CCITT V.35	
FAC 24	Direct connect with clock (No modem) 600, 1200 or 2400 bps
FAC 25	Direct connect with clock (No modem) 4800 or 9600 bps
FAC 26	Direct Connect with Clock (no modem) 56,000 bps
FAC 27	Direct connect without clock (No modem) to 9600 bps
FAC 28	Direct Connect without clock (no modem) to 56,000 bps
FAC 29	Up to 56,000 bps nonswitched.

FAC 12 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem without clocking - and point-to-point switched 2-wire - or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1601 and #3701 **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9121**	**#9122**	**#9123**	**#9124**	**#9125**	**#9126**	**#9127**	**#9128**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**

FAC 13 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - with external data communication equipment and clock - point-to-point switched with auto answer to 4800 bps or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9131**	**#9132**	**#9133**	**#9134**	**#9135**	**#9136**	**#9137**	**#9138**
LPDA	**#9801**	**#9802**	**#9803**	**#9804**	**#9805**	**#9806**	**#9807**	**#9808**

FAC 15 EIA RS-232-C Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9151**	**#9152**	**#9153**	**#9154**	**#9155**	**#9156**	**#9157**	**#9158**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**
2400 bps	**#9761**	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**	**#9767**	**#9768**

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port position one through four or five through eight. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9161**	**#9162**	**#9163**	**#9164**	**#9165**	**#9166**	**#9167**	**#9168**
4800 bps	**#9771**	**#9772**	**#9773**	**#9774**	**#9775**	**#9776**	**#9777**	**#9778**
9600 bps	**#9781**	**#9782**	**#9783**	**#9784**	**#9785**	**#9786**	**#9787**	**#9788**

FAC 17 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9171**	**#9172**	**#9173**	**#9174**	**#9175**	**#9176**	**#9177**	**#9178**

FAC 18 Integrated Modem: 600 or 1200 bps - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Prerequisites:** #1601 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9181**	**#9182**	**#9183**	**#9184**	**#9185**	**#9186**	**#9187**	**#9188**
2-wire								
600 bps	**#9851**	**#9852**	**#9853**	**#9854**	**#9855**	**#9856**	**#9857**	**#9858**
1200 bps	**#9861**	**#9862**	**#9863**	**#9864**	**#9865**	**#9866**	**#9867**	**#9868**
4-wire								
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**

FAC 19 Integrated Modem: 600 or 1200 bps - point-to-point switched with auto answer 2-wire. **Prerequisites:** #1601 and #5501. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9191**	**#9192**	**#9193**	**#9194**	**#9195**	**#9196**	**#9197**	**#9198**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**

FAC 20 Digital Network Interface (to ATT Dataphone® Digital Service): 2400, 4800, 9600 bps without business machine clock - and 4-wire point-to-point nonswitched - or multipoint nonswitched. **Prerequisites:** #1602 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9201**	**#9202**	**#9203**	**#9204**	**#9205**	**#9206**	**#9207**	**#9208**
2400 bps	**#9761**	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**	**#9767**	**#9768**
4800 bps	**#9771**	**#9772**	**#9773**	**#9774**	**#9775**	**#9776**	**#9777**	**#9778**
9600 bps	**#9781**	**#9782**	**#9783**	**#9784**	**#9785**	**#9786**	**#9787**	**#9788**

FAC 21 Digital Network Interface (to ATT Dataphone® Digital Service): 56,000 bps without business machine clock point to point and multipoint nonswitched operation. **Limitations:** Mutually exclusive with FAC codes 26, 28, 29, or two FAC codes 08, 09. Not available when 8101 is attached to the 8130 Processor. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #5660. **Specify:** From the table below,

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9211**	**#9212**	**#9213**	**#9214**	**#9215**	**#9216**	**#9217**	**#9218**

FAC 24 CCITT V.35 Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (Attached machine must not provide business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1601 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9241**	**#9242**	**#9243**	**#9244**	**#9245**	**#9246**	**#9247**	**#9248**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**
2400 bps	**#9761**	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**	**#9767**	**#9768**

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock - operating with no modem (Attached machine must not provide business machine clock - and direct connection up to 1,000 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port position 1-4 or 5-8. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9251**	**#9252**	**#9253**	**#9254**	**#9255**	**#9256**	**#9257**	**#9258**
4800 bps	**#9771**	**#9772**	**#9773**	**#9774**	**#9775**	**#9776**	**#9777**	**#9778**
9600 bps	**#9781**	**#9782**	**#9783**	**#9784**	**#9785**	**#9786**	**#9787**	**#9788**

FAC 26 CCITT V.35 Interface: 56,000 bps with business machine clock operating with no modem and direct connection up to 1,000 feet or up to a total cable length of 200 feet to a 3705. **Limitations:** Mutually exclusive with FAC codes 21, 28, 29 or two FAC codes 08, 09. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. Not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** One per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required code to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9261**	**#9262**	**#9263**	**#9264**	**#9265**	**#9266**	**#9267**	**#9268**

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9271**	**#9272**	**#9273**	**#9274**	**#9275**	**#9276**	**#9277**	**#9278**

FAC 28 CCITT V.35 Interface: 56,000 bps without business machine clock operating with no modem and direct connection up to 1,000 feet to another 8100 system. **Limitations:** Mutually exclusive with FAC codes 21, 26, 29 or two FAC codes 08, 09. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. Not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** One per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required code to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port8
Port	**#9281**	**#9282**	**#9283**	**#9284**	**#9285**	**#9286**	**#9287**	**#9288**

FAC 29 CCITT V.35 Interface: Up to 56,000 bps without business machine clock and external data communication equipment with clock, and point-to-point or multipoint nonswitched. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC codes 21, 26, 28 or two FAC codes 08, 09. Not available with 8140 mdl C processor with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. Not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** For operation at speeds greater than 9600 bps, one per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9291**	**#9292**	**#9293**	**#9294**	**#9295**	**#9296**	**#9297**	**#9298**

BSC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 40	600 or 1200 bps (External modem)
FAC 41	Up to 9600 bps (External modem)
FAC 44	2400, 4800 or 9600 bps direct connect with clock (No modem)
Integrated Modem	
FAC 45	600 or 1200 bps nonswitched
AT&T Dataphone® Digital Service	
FAC 47	2400, 4800 or 9600 bps nonswitched

FAC 40 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem with no clock - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9401**	**#9402**	**#9403**	**#9404**	**#9405**	**#9406**	**#9407**	**#9408**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**	**#9747**	**#9748**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**	**#9757**	**#9758**

FAC 41 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with external data communication equipment - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**9411**	**#9412**	**#9413**	**#9414**	**#9415**	**#9416**	**#9417**	**#9418**

FAC 44 EIA RS-232-C Interface: 2400, 4800 or 9600 bps with business machine clock - operating with no modem (attached downstream terminal must not provide business machine clock) - and direct connection to 40 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port position one through four or five through eight. Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	**#9441**	**#9442**	**#9443**	**#9444**	**#9445**	**#9446**	**#9447**	**#9448**
2400 bps	**#9761**	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**	**#9767**	**#9768**
4800 bps	**#9771**	**#9772**	**#9773**	**#9774**	**#9775**	**#9776**	**#9777**	**#9778**
9600 bps	**#9781**	**#9782**	**#9783**	**#9784**	**#9785**	**#9786**	**#9787**	**#9788**

FAC 45 Integrated Modem: 600 or 1200 bps - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1603 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	#9451	#9452	#9453	#9454	#9455	#9456	#9457	#9458
2-wire								
600 bps	#9851	#9852	#9853	#9854	#9855	#9856	#9857	#9858
1200 bps	#9861	#9862	#9863	#9864	#9865	#9866	#9867	#9868
4-wire								
600 bps	#9741	#9742	#9743	#9744	#9745	#9746	#9747	#9748
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756	#9757	#9758

FAC 47 Digital Network Interface (to ATT Dataphone® Digital Service): 2400, 4800 or 9600 bps without business machine clock - 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitations:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #l622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	#9471	#9472	#9473	#9474	#9475	#9476	#9477	#9478
2400 bps	#9761	#9762	#9763	#9764	#9765	#9766	#9767	#9768
4800 bps	#9771	#9772	#9773	#9774	#9775	#9776	#9777	#9778
9600 bps	#9781	#9782	#9783	#9784	#9785	#9786	#9787	#9788

START/STOP

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 60	110, 134.5, 150, 300 or 600 bps (External modem)
FAC 61	110, 134.5, 150, 300 or 600 bps Direct connect with clock (No modem)

FAC 60 EIA RS-232-C Interface: 110, 134.5, 150, 300, 600 bps with business machine clock - operating with external modem - and point-to-point nonswitched facilities. Will be provided under provisions of the IBM Multiple Supplier Systems Policy. See M2700 pages for specific information on communication facilities and other attachment information. **Limitations:** The 600 bps line speed is not available when the 8101 is attached to an 8130 Processor. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	#9601	#9602	#9603	#9604	#9605	#9606	#9607	#9608
110 bps	#9701	#9702	#9703	#9704	#9705	#9706	#9707	#9708
134.5 bps	#9711	#9712	#9713	#9714	#9715	#9716	#9717	#9718
150 bps	#9721	#9722	#9723	#9724	#9725	#9726	#9727	#9728
300 bps	#9731	#9732	#9733	#9734	#9735	#9736	#9737	#9738
600 bps	#9741	#9742	#9743	#9744	#9745	#9746	#9747	#9748

FAC 61 EIA RS-232-C Interface: 110, 134.5, 150, 300, 600 bps with business machine clock - operating with no modem (the attached terminal must provide its own business machine clock) - and direct connect to 40 feet. **Limitations:** The 600 bps line speed is not available when the 8101 is attached to an 8130 Processor. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Port	#9611	#9612	#9613	#9614	#9615	#9616	#9617	#9618
110 bps	#9701	#9702	#9703	#9704	#9705	#9706	#9707	#9708
134.5 bps	#9711	#9712	#9713	#9714	#9715	#9716	#9717	#9718
150 bps	#9721	#9722	#9723	#9724	#9725	#9726	#9727	#9728
300 bps	#9731	#9732	#9733	#9734	#9735	#9736	#9737	#9738
600 bps	#9741	#9742	#9743	#9744	#9745	#9746	#9747	#9748

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can attach directly to the 8101 Storage and Input/Output Unit:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8809 Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System configurator*, GA27-2876, for selection of the 8100 FAC codes.

	Loop Attachment		
	Direct At		Data Link At 2400,
Device and Mdl	9600 bps	38400 bps	4800,9600 bps
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 1	X	X	X
3274 Control Unit 51C,61C with: - 3178 Display Station - 3230 Printer 2 - 3268 Printer 1 - 3262 Printer 3,13 - 3268 Printer 2 - 3278 Display Station 1,2,3,4,5 - 3279 Color Display Unit 2A,2B,3A,3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X	X	X
3276 Control Unit Display Station 11,12,13,14 with: - 3178 Display Station - 3230 Printer 2 - 3262 Printer 13 - 3268 Printer 2 - 3278 Display Station 1,2,3,4 - 3279 Color Display 2A, 2B, 3A, 3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X		X
3287 Printer 11,12	X	X	X
3289 Printer 3 with: - 2502 Card Reader A1* - 3501 Card Reader - 3521 Card Punch* (*Requires 3782 Attachment Unit)	(1)		(1)
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E01, E02	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM Information System Configurator,* GA27-2876, for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3101 Display Terminal mdls 10, 12, 13

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

3232 Keyboard Printer Terminal mdl 1
3232 Keyboard Printer mdl 51
3274 Control Unit mdl 51C,61C with:
- 3178 Display Station
- 3230 Printer mdl 2
- 3268 Printer 2
- 3262 Printer mdls 3, 13
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3230 Printer mdl 2
- 3268 Printer 2
- 3262 Printer mdl 13
- 3278 Display Station mdls 1, 2, 3, 4
  (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
  (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3600 Finance Communication Controllers
3630 Plant Communication Controllers
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4700 Finance Communication Controller
4952, 4954, 4955, 4959 Processor (Series 1)
5150 IBM Personal Computer
5285, 5288 Programmable Data Stations
6360, 6580 Displaywriter (3270 DSC Mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using SDLC (FAC 15, 16, 17, 24, 25, 26, 27 or 28), BSC (FAC 44) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide* , GA27-2884, will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature No.	8100 FAC CODE
2741	134.5	#9114 and #3255	61
Devices Conforming to 2780/3780 Line Protocol	2400,4800, 9600	Refer to specific device	44
3101	110,150,300, 600*	None required	61
3232-1	1200,2400	None	15
	4800,9600	None	16
3232-51	300,600*	None	61
3274-51C, 61C	1200,2400	#3701 and #6302	15
	4800,9600	#3701 and #6302	16
	1200,2400	#1550 and #6302	24
	4800,9600	#1550 and #6302	25
	56,000	#1550 and #6303	26**
3276	600,1200,2400	#3701 w #9491 and #6302	15
	4800,9600	#3701 w #9491 and #6302	16
3651 25/75	4800	#9126	16****
3705-II	600,1200,2400	#4714	15
	4800,9600	#4714	16
	56,000	#4720	26**
3705-80	600,1200,2400,	None	15
	4800,9600	None	16
	56,000	#6712	26**
3725	600,1200,2400	#4911	15
	4800,9600	#4911	16
	56,000	#4911	26**
3767	600,1200,2400	#3718 w #9707 and #9533	15
4701	1200,2400	None	15
	4800,9600	None	16
4952, 4954, 4955, 4959	1200, 2400	#2090	15
	4800, 9600	#2090	16
6360	1200, 2400	#3707	15
	4800, 9600	#3707	16
6580 A04, B04	1200, 2400	#3705	15
	4800, 9600	#3705	16
6670	600,1200,2400,	#3701	15
	4800	#3701	16
7426-2	600,1200,2400,	None	15
	4800,9600	None	16
8101,8130,	600,1200,2400	FAC 17 (see note)	15
8140,AXX,	600,1200,2400	FAC 27 (see note)	24
BXX	4800,9600	FAC 17 (see note)	16
	4800,9600	FAC 27 (see note)	25
8140 CXX	4800	#1621 and #9688 (See note)	16
8101,8140 BXX	56,000	FAC 28 (see note)	26**
8140 CXX	56,000	#1614 and #9683 (See note)	26**
8150	4800, 9600	#1733 and #9688 or #1734 and #9698 (see note)	16
	56,000	#1742 and #9682 or #1745 and #9693 (see note)	26
8775	600,1200,2400	#3701	15
	4800,9600	#3701	16
	600,1200,2400	#1550	24
	4800,9600	#1550	25

* When 8101 is attached to a 8130, maximum speed is 300 bps.

** Not available when 8101 is attached to 8130.

**** Specify **#9770** is available to facilitate problem determination.

Note: FAC 17, 27 or 28 in attaching 8101, 8130, 8140-AXX, BXX or #1614, #1621 on the 8140 mdl C or 8150 with #1733, #1734, #1742 or #1745 without business machine clock.

8101 Storage and I/O Unit Mdls A10 - A13 (cont'd)

Table 5 - SELECTED CONFIGURATION CODES

Selected Configuration Feature Code	Quantity–Component Feature Code
#1000	None
#1002	3-#1602, 1-#3701, 2-#4830, 1-**#9081**, 1-**#9102**, 1-**#9133**, 1-**#9921**, 1-**#9943**
#1003	1-#1504, 4-#1602, 1-#3701, 3-#4830, 1-**#9081**, 1-**#9102**, 1-**#9106**, 1-**#9133**, 1-**#9921**, 1-**#9943**
#1004	3-#1602, 2-#3701, 1-#4830, 1-**#9081**, 1-**#9133**, 1-**#9134**, 1-**#9921**, 1-**#9943**
#1005	4-#1602, 2-#3701, 2-#4830, 1-**#9081**, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9921**, 1-**#9943**
#1006	1-#1504, 5-#1602, 2-#3701, 3-#4830, 1-**#9081**, 1-**#9102**, 1-**#9106**, 1-**#9133**, 1-**#9134**, 1-**#9921**, 1-**#9943**
#1008	3-#1602, 1-#3701, 2-#4830, 1-**#9101**, 1-**#9102**, 1-**#9133**, 1-**#9921**, 1-**#9943**
#1009	3-#1602, 2-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9921**, 1-**#9943**
#1010	1-#1504, 4-#1602, 3-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9135**, 1-**#9921**, 1-**#9943**

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Power Plug/Cable : **#9890, #9891, #9986.**

Processor Attachment (8130, 8140): **#9931, #9932.**

Optional Feature Code: #6555 - Keylock, Security Cover.

When the 8101s are attached to an 8140 mdl C processor with communication ports #1610, #1611, #1612, #1613 or #1614, or when attached to an 8150 processor with communication ports 1-4 or 9-12, Selected Configurations with 38,000 bps Loops are not available.

Table 6

Selected Configuration Feature Code	Quantity–Component Feature Code
#1000	None
#1002	1-#1503, 3-#1602, 1-#3701, 2-#4830, 1-**#9081**, 1-**#9102**, 1-**#9133**, 1-**#9921**
#1003	1-#1503, 1-#1504, 4-#1602, 1-#3701, 3-#4830, 1-**#9081**, 1-**#9102**, 1-**#9106**, 1-**#9133**, 1-**#9921**
#1004	1-#1503, 3-#1602, 2-#3701, 1-#4830, 1-**#9081**, 1-**#9133**, 1-**#9134**, 1-**#9921**
#1005	1-#1503, 4-#1602, 2-#3701, 2-#4830, 1-**#9081**, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9921**
#1006	1-#1503, 1-#1504, 1-#1602, 2-#3701, 3-#4830, 1-**#9081**, 1-**#9102**, 1-**#9106**, 1-**#9133**, 1-**#9134**, 1-**#9921**
#1008	1-#1503, 3-#1602, 1-#3701, 2-#4830, 1-**#9101**, 1-**#9102**, 1-**#9133**, 1-**#9921**
#1009	1-#1503, 3-#1602, 2-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9921**
#1010	1-#1503, 1-#1504, 4-#1602, 3-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9135**, 1-**#9921**

When the 8101s are attached to an 8140 mdl C processor with communication ports #1610, #1611, #1612, #1613 or #1614, or when attached to an 8150 processor with communication ports 1-4 or 9-12, Selected Configurations with 38,000 bps Loops are not available.

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Power Plug/Cable : **#9890, #9891, #9986.**

Processor Attachment (8130, 8140): **#9931, #9932.**

Optional Feature Code: #6555 - Security Cover Lock.

8101 STORAGE and I/O UNIT MDLS A20-A25

PURPOSE

Provides additional disk storage and device attachment capability for the 8100 Information System.

MODELS

Model A20 Device attachment capability

Model A23 64MB (64,520,192 bytes) - movable heads only and device attachments

Model A25 128MB (129,040,384 bytes) - movable heads only and device attachments

Maximum: Two per 8100 Information System with an 8130-AXX, three with an 8130-BXX Processor. One of the 8101s may be configured with Communication or Display/Printer features. Four with an 8140 or 8150 Processor. One of the 8101s may be configured with Communication or Display/Printer features with 8140 mdls B5X-B7X, C72-C92 or 8150, two with 8140 mdls A3X-A7X. The maximum is one if the 8809 Magnetic Tape Unit mdl 1B is attached to the 8130-AXX Processor, two for the 8130-BXX processor, or three if the 8809 Magnetic Tape Unit mdl 1B is attached to the 8140 or 8150 Processor. See Table 2 for 8100 System maximums.

Prerequisites: 8130, 8140 or 8150 Processor for the mdls A20, A23 or A25. The 8101 mdl A20 requires one Display and Printer Attachment or Communication Attachment or Diskette Drive and Magnetic Tape Attachment.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8101 Storage and Input/Output Unit provides additional disk storage and device attachment capabilities for the 8100 Information System. The 8101 Storage and Input/Output Unit attaches to the I/O bus of the 8130, 8140 or 8150 Processor.

Disk storage for the 8101 Storage and I/O Unit mdls A23 and A25 is provided by a non-removable high-speed direct access storage. Depending on the mdl selected, disk storage of up to 128 million bytes with movable heads is available. The disk storage operates at a data rate of 1,031,000 bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage of up to 1MB (985,088 bytes) is available for mdls A20, A23 and operates at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370 or 4300 Processor via the 3704, 3705 or 3725 Communications Controller for SNA/SDLC or BSC line control. The 8100 System can attach to the ICA of the 115, 125, 135 or 138 Processors for BSC line control. The 8100 System can attach to the Communications Adapter of the 4321 or 4331 or 4361 Processor for BSC and/or SDLC line control. For specific attachment, see M2700 pages.

The 8101 Storage and I/O Unit extends the capability of the 8100 Information System by providing for the attachment of a variety of input/output devices. These devices consist of Displays, Printers, Magnetic Tape, Controllers and Data Collection Units. The devices may be attached to the 8101 loops, data link attached loops, communication ports or direct attachment to the 8101.

Physical security is provided through the use of key locks on the diskette drive and machine covers. Additional or replacement Keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8101 Storage and I/O unit is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to enable the 8101 to be properly ordered and configured. Customer setup instructions will be shipped with each machine. An 8101 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given. If the user relocates and/or interchanges 8101 units from one system to another, the user must consider address compatibility of the processor and its attachments (see "System Attachment").

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Selected Configurations: To ease the selection, configuring, ordering and installation of 8101 Storage and Input/Output Units, several selected configurations have been developed. These selected configurations are designed to be applicable for the majority of customer installations. Both DPPX and DPCX are supported. The use of Selected Configurations is recommended. Traditional configuration selection and ordering should be used for configurations not included in the selected configurations.

Bibliography: GC20-8100.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9890** for 120V with locking plug, **#9891** for 120V with non-locking plug, **#9884** for 208V with locking plug, **#9894** for 240V with locking plug. **Field Installation:** Voltage conversions between 120V AC and 208/240V AC are not field installable. For conversion between 208V AC and 240V AC, contact your local CE representative.
- Cable: If 4.3 meter (14 foot) is not required, also specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only color available.
- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 system to another, the user must consider address compatibility of the processor and its attachments. For further information see *IBM 8100 Information System Site Planning Guide,* GA27-3341. For relocation/replace kit ordering see Relocate/Replace 8100 System under M8130 or 8140 Accessories.
- Cabling: For loop cable information, see the M8130, 8140 or 8150 Accessories section, and the *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341. For communication cable informations, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

  Communication cables must be ordered separately from the communication adapter features.
- Processor Attachment: Specify **#9931** for 8130, **#9932** for 8140, or **#9933** for 8150. **Field Installation:** Yes.
- System Attachment: Each 8101 requires a specify code to identify one of four sets of I/O addresses. Specify one of the following codes for each 8101 attaching to the same processor: **#9921, #9922, #9923** or **#9924**. These specify codes may be selected in any sequence. Duplicate codes are not permitted within a system. **Field Installation:** Yes.
- Terminal Requirements: For attachment of 3640 family of terminals, see "Terminal Requirements" in M8130, 8140 or 8150 pages.

SPECIAL FEATURES

Performance: The maximum number of Features for Attaching Communications (**FAC**) capable of concurrent operation is a function of the speed of the line, the communication facility, the operating system installed and the application work load. The maximum number of communications features which can be physically installed can exceed the operational capability. Increased processor utilization will result from sustained operation of BSC (#1603 and #1604) at the maximum aggregate data rate and may cause degradation of activity operating at lower priority levels. Analysis should be performed to determine the impact.

Note: Use of BSC 8101-A2X feature #1605 or 8140 mdl C features #1622 or #1623 or 8150 features #1763 or #1764 instead of features #1603 or #1604 will significantly reduce processor utilization.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System Publications are dependent on the presence of functional support modules provided by Distributed Processing Programming Executive (DPPX), Distributed Processing Control Executive (DPCX). Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Display And Printer, Add'l (#1506): Provides for the attachment of additional 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to four. **Maximum:** Five. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #3220.

Diskette Drive And Magnetic Tape Attachment (#1507): Provides the capability for the attachment of one Diskette Drive 2D (#4520) and one Magnetic Tape Attachment (#4521). **Limitations:** Only available with 8101 mdl A20. See special features #4520 and #4521 for Diskette Drive and Tape Attachment for the mdl A23 and A25. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes.

Communication Attachment Type 1 and Type 2 (#1701): Provides the capability for the attachment of four loops and/or Communication Ports. The first #1701 (feature Type 1) provides for ports 1-4, the

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

second #1701 (feature Type 2) provides for ports 5-8. Additional special features for line control, communication interface and modems are required to complete each communication port selected. **Limitations:** Port positions 5 through 8 not available with Display and Printer Attachment (#3220). Feature Type 1 (#1701) not available with feature type 1 (#1702) in ports 1-4. See Table 1 for additional information. **Maximum:** Two. Order once for port positions 1 through 4. Order again for port positions 5 through 8. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #3901 for first #1701 ports 1 through 4.

Communication Attachment Type 1 (#1702): Provides the capability for the attachment of four loops and/or communication ports for ports 1-4. Additional special features for line control, communications interface and DCE's are required to complete each communication port selected. **Limitations:** Available with Communications Attachment Type 2 (#1701) or Display and Printer Attachment (#3220) in ports 5-8. BSC/SS Communications (#1603 and #1604) are available with #1701 only. **Maximum:** One. Order for port positions 1-4. See table 2 for 8100 system maximums. **Field Installation:** Yes. **Note:** #1702 should be ordered if future requirements for the Programmed Communication Feature (#1605) are anticipated. **Prerequisites:** #3901.

Display And Printer Attachment (#3220): Provides for the attachment of 3277 Display Stations, 3732 Text Display and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to four. Can be expanded to a maximum of 24 devices with Display and Printer, Add'l (#1506). **Limitations:** Not available with Communication Attachment Type 2 (#1701), ports 5 through 8. See Table 1 for additional information. **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1701 or #1702 ports 1 through 4.

TABLE 1

When configuring the 8101 for Display/Printer and Communication, the table below shows the combinations of these features that may be configured.

#3901 ------- PLUS ------- #3220

OR

#3901 ------- PLUS ------- #1701 ------- PLUS ------- #1701

OR

#3901 ------- PLUS ------- #1701 ------- PLUS ------- #3220

OR

#3901 ------- PLUS ------- #1702 ------- PLUS ------- #1701

OR

#3901 ------- PLUS ------- #1702 ------- PLUS ------- #3220

Feature Expansion Prerequisite (#3901): Required for first Communications Attachment Type 1 (#1701 or #1702) ports 1 through 4 or Display and Printer Attachment (#3220) without Communications Attachment (#1701 or #1702). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1701, #1702 or #3220.

Diskette Drive 2D (#4520): Provides 1MB (985,088 bytes) of removable diskette storage for the 8101 mdl A20 or A23 operating at a data rate of up to 62K bytes per second. **Maximum:** One. See Table 2 for IBM System maximums. **Field Installation:** Yes. **Prerequisites:** #1507 for the mdl A20.

Magnetic Tape Attachment (#4521): Provides for the attachment to the 8101 mdl A20, A23 or A25 of up to four 8809 Magnetic Tape Units, consisting of one 8809 mdl 1A plus two mdl 2s and one mdl 3. **Limitations:** Not available if the 8130, 8140 or 8150 Processor has the 8809 Magnetic Tape Unit mdl 1B attached or if the 8140 mdl BXX or CXX has Magnetic Tape Attachment (#4901). **Maximum:** One. See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1507 for the mdl A20.

Selected Configurations

The following table lists the appropriate selected configuration codes for each mdl and the communication capabilities for each selected configuration.

	CODE									
Description	10000	10002	10003	10004	10005	10006	10008	10009	10010	10011
8101 mdl A20	-	x	x	x	x	x	x	x	x	x
8101 mdls A23, A25	x	x	x	x	x	x	x	x	x	x
Port 1 Dir Att Loop										
– 38.4KB	-	x	x	x	x	x	-	-	-	x
– 9.6KB	-	-	-	-	-	-	x	-	-	-
Port 2 Dir Att Loop										
9.6KB	-	x	x	-	x	x	x	x	x	x
Port 3 Data Link										
9.6KB	-	x	x	x	x	x	x	x	x	x
Port 4 Data Link										
9.6KB	-	-	-	x	x	x	-	x	x	x
Port 5 Data Link										
9.6KB	-	-	-	-	-	-	-	-	x	x
Port 6 Dir Att Loop										
9.6KB	-	-	x	-	-	x	-	-	-	-
Port 7 Data Link										
9.6KB	-	-	-	-	-	-	-	-	-	x

Notes:

1. Magnetic tape attachment to 8130 or 8140, use 8809 mdl 1B.
2. Recommended DPPX configurations:
   - No less than 512K processor storage
   - No less than 58MB disk storage
   - Fixed Head feature in processor disk.
3. When attached to an 8140 mdl C processor with communication port features #1610, #1611, #1612 #1613 or #1614 or when attached to an 8150 processor with communication ports 1-4 or 9-12, Selected Configurations with 38,400 bps loops are not available.

Selected Configuration Attachment (#1000): No communications ... mdls A23 and A25 only. See Table 5 for component feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1002): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1003): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 ... an SDLC link up to 9600 bps in Port 3 ... and a single-lobe, 9600 bps loop in Port 6. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1004): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... and an SDLC link up to 9600 bps in Port 3 and Port 4. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1005): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3 and Port 4. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1006): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3 and Port 4 ... and a single-lobe, 9600 bps loop in Port 6. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1008): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1009): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3 and Port 4. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1010): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 2 ... and an SDLC link up to 9600 bps in Port 3, Port 4 and Port 5. See

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Selected Configuration Attachment (#1011): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 1 ... a 9600 bps, single-lobe loop in Port 2 and Port 6 ... and an SDLC link up to 9600 bps in Port 3, Port 5 and Port 7. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None.

Communications And Loops:

CCITT V.35 Interface (#1550): Provides interface to external modems/data communication equipment up to 56,000 bps or Direct Connection at speeds of 9600 bps and at 56,000 bps. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC code 21 or 31, 33 or two FAC codes 08, 09 or 8140 mdl C processor with #1610, #1611, #1612, #1613 or #1614, or 8150 processor with ports 1-4 or 9-12, and is not available when the 8101 is attached to the 8130 Processor. See Table 2 for system maximums. **Maximum:** For speeds up to 9600 bps, one per selected Communication feature (#1601 or #1602). For operation at speeds greater than 9600 bps, one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisites:** #1601 or #1602 and #5200. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications With Business Machine Clock (#1601): Provides control for EIA RS-232-C Interface, integrated modems, direct connection and CCITT V.35 Interface. **Limitations:** In an 8100 System only ten loops or SDLC communication ports may be active at one time, except for the 8150. The 8150 can support ten per Processing and Control element (PCE). **Maximum:** Eight (per 8101). See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1602, #1603, #1604 or #1605) selected. **Field Installation:** Yes. **Prerequisites:** #1701 (Type 1 and Type 2) or #1702. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications Without Business Machine Clock (#1602): provides control for EIA RS-232-C or Digital Data Service Adapter (DDSA) or CCITT X.21 Interface, Direct Connection CCITT V.35 Interface and Loop Adapter. **Limitations:** In an 8100 System only ten loops or SDLC communications ports may be active at one time, except for the 8150. The 8150 can support ten per Processing and Control element (PCE). **Maximum:** Eight (per 8101). See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1603, #1604 or #1605) selected. **Field Installation:** Yes. **Prerequisites:** #1701 (Type 1 and Type 2) or #1702. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC/SS Communications With Business Machine Clock (#1603): Provides control for EIA RS-232-C Interface, integrated modems or direct connection. **Limitations:** Start/Stop Communications are not available with integrated modems. An 8101 with an 8130 Processor attached, the maximum aggregate BSC data rate is 9600 bps using #1603 and #1604 and 330 bps for Start/Stop. With an 8140 Processor attached, the maximum aggregate BSC data rate is 19,200 bps using #1603 and #1604, and 660 bps for Start/Stop. Not available in Communication Attachment Type 1 (#1702). Mutually exclusive with Programmed Communication Feature #1605 or 8140 mdl C Communication Ports Features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 System. **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1602, #1604 or #1605) selected. **Field Installation:** Yes. **Prerequisites:** #1701 (Type 1 and Type 2). **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC Communications Without Business Machine Clock (#1604): Provides control for EIA RS-232-C or Digital Data Service Adapter (DDSA) Interface and direct connect. **Limitations:** An 8101 with an 8130 Processor attached, the maximum aggregate BSC data rate is 9600 bps using #1603 and #1604. With 8140 Processor attached, the maximum BSC aggregate data rate is 19,200 bps using #1603 and #1604. Not available in Communication Attachment Type 1 (#1702). Mutually exclusive with Programmed Communication Feature #1605 or 8140 mdl C Communication Ports Features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 System. **Maximum:** Eight. See Table 2 for 8100 System maximums. The maximum is reduced by one for each Communication feature (#1601, #1602, #1603, #1604 or #1605) selected. **Field Installation:** Yes. **Prerequisites:** #1701 (Type 1 and Type 2). **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Programmed Communications Feature (#1605): Provides IBM microcode control for EIA RS-232-C BSC to external DCE with clocking from 1200-9600 bps, or without clocking at 600 or 1200 bps and direct connect with business machine clock at 1200, 1800, 2400, 3600, 7200 or 9600 bps. Speed and clocking options are user selected parameters. Processor utilization for #1605 is significantly reduced when substituted for features #1603 or #1604. **Limitations:** Available in ports 1-4 with #1702. Mutually exclusive with BSC features #1603 or #1604 in an 8100 system. **Maximum:** Four. See Table 2 for 8100 system maximums. The maximum is reduced by one for each communication feature (#1601 or #1602) selected. **Field Installation:** Yes. **Prerequisites:** #1702. **Specify:** Code as provided in FAC descriptions in "Communication Capabilities" section.

EIA RS-232-C Interface (#3701): Provides interface to external modems/data communication equipment or direct connection at speeds up to 9600 bps. **Maximum:** One per selected Communication feature (#1601, #1602, #1603, #1604 or #1605). **Field Installation:** Yes. **Prerequisites:** #1601, #1602, #1603, #1604, #1605, #1602 and #5200, #1604 and #5200. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Loop Adapter (#4830): Provides for the direct attachment of a single-lobe loop at 9600 or 38,400 bps. **Maximum:** One per selected Communication feature (#1602). Only one of these features may operate at 38,400 bps in an 8130/8101, two in an 8140/8101 or 8150/8101 without ports 1-4 or 9-12 in the 8150. See Table 2 for system maximums. The maximum is reduced by one for each selected communication facility attached to the 8101. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Maximum:** One per Communication Attachment Type 1 and Type 2 (#1701 or #1702). See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #4830. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Multi-Speed Clock (#5200): Provides business machine clocking at 2400, (FAC 44 only) 4800 bps, 9600 bps and 56,000 bps for direct connection. Can provide multiple speeds simultaneously. **Maximum:** One with each Communication Attachment (#1701 or #1702). See Table 2 for 8100 System maximums. **Field Installation:** Yes. **Prerequisites:** #1701 and either #1602 or #1604 or #1702 and #1602. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Modem, Integrated, Nonswitched (#5500): Provides interface to common carrier leased facilities at 600 or 1200 bps. **Limitations:** Not available for Start/Stop Communication Facilities. **Maximum:** One per selected Communication feature (#1601 or #1603). **Field Installation:** Yes. **Prerequisites:** #1601 or #1603. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Modem, Integrated, Switched (#5501): Provides interface to common carrier switched facilities with auto answer at 600 or 1200 bps. **Limitations:** Not available with Start/Stop communication facilities. **Maximum:** One per selected Communication feature (#1601). **Field Installation:** Yes. **Prerequisites:** #1601. **Note:** Attachment to the switched network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

X.21 Adapter For Nonswitched Networks (#5655): Provides interface for attachment to X.21 data communications equipment nonswitched at speeds up to 48,000 bps in point-to-point or multipoint configurations via an DCE complying with CCITT Recommendation X.21. **Limitations:** Operation at 48,000 bps is mutually exclusive with FAC codes 21, 26, 28, 29, 33 or two FAC codes 08, 09 , 8140 mdl C processor with #1610, #1611, #1612, #1613 or #1614, or 8150 processor with ports 1-4 or 9-12, and is not available when the 8101 is attached to the 8130 processor. See Table 2 for system maximums. **Maximum:** One per selected Communications Feature (#1602). For operation at 48,000 bps one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in the FAC description in "Communication Capabilities" section. section.

X.21 Adapter For Switched Networks (#5656): Provides interface for attachment via a Data Circuit-terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in SRL GA27-3287 and is switched at speeds up to 48,000 bps. **Limitations:** Operation at greater than 9600 bps is mutually exclusive with FAC codes 21, 26, 28, 29, 31, or two FAC codes 08, 09 and is not available when the 8101 is attached to the 8130, 8140 mdl C with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. **Maximum:** One per selected Communications Feature (#1602). For operation at greater than 9600 bps, one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisite:** #1602. **Specify:** Code as provided in the FAC description in "Communication Capabilities" section.

Digital Data Service Adapter (DDSA) (#5660): Provides interface to AT&T Dataphone® Digital Service Network for transfer of digital data at speeds of 2400, 4800, 9600 or 56,000 bps in point-to-point or multipoint configurations. **Limitations:** Operation at 56,000 bps is mutually exclusive with FAC codes 26, 28, 29, 31, 33 or two FAC codes 08, 09 , 8140 mdl C processor with #1610, #1611, #1612, #1613 or #1614, or 8150 processor with ports 1-4 or 9-12, and is not available when the 8101 is attached to an 8130 Processor. See Table 2 for system maximums. **Maximum:** For speeds up to 9600 bps, one per

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

selected Communication feature (#1602 or #1604). For operation at 56,000 bps one per 8101, one per 8140/8101 or 8150/8101. **Field Installation:** Yes. **Prerequisites:** #1602 for operation to 56,000 bps or #1604 for operation to 9600 bps. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

8100 System Maximums: The following table lists the system maximums common to the 8130, 8140, 8150 and 8101. Depending on the processor and special features selected, these maximums may not be possible. See the appropriate machine pages for additional feature information.

Table 2

	System Processor.....			
	8130	8130	8140	8140
Machine/Feature	A21-A22	B23	A31	A41
Function	A23-A24	B24	A34	A44
8101 See Note 3.	2	3	4	4
Disp/Prt Attch (#3220)	1	1	1	1
Disp./Prt. Add'l #1506	5	5	5	5
Communication Attch Type 1 and Type 2 (#1701)	2	2	4	4
Type 1 (#1702)	1	1	2	2
Diskette Drive	2	2	2	2
Tape Attachment	1	1	1	1
Communication Ports (SDLC, BSC/SS, Loop)	14	14	19	18
Loop at 38.4K bps	1	2*	2*	2*
Loop 2nd lobe	5	5	6	6
TP Link Greater than 9600 bps	0	1*	1*	1*
Multi-Speed clock	3	3	5	5

	System Processor.....			
	8140	8140	8140	8150
Machine/Feature	A51-A54	B51-B52	C72	B20
Function	A61-A64	B61-B62	C82	B40
	A71-A74	B71-B72	C92	B60
8101 See Note 3.	4	4	4	4
Disp./Prt. Attch (#3220)	1	1	1	1
Disp./Prt. Add'l #1506	5	5	5	5
Communication Attch Type 1 and Type 2 (#1701)	4	2	2	2
Type 1 (#1702)	2	1	1	1
Diskette Drive	2	2	2	2
Tape Attachment	1	1	1	1
Communication Ports (SDLC, BSC/SS, Loop)	16	19	18	20
Loop at 38.4K bps	2*	2*	2*	6**
Loop 2nd lobe	4	5	4	6
TP Link Greater than 9600 bps	1*	1*	1*	8**
Multi-Speed clock	4	5	4	4

* Either two loops at 38.4K bps or one loop at 38.4K bps and one TP Link greater than 9600 bps.

** Only if all ports are in the 8150 processor, otherwise the maximum is the same as the 8140 processors.

Note:

3. Only one 8101 may have Communication and Display/Printer features with the 8130 Processor, 8140 Processor, mdls BXX or CXX and 8150 Processor. Only two 8101 units may have Communication and Display/Printer features with the 8140 Processor, mdls A3X, A4X, A5X, A6X and A7X.

MODEL CONVERSIONS

Field conversion is possible for model A20 to A23, A20 to A25, and A23 to A25.

ACCESSORIES

For accessories, see the M8130, 8140 or 8150 Accessories section. For prices, see the Hardware Price List.

SUPPLIES (None)

Communication Capabilities

There are a variety of Communication Facilities (see M2700 pages) supported by the 8101 Features for Attaching Communications (FAC) differing in speed, protocol and attachment interfaces. These FAC codes have been categorized as Loop, SDLC, BSC and Start/Stop. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation FAC No.) for additional details. Reference to switched communications in the FAC codes, refers to the communication link between the 8100 System and the S/370 or 4300 processors.

The 8101 special features allow a maximum of eight communications capabilities to be configured and designated as communication ports. Each communication port position (1 through 8) must consist of a communications feature for SDLC, BSC or Start/Stop.

The SDLC communications feature is available with and without business machine clock (#1601, #1602). The BSC/SS communications feature (#1603) is available with business machine clock and the BSC communications feature (#1604) is available without business machine clock. If an 8101 communication port is to provide the attached facility with business machine clock at speeds of 2400 bps or greater for FAC 44, or 4800 bps or greater for other FAC codes, the multi-speed clock feature (#5200) is required. The Programmed Communications Feature (#1605) for BSC supports user parameters to select business machine clock options and speed from 600-900 bps, without the multispeed clock feature (#5200).

In addition to selecting a communications feature (#1601, #1602, #1603, #1604 or #1605) for each port configured in an 8101, a communication interface or integrated modem must be selected to support the Communication Facility attaching to that port. Direct connect at 2400, 4800, 9600 and 56,000 bps require the multi-speed clock feature (#5200).

Each port of the 8101 also requires the selection of a specify code to indicate the System 8100 FAC Code selected for that port. Certain System 8100 FAC codes will require a second specify code to select options available within the facility: 2/4 wire or line speed.

Note: Within a given FAC, the selected option (2/4-wire, LPDA or line speed) can be changed in the field by the Customer Engineer. All such changes are chargeable at the applicable FE hourly rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory.

Specify And FAC Code Descriptions: A specify code number is required to identify the selected FAC code and its physical port position. Port positions one through four are designated for Communications Attachment Type 1 (#1701 or #1702) and port positions five through eight are designated for the second Communications Attachment Type 2 (#1701). The specify code is constructed by concatenating the selected FAC and its port position to the numeral **9**, e.g., #9ABC where AB = FAC No. and C = Port Position.

FAC codes range in number from 08 to 61 resulting in FAC specify codes ranging in number from **#9081** to **#9618**. Additional codes must be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual,* GA27-2876, will aid in assigning the port positions.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two-lobe at 38,400 bps
FAC 10	Loop, single-lobe at 9600 bps
FAC 11	Loop, two-lobe at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. **Limitations:** If two 08 FAC codes are specified, FAC codes 09, 21, 26, 28, 29, 31 or 33 are not available. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8130/8101, two in an 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	**#9081**	**#9082**	**#9083**	**#9084**
	Port 5	Port 6	Port 7	Port 8
Port	**#9085**	**#9086**	**#9087**	**#9088**

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** If two 09 FAC codes are specified, FAC codes 08, 21, 26, 28, 29, 31 or 33 are not available. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximum. **Maximum:** One per 8130/8101, two in an 8140/8101. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required codes to complete the configuration for the port selected.

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9091	#9092	#9093	#9094
	Port 5	Port 6	Port 7	Port 8
Port	#9095	#9096	#9097	#9098

FAC 10 Loop, Single-Lobe: Required for operating a loop at 9600 bps. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9101	#9102	#9103	#9104
	Port 5	Port 6	Port 7	Port 8
Port	#9105	#9106	#9107	#9108

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** One for ports one through four and one for ports five through eight. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9111	#9112	#9113	#9114
	Port 5	Port 6	Port 7	Port 8
Port	#9115	#9116	#9117	#9118

SDLC

FAC No	FAC Code Description
EIA RS-232-C	
FAC 12	600 or 1200 bps (External modem)
FAC 13	Up to 9600 bps (External modem)
FAC 15	Direct connect with clock (No modem) 600, 1200 or 2400 bps
FAC 16	Direct connect with clock (No modem) 4800 or 9600 bps
FAC 17	Direct connect without clock up to 9600 bps
Integrated Modem	
FAC 18	600 or 1200 bps nonswitched
FAC 19	600 or 1200 bps switched with auto answer
AT&T Dataphone® Digital Service	
FAC 20	2400, 4800 or 9600 bps nonswitched
FAC 21	56,000 bps nonswitched
CCITT V.35	
FAC 24	Direct connect with clock (No modem) 600, 1200 or 2400 bps
FAC 25	Direct connect with clock (No modem) 4800 or 9600 bps
FAC 26	Direct connect with clock (No modem) 56,000 bps
FAC 27	Direct connect without clock (No modem) up to 9600 bps
FAC 28	Direct connect without clock (No modem) 56,000 bps
FAC 29	Up to 56,000 bps nonswitched
CCITT X.21	
FAC 30	Up to 9600 bps nonswitched
FAC 31	48,000 bps nonswitched
FAC 32	Up to 9600 bps switched
FAC 33	48,000 bps switched

FAC 12 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem without clocking - and point-to-point switched 2-wire - or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9121	#9122	#9123	#9124
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
	Port 5	Port 6	Port 7	Port 8
Port	#9125	#9126	#9127	#9128
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758

FAC 13 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - with external data communication equipment and clock - point-to-point switched with auto answer to 4800 bps or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9131	#9132	#9133	#9134
LPDA	#9801	#9802	#9803	#9804
	Port 5	Port 6	Port 7	Port 8
Port	#9135	#9136	#9137	#9138
LPDA	#9805	#9806	#9807	#9808

FAC 15 EIA RS-232-C Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9151	#9152	#9153	#9154
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
2400 bps	#9761	#9762	#9763	#9764
	Port 5	Port 6	Port 7	Port 8
Port	#9155	#9156	#9157	#9158
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758
2400 bps	#9765	#9766	#9767	#9768

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port positions 1 through 4 and the second Multi-Speed Clock (#5200) for ports 5 through 8. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9161	#9162	#9163	#9164
4800 bps	#9771	#9772	#9773	#9774
9600 bps	#9781	#9782	#9783	#9784
	Port 5	Port 6	Port 7	Port 8
Port	#9165	#9166	#9167	#9168
4800 bps	#9775	#9776	#9777	#9778
9600 bps	#9785	#9786	#9787	#9788

FAC 17 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9171	#9172	#9173	#9174
	Port 5	Port 6	Port 7	Port 8
Port	#9175	#9176	#9177	#9178

FAC 18 Integrated Modem: 600 or 1200 bps - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Prerequisites:** #1601 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9181	#9182	#9183	#9184
2-wire				
600 bps	#9851	#9852	#9853	#9854
1200 bps	#9861	#9862	#9863	#9864
4-wire				
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
	Port 5	Port 6	Port 7	Port 8
Port	#9185	#9186	#9187	#9188
2-wire				
600 bps	#9855	#9856	#9857	#9858
1200 bps	#9865	#9866	#9867	#9868
4-wire				
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758

FAC 19 Integrated Modem: 600 or 1200 bps - point-to-point switched with auto answer 2-wire. **Prerequisites:** #1601 and #5501. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9191	#9192	#9193	#9194
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
	Port 5	Port 6	Port 7	Port 8
Port	#9195	#9196	#9197	#9198
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758

FAC 20 Digital Network Interface (to ATT Dataphone® Digital Service): 2400, 4800, 9600 bps without business machine clock - and 4-wire point-to-point nonswitched - or multipoint nonswitched. **Prerequisites:** #1602 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9201	#9202	#9203	#9204
2400 bps	#9761	#9762	#9763	#9764
4800 bps	#9771	#9772	#9773	#9774
9600 bps	#9781	#9782	#9783	#9784
	Port 5	Port 6	Port 7	Port 8
Port	#9205	#9206	#9207	#9208
2400 bps	#9765	#9766	#9767	#9768
4800 bps	#9775	#9776	#9777	#9778
9600 bps	#9785	#9786	#9787	#9788

FAC 21 Digital Network Interface (to AT&T Dataphone® Digital Service): 56,000 bps without business machine clock - and point-to-point or multipoint nonswitched operation. **Limitations:** Mutually exclusive with FAC codes 26, 28, 29, 31, 33 or two FAC codes 08, 09. Not available when 8101 is attached to an 8130 Processor. See Table 2 for system maximums. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. **Maximum:** One per 8101, one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9211	#9212	#9213	#9214
	Port 5	Port 6	Port 7	Port 8
Port	#9215	#9216	#9217	#9218

FAC 24 CCITT V.35 Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1601 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9241	#9242	#9243	#9244
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
2400 bps	#9761	#9762	#9763	#9764
	Port 5	Port 6	Port 7	Port 8
Port	#9245	#9246	#9247	#9248
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758
2400 bps	#9765	#9766	#9767	#9768

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 1,000 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port positions 1-4 and the second Multi-Speed Clock (#5200) for ports 5-8. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9251	#9252	#9253	#9254
4800 bps	#9771	#9772	#9773	#9774
9600 bps	#9781	#9782	#9783	#9784
	Port 5	Port 6	Port 7	Port 8
Port	#9255	#9256	#9257	#9258
4800 bps	#9775	#9776	#9777	#9778
9600 bps	#9785	#9786	#9787	#9788

FAC 26 CCITT V.35 Interface: 56,000 bps with business machine clock - operating with no modem - and direct connection up to 1,000 feet or up to a total cable length of 200 feet to a 3705. **Limitations:** Mutually exclusive with FAC codes 21, 28, 29, 31, 33 or two FAC codes 08, 09. Not available when the 8101 is attached to the 8130 Processor. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8101, one per 8140/8101 or 8150/8101. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9261	#9262	#9263	#9264
	Port 5	Port 6	Port 7	Port 8
Port	#9265	#9266	#9267	#9268

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9271	#9272	#9273	#9274
	Port 5	Port 6	Port 7	Port 8
Port	#9275	#9276	#9277	#9278

FAC 28 CCITT V.35 Interface: 56,000 bps without business machine clock - operating with no modem - and direct connection up to 1,000 feet to another 8100 System (with business machine clock). **Limitations:** Mutually exclusive with FAC codes 21, 26, 29, 31, 33 or two FAC codes 08, 09. Not available when the 8101 is attached to the 8130 Processor. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** One per 8101, one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9281	#9282	#9283	#9284
	Port 5	Port 6	Port 7	Port 8
Port	#9285	#9286	#9287	#9288

FAC 29 CCITT V.35 Interface: Up to 56,000 bps without business machine clock and external data communication equipment with clock, and point-to-point or multipoint nonswitched. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC codes 21, 26, 28, 31, 33 or two FAC codes 08, 09. Not available when the 8101 is attached to the 8130 Processor. Not available with 8140 mdl C processor containing feature codes #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. See Table 2 for system maximums. **Maximum:** For operation at speeds greater than 9600 bps, one per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9291	#9292	#9293	#9294
	Port 5	Port 6	Port 7	Port 8
Port	#9295	#9296	#9297	#9298

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

FAC 32 CCITT X.21 Interface: Up to 9600 bps without business machine clock and switched with auto answer and auto call. **Prerequisites:** #1602 and #5656. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9321	#9322	#9323	#9324
	Port 5	Port 6	Port 7	Port 8
Port	#9325	#9326	#9327	#9328

FAC 33 CCITT X.21 Interface: Up to 48,000 bps without business machine clock and switched auto answer and auto call. **Limitations:** Mutually exclusive with FAC codes 21, 26, 28, 29, 31 or two FAC codes 08, 09. Not available when 8101 is attached to the 8130, 8140 mdl C with #1610, #1611, #1612, #1613 and #1614, or 8150 processor with ports 1-4 or 9-12. **Maximum:** One per 8101 or one per 8140/8101 or 8150/8101. **Prerequisites:** #1602 and #5656. **Specify:** From the table below specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9331	#9332	#9333	#9334
	Port 5	Port 6	Port 7	Port 8
Port	#9335	#9336	#9337	#9338

BSC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 40	600 or 1200 bps (External modem)
FAC 41	Up to 9600 bps (External modem)
FAC 42	Up to 9600 bps (External modem)
FAC 44	2400, 4800 or 9600 bps direct connect with clock (No modem)
FAC 46	Direct connect 1200-9600 bps with clock (No modem)
Integrated Modem	
FAC 45	600 or 1200 bps nonswitched
AT&T Dataphone® Digital Service	
FAC 47	2400, 4800 or 9600 bps nonswitched

FAC 40 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem with no clock - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1603, #1701 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9401	#9402	#9403	#9404
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
	Port 5	Port 6	Port 7	Port 8
Port	#9405	#9406	#9407	#9408
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758

FAC 41 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with external data communication equipment - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Mutually exclusive with 8101 A2X-FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604, #1701 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9411	#9412	#9413	#9414
	Port 5	Port 6	Port 7	Port 8
Port	#9415	#9416	#9417	#9418

FAC 42 EIA RS-232-C Interface: From 1200-9600 bps without business machine clock or 600 and 1200 bps with business machine clock...operating with external DCE...and point-to-point non-switched 2 or 4 wire...or multipoint non-switched 4 wire. User parameter selection of business machine clock options and speed is supported. **Limitations:** Mutually exclusive with FAC codes, 40, 41, 44, 45 or 47 on an 8100 System. **Prerequisites:** #1605, #1702, and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9421	#9422	#9423	#9424

FAC 44 EIA RS-232-C Interface: 2400, 4800 or 9600 bps with business machine clock - operating with no modem (attached downstream terminal must not provide business machine clock) - and direct connection to 40 feet. **Limitations:** One Multi-Speed Clock (#5200) is required for port positions 1 through 4 and the second Multi-Speed Clock (#5200) for ports 5 through 8. Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604, #1701, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9441	#9442	#9443	#9444
2400 bps	#9761	#9762	#9763	#9764
4800 bps	#9771	#9772	#9773	#9774
9600 bps	#9781	#9782	#9783	#9784
	Port 5	Port 6	Port 7	Port 8
Port	#9445	#9446	#9447	#9448
2400 bps	#9765	#9766	#9767	#9768
4800 bps	#9775	#9776	#9777	#9778
9600 bps	#9785	#9786	#9787	#9788

FAC 45 Integrated Modem: 600 or 1200 bps - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1603, #1701 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9451	#9452	#9453	#9454
2-wire				
600 bps	#9851	#9852	#9853	#9854
1200 bps	#9861	#9862	#9863	#9864
4-wire				
600 bps	#9741	#9742	#9743	#9744
1200 bps	#9751	#9752	#9753	#9754
	Port 5	Port 6	Port 7	Port 8
Port	#9455	#9456	#9457	#9458
2-wire				
600 bps	#9855	#9856	#9857	#9858
1200 bps	#9865	#9866	#9867	#9868
4-wire				
600 bps	#9745	#9746	#9747	#9748
1200 bps	#9755	#9756	#9757	#9758

FAC 46 -EIA RS-232-C Interface: Up to 9600 bps with business machine clock...for direct connection up to 40 feet (attached downstream terminal must not provide business machine clock). Business machine clock and speed are user selectable parameters at 1200, 1800, 2400, 3600, 7200, or 9600 bps. **Prerequisites:** #1605, #1702, and #3701. **Limitations:** Mutually exclusive with FAC codes 40, 41, 44, 45, or 47 on an 8100 System. **Specify:** From the table below, specify the required code to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9461	#9462	#9463	#9464

FAC 47 Digital Network Interface (to ATT Dataphone® Digital Service): 2400, 4800 or 9600 bps without business machine clock - 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitations:** Mutually exclusive with 8101-A2X FAC codes 42 or 46, or 8140 mdl C communication ports features #1622 or #1623 or 8150 features #1763 or #1764 on an 8100 system. **Prerequisites:** #1604, #1701 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9471	#9472	#9473	#9474
2400 bps	#9761	#9762	#9763	#9764
4800 bps	#9771	#9772	#9773	#9774
9600 bps	#9781	#9782	#9783	#9784
	Port 5	Port 6	Port 7	Port 8
Port	#9475	#9476	#9477	#9478
2400 bps	#9765	#9766	#9767	#9768
4800 bps	#9775	#9776	#9777	#9778
9600 bps	#9785	#9786	#9787	#9788

START/STOP

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 60	110, 134.5, 150, 300 or 600 bps (External modem)
FAC 61	110, 134.5, 150, 300 or 600 bps Direct connect with clock (No modem)

FAC 60 EIA RS-232-C Interface: 110, 134.5, 150, 300 and 600 bps with business machine clock - operating with external modem - and point-to-point nonswitched facilities. See M2700 pages for specific information on communication facilities and other attachment information. **Limitations:** The 600 bps line speed is not available when the 8101 is attached to an 8130 Processor. **Prerequisites:** #1603, #1701 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9601	#9602	#9603	#9604
110 bps	#9701	#9702	#9703	#9704
134.5 bps	#9711	#9712	#9713	#9714
150 bps	#9721	#9722	#9723	#9724
300 bps	#9731	#9732	#9733	#9734
600 bps	#9741	#9742	#9743	#9744
	Port 5	Port 6	Port 7	Port 8
Port	#9605	#9606	#9607	#9608
110 bps	#9705	#9706	#9707	#9708
134.5 bps	#9715	#9716	#9717	#9718
150 bps	#9725	#9726	#9727	#9728
300 bps	#9735	#9736	#9737	#9738
600 bps	#9745	#9746	#9747	#9748

FAC 61 EIA RS-232-C Interface: 110, 134.5, 150, 300, 600 bps with business machine clock - operating with no modem (the attached terminal must provide its own business machine clock) - and direct connection up to 40 feet. **Limitations:** The 600 bps line speed is not available when the 8101 is attached to an 8130 Processor. **Prerequisites:** #1603, #1701 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4
Port	#9611	#9612	#9613	#9614
110 bps	#9701	#9702	#9703	#9704
134.5 bps	#9711	#9712	#9713	#9714
150 bps	#9721	#9722	#9723	#9724
300 bps	#9731	#9732	#9733	#9734
600 bps	#9741	#9742	#9743	#9744
	Port 5	Port 6	Port 7	Port 8
Port	#9615	#9616	#9617	#9618
110 bps	#9705	#9706	#9707	#9708
134.5 bps	#9715	#9716	#9717	#9718
150 bps	#9725	#9726	#9727	#9728
300 bps	#9735	#9736	#9737	#9738
600 bps	#9745	#9746	#9747	#9738

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can attach directly to the 8101 Storage and Input/Output Unit:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8809 Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System configurator*, GA27-2876 for selection of the 8100 FAC codes.

	Loop Attachment		
	Direct At		Data Link At 2400,
Device and Mdl	9600 bps	38400 bps	4800,9600 bps
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit 51C, 61C with: - 3178 Display Station - 3230 Printer 2 - 3262 Printer 3,13 - 3268 Printer 2 - 3278 Display Station 1,2,3,4,5 - 3279 Color Display Unit 2A,2B,3A,3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X	X	X
3276 Control Unit Display Station 11,12,13,14 with: - 3178 Display Station - 3230 Printer 2 - 3262 Printer 13 - 3268 Printer 2 - 3278 Display Station 1, 2, 3, 4 - 3279 Color Display 2A, 2B, 3A, 3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X		X
3287 Printer 11,12	X	X	X
3289 Printer 3 with: - 2502 Card Reader A1* - 3501 Card Reader - 3521 Carder Punch* (*Requires 3782 Attachment Unit)	(1)		(1)
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E1,E2	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM Information System Configurator* GA27-2876, for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3101 Display Terminal mdls 10, 12, 13
3232 Keyboard Printer Terminal mdl 1
3232 Keyboard Printer mdl 51
3274 Control Unit mdl 51C, 61C with:
- 3178 Display Station

3230 Printer mdl 2
- 3262 Printer mdls 3, 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls supported in SDLC mode.)
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4
  (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
  (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

8101 Storage and I/O Unit Mdls A20-A25 (cont'd)

3600 Finance Communication Controllers
3630 Plant Communication Controller
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4700 Finance Communication Controller
4952,4954,4955,4959 Processor (Series/1)
5150 IBM Personal Computer
5285,5288 Programmable Data Station
6360,6580 Displaywriter (3270 DSC Mode only)
6670 Information Distributor
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
7426 Terminal Interface Unit mdl 2, with associated terminals
8775 Display Terminal mdls 11, 12

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using SDLC (FAC 15, 16, 17, 24, 25, 26, 27, or 28), BSC (FAC 44 or 46) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The 8100 Information System Site Planning Guide GA27-2884 will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature No.	FAC CODE
2741	134.5	#9114 and #3255	61
Devices Conforming to 2780/3780 Line Protocol	2400,4800, 9600	Refer to specific device	44
	1200,1800,2400 3600,4800,7200 9600	Refer to specific device	46
3101	110,150,300 600*	None required	61
3232-51	300,600*	None	61
*When 8101 is attached to the 8130, maximum speed is 300 bps.			
3232-1	1200,2400	None	15
	4800,9600	None	16
3274-51C, 61C	1200,2400	#3701 and #6302	15
	4800,9600	#3701 and #6302	16
	1200,2400	#1550 and #6302	24
	4800,9600	#1550 and #6302	25
	56,000	#1550 and #6303	26**
3651 25/75	4800	#9126	16*
3276	600,1200,2400	#3701 w #9491 and #6302	15
	4800,9600	#3701 w #9491 and #6302	16
3705-II	600,1200,2400	#4714	15
	4800,9600	#4714	16
	56,000	#4720	26**
3705-80	600,1200,2400,	None	15
	4800,9600	None	16
	56,000	#6712	26**
3725	600,1200,2400	#4911	15
	4800,9600	#4911	16
	56,000	#4911	26**
3767	600,1200,2400	#3718 w #9707 and #9533	15
4701	1200,2400	None	15
	4800,9600	None	16
4952,4954 4955,4959	1200,2400	#2090	15
	4800,9600	#2090	16
6360	1200,2400	#3707	15
	4800,9600	#3707	16
6580-A04, B04	1200,2400	#3705	15
	4800,9600	#3705	16
6670	600,1200,2400	#3701	15
	4800	#3701	16
7426-2	600,1200,2400	None	15
	4800,9600	None	16
8101,8130, 8140 AXX, BXX	600,1200,2400	FAC 17 (see note)	15
	600,1200,2400	FAC 27 (see note)	24
	4800,9600	FAC 17 (see note)	16
	4800,9600	FAC 27 (see note)	25
8140 CXX	4800	#1621 and #9688 (See Note)	16
8101,8140 BXX	56,000	FAC 28 (see note)	26**
8140 CXX	56,000	#1614 and #9683 (See Note)	26**
8150	4800, 9600	#1733 and #9688 or #1734 and #9698 (see note)	16
	56,000	#1742 and #9682 or #1745 and #9693 (see note)	26
8775	600,1200,2400	#3701	15
	4800,9600	#3701	16
	600,1200,2400	#1550	24
	4800,9600	#1550	25

* Specify **#9770** is available to facilitate problem determination.

** Not available when 8101 is attached to 8130.

Note: FAC 17, 27 or 28 in the attaching 8101, 8130, 8140 AXX, BXX or #1614, #1621 on the 8140 mdl C or 8150 with #1733, #1734, #1742 or #1745 without business machine clock.

SELECTED CONFIGURATIONS

Table 5
8101 Mdl A20, A23, A25
Selected Configuration Codes

Selected Configuration Feature Code	Quantity–Component Feature Code
#1000	None
#1002	3-#1602, 1-#1701, 1-#3701, 1-#3901, 2-#4830, 1-#9081, 1-#9102, 1-#9133, 1-#9921
#1003	4-#1602, 2-#1701, 1-#3701, 1-#3901, 3-#4830, 1-#9081, 1-#9102, 1-#9106, 1-#9133, 1-#9921
#1004	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-#9081, 1-#9133, 1-#9134, 1-#9921
#1005	4-#1602, 1-#1701, 2-#3701, 1-#3901, 2-#4830, 1-#9081, 1-#9102, 1-#9133, 1-#9134, 1-#9921
#1006	5-#1602, 2-#1701, 2-#3701, 1-#3901, 3-#4830, 1-#9081, 1-#9102, 1-#9106, 1-#9133, 1-#9134, 1-#9921
#1008	3-#1602, 1-#1701, 1-#3701, 1-#3901, 2-#4830, 1-#9101, 1-#9102, 1-#9133, 1-#9921
#1009	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-#9102, 1-#9133, 1-#9134, 1-#9921
#1010	4-#1602, 2-#1701, 3-#3701, 1-#3901, 1-#4830, 1-#9102, 1-#9133, 1-#9134, 1-#9135, 1-#9921
#1011	6-#1602, 2-#1701, 4-#3701, 1-#3901, 2-#4830, 1-#9081, 1-#9102, 1-#9133, 1-#9134, 1-#9135, 1-#9137, 1-#9921

8101s when attached to an 8140 mdl C processor with communication ports: #1610, #1611, #1612, #1613 or #1614 or when attached to an 8150 processor with communication ports 1-4 or 9-12, Selected Configurations with 38,400 bps loops are not available.

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Power Plug/Cable : **#9890, #9891, #9884, #9894, #9986.**

Processor Attachment (8130, 8140): **#9931, #9932.**

Systems Attachment (Selected Configuration #1000 only): **#9921, #9922, #9923, #9924.**

8130 PROCESSOR MDL A

PURPOSE

The 8130 Processor provides control, storage, processing capability, disk and diskette storage, and device attachment capabilities for the 8100 Information System.

MODELS

The following models of the 8130 are available depending on processor storage size and non-removable disk storage size. Some models have fixed head capability as well as movable heads for the non-removable, high speed, direct access disk storage. All 8130 models include removable diskette storage with up to 1 million bytes of storage.

Model	Base Processor Storage (bytes)	Non Removable Disk Capacity (million bytes)	Fixed Head Capacity (bytes)
A21	256K (262,144)	29MB (29,327,360)	None
A22	256K (262,144)	23MB (23,461,888)	131,072
A23	256K (262,144)	64MB (64,520,192)	None
A24	256K (262,144)	58MB (58,654,720)	131,072

Customer Setup (CSU): Machine Only

HIGHLIGHTS

The 8130 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8130 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions and up to eight I/O hardware interrupt levels provide for interrupt processing. The 8130 provides 256K (262,144)) bytes of processor storage that can be expanded to a maximum of 1,024K (1,048,576) bytes and provision for dynamic addressing and storage protection for up to 4 million bytes of logical storage.

The 8130 with a special feature for system expansion provides for the attachment of up to two 8101 Storage and Input/Output Units one of which may be configured with Communication and Display/Printer Feature Type I or Type II, or one 8101 Storage and Input/Output Unit and one 8809 Magnetic Tape Unit mdl 1B. An alternate configuration can consist of an 8130, two 8101 Storage and Input/Output Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit mdl 1A or 1B.

The 8130 Processor is provided with fixed high speed direct access storage. Depending on the 8130 mdl selected, disk storage of up to 64 million bytes with movable heads or up to 58 million bytes of disk storage with movable and fixed heads is available. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage is available with up to 1MB (985,088) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the diskette 2D or the diskette Type 1.

The 8100 System can attach to any S/370 or 4300 processor via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 System can attach to the ICA of the 115, 125, 135, or 138 Processors for BSC line control. The 8100 System can attach to the Communications Adapter of the 4321 or 4331 or 4361 Processor for BSC and/or SDLC line control. For specific attachment, see M2700 pages.

The capability of the 8100 Information System is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8130 via communication features which include data link, direct connect, and loops that are direct attached or data link attached loops. The 8130 provides for the attachment of two communication ports which can be expanded by optional features up to a maximum of six. With the 8101 Storage and Input/Output Unit attached, the communication ports physically attached can be further increased by eight, providing an 8100 System maximum of 14 communication ports.

Customer Setup: The 8130 Processor is designated as a customer setup unit thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8130. Setup procedures for the customer will be shipped with each machine. An 8130 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341 and *Installation Guide,* GA23-0039, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Selected Configurations: To ease the selection, configuring ordering and installation of an 8130 Processor, several selected configurations have been developed. These selected configurations are designed to be applicable for the majority of customer installations. Both DPPX and DPCX are supported. The use of selected configurations is recommended. Traditional configuration selection and ordering should be used by configurations not included in the selected configurations.

Bibliography: GC20-8100.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (120 AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for Non-Locking Plug or **#9890** for Locking Plug. If 4.3 meter (14 foot) power cable is not desired, specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only color available.
- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 system to another, the user must consider address compatibility of the processor and its attachments. For further information see *IBM 8100 Information System Site Planning and Guide,* GA27-2884. For relocation/replace kit ordering, see Relocate/Replace 8100 System under "Accessories".
- Cabling: For loop information see "Accessories" and the *IBM Multiuse Communication Loop-Planning Guide,* GA27-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

  Communication cables must be ordered separately from the communication adapter features.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations. **Field Installation:** Yes.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) if ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647:

  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101, and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 System.

  Maximum: One per 8100 System. **Field Installation:** Yes.

SPECIAL FEATURES

Performance: The maximum number of Features for Attaching Communications **(FAC)** capable of concurrent operation is a function of the speed of the line, communication facility, the operating system installed and the application work load. The maximum number of communications facilities which can be physically installed can exceed the operational capability. Increased processor utilization will result from sustained operation of BSC (#1603 and #1604) at the maximum aggregate data rate and may cause degradation of activity operating at lower priority levels. Analysis should be performed to determine the impact.

Note: Use of BSC 8101 A2X feature #1605 instead of features #1603 or #1604 will significantly reduce processor utilization.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System Publications are dependent on the presence of functional support modules provided by DPPX, DPCX. Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

System Expansion (#1530): Provides programmable hardware interrupt levels and sublevel interrupt determination. Required for attachment of up to two 8101 Storage and Input/Output Units or one 8101 and/or one 8809 Magnetic Tape Unit mdl 1B directly to the 8130. **Maximum:** One per 8130. **Field Installation:** Yes.

PROCESSOR STORAGE TYPE 1 (#1710): Provides 128K (131,072) bytes of additional processor storage. **Limitations:** Not available if Processor Storage Type 2 (#1720) is selected. **Maximum:** One per 8130. **Field Installation:** Yes.

Processor Storage Type 2 (#1720): Provides 256K (262,144) bytes of additional processor storage. For 512K byte configuration specify **#9961**, For 768K byte configuration specify **#9962**, For 1,024K byte configuration specify **#9963**. **Limitations:** Not available if Processor

8130 Processor Mdl A (cont'd)

Storage Type I (#1710) is selected. **Maximum:** Three per 8130. **Field Installation:** Yes.

Keylock (#4655): This Keylock Feature provides processor security by the selection of three modes of operation. These consist of ... Disable power on and disable operator panel ... Enable power on but disable operator panel ... Enable power on and enable operator panel. Additional or replacement Keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Security Cover Locks (#6555): This feature provides key operated security locks for the machine covers, restricting access to the machine interior and external cable connector area. See Security Lock, Diskette (#6566) if diskette security is required. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Security Lock, Diskette (#6566): This feature provides a key operated security lock to restrict access to the diskette magnetic media. It is accessible only by opening the front cover. For maximum system security, the Security Cover Lock (#6555) must be used in addition to the Diskette Security Lock. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Selected Configurations

The following table lists the appropriate selected configuration codes for each mdl and the communication capabilities for each selected configuration.

	CODE							
	1 0 0 0	1 0 0 0	1 0 0 0	1 0 0 0	1 0 0 0	1 0 0 0	1 0 0 0	1 0 0 1
Description	1	2	4	5	7	8	9	0
8130 mdl A21, A22 A23, A24	X	X	X	X	X	X	X	X
Port 1 Dir Att Loop								
– 38.4KB	X	X	X	X	-	-	-	-
– 9.6KB	-	-	-	-	-	X	-	-
Port 2 Dir Att Loop								
9.6KB	-	X	-	X	X	X	X	X
Port 3 Data Link								
9.6KB	X	X	X	X	X	X	X	X
Port 4 Data Link								
9.6KB	-	-	X	X	-	-	X	X
Port 5 Data Link								
9.6KB	-	-	-	-	-	-	-	X
Port 6 Dir Att Loop								
9.6KB	-	-	-	-	-	-	-	-

Notes:

1. Magnetic tape attachment to 8130.
   – use 8809 mdl 1B.
2. Recommended DPPX configurations:
   – No less than 512K processor storage
   – No less than 58MB disk storage
   – Fixed Head feature in processor disk

Selected Configuration Attachment (#1001): Provides for selection and attachment of one single lobe 38.4K bps Loop in Port 1 and one SDLC link up to 9600 bps in Port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1002): Provides for selection and attachment of one single-lobe 38.4K bps Loop in Port 1, one 9600 bps single-lobe loop in Port 2, and one SDLC link up to 9600 bps in Port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1004): Provides for selection and attachment of one single-lobe 38.4K bps loop in Port 1 and one SDLC link up to 9600 bps in Port 3 and Port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1005): Provides for selection and attachment of one single-lobe 38.4K bps loop in Port 1, one 9600 bps single-lobe loop in Port 2, one SDLC links up to 9600 bps in Port 3, and Port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1007): Provides for selection and attachment of one 9600 bps single lobe loop in Port 2 and one SDLC link up to 9600 bps in Port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1008): Provides for selection and attachment of one single-lobe 9600 bps loop in Port 1, one 9600 bps single-lobe loop in Port 2, and one SDLC link, up to 9600 bps in Port 3. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1009): Provides for selection and attachment of one 9600 bps single-lobe loop in Port 2, one SDLC link up to 9600 bps in Port 3 and Port 4. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

Selected Configuration Attachment (#1010): Provides for selection and attachment of one 9600 bps single lobe loop in Port 2 and one SDLC link up to 9600 bps in Port 3, Port 4 and Port 5. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

COMMUNICATIONS AND LOOPS

CCITT V.35 Interface (#1550): Provides interface for data transmission over direct connection at speeds up to 9600 bps. **Maximum:** One per selected Communication feature (#1601 or #1602). **Field Installation:** Yes. **Prerequisites:** #1601, #1602 or #1602 and #5200.

SDLC Communications With Business Machine Clock (#1601): Provides control for EIA RS-232-C interface, integrated modems, direct connection and CCITT V.35 Interface. **Limitations:** In an 8100 System only ten loop or SDLC communication ports may be active at one time. **Maximum:** Six. Maximum is fourteen per 8100 System *(See note)* with an 8130. The maximum is reduced by one for each Communication feature (#1602, #1603 or #1604). **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications Without Business Machine Clock (#1602): Provides control for EIA RS-232-C or DDS Adapter or CCITT X.21 interface, CCITT V.35 Interface and Loop Adapter. **Limitations:** In an 8100 System only ten loop or SDLC communication ports may be active at one time. **Maximum:** Six. Maximum is 14 per 8100 System *(See note)* with an 8130. The maximum is reduced by one for each Communication feature (#1601, #1603 or #1604). **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC/SS Communications With Business Machine Clock (#1603): Provides control for EIA RS-232-C interface, integrated modems or direct connection. In an 8100 System the maximum aggregate BSC data rate is 9600 bps and 330 bps for Start/Stop. **Limitations:** Start/Stop communications not available with integrated modems. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Maximum:** Six. Maximum is fourteen per 8100 System *(See note)* with an 8130. The maximum is reduced by one for each Communication feature (#1601, #1602 or #1604). **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC Communications Without Business Machine Clock (#1604): Provides control for EIA RS-232-C or DDS Adapter interface and direct connect. **Limitations:** In an 8100 System the maximum aggregate BSC data rate is 9600 bps. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 system. **Maximum:**Six. Maximum is fourteen per 8100 System *(See note)* with an 8130. The maximum is reduced by one for each Communication feature (#1601, #1602 or #1603). **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

EIA RS-232-C Interface (#3701): Provides interface to external modems/data communication equipment or direct connection at speeds of up to 9600 bps. **Maximum:** One per selected Communication feature (#1601, #1602, #1603 or #1604). **Field Installation:** Yes. **Prerequisites:** #1601, #1602, #1603, #1604, #1602 and #5200, or #1604 and #5200. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter (#4830): Provides for the direct attachment of a single-lobe loop at 9600 or 38,400 bps. **Maximum:** Six. Maximum is fourteen per 8100 System *(See note)* with an 8130. Only one of these features may operate at 38,400 bps in an 8130/8101. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Maximum:** Three per 8130. Maximum is five per 8100 Information System *(See note)* with an 8130. **Field Installation:** Yes. **Prerequisites:** #4830. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Note: An 8100 System consisting of an 8130 Processor and attached 8101 Storage and Input/Output Units.

Multi-Speed Clock (#5200): Provides business machine clocking at 2400, (FAC 44 only) 4800 bps and 9600 bps for direct connection. Can provide multiple speeds simultaneously. **Limitations:** Available for port positions three through six only. **Maximum:** One. Maximum is three per 8100 System with an 8130. **Field Installation:** Yes. **Prerequisites:** #1602 or #1604. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Nonswitched (#5500): Provides interface to common carrier leased facilities at 600 or 1200 bps. **Limitations:** Not available for Start/Stop Communications Facilities. **Maximum:** One

8130 Processor Mdl A (cont'd)

per selected Communication feature (#1601 or #1603). **Field Installation:** Yes. **Prerequisites:** #1601 or #1603. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Switched (#5501): Provides interface common-carrier switched facilities with auto answer at 600 or 1200 bps. **Limitations:** Not available with Start/Stop communication facilities. **Maximum:** One per selected Communication feature (#1601). **Field Installation:** Yes. **Prerequisites:** #1601. **Note:** Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

X.21 Adapter For Nonswitched Networks (#5655): Provides for the attachment of point-to-point or multipoint nonswitched communication facilities at speeds up to 9600 bps via DCE complying with CCITT Recommendation X.21. **Maximum:** One per selected Communications Feature (#1602). **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in the FAC description in "Communications Capabilities" section.

X.21 Adapter For Switched Networks (#5656): Provides interface for attachment via a Data Circuit-terminating Equipment (DCE) which complies with CCITT Recommendation X.21, as it is delineated in SRL GA27-3287, switched at up to 9600 bps. **Maximum:** One per (#1602). **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in the FAC description "Communications Capabilities" section.

Digital Data Service Adapter (DDSA) (#5660): Provides interface to AT&T Dataphone* Digital Service Network for transfer of digital data at speeds of 2400, 4800 or 9600 bps. Available for point-to-point line configurations or multipoint line configurations. **Maximum:** One per selected Communications feature (#1602 or #1604). **Field Installation:** Yes. **Prerequisites:** #1602 or #1604. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

MODEL CONVERSIONS

The following mdl changes can be field installed. Mdl upgrade may require replacement of disk storage unit. Adequate provisions must be made for retaining data contained on disk storage unit and elimination of user-proprietary information.

From	To	A22	A23	A24
A21		X	X	X
A22		–	X	X
A23		–	–	X

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1000 to 2000 feet). Additional lengths up to 609.6m (2000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1000 feet).

Exterior cable (P/N 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Order via MSORDER (Category = Bulk Cable). Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 x 4 ADAPTER PLATE (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	**1657300**
Loop Station Connector (Radial LSC)	**1657310**
Loop Station Connector (Wrap LSC)	**1657320**
Loop Station Connector Gasket	**1657260**
Loop Wiring Concentrator (LWC)	**1657330**
LWC Circuit Board Assy	

* Trademark of AT&T

8130 Processor Mdl A (cont'd)

(order instead of LWC-1657330) *	**1657332**
Loop Surge Suppressor (LSS)	**1657350**
LSS Circuit Board Assy (order instead of LSS-1657350) *	**1657354**
Continuity and Relay Tester	**1657420**
Wrap Switch Access Cover	**1657325**
Loop Accessory Keys (10 spares) **	**1657379**
2 x 4 Adapter Plate (2AP)	**7838771**
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	**2102151**
Clamp (for cable to indoor box)	**2100264**
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	**1657280**
Clamp - small (for indoor cable to environmental box)	**2114285**
Clamp - large (for outdoor cable to environmental box)	**1657377**
Single Device Attachment Cable, 12.1 m (40 ft.) 12.1 m (40 ft.)	**8269543**

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8130. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: Order via MSORDER (Order Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine type 8101 or 8130. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see GI section 71 for FE contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES:

Relocate/Replace Kits:

The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8130 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8101	4448550	4448551	N/A
8130	4448552	4448553	N/A

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2
Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8130	4448575	4448576	N/A

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry in this section of the Sales Manual.
- **Ordering Information** Order via MSORDER (category = supplies/ accessories Group Code = DP Supply Order)

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

Figure 3

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	**#3709**	7389282
DDSA	**#3717**	6835350
V.35 Modem	**#3718**	6835348
V.35 Direct Connect	**#3719**	6835349
V.35 Direct Connect PT TO PT	**#3720**	6835642
EIA Direct Connect	**#3721**	6835642
EIA Modem	**#3724**	6835346
Loop Station Adapter (Double Lobe)	**#3726**	7389282
	#3726	7389282
EIA Direct Connect PT to PT	**#3727**	6835347
X.21	**#3728**	6835379

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg

SUPPLIES (none)

COMMUNICATION CAPABILITIES

There are a variety of Communication Capabilities (see M2700 pages) supported by the 8130 Features for Attaching Communications **(FAC)** differing in speed, protocol and attachment interfaces. These FAC codes have been categorized as LOOP, SDLC, BSC and START/STOP. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation FAC No.) for additional details. Reference to switched communications in the FAC codes, refers to the communication link between the 8100 System and the S/370 or 4300 Processor.

The 8130 special features allow a maximum of six communication capabilities to be configured and designated as communication ports. Each communication port position (1 through 6) must consist of a communications feature for SDLC, BSC or Start/Stop.

The SDLC communications feature is available with and without business machine clock (#1601, #1602). The BSC/SS communications feature (#1603) is available with business machine clock and the BSC communications feature (#1604) is available without business machine clock. If an 8130 communication port is to provide the attached facility with business machine clock at speeds of 2400 bps or greater for FAC 44, or 4800 bps or greater for other FAC codes, the multi-speed clock feature (#5200) is required. One Multi-Speed Clock feature (#5200) can provide business machine clocking to any or all of port positions three through six.

In addition to selecting a Communications feature (#1601, #1602, #1603, #1604) for each port configured in an 8130, a communication interface or integrated modem must be selected to support the Communication Facility attaching to that port. A two lobe loop port requires three special features (#1602, #4830 and #4835). Direct

8130 Processor Mdl A (cont'd)

connect at 2400, (FAC 44 only) 4800 and 9600 bps requires the multi-speed clock feature (#5200). Each port of the 8130 also requires the selection of a specify code to indicate the 8100 System FAC Code selected for that port. Certain 8100 System FAC codes will require a second specify code to select options available within that facility: 2/4 wire or line speed. **Note:** Within a given FAC, the selected option (2/4 wire, LPDA or line speed) can be changed in the field by Field Engineering. All such changes are chargeable at the applicable CE rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory.

Specify And FAC Code Descriptions: A specify code number is required to identify the selected FAC code and its physical port position. The specify code is constructed by concatenating the selected FAC and its port position to the numeral **9**, e.g.:

#9ABC where AB = FAC No. and C = Port Position.

FAC codes range in number from **08** to **61** resulting in FAC specify codes ranging in number from **#9081** to **#9616**. Additional codes must be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual,* GA27-2876 will aid in assigning the port positions.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two-lobe at 38,400 bps
FAC 10	Loop, single-lobe at 9600 bps
FAC 11	Loop, two-lobes at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. **Limitations:** Not available with FAC 09. **Prerequisites:** #1602 and #4830. **Maximum:** One per 8130. Maximum is one per 8130/8101. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	**#9081**	**#9082**	**#9083**	**#9084**	**#9085**	**#9086**

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** Not available with FAC 08. Available for ports 4, 5 or 6 only. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** One per 8130/8101. Maximum is one per 8130/8101. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	N/A	**#9094**	**#9095**	**#9096**

FAC 10 Loop, Single-Lobe: Required for operating a loop at 9600 bps. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	**#9101**	**#9102**	**#9103**	**#9104**	**#9105**	**#9106**

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. **Limitations:** Available for ports 4, 5 or 6 only. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	N/A	**#9114**	**#9115**	**#9116**

SDLC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 12	600 or 1200 bps (External modem)
FAC 13	Up to 9600 bps (External modem)
FAC 15	600, 1200 or 2400 bps Direct connect with clock (No modem)
FAC 16	4800 or 9600 bps Direct connect with clock (No modem)
FAC 17	Direct connect without clock
Integrated Modem	
FAC 18	600 or 1200 bps nonswitched
FAC 19	600 or 1200 bps switched with auto answer
AT&T Dataphone® Digital Service	
FAC 20	2400, 4800 or 9600 bps nonswitched
CCITT V.35	
FAC 24	Direct connect with clock (No modem) 600, 1200 or 2400 bps
FAC 25	Direct connect with clock (No modem) 4800 or 9600 bps
FAC 27	Direct connect without clock (No modem) 9600 bps
CCITT X.21 Interface	
FAC 30	2400, 4800 or 9600 bps nonswitched
FAC 32	Up to 9600 bps switched

FAC 12 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem without clocking - and point-to-point switched 2-wire - or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	**#9121**	**#9122**	**#9123**	**#9124**	**#9125**	**#9126**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**

FAC 13 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - with external data communication equipment and clock - point-to-point switched with auto answer to 4800 bps or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	**#9131**	**#9132**	**#9133**	**#9134**	**#9135**	**#9136**
LPDA	**#9801**	**#9802**	**#9803**	**#9804**	**#9805**	**#9806**

FAC 15 EIA RS-232-C Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	**#9151**	**#9152**	**#9153**	**#9154**	**#9155**	**#9156**
600 bps	**#9741**	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**
1200 bps	**#9751**	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**
2400 bps	**#9761**	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

8130 Processor Mdl A (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	#9163	#9164	#9165	#9166
4800 bps	N/A	N/A	#9773	#9774	#9775	#9776
9600 bps	N/A	N/A	#9783	#9784	#9785	#9786

FAC 17 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9171	#9172	#9173	#9174	#9175	#9176

FAC 18 Integrated Modem: 600 or 1200 bps - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Prerequisites:** #1601 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9181	#9182	#9183	#9184	#9185	#9186
2-wire						
600 bps	#9851	#9852	#9853	#9854	#9855	#9856
1200 bps	#9861	#9862	#9863	#9864	#9865	#9866
4-wire						
600 bps	#9741	#9742	#9743	#9744	#9745	#9746
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756

FAC 19 Integrated Modem: 600 or 1200 bps - point-to-point switched with auto answer 2-wire. **Prerequisites:** #1601 and #5501. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9191	#9192	#9193	#9194	#9195	#9196
600 bps	#9741	#9742	#9743	#9744	#9745	#9746
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756

FAC 20 Digital Network Interface (to AT&T Dataphone® Digital Service): 2400, 4800, 9600 bps without business machine clock - and 4-wire point-to-point nonswitched - or multipoint nonswitched. **Prerequisites:** #1602 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9201	#9202	#9203	#9204	#9205	#9206
2400 bps	#9761	#9762	#9763	#9764	#9765	#9766
4800 bps	#9771	#9772	#9773	#9774	#9775	#9776
9600 bps	#9781	#9782	#9783	#9784	#9785	#9786

FAC 24 CCITT V.35 Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1601 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9241	#9242	#9243	#9244	#9245	#9246
600 bps	#9741	#9742	#9743	#9744	#9745	#9746
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756
2400 bps	#9761	#9762	#9763	#9764	#9765	#9766

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	#9253	#9254	#9255	#9256
4800 bps	N/A	N/A	#9773	#9774	#9775	#9776
9600 bps	N/A	N/A	#9783	#9784	#9785	#9786

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9271	#9272	#9273	#9274	#9275	#9276

FAC 30 CCITT X.21 Interface: Up to 9600 bps without business machine clock and 4-wire point-to-point nonswitched or multipoint nonswitched. **Prerequisites:** #1602 and #5655. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9301	#9302	#9303	#9304	#9305	#9306

FAC 32 CCITT X.21 Interface: Up to 9600 bps without business machine clock and switched with auto answer and auto call. **Prerequisites:** #1602 and #5656. **Specify:** From the table below specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9321	#9322	#9323	#9324	#9325	#9326

BSC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 40	600 or 1200 bps (External modem)
FAC 41	Up to 9600 bps (External modem)
FAC 44	2400, 4800 or 9600 bps direct connect with clock (No modem)
Integrated Modem	
FAC 45	600 or 1200 bps nonswitched
AT&T Dataphone® Digital Service	
FAC 47	2400, 4800 or 9600 bps nonswitched

FAC 40 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem with no clock - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101 A2X FAC codes 42 or 46 on an 8100 System. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9401	#9402	#9403	#9404	#9405	#9406
600 bps	#9741	#9742	#9743	#9744	#9745	#9746
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756

FAC 41 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with external data communication equipment - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101 A2X FAC codes 42 or 46 on an 8100 System. **Prerequisites:** #1604 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9411	#9412	#9413	#9414	#9415	#9416

FAC 44 EIA RS-232-C Interface: 2400, 4800 or 9600 bps with business machine clock - operating with no modem (attached downstream terminal must not provide business machine clock) - and direct connection to 40 feet. **Limitation:** Mutually exclusive with 8101 A2X FAC codes 42 or 46 on an 8100 System. **Prerequisites:** #1604, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

8130 Processor Mdl A (cont'd)

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	#9443	#9444	#9445	#9446
2400 bps	N/A	N/A	#9763	#9764	#9765	#9766
4800 bps	N/A	N/A	#9773	#9774	#9775	#9776
9600 bps	N/A	N/A	#9783	#9784	#9785	#9786

FAC 45 Integrated Modem: 600 or 1200 bps - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** Mutually exclusive with 8101 A2X FAC codes 42 or 46 on an 8100 System. **Prerequisites:** #1603 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9451	#9452	#9453	#9454	#9455	#9456
2-wire						
600 bps	#9851	#9852	#9853	#9854	#9855	#9856
1200 bps	#9861	#9862	#9863	#9864	#9865	#9866
4-wire						
600 bps	#9741	#9742	#9743	#9744	#9745	#9746
1200 bps	#9751	#9752	#9753	#9754	#9755	#9756

FAC 47 Digital Network Interface (to AT&T Dataphone® Digital Service): 2400, 4800 or 9600 bps without business machine clock - 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitation:** Mutually exclusive with 8101 A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1604 and #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9471	#9472	#9473	#9474	#9475	#9476
2400 bps	#9761	#9762	#9763	#9764	#9765	#9766
4800 bps	#9771	#9772	#9773	#9774	#9775	#9776
9600 bps	#9781	#9782	#9783	#9784	#9785	#9786

Start/Stop

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 60	110, 134.5, 150 or 300 bps (External modem)
FAC 61	110, 134.5, 150 or 300 bps Direct connect with clock (No modem)

FAC 60 EIA RS-232-C Interface: 110, 134.5, 150 or 300 bps with business machine clock - operating with external modem - and point-to-point nonswitched facilities will be provided under provisions of the IBM Multiple Supplier Systems Policy . See M2700 pages for specific information on communication facilities and other attachment information. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9601	#9602	#9603	#9604	#9605	#9606
110 bps	#9701	#9702	#9703	#9704	#9705	#9706
134.5 bps	#9711	#9712	#9713	#9714	#9715	#9716
150 bps	#9721	#9722	#9723	#9724	#9725	#9726
300 bps	#9731	#9732	#9733	#9734	#9735	#9736

FAC 61 EIA RS-232-C Interface: 110, 134.5, 150 or 300 bps with business machine clock - operating with no modem (the attached terminal must provide its own business machine clock) - and direct connect up to 40 feet. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9611	#9612	#9613	#9614	#9615	#9616
110 bps	#9701	#9702	#9703	#9704	#9705	#9706
134.5 bps	#9711	#9712	#9713	#9714	#9715	#9716
150 bps	#9721	#9722	#9723	#9724	#9725	#9726
300 bps	#9731	#9732	#9733	#9734	#9735	#9736

DEVICE ATTACHMENT

Direct Attached Devices: Devices that can attach directly to the processor are ... 8101 Storage and Input/Output Unit ... 8809 Magnetic Tape Unit.

Loop Attached Devices: The following devices can attach to a direct-attached loop or to a data link-attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of the 8100 FAC codes.

	Loop Attachment		
	Direct At		Data Link At 2400,
Device and Mdl	9600 bps	38400 bps	4800,9600 bps
3104 Display Terminal B1,B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit 51C,61C with:	X	X	X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 3,13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4,5			
- 3279 Color Display Unit 2A,2B,3A,3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3276 Control Unit Display Station 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4			
- 3279 Color Display 2A, 2B, 3A, 3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3287 Printer 11,12	X	X	X
3289 Printer 3 with:	(1)		(1)
- 2502 Card Reader A1*			
- 3501 Card Reader			
- 3521 Carder Punch*			
(*Requires 3782 Attachment Unit)			
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E01, E02	X		
7426 Terminal Interface Unit 1 with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM Information System Configurator,* GA27-2876, for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3101 Display Terminal mdls 10, 12, 13
3232 Keyboard Printer Terminal mdl 1
3232 Keyboard Printer mdl 51
3274 Control Unit mdl 51C, 61C with:
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdls 3, 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B

8130 Processor Mdl A (cont'd)

- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4
  (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
  (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3600 Finance Communication Controllers
3630 Plant Communication Controllers
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4701 Finance Communication Controller
4952, 4954, 4955, 4959 Processor (Series/1)
5285, 5288 Programmable Data Stations
6360, 6580 Displaywriter (3279 DSC Mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2,
with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using the SDLC (FAC 15, 16, 17, 24, 25, or 27), BSC (FAC 44) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide*, GA27-2884, will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature No.	8100 FAC CODE
2741	134.5	**#9114** and #3255	61
Devices Conforming to 2780/3780 Line Protocal	2400,4800, 9600	Refer to specific device	44
3232-1	1200,2400	None	15
	4800,9600	None	16
3232-51	300	None	61
3101	110,150,300	None required	61
3274-51C, 61C	1200,2400	#3701 and #6302	15
	4800,9600	#3701 and #6302	16
	1200,2400	#1550 and #6302	24
	4800,9600	#1550 and #6302	25
3276	600,1200,2400	#3701 w **#9491** and #6302	15
	4800,9600	#3701 w **#9491** and #6302	16
3651-25/75	4800	**#9126**	16*
3705-II	600,1200,2400	#4714	15
	4800,9600	#4714	16
3705-80	600,1200,2400	None	15
	4800, 9600	None	16
3725	600,1200,2400	#4911	15
	4800,9600	#4911	16
3767	600,1200,2400	#3718 w **#9707** and **#9533**	15
4701	1200,2400	None	15
	4800,9600	None	16
4952, 4954	1200, 2400	#2090	15
4955, 4959	4800, 9600	#2090	16
6360	1200, 2400	#3707	15
	4800, 9600	#3707	16
6580-A04, B04	1200, 2400	#3705	15
	4800, 9600	#3705	16
6670	600,1200,2400	#3701	15
	4800	#3701	16
7426-2	600,1200,2400	None	15
	4800,9600	None	16
8101,8130,	600,1200,2400	FAC 17 (See Note)	15
8140,AXX,	600,1200,2400	FAC 27 (See Note)	24
BXX	4800,9600	FAC 17 (See Note)	16
	4800,9600	FAC 27 (See Note)	25
8140 CXX	4800	#1621 and **#9688** (See Note)	16
8150	4800,9600	#1733 and **#9688** or #1734 and **#9698** (See Note)	16
8775	600,1200,2400	#3701	15
	4800,9600	#3701	16
	600,1200,2400	#1550	24
	4800,9600	#1550	25

Note: FAC 17 or 27 in the attaching 8101, 8130, 8140 AXX, BXX, #1621 and 8140 mdl C, or #1733 or #1734 on 8150 without business machine clock.

* Specify code **#9770** is available to facilitate problem determination.

SELECTED CONFIGURATION CODES

Table 1

Selected Configuration Feature Code	Quantity–Component Feature Code
#1001	2-#1602, 1-#3701, 1-#4830, 1-**#9081**, 1-**#9133**
#1002	3-#1602, 1-#3701, 2-#4830,1-**#9081**, 1-**#9102**, 1-**#9133**
#1004	3-#1602, 2-#3701, 1-#4830, 1-**#9081**, 1-**#9133**, 1-**#9134**,
#1005	4-#1602, 2-#3701, 2-#4830, 1-**#9081**, 1-**#9102**, 1-**#9133**, 1-**#9134**
#1007	1-#1602, 1-#3701, 1-#4830, 1-**#9102**, 1-**#9133**,
#1008	3-#1602, 1-#3701, 2-#4830, 1-**#9101**, 1-**#9102**, 1-**#9133**
#1009	3-#1602, 2-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**
#1010	4-#1602, 3-#3701, 1-#4830, 1-**#9102**, 1-**#9133**, 1-**#9134**, 1-**#9135**

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Programming Configuration: **#9700, #9710, #9720, #9730.**

3640 Attachment: **#9800.**

Storage Size: **#9961, #9962, #9963.**

Power Plug/Cable: **#9890, #9891, #9986.**

Optional Feature Code: #6555 - Keylock, Security Cover ... #1530 - Tape or 8101 Attachment ... #1710, #1720 - Processor Storage ... #4655 - Keylock, Operator ... #6566 Security Lock, Diskette.

8130 PROCESSOR MDLS B23, B24

PURPOSE

The 8130 Processors provide control, storage, processing capability, disk and diskette storage, and device communication attachment capabilities for the 8100 Information System.

MODELS

The following models of the 8130 are available, depending on non-removable disk storage size and fixed head capability. All models include 1 million bytes of removable diskette storage and 1 million bytes of processor storage.

Model	Base Processor Storage (Bytes)	Non Removable Disk Capacity (Million Bytes)	Fixed Head Capacity (Bytes)
B23	1,024K (1,048,576)	64MB (64,520,192)	None
B24	1,024K (1,048,576)	58MB (58,654,720)	131,072

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8130 B23 and B24 are additions to the 8130 family of processors and offer up to 50% more performance than previous 8130 models, greater real and logical storage, capacity for more high speed communicated ports and support attachment of 32XX and 37XX Printers and Displays without the requirement for an 8101.

The 8130 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8130 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions and up to eight I/O hardware interrupt levels provide for interrupt processing. The 8130 B23 and B24 provide 1,024K (1,048,576) bytes of processor storage that can be expanded to a maximum of 2,096K (2,097,152) bytes with additional features, and provide for dynamic addressing and storage protection for up to 8 million bytes of logical storage. The 8130 Models B23 and B24 storage makes use of error correction codes (ECC) to provide single error correction and double error detection capability.

The 8130 includes system expansion to provide for the attachment of up to three 8101 Storage and Input/Output Units, only one of which may be configured with Communication and Display/Printer Feature Type I or Type II or two 8101 Storage and Input/Output Unit and one 8809 Magnetic Tape Unit mdl 1B. An alternate configuration can consist of an 8130, three 8101 storage and Input/Output units, and one 8809 magnetic tape unit Model 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit Model 1A or 1B.

The 8130 Processors are provided with fixed high speed direct access storage. Depending on the 8130 mdl selected, disk storage of up to 64 million bytes with movable heads or up to 58 million bytes of disk storage with movable and fixed heads is available. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage is provided with up to 1MB (985,088) of storage operating at up to 62K bytes per second. The diskette drive can read/write in basic data exchange format on either the diskette 2D or the diskette Type 1.

The 8130 can attach to any S/370, 30XX or 4341 processor via the 3704/3705 for SNA/SDLC. The 8130 can attach to the Communications Adapter of the 4331 Processor for SDLC line control. For specific attachment, see M2700 pages.

The capability of the 8130 is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8130 via loops that are direct attached or data link attached. The 8130 provides for the attachment of six optional communication port features. (Only five if Display and Printer Attachment (#3220) selected.) On the 8130, the 8101 Storage and Input/Output Unit and the 8809-1B Magnetic Tape Unit can attach directly to the processor via the System Expansion Feature (#1530). With an 8101 Storage and Input/Output Unit attached the communication ports physically attached can be increased by eight, providing a maximum of fourteen communication ports.

Physical security is provided through the use of key locks on the operator panel, diskette drive, and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed., certain preparatory steps must be followed. See IBM Multiuse Communications Loop Planning and Installation Guide, GA27-3341 for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Designated Customer Setup: The 8130 Processor is designated as a customer setup unit thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8130. Setup procedures for the customer will be shipped with each machine. An 8130 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given. See IBM 8100 Information System, Site Planning Guide GA27-2884, for information necessary to plan the site and aid set-up personnel.

Bibliography: GC20-8100.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (120 AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for Non-Locking Plug or **#9890** for Locking Plug. If 4.3 meter (14 foot) power cable is not desired, specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only color available.
- Relocation: A user relocating, removing and/or interchanging an attaching 8101 from one 8100 system to another, the user must consider address compatibility of the processor and its attachments. For further information see *IBM 8100 Information System Site Planning and Preparation Guide,* GA27-2884. For relocation/replace kit ordering, see Relocate/Replace 8100 System under the 8130 A2X Accessories.
- Cabling: For loop information see the 8130 A1XX Accessories and the *IBM Multiuse Communication Loop-Planning Guide,* GA23-0038. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processor Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) if ordering any of the following terminals: 3641, 3642, 643, 3644, 3645, 3646, or 3647:
  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 System.

Maximum: One per 8100 System. **Field Installation:** Yes.

Performance: The maximum number of **Features for Attaching Communications (FAC)** capable of concurrent operation is a function of the speed of the line, communication facility, the operating system installed and the application work load. The maximum number of communication facilities which can be physically attached can exceed operational capability.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System Publications are dependent on the presence of functional support modules provided by DPPX, DPCX. Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the SIPO Functional Definition Manual 8100 which will be available from Mechanicsburg at first customer ship.

SPECIAL FEATURES

Display and Printer Additional (#1506): Provides for the attachment of additional 3277 Displays, 3732 Text Displays, and 3284, 3286 or 3287, 3288 and 3736 Printers up to a maximum of four. **Limitations:** See #3220. **Field Installation:** Yes. **Maximum:** Five. **Prerequisites:** (#3220).

System Expansion (#1530): Provides programmable hardware interrupt levels and interrupt ID determination. Required for attachment of up to three 8101 storage and I/O units or two 8101 and one 8809-1B magnetic tape unit directly to the 8130. **Field Installation:** Yes. **Maximum:** One per 8130.

Processor Storage (#1730): Provides 512K (524,288) bytes of additional processor storage. For 1536K byte configuration specify **#9962**, for 2048K byte configuration specify **#9963**. **Maximum:** Two per 8130. **Field Installation:** Yes.

Display and Printer Attachment (#3220): Provides attachment capability in any combination up to a maximum of four of the following devices:

8130 Processor Mdls B23, B24 (cont'd)

- 3277 Display Station, Models 1,2
- 3732 Text Display Station
- 3287 Printer, Models 1,2
- 3284, 3286, 3288, and 3736 Printers

Limitations: Not available with Port 6, FAC 9XX6. **Maximum:** One per 8130 system. **Field Installation:** Yes.

Communications and Loops

CCITT V.35 Interface (#1550): Provides interface to external modems/data communication equipment to 56,000 bps or Direct Connection at speeds up to 9600 bps and at 56,000 bps. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC code 31 or FAC 33 or two FAC codes 08, 09. See Table 2 in 8100 System pages for system maximums. **Maximum:** For speeds up to 9600 bps, one per selected Communication feature (#1602). For operation at speeds greater than 9600 bps, one in 8130, none in 8101. **Field Installation:** Yes. **Prerequisites:** #1602 or #1602 and #5200. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications without Business Machine Clock (#1602): Provides control for EIA RS-232-C or CCITT X.21 Interface, CCITT V.24/V.35 Interface and Loop Adapter. **Limitations:** In an 8100 System only 8 SDLC or Loop communication ports may be active at one time if the 1602 operates at greater than 9600 bps. **Maximum:** Six. The maximum is reduced by one for each communication feature #1602). An additional eight ports can be added if an 8101 is attached. **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

EIA RS-232-C Interface (#3701): Provides interface to external modems/data communication equipment or direct connection at speeds of up to 9600 bps. **Maximum:** One per selected Communication feature. **Field Installation:** Yes. **Prerequisites:** #1602, #1602 and #5200 . **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter (#4830): Provides for the direct attachment of a single-lobe loop at 9600 bps or 38,400 bps. **Maximum:** Six. An additional eight loops can be added if an 8101 is attached. If two of the features may operate at 38,400 bps they must be in the 8130. The maximum is reduced by one for each communication feature. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Limitations:** Available in ports four through six only. **Maximum:** Three. An additional two lobes can be added if an 8101 is attached. **Field Installation:** Yes. **Prerequisites:** #4830.

Multi-Speed Clock (#5200): Provides business machine clocking at 4800 bps and 9600, or 56,000 bps for direct connection. **Limitations:** Available for port position three through six only. **Maximum:** One. Maximum is three per 8130/8101 System. **Field Installation:** Yes. **Prerequisites:** #1602.

X.21 Adapter for Nonswitched Networks (#5655): Provides interface for attachment to X.21 data communication equipment nonswitched at speeds up to 48,000 bps in point-to-point or multipoint configurations. **Maximum:** One per selected Communications Feature (#1602). One in 8130 only if operating above 9600 bps. **Limitations:** Operation at 48,000 bps is mutually exclusive with FAC codes 26, 28, 29, 33 or two FAC codes 08, 09. See Table 2 in 8100 Systems pages for systems maximums. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

X.21 Adapter for Switched Networks (#5656): Provides interface for attachment via a Data Circuit-terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in SRL GA27-3287, switched at speeds up to 48,000 bps. **Maximum:** One per selected Communications Feature (#1602). One in 8130 if operating above 9600 bps. **Limitations:** Operation at greater than 9600 bps is mutually exclusive with FAC codes 26, 28, 29, 31 or two FAC codes 08, 09. See Table 2 in 8100 Systems pages for systems maximums. One per #1602. For operation at greater than 9600 bps, only one in 8130. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

MODEL CONVERSIONS

The following changes can be field installed. Adequate provisions must be made for retaining data contained on disk storage unit and elimination of user proprietary information.

From	To	B23	B24
A23		X	
A24			X
B23			X

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 feet). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1,000 feet).

Exterior cable (P/Ns 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 x 4 ADAPTER PLATE (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

8130 Processor Mdls B23, B24 (cont'd)

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

SYSTEM LOOP ACCESSORIES

Descriptions	Part Number
Loop Splice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330) *	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares) **	1657379
2 x 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for outdoor cable to environmental box)	1657377
Single Device Attachment Cable, 40 ft (12.1 m) 40 ft (12.1 m)	8269543

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8130. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: Order via MSORDER (Order Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine type 8101 or 8130. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see GI section 71 for FE contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits: The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8130 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8101	4448550	4448551	N/A
8130	4448552	4448553	N/A

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2
Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8130	4448575	4448576	N/A

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry in this section of the Sales Manual.
- **Ordering Information** Order via MSORDER (category = supplies/ accessories Group Code = DP Supply Order)

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

Figure 3

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	3709	7389282
DDSA	3717	6835350
V.35 Modem	3718	6835348
V.35 Direct Connect	3719	6835349
V.35 Direct Connect PT TO PT	3720	6835642
EIA Direct Connect	3721	6835642
EIA Modem	3724	6835346
Loop Station Adapter (Double Lobe)	3726	7389282
	3726	7389282
EIA Direct Connect PT to PT	3727	6835347
X.21	3728	6835379

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg

SUPPLIES (None)

COMMUNICATION CAPABILITIES

There are a variety of Communication Capabilities (see M2700 pages) supported by the 8130 **Features for Attaching Communications (FAC)** differing in speed, protocol and attachment interfaces. These FAC codes have been categorized as LOOP, SDLC, BSC, and START/STOP. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation FAC No.) for additional details. Reference to switched communications in the FAC codes, refers to the communication link between the 8100 System and the S/370 or 4300 Processor.

The 8130 special features allow a maximum of six communication capabilities to be configured and designated as communication ports but only five if Display and Printer Attachment (3220) is selected. Each communication port position (1 through 6) must consist of a communications feature for SDLC,

The SDLC communications feature is available without business machine clock (#1602). . If the 8130 is to provide the attached facility with business machine clock at speeds of 2400 bps or greater, the multi-speed clock feature (#5200) is required. One Multi-Speed Clock feature (#5200) can provide business machine clocking to any or all of port position three through six.

In addition to selecting a Communications feature #1602 for each port configured in an 8130, a communication interface must be selected to support the Communication Facility attaching to that port. A two lobe loop port requires three special features (#1602, #4830 and #4835). Direct connect at 2400, 4800, 9600 or 56,000 bps requires the

8130 Processor Mdls B23, B24 (cont'd)

Multi-Speed clock (#5200). Each port of the 8130 also requires the selection of a specify code to indicate the 8100 System FAC Code selected for that port. Certain 8100 System Fac Codes will require a second specify code to select options available within that facility: Line speed/LPDA.

Note: Within a given FAC, the selected option (line speed/LPDA) can be changed in the field by Field Engineering. All such changes are chargeable at the applicable CE rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory. Port 6 is not available if Display and Printer Attachment (3200) is selected.

Specify and FAC Code Descriptions: A specify code number is required to identify the selected FAC code and its physical port position. The specify code is constructed by concatenating the selected FAC and its port position to the numeral 9, e.g.:

#9ABC where AB = FAC No. and C = Port Position.

FAC codes range in number from 08 to 61 resulting in FAC specify codes ranging in number from **#9084** to **#9616**. Additional codes must be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual*, GA27-2876 will aid in assigning the port positions. FAC's 9XX6 are not available if Display and Printer Attachment (#3220) is selected, as denoted by *.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two lobe at 38,400 bps
FAC 10	Loop, single lobe at 9600 bps
FAC 11	Loop, two lobes at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. **Limitations**: Available in ports 4 and 5 only. **Prerequisites:** #1602 and #4830. **Maximum:** Two per 8130. none in an 8101. The maximum is reduced by one for each FAC 09, 26, 28, 29, 31 or 33. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	N/A	**#9084**	**#9085**	N/A

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** Available in Ports 4 and 5 only. available for ports 4 or 5 only. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** Two per 8130. None in 8101. Maximum is reduced by one for each FAC 08, 26, 28, 29, 31 or 33. **Specify:** From the table below, specify the required code to complete the configuration from the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	N/A	**#9094**	**#9095**	N/A

FAC 10 Loop Single Lobe: Required for operating a loop at 9600 bps. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9101**	**#9102**	**#9103**	**#9104**	**#9105**	**#9106**

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. loop at 38,400 bps. **Limitations:** Available for ports 4, 5 or 6 only. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** Two per 8130. None in 8101. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	N/A	N/A	N/A	**#9114**	**#9115**	**#9116**

SDLC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 13	Up to 9600 bps (External modem)
FAC 16	4800-9600 with clock (no modems)
FAC 17	Direct-connect without clock
CCITT V.35	
FAC 25	Direct-connect with clock (No modem) 4800 or 9600 bps
FAC 26	Direct-connect with clock (No modem) 56,000 bps
FAC 27	Direct-connect without clock (No modem) 9600 bps
FAC 28	Direct-connect without clock (No modem) 56,000 bps
FAC 29	Up to 56,000 bps nonswitched bps nonswitched
CCITT X.21 Interface	
FAC 30	Up to 9600 bps nonswitched
FAC 31	48,000 bps nonswitched
FAC 32	Up to 9600 bps switched
FAC 33	48,000 bps switched

FAC 13 EIA RS-232-C Interface: Up to 9600 bps without business machine clock with external data communication equipment and clock point-to-point switched with auto answer to4800 bps or point-to-point non-switched 2- or 4-wire or multipoint 4-wire. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9131**	**#9132**	**#9133**	**#9134**	**#9135**	**#9136**
LPDA	**#9801**	**#9802**	**#9803**	**#9804**	**#9805**	**#9806**

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock operating with no modem (attached machine must not provide business machine clock) and direct connection up to 40 feet. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	N/A	N/A	**#9163**	**#9164**	**#9165**	**#9166**
4800 bps	N/A	N/A	**#9773**	**#9774**	**#9775**	**#9776**
9600 bps	N/A	N/A	**#9783**	**#9784**	**#9785**	**#9786**

FAC 17 EIA RS-232-C Interface: up to 9600 bps without business machine clock operating with other 8100 Systems (with business machine clock) and direct connection up to 40 feet. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9171**	**#9172**	**#9173**	**#9174**	**#9175**	**#9176**

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock operating with no modem (attached machine must not provide clock) and direct connection up to 1,000 feet. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	N/A	N/A	**#9253**	**#9254**	**#9255**	**#9256**
4800 bps	N/A	N/A	**#9773**	**#9774**	**#9775**	**#9776**
9600 bps	N/A	N/A	**#9783**	**#9784**	**#9785**	**#9786**

FAC 26 CCITT V.35 Interface: 56,000 bps with business machine clock operating with no modem and direct connection up to 1000 or up to a total cable length of 200 feet to a 3705. **Limitations:** Mutually exclusive with FAC codes 28, 29, 31, 33 or two FAC codes 08, 09. Available in Port 3 only. See Table 2 in 8100 System pages for **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	N/A	N/A	**#9263**	N/A	N/A	N/A

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock operating with other 8100 System (with business machine clock) and direct connection up to 1,000 feet. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9271**	**#9272**	**#9273**	**#9274**	**#9275**	**#9276**

FAC 28 CCITT V.35 Interface: 56,000 bps without business machine clock operating with no modem and direct connection up to 1,000 feet to another 8100 System (with business machine clock). **Limitations:** Mutually exclusive with FAC codes 26, 29, 31, 33 or two FAC codes 08,

8130 Processor Mdls B23, B24 (cont'd)

09. Available in Port 3 only. See Table 1 in 8100 System pages for system maximums. **Maximum:** One per 8130. None in 8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	N/A	N/A	**#9283**	N/A	N/A	N/A

FAC 29 CCITT V.35 Interface: Up to 56,000 bps without business machine clocks and external data communication equipment with clock, and point-to-point or multipoint nonswitched. **Limitations:** Operation at speeds greater than 9600 bps is. mutually exclusive with FAC codes 26, 28, 31, 33 or two FAC codes 08, 09. Available in Port 3 only. See Table 2 in 8100 System pages for system maximums. **Maximum:** for operation at speeds greater than 9600 bps, one per 8130. None in 8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	**#9293**	N/A	N/A	N/A

FAC 30 CCITT X.21 Interface: Up to 9600 bps without business machine clock and 4-wire point-to-point nonswitched or multipoint nonswitched. **Prerequisites:** #1602 and #5655. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9301**	**#9302**	**#9303**	**#9304**	**#9305**	**#9306**

FAC 31 CCITT X.21 Interface: 48,000 bps without business machine clock and point-to-point or multipoint nonswitched operation. **Limitations:** Mutually exclusive with FAC codes 26, 28, 29, 33 or two FAC codes 08, 09. Available in Port 3 only. See Table 2 in 8100 System. pages for system maximums. **Maximum:** One per 8130. None in 8101. **Prerequisites:** #1602 and #5655. **Specify:** From the table below, specify the required codes to complete the configuration for each port

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	**#9313**	N/A	N/A	N/A

FAC 32 CCITT X.21 Interface: Up to 9600 bps without business machine clock and switched with auto answer and auto call. **Prerequisites:** #1602 and #5656. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6*
Port	**#9321**	**#9322**	**#9323**	**#9324**	**#9325**	**#9326**

FAC 33 CCITT X.21 Interface: Up to 48,000 bps without business machine clock and switched with auto answer and auto call. **Limitations:** Mutually exclusive with FAC codes 26,28, 29, 31 or two FAC codes 08, 09. Available in Port 3 only. One per 8130. None in 8101. **Prerequisites:** #1602 and #5656. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
Port	N/A	N/A	**#9333**	N/A	N/A	N/A

DEVICE ATTACHMENT

Direct Attached Devices: Devices that can attach directly to the 8130-B processor are:

3277 Display Station mdls 1, 2	(Via #3220, #1506)
3284 Printer mdls 1, 2	(Via #3220, #1506)
3286 Printer mdls 1, 2	(Via #3220, #1506)
3287 Printer mdls 1, 2	(Via #3220, #1506)
3288 Line Printer mdl 2	(Via #3220, #1506)
3732 Text Display Station	(Via #3220, #1506)
3736 Printer	(Via #3220, #1506)
8101 Storage & Input/Output Unit	
8809 Magnetic Tape Unit 1B	

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System configurator*, GA27-2876, for selection of the 8100 FAC codes.

	Loop Attachment		
Device and Mdl	**Direct At 9600 bps**	**38400 bps**	**Data Link At 2400, 4800,9600 bps**
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2, 12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit mdls 41C, 51C, 61C with:	X	X	X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 3, 13			
- 3268 Printer 2			
- 3278 Display Station 1, 2, 3, 4, 5			
- 3278 PC Attachment			
- 3279 Color Display Unit 2A, 2B, 3A, 3B			
- 3287 Printer 1, 2, 1C, 2C			
- 3289 Printer 1, 2			
- 3290 Information Panel			
3276 Control Unit Display Station 11, 12, 13, 14 with:	X		X
- 3230 Printer 2			
- 3262 Printer 13			
- 3268 Printer 2			
- 3278 Display Station 1, 2, 3, 4,			
- 3279 Color Display 2A, 2B, 3A, 3B			
- 3287 Printer 1, 2, 1C, 2C			
- 3289 Printer 1, 2			
3287 Printer 11, 12	X	X	X
3289 Printer 3 with:	(1)		(1)
- 2502 Card Reader A1*			
- 3501 Card Reader			
- 3521 Carder Punch*			
(*Requires 3782 Attachment Unit)			
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1, 2	X		X
3643 Keyboard Display 2, 3, 4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E01, E02	X		
7426 Terminal Interface Unit	X	X	X
8775 Display Terminal 1, 2	X	X	X

Note 1: Dedication of a 9600 bps single lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM 8100 Information System Configurator*, GA27-2876, for selection of 8100 FAC codes.

3232 Keyboard Printer mdl 51
3274 Control Unit mdl 41C, 51C, 61C with:
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdls 3, 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3278 PC Attachment
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3279 PC Attachment
- 3287 Printer mdls 1, 2, 1C ,2C
- 3289 Line Printer mdls 1, 2
- 3290 Information Panel

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14, with:
(*These mdls are supported in SDLC mode.)
- 3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4
(See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
(Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3601 Finance Communication Controllers mdls 1, 2A, 2B, 3A, 3B
3602 Finance Communication Controllers mdls 1A, 1B
3632 Plant Communication Controllers mdls 1A, 1B
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4701 Finance Communication Controller mdl 1
4952, 4954, 4955, 4959 Processor (Series/1)
5150 Personal Computer
5285, 5288 Programmable Data Stations

8130 Processor Mdls B23, B24 (cont'd)

6580 Display Writer (DSC mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2
with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

Direct Connect Attachment: In addition to terminal attachment to 8130B System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using the feature numbers and FAC codes as shown below. Shown below are the direct connect attachable devices and required device feature numbers. The *8100 IBM Information System Site Planning Guide for IBM 8101, 8130, 8140*, GA27-2884 will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature Number	8100 FAC Code
3274-41C, 51C, 61C	4800	#3701 and #6302	16
	9600	#3701 and #6302	16
	56000	#1550 and #6303	26
3276	4800,9600	#3701 w #9491 and #6302	16
3651 * 25/75	4800	#9126	16*
3705-II	4800	#4714	16
	9600	#4714	16
	56000	#4720	26
3705-80	4800	None	16
	9600	None	16
	56000	#6712	26
4701-1	4800,9600	None	16
4952, 4954, 4955, 4959	4800,9600	#2090	16
6360	4800,9600	#3707	16
6580-AO4 -BO4	4800,9600	#3705	16
6670	4800	#3701	16
6670	9600	#3701	
7426-2	4800	None	16
7426-2	9600	None	
8101, 8130, 8140 AXX, BXX	4800,9600	FAC17 (see Note)	16
8140, CXX	4800	#1621 and #9688 (see Note)	16
8140, CXX	56000	#1614 and #9683 (see Note)	26
8150	4800,9600	#1733 and #9688 or #1734 and #9698 (see Note)	16
	56000	#1742 and #9682 or #1745 and #9693 (see Note)	26
8101, 8140, BXX	56000	FAC28 (see Note)	26
8775	4800,9600	#1550	25

Note: FAC 17 or 28 in the attaching 8101, 8130, 8140 A2X, BXX, #1621 and 8140 mdl C or 8150 with #1733, #1734, #1742 or #1745 without business machine clock.

* Specify code #9770 is available to facilitate problem determination.

8140 PROCESSOR MDLS A31-A74

PURPOSE

The 8140 Processor provides control, storage, processing capability, disk and diskette storage, and device attachment capabilities for the 8100 Information System.

MODELS

Model	Base Processor Storage (bytes)	Non Removable Disk Capacity (million bytes)	Fixed Head Capacity (bytes)
A31	256K (262,144)	29MB (29,327,360)	None
A32	256K (262,144)	23MB (23,461,888)	131,072
A33	256K (262,144)	64MB (64,520,192)	None
A34	256K (262,144)	58MB (58,654,720)	131,072
A41	320K (327,680)	29MB (29,327,360)	None**
A42	320K (327,680)	23MB (23,461,888)	131,072**
A43	320K (327,680)	64MB (64,520,192)	None**
A44	320K (327,680)	58MB (58,654,720)	131,072**
A51	512K (524,288)	29MB (29,327,360)	None
A52	512K (524,288)	23MB (23,461,888)	131,072
A53	512K (524,288)	64MB (64,520,192)	None
A54	512K (524,288)	58MB (58,654,720)	131,072
A61*	768K (786,432)	29MB (29,327,360)	None
A62*	768K (786,432)	23MB (23,461,888)	131,072
A63*	768K (786,432)	64MB (64,520,192)	None
A64*	768K (786,432)	58MB (58,654,720)	131,072
A71*	1024K (1,048,576)	29MB (29,327,360)	
A72*	1024K (1,048,576)	23MB (23,461,888)	131,072
A73*	1024K (1,048,576)	64MB (64,	
A74*	1024K (1,048,576)	58MB (58,654,720)	131,072

* Available as mdl upgrade only.

** These mdls include Floating Point Arithmetic.

Maximum: One per 8100 Information System.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8140 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8140 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions. The 8140 mdl A41 through A44 also includes additional instructions for floating point arithmetic. Eight I/O interrupt levels provide for interrupt processing. The 8140 offers various amounts of bytes of processor storage of which 4,096 bytes are read only storage and not available for user programs. Processor storage can be expanded up to a maximum of 384K (393,216) for the mdl A31 through A34. Fixed amounts of 320K (327,680) bytes for the mdls A41 through A44 and 512K (524,288) bytes for the mdls A51 through A54, 768K (786,432) bytes for the mdls A61 through A64 and 1024K (1,048,576) bytes for the mdls A71 through A74. Capability for dynamic addressing and storage protection for up to 4 million bytes of logical storage is also available.

The 8140 allows for the attachment of up to four 8101 Storage and Input/Output Units two of which may be configured with Communication and Display/Printer Feature Type I or Type II, or three 8101 Storage and Input/Output Units and one 8809 Magnetic Tape Unit mdl 1B. An alternate configuration can consist of an 8140, four 8101 Storage and Input/Output Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit mdl 1A or 1B.

The 8140 Processor is provided with fixed high-speed direct access storage. Depending on the 8140 mdl selected, disk storage of up to 64 million bytes with movable heads or up to 58 million bytes of disk storage with movable and fixed heads is available. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage is available with up to 1MB (985,088 bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370 or 4300 processors via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 System attaches to the ICA of the 115, 125, 135, or 138 Processors for BSC line control. The 8100 System can attach to the communications adapter of the 4331 or 4361 Processor for BSC and/or SDLC line control. For specific attachment see M2700 pages.

The capability of the 8100 Information System is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8140 via communication features which include data link, direct-connect, and loops that are direct-attached or data link-attached. The number of communication ports that can be attached to the 8140 is three for mdls A31 through A34 and two for mdls A41 through A44. The 8140 mdls A51 through A74 requires the 8101 Storage and Input/Output Unit for the attachment of communication ports.

Customer Setup: The 8140 Processor is designated as a customer setup unit thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8140. Setup procedures for the customer will be shipped with each machine. An 8140 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Performance: The maximum number of Features for Attaching Communications **(FAC)** capable of concurrent operation is a function of the speed of the line, communication facilities, the operating system installed and the application work load. The maximum number of communications features which can be physically installed can exceed the operational capability. Increased processor utilization will result from sustained operation of BSC (#1603 and #1604) at the maximum aggregate data rate and may cause degradation of activity operating at lower priority levels. Analysis should be performed to determine the impact.

Note: Use of BSC 8101-A2X feature #1605 instead of features #1603 or #1604 will significantly reduce processor utilization.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System Publications are dependent on the presence of functional support modules provided by DPPX, DPCX. Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Selected Configurations: To ease the selection, configuring, ordering and installation of an 8140 Processor, Selected Configurations has been developed. Selected Configurations is designed to be applicable for the majority of customer installations, both DPPX and DPCX are supported. The use of Selected Configurations is recommended. Traditional configuration selection and ordering should be used for configurations not included in the selected configurations.

SELECTED CONFIGURATIONS

The following table lists the appropriate selected configuration codes for each mdl and the communication capabilities for each selected configuration.

	CODE							
	1 0 0 0	1 0 0 2	1 0 0 4	1 0 0 5	1 0 0 7	1 0 0 8	1 0 0 9	1 0 1 0
Description								
8140 mdl A4X, A5X, A6X, A7X	X							
Port 1 Dir-Att Loop – 38.4KB – 9.6KB								
Port 2 Dir-Att Loop 9.6KB								
Port 3 Data Link 9.6KB	**No Communication Attachment**							
Port 4 Data Link 9.6KB								
Port 5 Data Link 9.6KB								
Port 6 Dir-Att Loop 9.6KB								

Notes:

1. Magnetic tape attachment to 8140.
   - use 8809 mdl 1B.
2. Recommended DPPX configurations:
   - No less than 512K processor storage
   - No less than 58MB disk storage
   - Fixed Head feature in processor disk

Selected Configuration Attachment: No communications available. **Maximum:** One. **Field Installation:** No. **Prerequisites:** See Table 1.

8140 Processor Models A31 through A74 (cont'd)

Bibliography: GC20-8100.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120 AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for non-locking plug, **#9890** for locking plug. If 4.3m (14 ft.) power cable is not desired, specify **#9986** for 1.8m (6 ft.) cable.
- Color: Pebble gray is the only color available.
- **Relocation:** If the user relocates and/or interchanges an attaching 8101 from one 8100 System to another, the user must consider address compatibility of the processor and its attachments. For further information, see *IBM 8100 Information System Site Planning Guide*, GA27-2884. For relocation/replace kit ordering, see "Relocate/ Replace, 8100 System" under "Accessories".
- Cabling: For loop cabling information, see "Accessories" and the *IBM Multiuse Communication Loop Planning and Installation Guide*, GA27-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide* GA27-2884. Communication cables must be ordered separately from the communication adapter feature.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647.
  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 System. **Maximum:** One per 8100 System. **Field Installation:** Yes.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations. **Field Installation:** Yes.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Storage Increment 128K (#1490): Provides 131,072 bytes of additional processor storage. The ordering of the additional quantities of this feature will allow the expansion of the 8140 mdl A31 through A34 storage up to a maximum 393,216 bytes. **Maximum:** One for 8140 mdls A31 through A34. **Field Installation:** Yes.

Expanded Function Operator Panel (#4545): This feature provides operator access to processor storage, program stop and restart capability and current operating indicators. **Limitations:** Not available on 8140 mdls A41 through A44 with SDLC or BSC/SS Communications (#1601, #1602, #1603, #1604), Loop Adapter (#4830), or the 8140 mdls A51 through A74. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Keylock (#4655): This Keylock Feature provides processor security by the selection of three modes of operation: Disable power on and operator panel functions ... Enable power on but disable operator panel ... Enable power on and full operator panel functions. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Security Cover Locks (#6555): This feature provides key-operated security locks for the machine covers, restricting access to the machine interior and external cable connector area. See Security Lock, Diskette (#6566) if diskette security is required. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

Security Lock, Diskette (#6566): This feature provides a key operated security lock to restrict access to the diskette magnetic media. It is accessable only by opening the front cover. For maximum system security, the Security Cover Lock (#6555) must be used in addition to the Diskette Security Lock. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith. **Maximum:** One. **Field Installation:** Yes. **Field Removable:** No.

COMMUNICATIONS FEATURES

CCITT V.35 Interface (#1550): Provides interface to External Modems/Data Communication equipment to 56,000 bps or Direct Connection at speeds up to 9600 bps. Transmission over direct connection at speeds up to 9600 bps. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC code 21 or two FAC codes 08, 09. **Maximum:** For speeds up to 9600 bps one per selected Communication feature (#1601 or #1602). For operation at speeds greater than 9600 bps, one per 8140 or one per 8140/8101. **Field Installation:** Yes. **Prerequisites:** #1601, #1602, #5200. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

SDLC Communications With Business Machine Clock (#1601): Provides control for EIA RS-232-C interface, integrated modems, direct connection and CCITT V.35 Interface. **Limitations:** Not available with the Expanded Function Operator Panel (#4545) on the 8140 mdls 41 through 44. Not available with the 8140 mdls A51 through A74. In an 8100 System, only ten loop or SDLC communication ports may be active at one time. **Maximum:** Three with the 8140 mdls A31 through A34 and two with the mdls A41 through A44. Maximum is 19 per 8100 System (see Note) with 8140 mdls A31 through A34, 18 with 8140 mdls A41 through A44 or 16 with 8140 mdls A51 through A74. The maximum is reduced by one for each Communication feature (#1602, #1603 or #1604) selected. **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

SDLC Communications Without Business Machine Clock (#1602): Provides control for EIA RS-232-C or Digital Data Service Adapter interface, CCITT V.35 Interface and Loop Adapter. **Limitations:** Not available with the Expanded Function Operator Panel (#4545) on 8140 mdls 41 through 44. Not available with the 8140 mdls A51 through A74. In an 8100 System only ten loop or SDLC communication ports may be active at one time. **Maximum:** Three with 8140 mdls A31 through A34 and two with mdls A41 through A44. Maximum is 19 per 8100 System (see Note) with 8140 mdls A31 through A34, 18 with 8140 mdls A41 through A44 or 16 with 8140 mdls A51 through A74. The maximum is reduced by one for each Communication feature (#1601, #1603 or #1604) selected. **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC/SS Communications With Business Machine Clock (#1603): Provides control for EIA RS-232-C interface, integrated modems or direct connection. **Limitations:** Start/Stop communications are not available with integrated modems. Not available with the Expanded Function Operator Panel (#4545) on the 8140 mdls 41 through 44. Not available with the 8140 mdls A51 through A74. In an 8100 System, the maximum aggregate BSC data rate is 19,200 bps and 660 bps for Start/Stop. BSC mutually exclusive with 8101-A2X FAC Codes 42 or 46 on an 8100 System. **Maximum:** Three with 8140 mdls A31 through A34 and two with 8140 mdls A41 through A44. Maximum is 19 per 8100 System (see Note) with 8140 mdls A31 through A34, 18 with 8140 mdls A41 through A44 or 16 with 8140 mdls A51 through A74. The maximum is reduced by one for each Communication feature (#1601, #1602 or #1604) selected. **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

BSC Communications Without Business Machine Clock (#1604): Provides control for EIA RS-232-C or Digital Data Service Adapter interface and direct-connect. **Limitations:** Not available with the Expanded Function Operator Panel (#4545) on the 8140 mdls 41 through 44. Not available with 8140 mdls A51 through A74. In an 8100 System, the maximum aggregate BSC data rate is 19,200 bps. BSC mutually exclusive with 8101-A2X FAC Codes 42 or 46 on an 8100 System. **Maximum:** Three with the 8140 mdls A31 through A34 and two with mdls A41 through A44. Maximum is 19 per 8100 System (see Note) with 8140 mdls A31 through A34, 18 with 8140 mdls A41 through A44 or 16 with 8140 mdls A51 through A74. The maximum is reduced by one for each Communication feature (#1601, #1602 or #1603) selected. **Field Installation:** Yes. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section.

EIA RS-232-C Interface (#3701): Provides interface to external modems/data communication equipment or direct connection at speeds of up to 9600 bps. **Maximum:** One per selected Communication feature (#1601, #1602, #1603 or #1604). **Field Installation:** Yes. **Prerequisites:** #1601, #1602, #1603, #1604, #5200. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Loop Adapter (#4830): Provides for the direct attachment of a single-lobe loop at 9600 or 38,400 bps. **Limitations:** Not available with the Expanded Function Operator Panel (#4545) on the 8140 mdls 41 through 44. Not available with the 8140 mdls A51 through A74. **Maximum:** Three with 8140 mdls A31 through A34 and two with the mdls A41 through A44. Only two of these features may operate at 38,400 bps in an 8140/8101. The maximum is reduced by one for each selected communication facility attached to the 8140. **Field Installation:** Yes. **Prerequisites:** #1602. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

8140 Processor Models A31 through A74 (cont'd)

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Limitations:** Not available with 8140 mdls A51 through A74. **Maximum:** Two per 8140 mdls A31 through A34 and A41 through A44. Maximum is six per 8100 System (see Note) with the 8140 mdls A31 through A34 and A41 through A44 or four with 8140 mdls A51 through A74. **Field Installation:** Yes. **Prerequisites:** #4830. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Note: An 8100 System consisting of an 8140 Processor and attached 8101 Storage and Input/Output Units.

Multi-Speed Clock (#5200): Provides business machine clocking at 2400, (FAC 44 only) 4800 bps and 9600 bps for direct connection facilities. Can provide multiple speeds simultaneously. **Limitations:** Not available with the 8140 mdls A51 through A74. **Maximum:** One per 8140 mdls A31 through A34 and mdls A41 through A44. Maximum is five per 8100 System with the 8140 mdls A31 through A34 and A41 through A44 or four with the 8140 mdls A51 through A74. **Field Installation:** Yes. **Prerequisites:** #1602 or #1604. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Nonswitched (#5500): Provides interface to common carrier leased facilities at 600 or 1200 bps. **Limitations:** Not available for Start/Stop communication facilities. **Maximum:** One per selected Communication feature (#1601 or #1603). **Field Installation:** Yes. **Prerequisites:** #1601, #1603. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Modem, Integrated, Switched (#5501): Provides interface to common carrier switched facilities with auto answer at 600 or 1200 bps. **Limitations:** Not available with Start/Stop communication facilities. **Maximum:** One per selected communication feature (#1601). **Field Installation:** Yes. **Prerequisites:** #1601. **Note:** Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

Digital Data Service Adapter (DDSA) (#5660): Provides interface to AT&T Dataphone® Digital Service Network for transfer of digital data at speeds of 2400, 4800, 9600 or 56,000 bps in point to point or multipoint configurations. **Limitations:** Operation at 56,000 bps is mutually exclusive with FAC codes 29, or two FAC codes 08, 09. See Table 2 in 8100 System Pages for system maximums. **Maximum:** One per selected Communication feature (#1602 or #1604). For operation at 56,000 bps, one per 8140 or one per 8140/8101. **Field Installation:** Yes. **Prerequisites:** SDLC Communications without Clock (#1602) for operation to 56,000 bps, or BSC Communications without Clock (#1604) for operation to 9600 bps. **Specify:** Code as provided in FAC description in the "Communication Capabilities" section.

MODEL CONVERSIONS

Model upgrades are available, however model changes from 8140-A3X to 8140-A4X are not recommended for field installation. The 8140 mdls A6X and A7X are available only for field upgrade. For model changes which require replacement of a disk storage unit, adequate provisions must be made for retaining data contained in disk storage and elimination of user-proprietary information.

The following model changes can be field installed

From	To A32	A33	A34	A42	A43	A44	A51	A52	A53	A54
A31	X	X	X				*	*	*	*
A32		X	X					*	*	*
A33			X						*	*
A34										*
A41				X	X	X	*	*	*	*
A42					X	X		*	*	*
A43						X			*	*
A44										*
A51								X	X	X
A52									X	X
A53										X

From	To A61	A62	A63	A64	A71	A72	A73	A74
A31	*	*	*	*	*	*	*	*
A32		*	*	*		*	*	*
A33			*	*			*	*
A34				*				*
A41	*	*	*	*	*	*	*	*
A42		*	*	*		*	*	*
A43			*	*			*	*
A44				*				*
A51	X	X	X	X	X	X	X	X
A52		X	X	X		X	X	X
A53			X	X			X	X
A54				X				X
A61		X	X	X	X	X	X	X
A62			X	X		X	X	X
A63				X			X	X
A64								X
A71						X	X	X
A72							X	X
A73								X

*Purchase price for this model upgrade is configuration and feature dependent. The purchase customer must submit an RPQ.

Customer price quotations and customer order acknowledgements letters for purchase MES must state "Installation of this model change involves the removal of parts which become the property of IBM".

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 ft.). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1,000 ft.).

Exterior cable (P/N's 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 ft.), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. @SMQ@Order via MSORDER (Category = Bulk Cable).@SS@ Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or

8140 Processor Models A31 through A74 (cont'd)

to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 X 4 Adapter Plate (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36 x 30 x 15cm (14 x 12 x 6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36 x30 x 15cm (14 x 12 x 6 in.).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	**1657300**
Loop Station Connector (Radial LSC)	**1657310**
Loop Station Connector (Wrap LSC)	**1657320**
Loop Station Connector Gasket	**1657260**
Loop Wiring Concentrator (LWC)	**1657330**
LWC Circuit Board Assy (order instead of LWC-1657330) *	**1657332**
Loop Surge Suppressor (LSS)	**1657350**
LSS Circuit Board Assy (order instead of LSS-1657350) *	**1657354**
Continuity and Relay Tester	**1657420**
Wrap Switch Access Cover	**1657325**
Loop Accessory Keys (10 spares) **	**1657379**
2 x 4 Adapter Plate (2AP)	**7838771**
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	**2102151**
Clamp (for cable to indoor box)	**2100264**
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 in.) (For industrial use)	**1657280**
Clamp - small (for indoor cable to environmental box)	**2114285**
Clamp - large (for outdoor cable to environmental box)	**1657377**
Single Device Attachment Cable, 12.1m (40 ft.) 12.1m (40 ft.)	**8269543**

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8140. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: When ordering, use Machine type 8101 or 8140. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see IBM for contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits:

The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8140 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8101	**4448550**	**4448551**	N/A
8140	**4448554**	**4448555**	N/A

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2
Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package
8140	**4448577**	**4448578**	N/A

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry in this section of the Sales Manual.
- **Ordering Information**

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

Figure 3

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	3709	**7389282**
DDSA	3717	**6835350**
V.35 Modem	3718	**6835348**
V.35 Direct Connect	3719	**6835349**
V.35 Direct Connect PT TO PT	3720	**6835642**
EIA Direct Connect	3721	**6835642**
EIA Modem	3724	**6835346**
Loop Station Adapter (Double Lobe)	3726	**7389282**
EIA Direct Connect PT to PT	3726	**7389282**
X.21	3727	**6835347**
	3728	**6835379**

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg

SUPPLIES (None)

8140 Processor Models A31 through A74 (cont'd)

COMMUNICATIONS

There are a variety of Communication Facilities (see M2700 pages) supported by the 8140 mdls A31 through A44 Features for **A**ttaching **C**ommunications (**FAC**) which differ in speed, protocol and attachment interfaces. These FAC codes have been categorized as LOOP, SDLC, BSC and START/STOP. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation FAC No.) for additional details. Reference to switched communications in the FAC codes, refers to the communication link between the 8100 System and the S/370.

The 8140 special features allow a maximum of three communication capabilities to be configured and designated as communication ports. Each communication port position (1 through 3) must consist of a communications feature for SDLC, BSC or Start/Stop.

The SDLC communications feature is available with and without business machine clock (#1601, #1602). The BSC/SS communications feature (#1603) is available with business machine clock and the BSC communications feature (#1604) is available without business machine clock. If an 8140 communication port is to provide the attached facility with business machine clock at speeds greater than 2400 bps the Multi-Speed Clock feature (#5200) is required.

In addition to selecting a communications feature (#1601, #1602, #1603, #1604) for each port configured in an 8140, a communication interface or integrated modem must be selected to support the Communication Facility attaching to that port. A two-lobe loop port requires three special features (#1602, #4830 and #4835). Direct connect at 2400(FAC 44 only),4800 and 9600 bps requires the Multi-Speed Clock feature (#5200). Each port of the 8140 also requires the selection of a specify code to indicate the System 8100 FAC code selected for that port. Certain System 8100 FAC Codes will require a second specify code to select options available within that facility: 2/4-wire or line speed.

Note: Within a given FAC, the selected option (2/4 wire, LPDA or line speed) can be changed in the field by Field Engineering. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory.

Specify And FAC Code Descriptions: A specify code number is required to identify the selected FAC Code and its physical port position. The specify code is constructed by concatenating the selected FAC and its port position to the numeral **9**, e.g.:

#9ABC where AB = FAC No. and C = Port Position

FAC codes range in number from 08 to 61 resulting in FAC specify codes ranging in number from **#9081** to **#9613**. Additional codes may be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual,* GA27-2876, will aid in assigning the port positions.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two lobes at 38,400 bps
FAC 10	Loop, single-lobe at 9600 bps
FAC 11	Loop, two-lobes at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. Port position three not available with 8140 mdls A41 through A44. **Limitations:** If two 08 FAC codes are specified, FAC codes 09, 21, 29 are not available. See Table 2 in 8100 System pages for system maximums. **Maximum:** Two per 8140 or two per 8140/8101. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9081**	**#9082**	**#9083**

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** If two 09 FAC codes are specified, FAC codes 08, 21, 29 are not available. See Table 2 in 8100 System pages for system maximums. **Prerequisites:** #1602, #4830 and #4835. **Maximum:** Two per 8140 or two per 8140/8101. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9091**	**#9092**	N/A

FAC 10 Loop, Single-Lobe: Required for operating a loop at 9600 bps. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9101**	**#9102**	**#9103**

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9111**	**#9112**	N/A

SDLC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 12	600 or 1200 bps (External modem)
FAC 13	Up to 9600 bps (External modem)
FAC 15	600, 1200 or 2400 bps Direct connect with clock (No modem)
FAC 16	4800 or 9600 bps Direct connect with clock (No modem)
FAC 17	Direct connect without clock
Integrated Modem	
FAC 18	600 or 1200 bps nonswitched
FAC 19	600 or 1200 bps switched with auto answer
AT&T Dataphone® Digital Service	
FAC 20	2400, 4800 or 9600 bps nonswitched
FAC 21	56,000 nonswitched
CCITT V.35	
FAC 24	Direct connect with clock (No modem) 600, 1200 or 2400 bps
FAC 25	Direct connect with clock (No modem) 4800 or 9600 bps
FAC 27	Direct connect without clock (No modem) 9600 bps
FAC 29	Up to 56,000 bps nonswitched

FAC 12 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem without clocking - and point-to-point switched 2-wire - or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9121**	**#9122**	**#9123**
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**

FAC 13 EIA RS-232-C Interface : Up to 9600 bps without business machine clock with external data communication equipment and clock point-to-point switched with auto answer to 4800 bps or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9131**	**#9132**	**#9133**
LPDA	**#9801**	**#9802**	**#9803**

FAC 15 EIA RS-232-C Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9151**	**#9152**	**#9153**
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**
2400 bps	**#9761**	**#9762**	**#9763**

8140 Processor Models A31 through A74 (cont'd)

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) and direct connection up to 40 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9161**	**#9162**	**#9163**
4800 bps	**#9771**	**#9772**	**#9773**
9600 bps	**#9781**	**#9782**	**#9783**

FAC 17 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 40 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9171**	**#9172**	**#9173**

FAC 18 Integrated Modem: 600 or 1200 bps - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1601 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9181**	**#9182**	**#9183**
2-wire			
600 bps	**#9851**	**#9852**	**#9853**
1200 bps	**#9861**	**#9862**	**#9863**
4-wire			
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**

FAC 19 Integrated Modem: 600 or 1200 bps - point-to-point switched with auto answer 2-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1601 and #5501. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9191**	**#9192**	**#9193**
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**

FAC 20 Digital Network Interface (to AT&T Dataphone® Digital Service): 2400, 4800, 9600 bps without business machine clock - and 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9201**	**#9202**	**#9203**
2400 bps	**#9761**	**#9762**	**#9763**
4800 bps	**#9771**	**#9772**	**#9773**
9600 bps	**#9781**	**#9782**	**#9783**

FAC 21 Digital Network Interface (to AT&T Dataphone® Digital Service: 56,000 bps without business machine clock and point to point and multipoint nonswitched operation. Port position three not available with 8140 mdl A41 through A44. **Limitations:** Mutually exclusive with FAC codes 29 or two FAC codes 08, 09. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9211**	**#9212**	**#9213**

FAC 24 CCITT V.35 Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (Attached machine must not have business machine clock) - and direct connection up to 1,000 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1601 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9241**	**#9242**	**#9243**
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**
2400 bps	**#9761**	**#9762**	**#9763**

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock - operating with no modem (Attached machine must not have business machine clock) - and direct connection up to 1,000 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9251**	**#9252**	**#9253**
4800 bps	**#9771**	**#9772**	**#9773**
9600 bps	**#9781**	**#9782**	**#9783**

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 1,000 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9271**	**#9272**	**#9273**

FAC 29 CCITT V.35 Interface: Up to 56,000 bps without business machines clock and external data communication equipment with clock, and point-to-point or multipoint nonswitched. Port position three not available with 8140 mdl A41 through A44. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC code 21 or or two FAC codes 08, 09. See Table 2 in 8100 System pages for system maximums. **Maximum:** For operation at speeds greater than 9600 bps, one per 8140 or one per 8140/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9291**	**#9292**	**#9293** *BSC*

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 40	600 or 1200 bps (External modem)
FAC 41	Up to 9600 bps (External modem)
FAC 44	2400, 4800 or 9600 bps direct connect with clock (No modem)
Integrated Modem	
FAC 45	600 or 1200 bps nonswitched
AT&T Dataphone® Digital Service	
FAC 47	2400, 4800 or 9600 bps nonswitched

FAC 40 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem with no clock - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9401**	**#9402**	**#9403**
600 bps	**#9741**	**#9742**	**#9743**
1200 bps	**#9751**	**#9752**	**#9753**

FAC 41 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with external data communication equipment - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Prerequisites:** #1604 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 1	Port 2	Port 3
Port	**#9411**	**#9412**	**#9413**

8140 Processor Models A31 through A74 (cont'd)

FAC 44 EIA RS-232-C Interface: 2400, 4800 or 9600 bps with business machine clock - operating with no modem (attached downstream terminal must not provide business machine clock) - and direct connection to 40 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Prerequisites:** #1604, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 1	Port 2	Port 3
2400 bps	#9441	#9442	#9443
4800 bps	#9761	#9762	#9763
9600 bps	#9771	#9772	#9773
	#9781	#9782	#9783

FAC 45 Integrated Modem: 600 or 1200 bps - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitations:** Port position three not available with 8140 mdl A41 through A44. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Prerequisites:** #1603 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 1	Port 2	Port 3
2-wire	#9451	#9452	#9453
600 bps	#9851	#9852	#9853
1200 bps	#9861	#9862	#9863
4-wire			
600 bps	#9741	#9742	#9743
1200 bps	#9751	#9752	#9753

FAC 47 Digital Network Interface (to AT&T Dataphone® Digital Service): 2400, 4800 or 9600 bps without business machine clock 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitations:** Port position three not available with 8140 mdl A41 through A44. BSC mutually exclusive with 8101 A2X FAC Codes 42 or 46 on an 8100 System. **Prerequisites:** #1604, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 1	Port 2	Port 3
2400 bps	#9471	#9472	#9473
4800 bps	#9761	#9762	#9763
9600 bps	#9771	#9772	#9773
	#9781	#9782	#9783

START/STOP

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 60	110, 134.5, 150, 300 or 600 bps (External modem)
FAC 61	110, 134.5, 150, 300 or 600 bps Direct connect with clock (No modem)

FAC 60 EIA RS-232-C Interface: 110, 134.5, 150, 300 and 600 bps with business machine clock - operating with external modem - and point-to-point nonswitched facilities will be provided under provisions of the IBM Mulitiple Supplier System Policy. (See GI pages). See M2700 pages for specific information on communication facilities and other attachment information. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1603, #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 1	Port 2	Port 3
110 bps	#9601	#9602	#9603
134.5 bps	#9701	#9702	#9703
150 bps	#9711	#9712	#9713
300 bps	#9721	#9722	#9723
600 bps	#9731	#9732	#9733
	#9741	#9742	#9743

FAC 61 EIA RS-232-C Interface: 110, 134.5, 150, 300, 600 bps with business machine clock - operating with no modem (the attached terminal must provide its own business machine clock) - and direct connect to 40 ft. **Limitations:** Port position three not available with 8140 mdl A41 through A44. **Prerequisites:** #1603, #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 1	Port 2	Port 3
110 bps	#9611	#9612	#9613
134.5 bps	#9701	#9702	#9703
150 bps	#9711	#9712	#9713
300 bps	#9721	#9722	#9723
600 bps	#9731	#9732	#9733
	#9741	#9742	#9743

DEVICE ATTACHMENT

Direct Attached Devices: Devices that can attach directly to the processor are ... 8101 Storage and Input/Output Unit ... 8809 Magnetic Tape Unit.

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System configurator* GA27-2876 for selection of the 8100 FAC codes.

Device and Mdl	Loop Attachment Direct At 9600 bps	Direct At 38400 bps	Data Link At 2400, 4800,9600 bps
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit 51C,61C with: - 3178 Display Terminal - 3230 Printer 2 - 3262 Printer 3,13 - 3268 Printer 2 - 3278 Display Station 1,2,3,4,5 - 3279 Color Display Unit 2A,2B,3A,3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X	X	X
3276 Control Unit Display - 3178 Display Terminal Station 11,12,13,14 with: - 3230 Printer 2 - 3262 Printer 13 - 3268 Printer 2 - 3278 Display Station 1,2,3,4 - 3279 Color Display 2A,2B,3A,3B - 3287 Printer 1,2,1C,2C - 3289 Printer 1,2	X		X
3287 Printer 11,12	X	X	X
3289 Printer 3 with: - 2502 Card Reader A1* - 3501 Card Reader - 3521 Carder Punch* (*Requires 3782 Attachment Unit)	(1)		(1)
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E01, E02	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note:

1. Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM Information System Configurator* GA27-2876 for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3232 Keyboard Printer mdl 1
3232 Keyboard Printer mdl 51
3101 Display Terminal mdls 10, 12, 13
3274 Control Unit mdl 51C, 61C with:
- 3178 Display Terminal
- 3230 Printer 2
- 3268 Printer 2

8140 Processor Models A31 through A74 (cont'd)

- 3262 Printer mdls 3, 13
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)

- 3178 Display Terminal
- 3230 Printer 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4 (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3600 Finance Communication Controllers
3630 Plant Communication Controllers
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4700 Finance Communication Controllers
4952, 4954, 4955, 4959 Processor (Series/1)
5150 IBM Personal Computer
5285, 5288 Programmable Data Stations
6360, 6580 Displaywriter (3270 DSC Mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

*Specify **#9770** is available to facilitate problem determination.

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using SDLC (FAC 15, 16, 17, 24, 25, or 27), BSC (FAC 44) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide* GA27-2884 will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature No.	8100 FAC CODE
2741	134.5	**#9114** and #3255	61
Devices Conforming to 2780/3780 Line Protocol	2400, 4800, 9600	Refer to specific device	44
3101	110,150,300, 600	None required	61
3232-1	1200,2400	None	15
	4800,9600	None	16
3232-51	300,600	None	61
3274-51C,61C	1200,2400	#3701 and #6302	15
	4800,9600	#3701 and #6302	16
	1200,2400	#1550 and #6302	24
	4800,9600	#1550 and #6302	25
3276	600,1200,2400	#3701 w **#9491** and #6302	15
	4800,9600	#3701 w **#9491** and #6302	16
3651 25/75	4800	**#9126**	16*
3705-II	600,1200,2400	#4714	15
	4800,9600	#4714	16
3705-80	600,1200,2400	None	15
	4800,9600	None	16
3725	600,1200,2400	#4911	15
	4800,9600	#4911	16
3767	600,1200,2400	#3718 w **#9707** and **#9533**	15
4701	1200,2400	None	15
	4800,9600	None	16
4952,4953	1200,2400	#2090	15
4955,4959	4800,9600	#2080	16
6360	1200,2400	#3707	15
	4800,9600	#3707	16
6580-A04, B04	1200,2400	#3705	15
	4800,9600	#3705	16
6670	600,1200,2400	#3701	15
	4800	#3701	16
7426-2	600,1200,2400	None	15
	4800,9600	None	16
8101,8130, 8140,AXX BXX	600,1200,2400	FAC 17 (see Note)	15
	600,1200,2400	FAC 27 (see Note)	24
	4800,9600	FAC 17 (see Note)	16
	4800,9600	FAC 27 (see Note)	25
8140CXX	4800	#1621 and **#9688** (see Note)	16
8150	4800,9600	#1733 and **#9688** or #1734 and **#9698** (see Note)	16
8775	600,1200,2400	#3701	15
	4800,9600	#3701	16
	600,1200,2400	#1550	24
	4800,9600	#1550	25

Note: FAC 17 or 27 in the attaching 8101, 8130, 8140 AXX, BXX , #1621 on 8140 mdl C or #1733 or #1734 on 8150 without business machine clock.

SELECTED CONFIGURATIONS

Table 1
Selected Configuration Codes

Selected Configuration Feature Code	Quantity–Component.Feature Code
#1000	**No Communication Facilities**

Note: Additional required specified codes.

Power Plug/Cable: **#9890, #9891, #9986.**

3640 Attachment: **#9800.**

Programing Configuration: **#9700, #9710, #9720, #9730**

Optional feature codes: #4655-Keylock, Operator ... #6555-Keylock, Security Cover ... #6566-Security Lock, Diskette ... #1490-Storage Expansion, A3X.

8140 PROCESSOR MDLS B51-B72

PURPOSE

The 8140 Processor provides control, storage, processing capability, disk and diskette storage, and device attachment capabilities for the 8100 Information System.

MODELS

Model	Base Processor Storage (bytes)	Non-Removable Disk Capacity (million bytes)	Fixed Head Capacity (bytes)
B51	512K (524,288)	58MB (58,654,720)	131,072
B52	512K (524,288)	123MB (123,174,912)	131,072
B61	768K (786,432)	58MB (58,654,720)	131,072
B62	768K (786,432)	123MB (123,174,912)	131,072
B71	1024K (1,048,576)	58MB (58,654,720)	131,072
B72	1024K (1,048,576)	123MB (123,174,912)	131,072

Maximum: One per 8100 Information System.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8140 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8140 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions. Optional instructions are available for floating point arithmetic. Eight I/O interrupt levels provide for interrupt processing. The 8140 offers various amounts of bytes of processor storage. Depending on the mdl processor selected, processor storage can be up to a maximum of 1,024K (1,048,576 bytes). Capability for dynamic addressing and storage protection for up to 4 million bytes of logical storage is also available.

The 8140 mdls B51 through B72 allow for the attachment of up to four 8101 Storage and Input/Output Units, one of which may be configured with Communications and Display/Printer Features, or three 8101 Storage and Input/Output Units and one 8809 Magnetic Tape Unit mdl 1B. An alternate configuration can consist of an 8140, four 8101 Storage and Input/Output Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit mdl 1A or 1B.

The 8140 Processor is provided with fixed high-speed direct access storage. Disk storage of up to 123 million bytes with movable and fixed heads is available. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds, with an average rotational delay of 9.6 milliseconds. Removable diskette storage is available with up to 1MB (985,088 bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370, 4341 or 4381 Processors via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 System attaches to the ICA of the 115, 125, 135 or 138 Processors for BSC line control. The 8100 System can attach to the communications adapter of the 4321, 4331 or 4361 Processor for BSC and/or SDLC line control. For specific attachment, see M2700 pages.

The capability of the 8100 Information System is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8140 via communication features which include data link, direct-connect, and loops that are direct-attached or data link-attached. Up to 11 communication ports can be attached to the 8140 mdls B51 through B72.

Physical security is provided through the use of key locks on the operator panel, diskette drive and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8140 Processor is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8140. Customer setup instructions will be shipped with each machine. An 8140 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341 for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Selected Configurations: To ease the selection, configuring, ordering and installation of an 8140 Processor, several selected configurations have been developed. These selected configurations are designed to be applicable for the majority of customer installations. Both DPPX and DPCX are supported. The use of Selected Configurations is recommended. Traditional configuration selection and ordering should be used for configurations not included in the selected configurations.

Bibliography: GC20-8100.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 system to another, the user must consider address compatibility of the processor and its attachments. For further information, see *IBM 8100 Information System Site Planning Guide,* GA27-2884. For relocation/ replace kit ordering see "Relocate/Replace 8100 System Accessories".
- Upending: In the event the 8140-BXX must be placed on end to maneuver to the installation site, specify **#9840**. For additional ordering information associated with specify **#9840**, see Accessories "Upending Feature, 8140". **Field Installation:** Yes.
- Color: Pebble gray is the only available color.
- Cabling: For loop cabling information, see "Accessories" and the *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

  Communication cables must be ordered separately from the communication adapter features.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647.

  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 System.

  Maximum: One per 8100 System. **Field Installation:** Yes.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations. **Field Installation:** Yes.
- Voltage (AC, 1-phase, 3-wire, 60 Hz): Specify **#9884** for 208V, **#9894** for 240V. For conversion between 208V AC and 240V AC, contact your local CE representative. If standard 4.3 meter (14 foot) cable is not required, also specify **#9986** for 1.8 meter (6 foot) cable.

SPECIAL FEATURES

Performance: The maximum number of Features for Attaching Communications (**FAC**) capable of concurrent operation is a function of the speed of the line, communication facilities, the operating system installed and the application work load. The maximum number of communications features which can be physically installed can exceed the operational capability. Increased processor utilization will result from sustained operation of BSC (#1603 and #1604) at the maximum aggregate data rate and may cause degradation of activity operating at lower priority levels. Analysis should be performed to determine the impact.

Note: Use of BSC 8101-A2X feature #1605 instead of features #1603 or #1604 will significantly reduce processor utilization.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System publications are dependent on the presence of functional support modules provided by DPPX, DPCX. Operational and maintenance conditions for the 8100 System are predicated on the presence of these functional support modules. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Display And Printer, Add'l (#1506): Provides for the attachment of additional 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to four. **Maximum:** Five. **Field Installation:** Yes. **Prerequisites:** #3220.

Communication Attachment (#1701): Allows the expansion of communication capabilities to include ports 5-8 or 9-12. Additional special features for line control, communication interface and modems are required to complete each communication port selected. **Limitations:** Port positions 9-12 not available with Display and Printer Attachment (#3220), Magnetic Tape Attachment (#4901) or Floating Point (#3750). See Table 1 for additional information. **Maximum:** Order once for port positions 5-8. Order again for port positions 9-12.

8140 Processor Mdls B51-B72 (cont'd)

Field Installation: Yes. **Prerequisites:** #3901 for first #1701 (ports 5-8).

Display And Printer Attachment (#3220): Provides for the attachment of 3277 Displays, 3732 Text Displays and 3284, 3286, 3287, 3288 and 3736 Printers in any combination up to four. Can be expanded to a maximum of 24 devices with Display and Printer, Add'l (#1506). **Limitations:** Not available with Communication Attachment (#1701), ports 9-12, Magnetic Tape Attachment (#4901), or Communication Attachment (#1701) ports 5-8 and Floating Point (#3750). See Table 1 for additional information. **Maximum:** One per 8100 system. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1701 (ports 5-8).

Floating Point (#3750): Provides for execution of 30 floating point instructions and 32 floating point registers to improve performance of floating point operations. The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing and controlling the sign of short (4-byte) operands and long (8-byte) operands. **Limitations:** Not available with Communication Attachment (#1701) ports 9-12, or Display and Printer Attachment (#3220) with Communication Attachment (#1701) ports 5-8, or Magnetic Tape Attachment (#4901) with Communication Attachment (#1701) ports 5-8. **Maximum:** One. **Field Installation:** Yes.

Feature Expansion Prerequisite (#3901): Required for first Communication Attachment (#1701) ports 5-8 or Display and Printer Attachment (#3220) without Communication Attachment (#1701) or Magnetic Tape Attachment (#4901) without Communication Attachment (#1701). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1701 or #3220 or #4901.

Expanded Function Operator Panel (#4545): This feature provides operator access to processor storage, program stop and restart capability and current operating indicators. **Maximum:** One. **Field Installation:** Yes.

Magnetic Tape Attachment (#4901): Provides for the attachment of up to four 8809 Magnetic Tape Units, consisting of one 8809 mdl 1A plus two mdl 2s and one mdl 3. **Limitations:** Not available if the 8101 Storage and Input/Output Unit has the 8809 Magnetic Unit mdl 1A attached (#4521) or if 8809 mdl 1B is attached to the 8140 mdl BXX Processor. Not available with Display and Printer Attachment (#3220), Communication Attachment (#1701), ports 9-12, or Communication Attachment (#1701), ports 5-8 and Floating Point (#3750). See Table 1 for additional information. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1701 (ports 5-8).

Table 1

When configuring the 8140 for Communication, Display/Printer, Magnetic Tape attachments, the table below shows the combinations of these features that may be configured.

#3901 PLUS (#1701 or #3220 or #4901)

OR

#3901 PLUS #1701 PLUS (#1701 or #3220 or #4901)

Selected Configurations

The following table lists the appropriate selected configuration codes for each mdl and the communication capabilities for each selected configuration.

	CODE								
	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1
Description	**2**	**3**	**4**	**5**	**6**	**8**	**9**	**0**	**1**
8140 mdls B51, B52, B61, B62, B71, B72	x	x	x	x	x	x	x	x	x
Port 2 Dir Att Loop									
– 38.4KB	x	x	x	x	x	-	-	-	x
– 9.6KB	-	-	-	-	-	x	-	-	-
Port 3 Dir-Att Loop									
9.6KB	x	x	-	x	x	x	x	x	x
Port 4 Data Link									
9.6KB	x	x	x	x	x	x	x	x	x
Port 5 Data Link									
9.6KB	-	-	x	x	x	-	x	x	x
Port 6 Data Link									
9.6KB	-	-	-	-	-	-	-	x	x
Port 7 Dir-Att Loop									
9.6KB	-	x	-	-	x	-	-	-	-
Port 8 Data Link									
9.6KB	-	-	-	-	-	-	-	-	x

Notes:

1. Magnetic tape attachment to 8140, use 8809 mdl 1B.
2. Recommended DPPX configurations:
   - No less than 512K processor storage
   - No less than 58MB disk storage
   - Fixed Head feature in processor disk.

Selected Configuration Attachment (#1002): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 ... and an SDLC link up to 9600 bps in Port 4. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1003): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 ... an SDLC link up to 9600 bps in Port 4 ... and a single-lobe, 9600 bps loop in Port 7. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1004): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... and an SDLC link up to 9600 bps in Port 4 and Port 5. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1005): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 ... and an SDLC link up to 9600 bps in Port 4 and Port 5. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1006): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 ... an SDLC link up to 9600 bps in Port 4 and Port 5 ... and a single-lobe, 9600 bps loop in Port 7. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1008): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 ... and an SDLC link up to 9600 bps in Port 4. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1009): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 3 ... and an SDLC link up to 9600 bps in Port 4 and Port 5. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1010): Provides for the selection and attachment of one, single-lobe, 9600 bps loop in Port 3 ... and an SDLC link up to 9600 bps in Port 4, Port 5 and Port 6. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

Selected Configuration Attachment (#1011): Provides for the selection and attachment of one, single-lobe, 38,400 bps loop in Port 2 ... a 9600 bps, single-lobe loop in Port 3 and Port 7 ... and an SDLC link up to 9600 bps in Port 4, Port 5, Port 6 and Port 8. See Table 5 for component features. **Maximum:** One. **Field Installation:** Yes.

8140 Processor Mdls B51-B72 (cont'd)

COMMUNICATIONS and LOOPS

CCITT V.35 Interface (#1550): Provides interface to external modems/data communication equipment to 56,000 bps or Direct Connection at speeds up to 9600 bps and at 56,000 bps. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC codes 21, 31, 33, or two FAC codes 08, 09. **Maximum:** For speeds up to 9600 bps, one per selected Communication feature (#1601 or #1602). For operation at speeds greater than 9600 bps, one per 8140 or one per 8140/8101. **Field Installation:** Yes. **Prerequisites:** #1601 ... #1602 and #5200. **Specify:** Code as provided in FAC descriptions in the "Communication Capabilities" section. When ordering, use machine type 8101 or 8140. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the branch office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits:

The material required to perform machine relocation or processor replacement has been grouped into machine type-dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8140 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1 - Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8101	**4448550**	**4448551**	N/A
8140	**4448556**	**4448557**	**4448558**

* With packing material for units with upending feature **(#9840)** previously installed.

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2 - Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8140	**4448579**	**4448580**	**4448549**

* With packing material for units with upending feature **(#9840)** previously installed.

– Check for missing/damaged wrap plugs. If required, see "Wrap Plugs" below.

– If up-ending is required to position the 8140, see "Upending Feature - 8140" below.

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

Figure 3

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	**#3709**	**7389282**
DDSA	**#3717**	**6835350**
V.35 Modem	**#3718**	**6835348**
V.35 Direct Connect	**#3719**	**6835349**
V.35 Direct Connect PT TO PT	**#3720**	**6835642**
EIA Direct Connect	**#3721**	**6835642**
EIA Modem	**#3724**	**6835346**
Loop Station Adapter (Double Lobe)	**#3726**	**7389282**
	#3726	**7389282**
EIA Direct Connect PT to PT	**#3727**	**6835347**
X.21	**#3728**	**6835379**

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg

Upending Feature - 8140

Plant/Field feature **#9840** is required to upend the 8140. It consists of a reinforced left end cover, a removable wooden pallet and mounting straps and buckles. The wooden pallet, mounting straps and buckles should be removed during installation and stored for future use.

Ordering Instructions: See "Specify" for ordering **#9840.** When ordering replacement parts, order via IBM.

Replacement parts may be ordered separately and are listed below.

Pallet	P/N **4448587**
Mounting Reference Drawing	P/N **4448548**

SUPPLIES (None)

COMMUNICATION CAPABILITIES

There are a variety of Communication Facilities (see M2700 pages) supported by the 8140 mdls B51 through B72 Features for Attaching Communications **(FAC)** which differ in speed, protocol and attachment interfaces. These FAC codes have been categorized as LOOP, SDLC, BSC and Start/Stop. The user should select the desired communication FAC code and refer to the full special feature description and the FAC code description (identified by the abbreviation 'FAC No.') for additional details. Reference to switched communications in the FAC codes refers to the communication link between the 8100 System and the S/370.

The 8140 mdls B51 through B72 special features allow a maximum of 11 communication capabilities to be configured and designated as communication ports. Each communication port position (2 through 12) must consist of a communications feature for SDLC, BSC or Start/Stop.

Planning: When configuring communication ports for 8140 mdl B, thought should be given to possible future upgrades to 8140 mdl C in a network. These activities may be easier to implement if the port assignment capabilities of the 8140 mdls C (feature codes #1610 through #1614 plus #1620, #1621 and #1630) are studied first and the communication port assignment for the 8140 mdl B is then made in a way to minimize future reassignments and address changes.

The SDLC communications feature is available with and without business machine clock (#1601, #1602). The BSC/SS communications feature (#1603) is available with business machine clock and the BSC communications feature (#1604) is available without business machine clock. If an 8140 communication port is to provide the attached facility with business machine clock at speeds of 2400 bps or greater for FAC 44 or 4800 bps or greater for other FAC codes. the Multi-Speed Clock feature (#5200) is required.

In addition to selecting a communications feature (#1601, #1602, #1603, #1604) for each port configured in an 8140, a communication interface or integrated modem must be selected to support the Communication Facility attaching to that port. A two-lobe loop port requires three special features (#1602, #4830 and #4835). Direct connect at 2400, (FAC 44 only) 4800, 9600 and 56,000 bps requires the Multi-Speed Clock feature (#5200). Each port of the 8140 also requires the selection of a specify code to indicate the System 8100 FAC code selected for that port. Certain System 8100 FAC Codes will require a second specify code to select options available within that facility: 2/4-wire or line speed.

Note: Within a given FAC, the selected option (2/4 wire, LPDA or line speed) can be changed in the field by the CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a FAC and its associated feature and specify codes must identify the original codes ordered from the factory.

Specify and FAC Code Descriptions: A specify code number is required to identify the selected FAC Code and its physical port position. The specify code is constructed by concatenating the selected FAC and its port position to the numeral **9** or **8** (where "9" is

8140 Processor Mdls B51-B72 (cont'd)

for ports 2 through 8 and "8" for ports 9 through 12), e.g., **#9ABC** or **#8ABC** where AB = FAC No. and C = Port Position.

FAC codes range in number from 08 to 61. Additional codes may be specified for selected options. These codes are outlined in the FAC code descriptions. No two FAC codes can occupy the same port position. *Configuration Manual,* GA27-2876, will aid in assigning the port positions.

LOOP

FAC No.	FAC Code Description
FAC 08	Loop, high-speed single-lobe at 38,400 bps
FAC 09	Loop, high-speed two-lobe at 38,400 bps
FAC 10	Loop, single-lobe at 9600 bps
FAC 11	Loop, two-lobe at 9600 bps

FAC 08 Loop High-Speed, Single-Lobe: Required for operating a loop at 38,400 bps. **Limitations:** If two 08 FAC codes are specified, FAC codes 09, 21, 26, 28, 29, 31, or 33 are not available. **Maximum:** Two per 8140 or two per 8140/8101. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9082	**#9083**	**#9084**	**#9085**	**#9086**

Port	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
	#9087	**#9088**	**#8081**	**#8082**	**#8083**	**#8084**

FAC 09 Loop High-Speed, Two-Lobe: Required for operating a two-lobe loop at 38,400 bps. **Limitations:** If two 09 FAC codes are specified, FAC codes 08, 21, 26, 28, 29, x31, or 33 are not available. **Maximum:** Two per 8140 or two per 8140/8101. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required code to complete the configuration for the port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9092	**#9093**	**#9094**	**#9095**	**#9096**

Port	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
	#9097	**#9098**	**#8091**	**#8092**	**#8093**	**#8094**

FAC 10 Loop, Single-Lobe: Required for operating a loop at 9600 bps. **Prerequisites:** #1602 and #4830. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9102	**#9103**	**#9104**	**#9105**	**#9106**

Port	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
	#9107	**#9108**	**#8101**	**#8102**	**#8103**	**#8104**

FAC 11 Loop, Two-Lobe: Required for operating two-lobe loops at 9600 bps. **Prerequisites:** #1602, #4830 and #4835. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected. **Maximum:** Three, one for ports 2-4, one for ports 5-8 and one for ports 9-12. Two with FAC 09.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9112	**#9113**	**#9114**	**#9115**	**#9116**

Port	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
	#9117	**#9118**	**#8111**	**#8112**	**#8113**	**#8114**

SDLC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 12	600 or 1200 bps (External modem)
FAC 13	Up to 9600 bps (External modem)
FAC 15	600, 1200 or 2400 bps Direct connection with clock (No modem)
FAC 16	4800 or 9600 bps Direct connection with clock (No modem)
FAC 17	Direct connection without clock
Integrated Modem	
FAC 18	600 or 1200 bps nonswitched
FAC 19	600 or 1200 bps switched with auto answer
AT&T Dataphone® Digital Service	
FAC 20	2400, 4800 or 9600 bps nonswitched
FAC 21	56,000 bps nonswitched
CCITT V.35	
FAC 24	Direct connection with clock (No modem) 600, 1200 or 2400 bps
FAC 25	Direct connection with clock (No modem) 4800 or 9600 bps
FAC 26	Direct connection with clock (No modem) 56,000 bps
FAC 27	Direct connection without clock (No modem) 9600 bps
FAC 28	Direct connection without clock (No modem) 56,000 bps
FAC 29	Up to 56,000 bps nonswitched
CCITT X.21	
FAC 30	Up to 9600 bps nonswitched
FAC 31	48,000 bps nonswitched
FAC 32	Up to 9600 bps switched
FAC 33	48,000 bps switched

FAC 12 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem without clocking - and point-to-point switched 2-wire - or point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
600 bps	**#9122**	**#9123**	**#9124**	**#9125**	**#9126**
1200 bps	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**
	#9752	**#9753**	**#9754**	**#9755**	**#9756**

Port	Port 7	Port 8
	#9127	**#9128**
600 bps	**#9747**	**#9748**
1200 bps	**#9757**	**#9758**

FAC 13 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - with external data communication equipment and clock - point-to-point switched with auto answer to 4800 bps - point-to-point nonswitched 2- or 4-wire - or multipoint 4-wire. **Prerequisites:** #1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
LPDA	**#9132**	**#9133**	**#9134**	**#9135**	**#9136**
	#9802	**#9803**	**#9804**	**#9805**	**#9806**

Port	Port 7	Port 8
	#9137	**#9138**
LPDA	**#9807**	**#9808**

FAC 15 EIA RS-232-C Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1601 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9152	**#9153**	**#9154**	**#9155**	**#9156**
600 bps	**#9742**	**#9743**	**#9744**	**#9745**	**#9746**
1200 bps	**#9752**	**#9753**	**#9754**	**#9755**	**#9756**
2400 bps	**#9762**	**#9763**	**#9764**	**#9765**	**#9766**

Port	Port 7	Port 8
	#9157	**#9158**
600 bps	**#9747**	**#9748**
1200 bps	**#9757**	**#9758**
2400 bps	**#9767**	**#9768**

FAC 16 EIA RS-232-C Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1602, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection Port	Port 2	Port 3	Port 4	Port 5	Port 6
	#9162	**#9163**	**#9164**	**#9165**	**#9166**
4800 bps	**#9772**	**#9773**	**#9774**	**#9775**	**#9776**
9600 bps	**#9782**	**#9783**	**#9784**	**#9785**	**#9786**

Port	Port 7	Port 8
	#9167	**#9168**
4800 bps	**#9777**	**#9778**
9600 bps	**#9787**	**#9788**

FAC 17 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 40 feet. **Prerequisites:**

8140 Processor Mdls B51-B72 (cont'd)

#1602 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9172	#9173	#9174	#9175	#9176
	Port 7	Port 8				
Port	#9177	#9178				

FAC 18 Integrated Modem: 600 or 1200 bps - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Prerequisites:** #1601 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9182	#9183	#9184	#9185	#9186
2-wire						
600 bps		#9852	#9853	#9854	#9855	#9856
1200 bps		#9862	#9863	#9864	#9865	#9866
4-wire						
600 bps		#9742	#9743	#9744	#9745	#9746
1200 bps		#9752	#9753	#9754	#9755	#9756
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9187	#9188	#8181	#8182	#8183	#8184
2-wire						
600 bps	#9857	#9858	#8851	#8852	#8853	#8854
1200 bps	#9867	#9868	#8861	#8862	#8863	#8864
4-wire						
600 bps	#9747	#9748	#8741	#8742	#8743	#8744
1200 bps	#9757	#9758	#8751	#8752	#8753	#8754

FAC 19 Integrated Modem: 600 or 1200 bps - point-to-point switched with auto answer 2-wire. **Prerequisites:** #1601 and #5501. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9192	#9193	#9194	#9195	#9196
600 bps		#9742	#9743	#9744	#9745	#9746
1200 bps		#9752	#9753	#9754	#9755	#9756
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9197	#9198	#8191	#8192	#8193	#8194
600 bps	#9747	#9748	#8741	#8742	#8743	#8744
1200 bps	#9757	#9758	#8751	#8752	#8753	#8754

FAC 20 Digital Network Interface (to AT&T Dataphone® Digital Service): 2400, 4800, 9600 bps without business machine clock - and 4-wire point-to-point nonswitched - or multipoint nonswitched. **Prerequisites:** #1602, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9202	#9203	#9204	#9205	#9206
2400 bps		#9762	#9763	#9764	#9765	#9766
4800 bps		#9772	#9773	#9774	#9775	#9776
9600 bps		#9782	#9783	#9784	#9785	#9786
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9207	#9208	#8201	#8202	#8203	#8204
2400 bps	#9767	#9768	#8761	#8762	#8763	#8764
4800 bps	#9777	#9778	#8771	#8772	#8773	#8774
9600 bps	#9787	#9788	#8781	#8782	#8783	#8784

FAC 21 Digital Network Interface (to AT&T Dataphone® Digital Service): 56,000 bps without business machine clock - and point-to-point or multipoint nonswitched operation. **Limitations:** Mutually exclusive with FAC codes 26, 28, 29, 31, 33 or two FAC codes 08, 09. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9212	#9213	#9214	#9215	#9216
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9217	#9218	#8211	#8212	#8213	#8214

FAC 24 CCITT V.35 Interface: 600, 1200 or 2400 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1601 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9242	#9243	#9244	#9245	#9246
600 bps		#9742	#9743	#9744	#9745	#9746
1200 bps		#9752	#9753	#9754	#9755	#9756
2400 bps		#9762	#9763	#9764	#9765	#9766
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9247	#9248	#8241	#8242	#8243	#8244
600 bps	#9747	#9748	#8741	#8742	#8743	#8744
1200 bps	#9757	#9758	#8751	#8752	#8753	#8754
2400 bps	#9767	#9768	#8761	#8762	#8763	#8764

FAC 25 CCITT V.35 Interface: 4800 or 9600 bps with business machine clock - operating with no modem (attached machine must not provide business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9252	#9253	#9254	#9255	#9256
4800 bps		#9772	#9773	#9774	#9775	#9776
9600 bps		#9782	#9783	#9784	#9785	#9786
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9257	#9258	#8251	#8252	#8253	#8254
4800 bps	#9777	#9778	#8771	#8772	#8773	#8774
9600 bps	#9787	#9788	#8781	#8782	#8783	#8784

FAC 26 CCITT V.35 Interface: 56,000 bps with business machine clock - operating with no modem - and direct connection up to 1,000 feet or up to a total cable length of 200 feet to a 3705. **Limitations:** Mutually exclusive with FAC codes 21, 28, 29, 31, 33 or two FAC codes 08, 09. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602, #1550 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9262	#9263	#9264	#9265	#9266
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9267	#9268	#8261	#8262	#8263	#8264

FAC 27 CCITT V.35 Interface: Up to 9600 bps without business machine clock - operating with other 8100 System (with business machine clock) - and direct connection up to 1,000 feet. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9272	#9273	#9274	#9275	#9276
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9277	#9278	#8271	#8272	#8273	#8274

FAC 28 CCITT V.35 Interface: 56,000 bps without business machine clock - operating with no modem - and direct connection up to 1,000 feet to another 8100 System (with business machine clock). **Limitations:** Mutually exclusive with FAC codes 21, 26, 29, 31, 33 or two FAC codes 08, 09. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9282	#9283	#9284	#9285	#9286
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9287	#9288	#8281	#8282	#8283	#8284

FAC 29 CCITT V.35 Interface: Up to 56,000 bps without business machines clock and external data communication equipment with clock, and point-to-point or multipoint nonswitched. **Limitations:** Operation at speeds greater than 9600 bps is mutually exclusive with FAC codes 21, 26, 28, 31, 33 or two FAC codes 08, 09. **Maximum:** For operation at speeds greater than 9600 bps, one per 8140 or one per 8140/8101. **Prerequisites:** #1602 and #1550. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9292	#9293	#9294	#9295	#9296
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9297	#9298	#8291	#8292	#8293	#8294

FAC 30 CCITT X.21 Interface: Up to 9600 bps without business machine clock and 4-wire point-to-point nonswitched or multipoint nonswitched. **Prerequisites:** #1602 and #5655. **Specify:** From the

8140 Processor Mdls B51-B72 (cont'd)

table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9302	#9303	#9304	#9305	#9306
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9307	#9308	#8301	#8302	#8303	#8304

FAC 31 CCITT X.21 Interface: 48,000 bps without business machine clock and point-to-point or multipoint nonswitched operation. **Limitations:** Mutually exclusive with FAC codes 21, 26, 28, 29, 33 or two FAC codes 08, 09. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602 and #5655. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9312	#9313	#9314	#9315	#9316
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9317	#9318	#8311	#8312	#8313	#8314

FAC 32 CCITT X.21 Interface: Up to 9600 bps without business machine clock and switched with auto answer and auto call. **Prerequisites:** #1602 and #5656. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9322	#9323	#9324	#9325	#9326
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9327	#9328	#8321	#8322	#8323	#8324

FAC 33 CCITT X.21 Interface: Up to 48,000 bps without business machine clock and switched with auto answer and auto call. **Limitations:** Mutually exclusive with FAC codes 21, 26, 28, 29, 31 or two FAC codes 08, 09. One per 8140 or one per 8140/8101. **Maximum:** One per 8140 or one per 8140/8101. **Prerequisites:** #1602 and #5656. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9332	#9333	#9334	#9335	#9336
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9337	#9338	#8331	#8332	#8333	#8334

BSC

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 40	600 or 1200 bps (External modem)
FAC 41	Up to 9600 bps (External modem)
FAC 44	2400, 4800 or 9600 bps direct connection with clock (No modem)
Integrated Modem	
FAC 45	600 or 1200 bps nonswitched
AT&T Dataphone® Digital Service	
FAC 47	2400, 4800 or 9600 bps nonswitched

FAC 40 EIA RS-232-C Interface: 600 or 1200 bps with business machine clock - operating with external modem with no clock - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** BSC mutually exclusive with 8101-A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9402	#9403	#9404	#9405	#9406
600 bps		#9742	#9743	#9744	#9745	#9746
1200 bps		#9752	#9753	#9754	#9755	#9756
	Port 7	Port 8				
Port	#9407	#9408				
600 bps	#9747	#9748				
1200 bps	#9757	#9758				

FAC 41 EIA RS-232-C Interface: Up to 9600 bps without business machine clock - operating with external data communication equipment - and point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** BSC mutually exclusive with 8101-A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1604 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9412	#9413	#9414	#9415	#9416
	Port 7	Port 8				
Port	#9417	#9418				

FAC 44 EIA RS-232-C Interface: 2400, 4800 or 9600 bps with business machine clock - operating with no modem (attached downstream terminal must not provide business machine clock) - and direct connection up to 40 feet. **Limitation:** BSC mutually exclusive with 8101-A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1604, #3701 and #5200. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9442	#9443	#9444	#9445	#9446
2400 bps		#9762	#9763	#9764	#9765	#9766
4800 bps		#9772	#9773	#9774	#9775	#9776
9600 bps		#9782	#9783	#9784	#9785	#9786
	Port 7	Port 8				
Port	#9447	#9448				
2400 bps	#9767	#9768				
4800 bps	#9777	#9778				
9600 bps	#9787	#9788				

FAC 45 Integrated Modem: 600 or 1200 bps - point-to-point nonswitched 2- or 4-wire - or multipoint nonswitched 4-wire. **Limitation:** BSC mutually exclusive with 8101-A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1603 and #5500. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9452	#9453	#9454	#9455	#9456
2-wire						
600 bps		#9852	#9853	#9854	#9855	#9856
1200 bps		#9862	#9863	#9864	#9865	#9866
4-wire						
600 bps		#9742	#9743	#9744	#9745	#9746
1200 bps		#9752	#9753	#9754	#9755	#9756
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9457	#9458	#8451	#8452	#8453	#8454
2-wire						
600 bps	#9857	#9858	#8851	#8852	#8853	#8854
1200 bps	#9867	#9868	#8861	#8862	#8863	#8864
4-wire						
600 bps	#9747	#9748	#8741	#8742	#8743	#8744
1200 bps	#9757	#9758	#8751	#8752	#8753	#8754

FAC 47 Digital Network Interface (to AT&T Dataphone ® Digital Service): 2400, 4800 or 9600 bps without business machine clock - 4-wire point-to-point nonswitched - or multipoint nonswitched. **Limitation:** BSC mutually exclusive with 8101-A2X FAC codes 42 or 46 on an 8100 system. **Prerequisites:** #1604, #5660. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection		Port 2	Port 3	Port 4	Port 5	Port 6
Port		#9472	#9473	#9474	#9475	#9476
2400 bps		#9762	#9763	#9764	#9765	#9766
4800 bps		#9772	#9773	#9774	#9775	#9776
9600 bps		#9782	#9783	#9784	#9785	#9786
	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Port	#9477	#9478	#8471	#8472	#8473	#8474
2400 bps	#9767	#9768	#8761	#8762	#8763	#8764
4800 bps	#9777	#9778	#8771	#8772	#8773	#8774
9600 bps	#9787	#9788	#8781	#8782	#8783	#8784

START/STOP

FAC No.	FAC Code Description
EIA RS-232-C	
FAC 60	110, 134.5, 150, 300 or 600 bps (External modem)
FAC 61	110, 134.5, 150, 300 or 600 bps Direct connection with clock (No modem)

FAC 60 EIA RS-232-C Interface: 110, 134.5, 150, 300 and 600 bps with business machine clock - operating with external modem - and point-to-point nonswitched facilities. See M2700 pages for specific

8140 Processor Mdls B51-B72 (cont'd)

information on communication facilities and other attachment information. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9602	#9603	#9604	#9605	#9606
110 bps	#9702	#9703	#9704	#9705	#9706
134.5 bps	#9712	#9713	#9714	#9715	#9716
150 bps	#9722	#9723	#9724	#9725	#9726
300 bps	#9732	#9733	#9734	#9735	#9736
600 bps	#9742	#9743	#9744	#9745	#9746

	Port 7	Port 8
Port	#9607	#9608
110 bps	#9707	#9708
134.5 bps	#9717	#9718
150 bps	#9727	#9728
300 bps	#9737	#9738
600 bps	#9747	#9748

FAC 61 EIA RS-232-C Interface: 110, 134.5, 150, 300 and 600 bps with business machine clock - operating with no modem (the attached terminal must provide its own business machine clock) - and direct connection up to 40 feet. **Prerequisites:** #1603 and #3701. **Specify:** From the table below, specify the required codes to complete the configuration for each port selected.

FAC Specify Selection	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9612	#9613	#9614	#9615	#9616
110 bps	#9702	#9703	#9704	#9705	#9706
134.5 bps	#9712	#9713	#9714	#9715	#9716
150 bps	#9722	#9723	#9724	#9725	#9726
300 bps	#9732	#9733	#9734	#9735	#9736
600 bps	#9742	#9743	#9744	#9745	#9746

	Port 7	Port 8
Port	#9617	#9618
110 bps	#9707	#9708
134.5 bps	#9717	#9718
150 bps	#9727	#9728
300 bps	#9737	#9738
600 bps	#9747	#9748

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can attach directly to the processor:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8101 Storage and Input/Output Unit
8809 Magnetic Tape Unit

Loop-Attached Devices: The following devices can attach to a direct-attached loop or to a data link-attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of the 8100 FAC codes.

Device and Mdl	Loop Attachment: Direct At 9600 bps	Direct At 38400 bps	Data Link At 2400, 4800,9600 bps
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit 51C,61C with:	X	X	X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 3,13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4,5			
- 3279 Color Display Unit 2A,2B,3A,3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3276 Control Unit Display Station 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4			
- 3279 Color Display 2A,2B,3A,3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3287 Printer 11,12	X	X	X
3289 Printer 3 with:	(1)		(1)
- 2502 Card Reader A1*			
- 3501 Card Reader			
- 3521 Carder Punch*			
(*Requires 3782 Attachment Unit)			
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 E01,E02	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

(1) Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM Information System Configurator,* GA27-2876, for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3101 Display Terminal mdls 10, 12, 13
3232 Keyboard Printer mdl 1
3232 Keyboard Printer mdl 51
3274 Control Unit mdl 51C, 61C with:
- 3230 Printer mdl 2
- 3262 Printer mdls 3, 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4
  (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
  (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3600 Finance Communication Controllers
3630 Plant Communication Controllers
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4700 Finance Communication Controllers
4952,4954,4955,4959 Processor (series/1)
5150 IBM Personal Computer
5285,5288 Programmable Data Stations
6360,6580 Displaywriter (3270 DSC Mode only)
6670 Information Distributor
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
7426 Terminal Interface Unit mdl 2, with associated terminals
8775 Display Terminal mdls 11, 12

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using SDLC (FAC 15, 16, 17, 24, 25, 27 or 28), BSC (FAC 44) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide,* GA27-2884, will assist in the selection of direct connect cables.

8140 Processor Mdls B51-B72 (cont'd)

Attaching Device	Speeds bps	Attaching Device Feature No.	8100 FAC CODE
2741	134.5	#9114 and #3255	61
Devices Conforming to 2780/3780 Line Protocol	2400,4800, 9600	Refer to specific device	44
3101	110,150,300, 600	None required	61
3232-1	1200,2400 4800,9600	None None	15 16
3232-51	300,600	None	61
3274-51C, 61C	1200,2400 4800,9600	#3701 and #6302 #3701 and #6302	15 16
	1200,2400 4800,9600 56,000	#1550 and #6302 #1550 and #6302 #1550 and #6303	24 25 26
3276	600,1200,2400 4800,9600	#3701 w **#9491** and #6302 #3701 w **#9491** and #6302	15 16
3651-25/75	4800	**#9126**	16*
3705-II	600,1200,2400 4800,9600 56,000	#4714 #4714 #4720	15 16 26
3705-80	600,1200,2400 4800,9600 56,000	None None #6712	15 16 26
3725	600,1200,2400 4800,9600	#4911 #4911	15 16
3767	600,1200,2400	#3718 w **#9707** and **#9533**	15
4701	1200,2400 4800,9600	None None	15 16
4952,4954, 4955,4959	1200,2400 4800,9600	#2090 #2090	15 16
6360	1200,2400,2400 4800,9600	#3707 #3707	15 16
6580-AO4, BO4	1200,2400 4800,9600	#3705 #3705	15 16
6670	600,1200,2400 4800	#3701 #3701	15 16
7426-2	600,1200,2400 4800,9600	None None	15 16
8101,8130, 8140-AXX 8140-AXX BXX	600,1200,2400 600,1200,2400 4800,9600 4800,9600	FAC 17 (see Note) FAC 27 (see Note) FAC 17 (see Note) FAC 27 (see Note)	15 24 16 25
8140-CXX	4800	#1621 and **#9688** (see Note)	16
8101 8140-BXX	56,000	FAC 28 (see Note)	26
8140-CXX	56,000	#1614 and **#9683** (see Note)	26
8150	4800,9600	#1733 and **#9688** or #1734 and **#9698** (see Note)	16
	56,000	#1742 and **#9682** or #1745 and **#9693** (see Note)	26
8775	600,1200,2400 4800,9600 600,1200,2400 4800,9600	#3701 #3701 #1550 #1550	15 16 24 25

Note: FAC 17, 27 or 28 in the attaching 8101, 8130, 8140-AXX, BXX or #1614, #1621 on 8140 mdl C, or 8150 with #1733, #1734, #1742 or #1745 without business machine clock.

*Specify **#9770** is available to facilitate problem determination.

SELECTED CONFIGURATIONS

Table 5
8140 Mdl B51, B52, B61, B62, B71, B72
Selected Configuration Codes

Selected Configuration Feature Code	Quantity–Component Feature Code
#1002	3-#1602, 1-#3701, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**
#1003	4-#1602, 1-#1701, 1-#3701, 1-#3901, 3-#4830, 1-**#9082**, 1-**#9103**, 1-**#9107**, 1-**#9134**
#1004	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-**#9082**, 1-**#9134**, 1-**#9135**
#1005	4-#1602, 1-#1701, 2-#3701, 1-#3901, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**, 1-**#9135**
#1006	5-#1602, 1-#1701, 2-#3701, 1-#3901, 3-#4830, 1-**#9082**, 1-**#9103**, 1-**#9107**, 1-**#9134**, 1-**#9135**
#1008	3-#1602, 1-#3701, 2-#4830, 1-**#9102**, 1-**#9103**, 1-**#9134**
#1009	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-**#9103**, 1-**#9134**, 1-**#9135**
#1010	4-#1602, 1-#1701, 3-#3701, 1-#3901, 1-#4830, 1-**#9103**, 1-**#9134**, 1-**#9135**, 1-**#9136**
#1011	6-#1602, 1-#1701, 4-#3701, 1-#3901, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**, 1-**#9135**, 1-**#9136**, 1-**#9138**

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Power/Plug: **#9884**, **#9894**.

6-foot Cable: **#9986**

3640 Attachment: **#9800**

Programming Configuration: **#9700**, **#9710**, **#9720**, **#9730**

Floating Point: #3750

8140 Processor Mdls B51-B72 (cont'd)

FAC Specify Selection	Port 2	Port 3	Port 4	Port 5	Port 6
Port	#9612	#9613	#9614	#9615	#9616
110 bps	#9702	#9703	#9704	#9705	#9706
134.5 bps	#9712	#9713	#9714	#9715	#9716
150 bps	#9722	#9723	#9724	#9725	#9726
300 bps	#9732	#9733	#9734	#9735	#9736
600 bps	#9742	#9743	#9744	#9745	#9746

	Port 7	Port 8
Port	#9617	#9618
110 bps	#9707	#9708
134.5 bps	#9717	#9718
150 bps	#9727	#9728
300 bps	#9737	#9738
600 bps	#9747	#9748

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can attach directly to the processor:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8101 Storage and Input/Output Unit
8809 Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the IBM 8100 Information System configurator GA27-2876 for selection of the 8100 FAC codes.

Device and Mdl	Loop Attachment: Direct At 9600 bps	Direct At 38400 bps	Data Link At 2400, 4800,9600 bps
3104 Display Terminal B1, B2	X	X	X
3230 Printer 1	X	X	X
3232 Keyboard Printer Terminal mdl 11	X	X	X
3262 Printer 2,12	(1)	X	(1)
3268 Printer 1	X	X	X
3274 Control Unit 51C,61C with:	X	X	X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 3,13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4,5			
- 3279 Color Display Unit 2A,2B,3A,3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3276 Control Unit Display Station 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3230 Printer 2			
- 3262 Printer 13			
- 3268 Printer 2			
- 3278 Display Station 1,2,3,4			
- 3279 Color Display 2A,2B,3A,3B			
- 3287 Printer 1,2,1C,2C			
- 3289 Printer 1,2			
3287 Printer 11,12	X	X	X
3289 Printer 3 with:	(1)		(1)
- 2502 Card Reader A1*			
- 3501 Card Reader			
- 3521 Carder Punch*			
(*Requires 3782 Attachment Unit)			
3641 Reporting Terminal 1,2	X		X
3642 Encoder Printer 1,2	X		X
3643 Keyboard Display 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 E01,E02	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note: 1 Dedication of a 9600 bps single-lobe loop to the attachment of the 3289-3, 3262-2 or 3262-12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data see the M2700 pages and appropriate machine pages for additional information. Refer to the IBM Information System Configurator GA27-2876 for selection of 8100 FAC codes.

Devices conforming to TTY 33/35 or equivalent
2741 Communication Terminal
Terminals conforming to 2780/3780 line protocol
3101 Display Terminal mdls 10, 12, 13
3232 Keyboard Printer mdl 1
3232 Keyboard Printer mdl 51
3274 Control Unit mdl 51C, 61C with:
- 3230 Printer mdl 2
- 3262 Printer mdls 3, 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer 2
- 3278 Display Station mdls 1, 2, 3, 4 (See M3276 for configuration details.)
- 3279 Color Display Station mdls 2A, 2B, 3A, 3B (Not supported on 3276 mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2

3600 Finance Communication Controllers
3630 Plant Communication Controllers
3651 Store Controllers mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4700 Finance Communication Controllers
4952,4954,4955,4959 Processor (series/1)
5150 IBM Personal Computer
5285,5288 Programmable Data Stations
6360,6580 Displaywriter (3270 DSC Mode only)
6670 Information Distributor
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
7426 Terminal Interface Unit mdl 2, with associated terminals
8775 Display Terminal mdls 11, 12

Direct Connection Attachment: In addition to terminal attachment to 8100 System through common carrier facilities (see M2700 pages) or local loops, attachment can be made by direct connect. The direct connect is made by using SDLC (FAC 15, 16, 17, 24, 25, 27 or 28), BSC (FAC 44) and Start/Stop (FAC 61). Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide* GA27-2884 will assist in the selection of direct connect cables.

Attaching Device	Speeds bps	Attaching Device Feature No.	8100 FAC CODE
2741	134.5	#9114 and #3255	61
Devices Conforming to 2780/3780 Line Protocol	2400,4800, 9600	Refer to specific device	44
3101	110,150,300, 600	None required	61
3232-1	1200,2400	None	15
	4800,9600	None	16
3232-51	300,600	None	61
3274-51C, 61C	1200,2400	#3701 and #6302	15
	4800,9600	#3701 and #6302	16
	1200,2400	#1550 and #6302	24
	4800,9600	#1550 and #6302	25
	56,000	#1550 and #6303	26
3276	600,1200,2400	#3701 w #9491 and #6302	15
	4800,9600	#3701 w #9491 and #6302	16
3651 25/75	4800	#9126	16*
3705-II	600,1200,2400	#4714	15
	4800,9600	#4714	16
	56,000	#4720	26

8140 Processor Mdls B51-B72 (cont'd)

3705-80	600,1200,2400 4800,9600	None None	15 16
	56,000	#6712	26
3725	600,1200,2400 4800,9600	#4911 #4911	15 16
3767	600,1200,2400	#3718 w **#9707** and **#9533**	15
4701	1200,2400 4800,9600	None None	15 16
4952,4954 4955,4959	1200,2400 4800,9600	#2090 #2090	15 16
6360	1200,2400,2400 4800,9600	#3707 #3707	15 16
6580-AO4, BO4	1200,2400 4800,9600	#3705 #3705	15 16
6670	600,1200,2400 4800	#3701 #3701	15 16
7426-2	600,1200,2400 4800,9600	None None	15 16
8101,8130, 8140 AXX BXX	600,1200,2400 600,1200,2400 4800,9600 4800,9600	FAC 17 (see note) FAC 27 (see note) FAC 17 (see note) FAC 27 (see note)	15 24 16 25
8140 CXX	4800	#1621 and **#9688** (see note)	16
8101,8140 BXX	56,000	FAC 28 (see note)	26
8140 CXX	56,000	#1614 and **#9683** (see note)	26
8775	600,1200,2400 4800,9600 600,1200,2400 4800,9600	#3701 #3701 #1550 #1550	15 16 24 25

Note: FAC 17, 27 or 28 in the attaching 8101, 8130, 8140 AXX, BXX or #1614, #1621 on 8140 mdl C without business machine clock.

*Specify **#9770** is available to facilitate problem determination.

SELECTED CONFIGURATIONS

Table 5
8140 Mdl B51, B52, B61, B62, B71, B72
SELECTED CONFIGURATION CODES

Selected Configuration Feature Code	Quantity–Component Feature Code
#1002	3-#1602, 1-#3701, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**
#1003	4-#1602, 1-#1701, 1-#3701, 1-#3901, 3-#4830, 1-**#9082**, 1-**#9103**, 1-**#9107**, 1-**#9134**
#1004	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-**#9082**, 1-**#9134**, 1-**#9135**
#1005	4-#1602, 1-#1701, 2-#3701, 1-#3901, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**, 1-**#9135**
#1006	5-#1602, 1-#1701, 2-#3701, 1-#3901, 3-#4830, 1-**#9082**, 1-**#9103**, 1-**#9107**, 1-**#9134**, 1-**#9135**
#1008	3-#1602, 1-#3701, 2-#4830, 1-**#9102**, 1-**#9103**, 1-**#9134**
#1009	3-#1602, 1-#1701, 2-#3701, 1-#3901, 1-#4830, 1-**#9103**, 1-**#9134**, 1-**#9135**
#1010	4-#1602, 1-#1701, 3-#3701, 1-#3901, 1-#4830, 1-**#9103**, 1-**#9134**, 1-**#9135**, 1-**#9136**
#1011	6-#1602, 1-#1701, 4-#3701, 1-#3901, 2-#4830, 1-**#9082**, 1-**#9103**, 1-**#9134**, 1-**#9135**, 1-**#9136**, 1-**#9138**

Note: Only the appropriate codes listed below may be specified in addition to the Selected Configuration code.

Power/Plug: **#9884, #9894.**

6 foot Cable: **#9986.**

3640 Attachment: **#9800**

Programming Configuration: **#9700, #9710, #9720, #9730**

Floating Point: #3750

8140 PROCESSOR MDLS C72, C82, C92

PURPOSE

The 8140 Processor provides control, storage, processing capability, disk and diskette storage, and device or communication attachment capabilities for the 8100 Information System.

MODELS

Model	Base Processor Storage (bytes)	Non-Removable Disk Capacity (bytes)	Fixed Head Capacity (bytes)
C72	1024K (1,048,576)	123MB (123,174,192)	131,072
C82	1536K (1,572,864)	123MB (123,174,192)	131,072
C92	2048K (2,097,152)	123MB (123,174,192)	131,072

Maximum: One per 8100 Information System.

Customer Setup (CSU): Machine only

HIGHLIGHTS

The 8140 Processor is a multi-level, interrupt-driven processor which provides control, proccessing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8140 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions. Optional instructions are available for floating point arithmetic. Eight I/O interrupt levels provide for interrupt processing. The 8140 C mdls offer three processor storage sizes. Depending on the mdl of the processor selected, processor storage can be up to a maximum of 2048K (2,097,152) bytes. Capability for dynamic addressing and storage protection for up to 16 million bytes of logical storage is available. The 8140 Processor mdls C72, C82 and C92 storage makes use of the Error Correction Code (ECC) to provide single-error and double-error detection capability.

The 8140 mdls C72, C82 and C92 allow for the attachment of up to four 8101 Storage and Input/Output Units, or three 8101 Storage and Input/Output Units and one 8809 Magnetic Tape Unit mdl 1B. One 8101 I/O unit may be configured with Communications and Display/Printer features. An alternate configuration can consist of an 8140, four 8101 Storage and Input/Output Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit mdl 1A or 1B.

The 8140 C mdls Processor is provided with fixed high-speed direct access disk storage of 123 million bytes (consisting of two volumes) with movable and fixed heads. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage is provided with up to 1MB (985,088 bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370 or 4341 processor via the 3704, 3705, or 3725 for SNA/SDLC or BSC line control. The 8100 System can attach to the communications adapter of the 4321 or 4331 Processor for SDLC or BSC line control. For specific attachment, see M2700 pages.

The capability of the 8100 Information System is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8140 via communication port features which include data link, direct connect, and loops that are direct attached or data link attached. Up to ten communication and loop ports can be configured in the 8140 mdls C72, C82 and C92.

Physical security is provided through the use of keylocks on the operator panel, diskette drive and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8140 Processor is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8140. Customer setup instructions will be shipped with each machine. An 8140 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Bibliography: GC20-8100.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Specify **#9884** for 208V or **#9894** for 240V. For conversion between 208V AC and 240V AC, contact your Local customer engineering representative. If standard 4.3 meter (14 foot) cable is not required, also specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only available color.
- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 System to another, the user must consider address compatibility of the processor and its attachments. For further information, see *IBM 8100 Information System Site Planning Guide,* GA27-2884. For relocation/replace Kit Ordering, see "Relocate/Replace: 8100 System" under Accessories.
- Upending: In the event the 8140 must be placed on end to maneuver to the installation site, specify **#9840**. For additional ordering information associated with **#9840**, see Accessories "Upending Feature, 8140". **Field Installation:** Yes.
- Cabling: For loop cabling information, see Accessories and the *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

  Communication cables must be ordered separately from the communication adapter features.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647.
  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 system.

  Maximum: One per 8100 system. **Field Installation:** Yes.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations. **Field Installation:** Yes.

SPECIAL FEATURES

Performance: The maximum number of communication and loop ports configured and capable of concurrent operation is a function of the speed of the line, communication facilities, the operating system installed and the application work load. The maximum number of communications and loop ports which can be physically installed can exceed the operational capability.

Multiple High Speed Adapters: The 8140 C mdls have the physical capability for four (high-speed) communication ports in excess of 9600 bps. The maximum number of high-speed ports activated concurrently is limited to two.

- Two loops at 38400 bps, or
- One loop at 38400 bps and one SDLC data link at a speed greater than 9600 bps.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System publications require DPPX or DPCX. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Display and Printer, Add'l (#1506): Provides for the attachment of additional 3277 Displays, 3284, 3286, 3287 and 3288 Printers in any combination up to four. **Maximum:** Five. **Field Installation:** Yes. **Prerequisites:** #3220.

Display and Printer Attachment (#3220): Provides for the attachment of 3277 Displays, 3284, 3286, 3287 and 3288 Printers in any combination up to four. Can be expanded to a maximum of 24 devices with Display and Printer, Add'l (#1506). **Limitations:** Not available with #4901 or #1630 (see Table 1 for further information). **Maximum:** One per 8100 system. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1620, #1621, #1622 or #1623.

Floating Point Feature (#3750): Provides for execution of 30 floating point instructions and 32 floating point registers to improve performance of floating point operations. The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing and controlling the sign of short (4-byte) operands and long (8-byte) operands. **Maximum:** One. **Field Installation:** Yes.

Feature Expansion Prerequisite (#3901): Required for communication ports feature #1620, #1621, #1622 or #1623 or Display and Printer Attachment (#3220) without communication ports feature #1620, #1621, #1622 or #1623 or Magnetic Tape Attachment (#4901) without

8140 Processor Mdls C72, C82, C92 (cont'd)

communication ports feature #1620, #1621 #1622 or #1623. See Table 1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1620, #1621, #1622 or #1623 ... #3220 or #4901 without #1620, #1621, #1622 or #1623.

Magnetic Tape Attachment (#4901): Provides for the attachment of up to four 8809 Magnetic Tape Units, consisting of one 8809 mdl 1A plus two mdl 2s and one mdl 3. **Limitations:** Not available if the 8101 Storage and Input/Output Unit has the 8809 Magnetic Tape Unit mdl 1A attached (#4521) or if 8809 mdl 1B is attached to the 8140 mdl C72, C82 or C92 Processor. Also not available with Communication Ports Feature #1630 or Display and Printer Attachment (#3220). See Table 1 for further information. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1620, #1621, #1622 or #1623.

Table 1

When configuring the 8140 C mdls for communication port features for Ports 5 through 10, Display and Printer Attachment, and Magnetic Tape Attachment, the table below shows the combination of these features that may be configured.

#3901 plus (#1620, #1621, #1622 or #1623, or #3220 or #4901)
or
#3901 plus (#1620, #1621, #1622 or #1623)
plus (#1630 or #3220 or #4901)

Communications And Loops

The communication and loop attachments are available in line sets which occupy pre-defined ports. There are five sets of which one can occupy Ports 1 through 4, four sets of which one can occupy Ports 5 through 8 and one set for Ports 9 and 10. A maximum of ten ports are available. If a line set is selected for Ports 1-4, there can be no high-speed (greater than 9600 bps) ports in an attached 8101 storage and I/O unit. Conversely, if there are no line sets selected for Ports 1-4, then the 8101 may contain high-speed ports (maximum two).

The speed of the loops in communication ports features #1610-#1614 are manually switch selectable at customer setup time at either 9600 bps or 38400 bps. The limitation on the total number of active ports at greater than 9600 bps is two. In 8100 System only 10 Loop or SDLC communication ports may be active at one time.

Note: With a given Communication Ports Feature the selected option LPDA can be changed in the field by the Customer Engineer. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a Communication Ports Feature and its associated specify code must identify the original codes ordered from the factory.

Communication Ports Feature (#1610): Two directly attached loops and two SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Ports 1 and 2 with the speed selectable by switch at 9600 bps or 38400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873**. Ports 3 and 4 provide a communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9803** for port 3 and **#9804** for port 4. **Limitations:** Not available with #1611, #1612, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1610	Direct Attach Loop	Direct Attach Loop	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT

Communication Ports Feature (#1611): Three directly attached loops and one SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Ports 1, 2 and 3 with the speed selectable by switch at 9600 bps or 38400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873**. Port 4 provides communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9804** for port 4. **Limitations:** Not available with #1610, #1612, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Only two loops may be activated concurrently at 38400 bps. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1611	Direct Attach Loop	Direct Attach Loop	Direct Attach Loop	SDLC/ EIA/ CCITT

Communication Ports Feature (#1612): Three Loops and one SDLC/CCITT X.21 Switched interfaces. Provides for loop attachment in Ports 1, 2 and 3 with the speed selectable by switch at 9600 bps or 38400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873**. Port 4 provides SDLC/CCITT X.21 switched interface without clock up to 48000 bps ... with auto answer and auto call ... via a Data Circuit-terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in IBM SRL GA27-3287. **Limitations:** Not available with #1610, #1611, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38400 bps, or one loop at 38400 bps and the X.21 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1612	Direct Attach Loop	Direct Attach Loop	Direct Attach Loop	SDLC/ X.21 Non-Switched

Communication Ports Feature (#1613): Three Loops and one SDLC/CCITT X.21 Nonswitched interfaces. Provides for loop attachment in Ports 1, 2 and 3 with the speed selectable by switch at 9600 bps or 38400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873**. Port 4 provides SDLC/CCITT X.21 nonswitched interface without clock up to 48,000 bps --- point-to-point or multipoint --- via a Data Circuit-terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in IBM SRL GA27-3287. **Limitations:** Not available with #1610, #1611, #1612 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38400 bps, or one loop at 38400 bps and the X.21 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1613	Direct Attach Loop	Direct Attach Loop	Direct Attach Loop	SDLC/ X.21 Non-Switched

Communication Ports Feature (#1614): Three Loops and one SDLC/CCITT V.35 interfaces. Provides for loop attachment in Ports 1, 2 and 3 with the speed selectable by switch at 9600 bps or 38400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873**. Port 4 provides SDLC/CCITT V.35 interface without clock up to 56000 bps to external modem with clock, or direct connect with or without clock at 56000 bps up to 1,000 feet or up to a total cable length of 200 feet to a 3705. Specify code **#9684** for external modem, **#9683** for direct connect without clock, or **#9682** with prerequisite multi-speed clock (#5200), for direct connect with clock at 56000 bps. **Limitations:** Not available with #1610, #1611, #1612 or #1613. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38400 bps, or one loop at 38400 bps and the CCITT V.35 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1614	Direct Attach Loop	Direct Attach Loop	Direct Attach Loop	SDLC/ V.35

Communication Ports Feature (#1620): One Low Speed Loop and three SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Port 7 operating at 9600 bps. Port 7 may be a two-lobe loop with the addition of #4835 and specify code **#9874**. Ports 5, 6 and 8 provide a communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9805** for port 5, **#9806** for port 6 and **#9808** for port 8. **Limitations:** Not available with #1621. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position			
	5	6	7	8
#1620	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	Direct Attach Loop	SDLC/ EIA/ CCITT

8140 Processor Mdls C72, C82, C92 (cont'd)

Communication Ports Feature (#1621): Four SDLC/EIA RS-232-C interfaces. Provides communication interfaces in Ports 5, 6, 7 and 8. Ports 6, 7 and 8 are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 5 provides the same interface as Ports 6, 7 and 8, or direct connect at 4800 bps up to 40 feet for Port 5. Specify code **#9689** for external modem, **#9688** for direct connect without clock, or **#9686** with prerequisite multi-speed clock (#5200), for direct connect with clock at 4800 bps. If LPDA is required, specify **#9805** for port 5, **#9806** for port 6, **#9807** for port 7 and **9808** for port 8. **Limitations:** Not available with #1620. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position			
	5	6	7	8
#1621	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT

Communication Ports Feature (#1622): One SDLC and three BSC EIA RS-232-C interfaces. Provides IBM microcode control for BSC communication interfaces in ports 5, 6, and 8 from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external DCE point-to-point non-switched 2- or 4-wire or multipoint 4-wire. Port 5 also provides for direct connect up to 40 feet. User parameter selectable business machine clock options and speed at 1200, 1800, 3600, 4800, 7200 and 9600 bps are available. The attached terminal must not provide business machine clocking. Specify code **#9690** for direct connect with clock. The SDLC port 7 provides a communication interface without clock to an external DCE with clock to 9600 bps point-to-point switched with auto answer to 4800 bps ... point-to-point non-switched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9807** for port 7. **Limitations:** Not available with #1620, #1621, or #1623. Mutually exclusive with 8101 BSC FAC codes 40, 41, 44, 45 or 47 on an 8100 system. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position			
	5	6	7	8
#1622	BSC/ EIA/ CCITT	BSC/ EIA/ CCITT	SDLC/ EIA/ CCITT	BSC/ EIA/ CCITT

Communication Port Feature (#1623): Two BSC EIA RS-232-C interfaces. Provides IBM microcode control for BSC communication interfaces in ports 5 and 6 from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to an external DCE point-to-point non-switched 2- or 4-wire or multipoint non-switched 4-wire. **Limitations:** Not available with #1620, #1621, or #1622. Mutually exclusive with 8101 BSC FAC codes 40, 41, 44, 45 or 47on an 8100 system. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position	
	5	6
#1623	BSC/ EIA/ CCITT	BSC/ EIA/ CCITT

Communication Ports Feature (#1630): Two SDLC/EIA interfaces. Provides for SDLC/EIA RS-232-C interface without clock to external modem, with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire in Ports 9 and 10. If LPDA is required, specify **#8801** for port 9, and **#8802** for port 10. **Limitations:** Not available with #3220 or #4901. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1620, #1621, #1622 or #1623.

Special Feature	Port Position	
	9	10
#1630	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Maximum:** Two. One for Port 2 and one for Port 7. Maximum is four per 8100 System. **Field Installation:** Yes. **Prerequisites:** #1610, #1611, #1612, #1613, #1614 or #1620. **Specify:** Code **#9873** for Port 2 in Communication Ports Features #1610 through #1614 and **#9874** for Port 7 in Communication Ports Feature #1620.

Multi-Speed Clock (#5200): Provides business machine clocking at 56000 bps for direct connect in Port 4 of Communication Ports Feature #1614 or business machine clocking at 4800 bps for Port 5 of Communication Ports Feature #1621. One must be ordered for each clocked port. **Maximum:** Two per 8140 mdl C72, C82 or C92. **Field Installation:** Yes. **Prerequisites:** #1614 or #1621.

MODEL CONVERSIONS

The following model changes can be field installed:

From	To	C72	C82	C92
B52*		X	X	X
B62*		X	X	X
B72*		X	X	X
C72			X	X
C82				X

* For 8140 B mdl upgrades, order a preparation MES for steps 1 to 3 if required, and then order the upgrade MES for all items in step 4.

1. 8140 mdl BX1 without #4545 expanded function panel, order MES for:
   - Mdl change to 8140 mdl BX2.
2. 8140 mdl BX1 with #4545 expanded function panel, order MES for:
   - Remove #4545, and
   - Mdl change to 8140 mdl BX2.
3. 8140 mdl BX2 with #4545 expanded function panel, order MES for:
   - Remove #4545.
4. 8140 mdl BX2, order MES for:
   - Mdl change to 8140 C mdl.
   - Remove all 8140 B mdl communication and loop associated feature codes and specify codes.
   - Add 8140 C mdl communication port and loop features as required.

Purchase price for this model upgrade is configuration- and feature-dependent. The purchase customer must submit an RPQ.

Additional communications cables may be required when converting 8140 mdl B to mdl C. For communication cable information, see the *8100 Information System Site Planning Guide,* GA27-2884.

BSC, Start/Stop, integrated modems, digital data service adapter, communications features are not available in the 8140 mdls C72, C82, C92.

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (P/N 1657265, 7838694 and 7838695) should be ordered in lengths of 304.8m to 609.6m (1000 to 2000 feet). Additional lengths up to 609.6m (2000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1000 feet).

Exterior cable (P/N's 1657267 and 1657268) should be ordered in one continuous length, up to a maximum of 914.4m (3000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Order via MSORDER (Category = Bulk Cable). Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

8140 Processor Mdls C72, C82, C92 (cont'd)

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

2 X 4 ADAPTER PLATE (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330) *	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares) **	1657379
2 x 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for outdoor cable to environmental box)	1657377
Single Device Attachment Cable, 40 ft (12.1 m) 40 ft (12.1 m)	8269543

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8140. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: Order via MSORDER (Order Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine type 8101 or 8140. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see GI section 71 for FE contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits:

The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8140 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8101	4448550	4448551	N/A
8140	4448556	4448557	4448558

* With packing material for units with upending feature (#9840) previously installed.

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2
Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8140	4448579	4448580	4448549

*With packing material for units with upending feature (#9840) previously installed.

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry in this section of the Sales Manual.
- If up-ending is required to position the 8140, see "Upending information" in this section of the Sales Pages.

8140 Processor Mdls C72, C82, C92 (cont'd)

- **Ordering Information** Order via MSORDER (category = supplies/accessories Group Code = DP Supply Order)

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

Figure 3:

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	3709	7389282
DDSA	3717	6835350
V.35 Modem	3718	6835348
V.35 Direct Connect	3719	6835349
V.35 Direct Connect PT TO PT	3720	6835642
EIA Direct Connect	3721	6835642
EIA Modem	3724	6835346
Loop Station Adapter (Double Lobe)	3726	7389282
	3726	7389282
EIA Direct Connect PT to PT	3727	6835347
X.21	3728	6835379

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg

Upending Feature 8140

Plant/Field feature **#9840** is required to upend the 8140. It consists of a reinforced left end cover, a removable wooden pallet and mounting straps and buckles. The wooden pallet, mounting straps and buckles should be removed during installation and stored for future use.

Ordering Instructions: See specify for ordering #9840. When ordering replacement parts, order via MSORDER (Category = Supplies/Accessories; Group Code = DP Supply Order).

Replacement parts may be ordered separately and are listed below.

Pallet	P/N 4448587
Mounting Reference Drawing	P/N 4448548

SUPPLIES

None required with machine order.

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can attach directly to the processor:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8101 Storage and I/O Unit
8809 Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct attached loop or to a data link attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of the 8140 communication ports features.

Device and Mdl	Loop Attachment Direct At 9600 bps	Direct At 38400 bps	Data Link at 2400,4800 4800,9600 bps
3104 Display Terminal mdl B1, B2	X	X	X
3230 Printer mdl 1	X	X	X
3232 Printer mdl 11	X	X	X
3262 Printer mdls 2,12	(1)	X	(1)
3268 Printer mdl 1	X	X	X
3274 Control Unit mdl 51C,61C:	X	X	X
- 3178 Display Station			
- 3230 Printer mdl 2			
- 3262 Printer mdls 3,13			
- 3262 Printer mdl 2			
- 3268 Printer mdl 1			
- 3278 Display Station mdls 1,2,3,4,5			
- 3279 Color Display Unit mdls 2A,2B,3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Printer mdls 1,2			
3276 Control Unit Display Station mdls 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3230 Printer mdl 2			
- 3262 Printer mdl 13			
- 3268 Printer mdl 2			
- 3278 Display Station mdls 1,2,3,4			
- 3279 Color Display mdls 2A,2B, 3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Printer mdls 1,2			
3287 Printer mdls 11,12	X	X	X
3289 Printer mdl 3 with:	(1)		(1)
- 2502 Card Reader mdl A1*			
- 3501 Card Reader			
- 3521 Card Punch*			
(*Requires 3782 Attachment Unit)			
3641 Reporting Terminal mdls 1,2	X		X
3642 Encoder Printer mdls 1,2	X		X
3643 Keyboard Display mdls 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E1,E2	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal mdls 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289 mdl 3, 3262 mdl 2 or 3262 mdl 12 printer should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of 8140 communication ports features.

Terminals conforming to 2780/3780 line protocol
3232 Printer mdl 1
3274 Control Unit mdl 51C, 61C with:
- 3178 Display Station

3230 Printer mdl 2
- 3262 Printer mdls 3,13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1,2,3,4,5
- 3279 Color Display Station mdls 2A,2B,3A,3B
- 3287 Printer mdls 1,2,1C,2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*,2*,3*,4*,11,12, 13,14 with: (* These mdls are supported in SDLC mode)
- 3178 Display Station

3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1,2,3,4 (See M3276 for configuration details)
- 3279 Color Display Station mdls 2A,2B,3A,3B (Not supported on 3276 mdls 1,2,3,4)
- 3287 Printer mdls 1,2,1C,2C
- 3289 Line Printer mdls 1,2

3601 Finance Communication Controller mdls 1,2A,2B,3A,3B
3602 Finance Communication Controller mdls 1A,1B
3631 Plant Communication Controller mdls 1A,1B
3632 Plant Communication Controller mdls 1A,1B
3651 Store Controller mdls 25,75
3684 Point of Sale Control Unit mdls 1,2
3767 Communication Terminal mdls 1,2,3
3843 Loop Control Unit
4701 Finance Communication Controller mdl 1
4952 Processor
4954 Processor
4955 Processor
4959 Processor
5150 IBM Personal Computer
5285, 5288 Programmable Data Stations
6360, 6580 Display Writer (3270 DSC Mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8775 Display Terminal mdls 11,12

8140 Processor Mdls C72, C82, C92 (cont'd)

Direct Connection Attachment: In addition to terminal attachment to the 8100 System through common carrier facilities (see M2700 pages), attachment can be made by direct connect. The direct connect is made by using Communication Ports Feature #1614 with specify **#9682** or **#9683**, or #1621 with **#9686** or **#9688** or #1622 and **#9690**. Shown below are the direct connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide*, GA27-2884, will assist in the selection of direct connect cables.

Attaching Device	Speed (bps)	Attaching Device Feature No.	8140 CXX Comm. Feature No.
Devices Conforming to 2780/3780 Line Protocol	1200 1800 2400 3600 4800 7200 9600	Refer to specific device	#1622, **#9690**
3232-1	4800	None	#1621, #5200 and **#9686**
3274-51C,61C	4800	#3701 and #6302	#1621, #5200 and **#9686**
	56000	#1550 and #6303	#1614, #5200 and **#9682**
3276	4800	#3701 w **#9491** and #6302	#1621, #5200 and **#9686**
3651* 25/75	4800	**#9126**	#1621, 5200 and **#9686**
3705-II	4800	#4714	#1621, #5200 and **#9686**
	56000	#4720	#1614, #5200 and **#9682**
3705-80	4800	None	#1621, #5200 and **#9686**
	56,000	#6712	#1614, #5200 and **#9682**
3725	4800	#4911	#1621, #5200 and **#9696**
	56,000	#4931	#1614, #5200 and **#9682**
4701-1	4800	None	#1621, #5200 and **#9686**
4952, 4954,4955,4959	4800	#2090	#1621, #5200 and **#9686**
6360	4800	#3707	#1621,#5200 and **#9686**
6580-A04, B04	4800	#3705	#1621,#5200 and **#9686**
6670	4800	#3701	#1621, #5200 and **#9686**
7426-2	4800	None	#1621,#5200 and **#9686**
8101,8130 8140 AXX,BXX	4800	FAC 17 (see Note)	#1621, #5200 and **#9686**
8140 CXX	4800	#1621 and **#9688** (see Note)	#1621, #5200 and **#9686**
8101, 8140 BXX	56000	FAC 28 (see Note)	#1614, #5200 and **#9682**
8140 CXX	56000	#1614 and **#9683** (see Note)	#1614, #5200 and **#9682**
8775	4800	#3701	#1621, #5200 and **#9686**

Note: FAC 17, 28, #1614 and **#9683**, or #1621 and **#9688** in the attaching 8101, 8130, 8140 without business machine clock.

***Specify code #9770** is available to facilitate problem determination

8150 PROCESSOR MDLS B20, B40, B60

PURPOSE

The 8150 Processor provides higher performance and availability for the 8100 Information System. The 8150 has two Processing and Control Elements (PCEs) with the capability of operating in dual mode or in single mode with either PCE. Each processor also includes processor storage, diskette storage, communications attachment, and 8101 I/O attachment capabilities.

MODELS

Models	Storage
B20	2MB (2,097,152)
B40	4MB (4,194,304)
B60	6MB (6,291,456)

Prerequisites: 8101 Storage and I/O Unit mdl A13, A23, or A25.

Customer Setup (CSU): Yes. Machine only.

HIGHLIGHTS

The 8150 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, diskette storage, and communication features for the 8100 Information System. The flexibility offered by the 8150 Processor allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs, with minimum disruption.

The 8150 Processor offers storage up to a maximum of 6MB (6,291,456 bytes). This storage makes use of Error Correction Code (ECC) to provide correction of all single and most double-bit main storage errors. Capability for dynamic address translation and storage protection for up to 16 million bytes of logical storage is provided. Utilization of this logical storage is enhanced by a facility called "Keys and Locks". It allows much larger Common Address Space Section (CASS) and a significantly larger number of address spaces.

The 8150 has two PCEs and two I/O buses with the capability of operating in dual mode or in single mode with either PCE. The Diskette and Ports 1 through 6, as a group, may be enabled by the Operating System on either PCE. Ports 7 through 12 as a group may also be enabled on either PCE. Attached 8101-A2X mdls with Manual/File Tape Switch RPQ may be attached to both I/O buses (active on only one at a time). This dual bus and switching capability permits reconfiguring for higher availability.

A minimum of one 8101 Storage and Input/Output Unit is required for use as the primary IPL device. Specify codes are required at the time of order so that the Primary IPL device address will be set in the 8150 Processor at the time of manufacture.

The 8150 Processor allows for the attachment of up to four 8101 Storage and Input/Output Units, or three 8101 Storage and I/O Units and one 8809 Magnetic Unit mdl 1B. An alternate configuration can consist of a 8150 Processor, four 8101 Storage and I/O Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units may be attached to the 8809 mdl 1A or 1B. A maximum of one 8101 may be configured with Communications and/or Display and Printer features.

Removable diskette storage is provided with up to 1MB (985,088) bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 system can attach to any S/370 or 4300 processor via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 system can attach to the communications adapter of the 4321 or 4331 Processor for SDLC or BSC line control. See M2700 pages for specific attachment. **Note:** The 8150 can operate in dual mode using BSC Communications Features (#1763 and #1764).

The 8150 Processor provides for the attachment of a variety of input/output devices. These devices may be attached to the 8150 Processor via communication features which include data link, direct-connect, and loops that are direct-attached or data link attached. Up to 12 communication and loop ports may be configured in an 8150 Processor.

Physical security is provided through the use of key locks on the operator panel, diskette drive and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8150 Processor is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Customer Setup instructions will be shipped with each machine. An 8150 Processor installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Relocation/Replacement: If the user relocates the processor from one system to another or replaces the processor on an existing system the following conditions must be met:

1. Each 8101 on the system must have a unique address code -- **#9921**, **#9922**, **#9923** or **#9924**. There cannot be duplicate address codes on the same system.
2. The processor must have the correct address of the 8101 which will be its primary IPL device. Refer to "Primary IPL Device Address" under specify below. For further information, see *IBM 8100 Information System Site Planning Guide,* GA27-2884.

For relocation/replace kit ordering, see "Relocate/Replace: 8100 System" under "Accessories".

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors.

Cabling: For loop cabling information, see *Accessories and the IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884. Communications cables must be ordered separately from the Communications Features.

Bibliography: GC20-8100

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (200V to 240V AC, 1-phase, 3-wire 60 Hz): If standard 4.3 meter (14 foot) cable is not required specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only available color.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX, or **#9730** for all other configurations. **Maximum:** One. **Field Installation:** Yes.
- Primary IPL Device Address: The primary IPL device must be an 8101 Storage and I/O Unit. You must specify **#9935** for an 8101 mdl A13, A23, A25 and, in addition, specify **#9921**, **#9922**, **#9923** or **#9924** using the same number as used on the 8101 that will be the primary IPL device. **Field Installation:** The IPL Device Address can be changed by a CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647. 1) On the initial order. 2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor. 3) Via MES when the first terminal is field installed on an 8100 system. **Maximum:** One per system. **Field Installation:** Yes.
- 8101, 8809 mdl 1B Attachment: If any installed 8101 will be attached to an 8150 Processor, an MES to remove specify code **#9931** (8130 Attachment) or **#9932** (8140 Attachment) and add **#9933** (8150 Attachment) must be ordered for the 8101 to ensure the correct level of adapters and maintenance capability. If an 8809-1B will be attached to an 8150 Processor, an MES to add **#9933** must be ordered for the 8809.

SPECIAL FEATURES

Performance: Higher performance is achievable if the communication ports in a system are configured in the 8150 Processor and not in an 8101 I/O Unit and ports 1 through 6 are utilized first. **Note:** The maximum number of communication and loop ports configured and capable of concurrent operation in an 8100 System is a function of the speed of the lines, communication facilities, the operating system installed and the application work load. The maximum number of communications and loop ports which can be physically installed can exceed the operational capability. The aid ANDPPX can be used to determine the operational capability of the system (processor utilization, storage requirements, and response times).

Multiple High-Speed Adapters: An 8150 Processor has the physical capability for eight high-speed communication ports in excess of 9600 bps. The maximum number of high-speed ports activated concurrently is limited to four on each PCE.

Diagnostics: The 8100 system hardware and feature operation, diagnostic support and maintenance support described in 8100 Information System publications are dependent on the presence of functional support modules provided by DPPX or DPCX. Customers ordering 8100 Information System hardware without these programs should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

8150 Processor Mdls B20, B40, B60 (cont'd)

Floating Point Feature (#3750): Provides for execution of 30 floating point instructions and 32 floating point registers to improve performance of floating point operations (operates with only PCE 0). The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing and controlling the sign of short (4-byte) operands and long (8-byte) operands. **Maximum:** One. **Field Installation:** Yes.

Feature Expansion Prerequisite (#3901): Required for communications ports 7 through 12. This is a prerequisite for communication features #1716, #1726, #1734, #1735, #1745, #1755, and #1764. **Maximum:** One. **Field Installation:** Yes.

Multi-Speed clock (#5200): Provides business machine clocking at 4800, 9600 and 56,000 bps for SDLC direct-connection facilities. Can provide multiple speeds simultaneously. One multi-speed clock can provide clocking for features #1733, port 5, and #1742, port 4, and another multi-speed clock can provide clocking for features #1734, port 8, and #1745, port 9. **Maximum:** Two. One for ports 4 and 5 and one for ports 8 and 9. **Field Installation:** Yes. **Prerequisites:** #1733, #1734, #1742, or #1745.

COMMUNICATIONS and LOOPS

The communication and loop attachments are available in line sets which occupy predefined ports. A maximum of 12 ports are available, however only 10 loops and SDLC lines may be activated at any one time on each PCE. If line sets are selected in ports 1 to 4 or 9 to 12, there can be no high-speed ports in an attached 8101. The speed of the loops in communication ports 1 to 4 and ports 11 and 12 is manually switch selectable at either 9600 bps or 38,400 bps. The limitation on the total number of active ports at greater than 9600 bps is four on each PCE.

Note: Within a given Communications Feature the selected option Link Problem Determination Aid (LPDA) or line speed can be changed in the field by the CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a Communications Feature and its associated specify codes must identify the original codes ordered from the factory.

For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

COMMUNICATION FEATURES

Ports					
1	2	3	4	5	6
#1711		#1712		#1733	
Loop	Loop	Loop	Loop	SDLC EIA *DC	SDLC EIA
or		or		or	
#1721		#1732		#1763	
Loop 2-Lobe	Loop 2-Lobe	SDLC EIA	SDLC EIA	BSC EIA *DC	BSC EIA
or					
#1742					
SDLC V.35	SDLC V.35 *DC				
or					
#1752					
SDLC X.21 Sw	SDLC X.21 Non-Sw				

#3901 Prerequisites

Ports					
7	8	9	10	11	12
#1734		#1735		#1716	
SDLC EIA	SDLC EIA *DC	SDLC EIA	SDLC EIA	Loop	Loop
or		or		or	
#1764		#1745		#1726	
BSC EIA	BSC EIA *DC	SDLC V.35 *DC	SDLC V.35	Loop 2-Lobe	Loop 2-Lobe
or					
#1755					
SDLC X.21 Non-Sw	SDLC X.21 Sw				

* DC = Direct Connect

Communications Feature (#1711): Provides for directly-attached loops with single lobes in ports 1 and 2 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1721. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1712): Provides for directly-attached loops with single lobes in ports 3 and 4 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1732, #1742 or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1716): Provides for directly-attached loops with single lobes in ports 11 and 12 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1726. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1721): Provides for directly-attached loops with double lobes in ports 1 and 2 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1711. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1726): Provides for directly-attached loops with double lobes in ports 11 and 12 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1716. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1732): Provides for two SDLC EIA RS-232-C interfaces in ports 3 and 4. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. **Limitations:** Not available with #1712, #1742, or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Specify: #9803** for port 3 with LPDA, **#9804** for port 4 with LPDA.

Communications Feature (#1733): Provides for two SDLC EIA RS-232-C interfaces in ports 5 and 6. Port 6 is unclocked and attaches to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 5 provides the same interface as Port 6 or direct-connect at 4800 bps or 9600 bps up to 40 feet. **Limitations:** Not available with #1763. **Maximum:** One. **Field Installation:** Yes. **Specify: #9689** for external modem, **#9688** for direct connect without clock, **#9686** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 4800 bps or **#9687** with prerequisite multi-speed clock (#5200) for direct-connect at 9600 bps. Specify **#9805** for port 5 with LPDA, **#9806** for port 6 with LPDA.

Communications Feature (#1734): Provides for two SDLC EIA RS-232-C interfaces in ports 7 and 8. Port 7 is unclocked and attaches to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 8 provides the same interface as Port 7 or direct-connect at 4800 bps or 9600 bps up to 40 feet. **Limitations:** Not available with #1764. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #9699** for external modem, **#9698** for direct-connect without clock, **#9696** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 4800 bps or **#9697** with prerequisite multi-speed clock (#5200) for

8150 Processor Mdls B20, B40, B60 (cont'd)

direct-connect at 9600 bps. Specify **#9807** for port 7 with LPDA, **#9808** for port 8 with LPDA.

Communications Feature (#1735): Provides for two SDLC EIA RS-232-C interfaces in ports 9 and 10. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. **Limitations:** Not available with #1745 or #1755. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #8801** for port 9 with LPDA, **#8802** for port 10 with LPDA.

Communications Feature (#1742): Provides for two SDLC/CCITT V.35 interfaces in ports 3 and 4. Port 3 is unclocked and attaches to an external modem with clock up to 56,000 bps. Port 4 provides the same interface as Port 3 or direct-connect with or without clock at 56,000 bps for a total cable length of up to 1,000 feet or up to 200 feet to a 3705 or up to 492 feet to a 3725. **Limitations:** Not available with #1712, #1732 or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Specify: #9684** for external modem, **#9683** for direct-connect without clock, **#9682** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 56,000 bps.

Communications Feature (#1745): Provides for two SDLC/CCITT V.35 interfaces in ports 9 and 10. Port 10 is unclocked and attaches to an external modem with clock up to 56,000 bps. Port 9 provides the same interface as Port 10 or direct-connect with or without clock at 56,000 bps for a total cable length of up to 1,000 feet or up to 200 feet to a 3705 or up to 492 feet to a 3725. **Limitations:** Not available with #1735 or #1755. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #9694** for external modem, **#9693** for direct-connect without clock, **#9692** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 56,000 bps.

Communications Feature (#1752): Provides one SDLC/CCITT X.21 Switched interface with auto answer and auto call in port 3 and one SDLC/CCITT X.21 nonswitched interface point-to-point or multipoint in port 4, without clock up to 48,000 bps via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1712, #1732 or #1742. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1755): Provides one SDLC/CCITT X.21 Switched interface with auto answer and auto call in port 10 and one SDLC/CCITT X.21 nonswitched interface point-to-point or multipoint in port 9, without clock up to 48,000 bps via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1735 or #1745. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1763): Provides two BSC EIA RS-232-C interfaces in ports 5 and 6. Port 6 provides an IBM microcode-programmed BSC communication interface from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external Data Circuit-Terminating Equipment (DCE) point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 5 provides the same interface as port 6 or direct-connect up to 40 feet. **Limitations:** Not available with #1733. Not available if BSC FAC Codes 40, 41, 44, 45 or 47 are in an attached 8101. **Field Installation:** Yes. **Specify: #9690** for direct-connect. User parameter selectable business machine clock options and speed are available at 1200, 1800, 2400, 3600, 4800, 7200, or 9600 bps. The attached terminal must not provide business machine clocking.

Communications Feature (#1764): Provides two BSC EIA RS-232-C interfaces in ports 7 and 8. Port 7 provides an IBM microcode-programmed BSC communication interface from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external Data Circuit-Terminating Equipment (DCE) point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 8 provides the same interface as port 7 or direct-connect up to 40 feet. User parameter selectable business machine clock options and speed are available at 1200, 1800, 2400, 3600, 4800, 7200, or 9600 bps. The attached terminal must not provide business clocking. **Limitations:** Not available with #1734. Not available if BSC FAC Codes 40, 41, 44, 45 or 47 are in an attached 8101. **Field Installation:** Yes. **Specify: #9680** for direct-connect.

MODEL CONVERSIONS

The following model changes can be field installed:

From	To	B40	B60
B20		X	X
B40			X

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- Indoor Cable **P/N 1657265:** UL approved (style 2919 for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to 80°C.
- Indoor Cable **P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to 90°C.
- Indoor Cable **P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to 105°C.
- Outdoor Cable **P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to 80°C.
- Outdoor Cable **P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to 80°C.

Ordering Instructions: Indoor cable (**P/N 1657265**, **7838694** and **7838695**) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 feet). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via **P/N 1657300.** A minimum order quantity is 304.8m (1,000 feet). Outdoor cable (**P/Ns 1657267** and **1657268**) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted. Outdoor splices with aerial and burial cable should be avoided.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, and for installation and testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and Radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through a Loop Wiring Concentrator (LWC) to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 x 4 Adapter Plate (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the *Loop Installation and Planning Guide.* It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called radials. The point where a radial line terminates at the LWC is called an LWC port. Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

8150 Processor Mdls B20, B40, B60 (cont'd)

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer-supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5,000 ohms/volt, to verify the loop installation, including loop cabling and accessories after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	P/N
Loop Slice Plate (LSP) (indoor)	**1657300**
Loop Station Connector (Radial LSC)	**1657310**
Loop Station Connector (Wrap LSC)	**1657320**
Loop Station Connector Gasket	**1657260**
Loop Wiring Concentrator (LWC)	**1657330**
LWC Circuit Board Assy (order instead of LWC - **1657330**)*	**1657332**
Loop Surge Suppressor (LSS)	**1657350**
LSS Circuit Board Assy (order instead of LSS - **1657350**)*	**1657354**
Continuity and Relay Tester	**1657420**
Wrap Switch Access Cover	**1657325**
Loop Accessory Keys (10 spares)**	**1657379**
2 x 4 Adapter Plate (2AP)	**7838771**
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	**2102151**
Clamp (for cable to indoor box)	**2100264**
Electrical box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	**1657280**
Clamp - small (for indoor cable to environmental box)	**2114285**
Clamp - large (for indoor cable to environmental box)	**1657377**
Single Device Attach. Cable, 12.1m (40 ft)	**8269543**

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8140. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: When ordering, use Machine type 8101 or 8150. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories. However, see IBM for contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the branch office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits: The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit.
- 8150 kits apply to processor relocation or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material
8101	**4448550**	**4448551**
8150	**4719031**	**4719032**

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry below.

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 2.

Figure 2

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	#3709, #4838	**7389282**
DDSA	#3717	**6835350**
V.35 Modem	#3718, #4840	**6835348**
V.35 Direct Connect	#3719, #4841	**6835349**
V.35 Direct Connect PTP	#3720, #4830	**6835353**
EIA Direct Connect	#3721, #4833	**6835642**
EIA Modem	#3724,	**6835346**
Loop Station Adapter (Double Lobe)	#3726, #4839	**7389282** (2 Req'd)
EIA Direct Connect PTP	#3727, #4835	**6835347**
X.21 Nonswitched	#3728,	**6835379**
X.21 Switched	#3733, #4836	**6226830**
V.35 Direct Connect PTP	#4829	**4718959**
EIA Direct Connect PTP	#4834	**4718958**

SUPPLIES

None required with machine order.

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can be directly attached to the processor:

8101 Storage and I/O Unit
8809 mdl 1B Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct-attached loop or a data link attached loop via the 3842 or 3843 Loop Control Unit.

	Loop Attachment		
	Direct-Attach		Data Link
Device and Mdl	9600 bps	38,400 bps	At 2400,4800, 9600 bps
3104 Display Terminal B1,B2	X	X	X
3262 Printer mdls 2,12	(1)	X	(1)
3268 Printer mdl 1	X	X	X
3274 Control Unit mdls 51C,61C with:	X	X	X
- 3178 Display Station			
- 3262 Printer mdls 3,13			
- 3268 Printer mdl 2			
- 3278 Display Station mdls 1,2,3,4,5			
- 3278 PC Attach			
- 3279 Color Display mdls 2A,2B,3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Printer mdls 1,2			
- 3290 Information Panel			
- 5210 Printer mdls G1,G2			
- 6580 Displaywriter w/3270 AW			
3276 Control Unit Display Station mdls 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3262 Printer mdl 13			
- 3268 Printer mdl 2			
- 3278 Display Station mdls 1,2,3,4			
- 3278 PC Attach			
- 3279 Color Display mdls 2A,2B,3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Line Printer mdls 1,2			
- 5210 Printer mdls G1,G2			
- 6580 Displaywriter w/3270 AW			
3287 Printer mdls 11,12	X	X	X
3289 Printer mdl 3 with:	(1)		(1)
- 2502 Card Reader mdl A1*			
- 3501 Card Reader			
- 3521 Card Punch*			
(* Requires 3728 Attachment Unit)			
3641 Reporting Terminal mdls 1,2	X		X
3642 Encoder Printer mdls 1,2	X		X
3643 Keyboard Display mdls 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer mdls E1,E2	X		

8150 Processor Mdls B20, B40, B60 (cont'd)

7426 Terminal Interface Unit mdl 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289 mdl 3, 3262 mdl 2 or 3262 mdl 12 printer (when attached to a 9600 bps loop) should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information.

Terminals Conforming to 2780/3780 line protocol
3274 Control Unit mdl 41C, 51C, 61C with
- 3178 Display Station
- 3262 Printer mdls 3, 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3278 PC Attach
- 3279 Color Display mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Printer mdls 1, 2
- 3290 Information Panel
- 5210 Printer mdls G1,G2
- 6580 Displaywriter w/3270 AW

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3262 Printer mdl 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1, 2, 3, 4 (See M3276 for configuration details)
- 3279 Color Display mdls 2A, 2B, 3A, 3B (Not supported on 3276 mdls mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2
- 5210 Printer mdls G1, G2
- 6580 Displaywriter w/3270 AW

3601 Finance Communication Controller mdls 1, 2A, 2B, 3A, 3B
3602 Finance Communication Controller mdls 1A, 1B
3631 Plant Communication Controller mdls 1A, 1B
3632 Plant Communication Controller mdls 1A, 1B
3651 Store Controller mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3705-II, 80 Communications Controller
3725 Communication Controller
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4701 Finance Communication Controller mdl 1
4952, 4954, 4955, 4959 Processor (Series/1)
5150 Personal Computer
5285,5288 Programmable Data Stations
6580 Displaywriter (3270 DSC load only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

Direct-Connection Attachment: In addition to device attachment to the 8100 System through common carrier facilities (see M2700 pages), attachment can be made by direct-connect. Shown below are the direct-connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide,* GA27-2884, will assist in the selection of cables.

Attaching Device	Speeds (bps)	Attaching Device Feature Number	8150 Comm. Feature Number
Devices Conforming to 2780/3780 Line Protocol	9600	Refer to Device	#1763 and **#9690** #1764 and **#9680**
3274-41C,51C, 61C	4800	#3701 and #6302	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701 and #6302	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#1550 and #6303	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3276	4800	#3701 w **#9491** and #6302	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701 w **#9491** and #6302	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
3651-25/75 *	4800	**#9126**	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
3705-II	4800	#4714	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#4714	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#4720	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3705-80	4800	None	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	None	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#6712	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3725-1,2	4800	#4666 and #4911	#1733 w **#9688** or #1734 w **#9698**
	9600	#4666 and #4911	#1733 w **#9688** or #1734 w **#9698**
	56,000	#4666 and #4931	#1742 w **#9683** or #1745 w **#9693**
4701-1	4800	None	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	None	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
4952,4954, 4955,4959	4800	**#2090**	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	**#2090**	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6360	4800	#3707	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3707	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6580-A04,A10, B04,B10	4800	#3705	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3705	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6670	4800	#3701	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
7426-2	4800	None	#1733,#5200,and **#9686** #1734,#5200,and

8150 Processor Mdls B20, B40, B60 (cont'd)

	9600	None	**#9696** #1733,#5200,and **#9687** #1734,#5200,and **#9697**
8101, 8130 8140-AXX/BXX	4800	FAC17(see Note)	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	FAC 17(see Note)	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
8140-CXX	4800	#1621 and **#9688** (see Note)	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	56,000	#1614 and **#9683** (see Note)	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
8101,8140-BXX	56,000	FAC 28 (see Note)	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
8775	4800	#3701	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701	#1733,#5200,and **#9687** #1734,#5200,and **#9697**

Note: FAC 17, 28, #1614 with **#9683**, or #1621 and **#9688** in the attaching 8101, 8130, 8140 without business machine clock.

* Specify code **#9770** is available on the 3651-25/75 to facilitate problem determination.

8775 DISPLAY TERMINAL

PURPOSE

A high function cathode ray tube display terminal provides a means of entering data to or receiving data from the 4300, S/370 Processor or the 8100 Information System.

APL, field and character highlighting, field validation, multiple partitions, scrolling, programmed symbols, extended data entry capabilities and facilities for entry and edit of text are available. A Keyboard or a Selector Light-Pen permit an operator to display and manipulate data on the screen in a flexible and efficient manner. Other functions include Audible Alarm, Security Keylock, Printer Adapter and Magnetic Slot Reader or Magnetic Hand Scanner. The 8775 meets both general and unique display requirements with its set of basic and optional features.

MODELS

Loop Attach on the 4331 Processor Mdl Group 1 and 2 or 8100 System.

Model 1 001 — Displays 960, 1920 or 2560 characters in the 9x16 character matrix size.

Model 2 002 — Displays 960, 1920, 2560 in the 9x16 character matrix size or 3440 characters in the 9x12 character matrix size.

SNA/SDLC data link attach over communication facilities to a 4300, S/370 or 8100.

Model 11 011 — Displays 960, 1920 or 2560 characters in the 9x16 character matrix size.

Model 12 012 — Displays 960, 1920 or 2560 characters in the 9x16 character matrix size or 3440 characters in the 9x12 character matrix size.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

Displays 960, 1920 or 2560 characters in a 9x16 character matrix, or 3440 characters in a 9x12 character matrix. (Mdl 2 and 12 only.)

The number of characters displayed is determined under operator control. All configurations include 62 alphameric and 32 special characters, the Space, and Null characters. Use of 3270 Field Formatting capability permits individual fields of data on the screen to be program defined with various attributes such as protected/unprotected, alphameric/numeric, normal/highlighted intensity, displayable/non-displayable, and selector light-pen detection allowed/disallowed.

The 8775 Display Terminal communicates with a 4331, 8130 or 8140 Processor using Synchronous Data Link Control (SDLC) over either direct or data link attach loops or with an 8130, 8140, 4300 or S/370 processor via data link attach over communication facilities. The basic 8775 offers equivalent function and is upward data stream compatible with the 3276/3278.

Downstream loadable function which includes APL, field and character highlighting, field validation, enhanced function with magnetics, multiple partitions, scrolling, and text entry and edit is optionally available. The Enhanced Function, Enhanced Function with Magnetics, and Multiple Partitions and Scrolling features, and the Interactive Display Text Facility (IDTF) licensed program consist of four sets of data contained on magnetic media. Only one set can be loaded into an 8775 at a given time. The Interactive Display Text Facility (IDTF) licensed program is on separate magnetic media supplied by IBM program libraries.

The Printer Adapter provides the capability to print either the screen contents or bulk data from the host. This feature is mutually exclusive with any of the downstream loadable function. One of the following printers may be attached 3230 mdl 2, 3262 mdl 13, 3268 mdl 2, 3287 mdl 1, 2, 1C, or 2C, 5210 mdl G01, G02 or 7436 mdl 1.

Operator Factors: 8775 has an anti-reflective screen. Indicators are displayed on the bottom row of the screen, outside the data display area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interrupt (i.e., no blinking). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

Editing Facilities: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic. All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor typematic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the Selector Light-Pen function. Fields of data may be selected by positioning the cursor then using the Cursor Select Key.

Input Flexibility: A choice of keyboards or the Selector Light-Pen provide input flexibility ... see "Special Features" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the Selector Light-Pen. Twelve Program Function (PF) keys are basic with all typewriter keyboards; seven or more PF keys are available on all Data Entry Keyboards.

Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification or display of data in the display buffer unless the key is turned to the "on" position. The Setup Keylock (optional) controls access via the keyboard to change the terminal address. Those capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and to record an audit of actions. A Magnetic Slot Reader or Magnetic Hand Scanner is available to enter system user identification.

Communications: The 8775 mdl 1, 2 display terminals are attached to customer-owned loops. A direct loop to a 4331 Mdl Group 1 and 2 or 8100 processor may operate at 38.4K bps, or 9600 bps, this operating speed being determined by the customer at order time. A data link-attached loop may be connected to an 4331 or an 8100 System via a 3843 Loop Control Unit. The 3843 provides an interface to a synchronous modem transmitting at 2400, 4800 or 9600 bps. The Loop Control Units support point-to-point or multipoint telecommunication links. Half-speed operation of the 8775 can be selected by the operator. Refer to the M3843 pages for more information.

The 8775 mdls 11, 12 may communicate to an 8100 Information System over data link nonswitched communication facilities or to a 4331 Processor via its Integrated Communications Adapter or to a 4300 and S/370 Processors via 3704, 3705 or 3725 Communication Controller over data link nonswitched, nonswitched with switched network back-up or public switched network communication facilities using Synchronous Data Link Control (SDLC).

Modems: A 1200 bps Integrated Modem feature (#5500) or an external IBM modem may be attached to an 8775 mdl 11, 12. External modems require the external modem interface (#3701).

3863 mdl 1/2	2400/1200
3864 mdl 1/2	4800/2400
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

Switched Network back-up operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1.

For communication capabilities, product utilization and special features, see the M2700 pages and appropriate modem pages for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

Communication network management problem determination support for 4331 Mdl Group 1 and 2 loop attached 8775s is provided via NCCF/NPDA.

Customer Setup (CSU): 8775 is designated Customer Setup, thereby offering customers ease of set up and relocation flexibility. For additional information on CSU, refer to the General Information section.

One copy of the CSU instructions, Problem Determination Guide, and Trouble Report form are shipped with each 8775 .

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of 8775 display terminal.
- Physical setup, connection of cables incorporating protected customer access areas, and check-out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access area is not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance; appropriate instructions will be provided by IBM.
- Procurement, installation and maintenance of the loop network, see Accessories.
- Performing 8775 Customization if required in accordance with IBM supplied procedures.
  - For initial setup.
  - Updating of the 8775 diskettes (at customer option).

8775 Display Terminal (cont'd)

Bibliography: Refer to *An Introduction to the IBM 8775 Display Terminal*, GC33-3040.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V, AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug. If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) cable, **#9512** for 3.7 meter (12 foot) cable, or **#9513** for 4.5 meter (15 foot) cable.

- Attachment: Specify the following: **#9221** for attachment to the 8130 Information System, **#9222** for attachment to the 8140 Information System, **#9223** for attachment to a 4331 or 4361 Processor, **#9224** for attachment to a 4341 and 4381 Processor or **#9225** for attachment to a S/370 processor.

- Distribution of Magnetic Media for Enhanced Function (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110).

  If Enhanced Function Feature (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) is ordered, one copy of magnetic media is needed per System, therefore, specify:

  #9491 - For one 8775 on each system

  #9492 - For all other 8775s on each system

  Note: For each system with one or more 8775s (with #3624, #3626 or #5110) attached, one and only one 8775 should specify **#9491**. Care should be exercised when relocating 8775s, that this relationship is maintained.

  If **#9491** is specified, also select **#9425** Diskette 2D for the 8100 System, **#9412** for 9/800 magnetic tape, **#9413** for 9/1600 magnetic tape or **#9414** for 9/6250 for magnetic tape for 4300 or S/370 Processor to identify the type of magnetic media. Additional shipping instructions are also required.

- Licensed Programming: Specify **#9600** if the Interactive Display Text Facility (IDTF) licensed program is to be used on this machine. **Prerequisites:** #3623, #3905, #4670,

  #5781, #3624, #3626 and #5110. These provide the necessary configuration to enable the IDTF licensed program to be loaded into the terminal.

  Note: The feature codes #3624, #3626, #5110 and #5781 are necessary to enable correct order processing. However, the functions provided by these features cannot be operational when the IDTF licensed program is loaded into the terminal. The IDTF licensed program is distributed on a separate diskette. If required, it must be ordered separately (see Program Product pages).

  If Enhanced Function Feature #3624, Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) is ordered, additional shipping information is required.

  Supplemental specification (via AAS entry) is to be entered exactly as follows to indicate the shipping address to which the initial copy of magnetic media is sent. This may be either a S/370 or 4300 Processor or 8100 System or any address desired by the customer.

  For 8100 System:

  Line 1 - Name of Customer
  Line 2 - Street Address (or P.O. Box)
  Line 3 - City, State, Zip Code
  Line 4 - Attn: Data Processing Manager

  For 4300 or S/370 Processor:

  Line 1 - IBM Programming Support Representative
  Line 2 - C/O (Name of Customer)
  Line 3 - Street Address (or P.O. Box)
  Line 4 - City, State, Zip Code

  Whenever the Enhanced Function feature (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partition and Scrolling (#5110) is updated by an EC, the magnetic media will be sent to the address associated with the MC for each Display Terminal designated by specify **#9491**.

  All 8775s with #3624, #3626 or #5110 are attached to a system which is assigned a MC (Microcode Control Number). This MC identifies a network associated with a 4331 or 8100 System or a Central Site Facility.

  The MC, controlled and supplied by the Field Engineering Branch Office, is a 6-character code. The MC is assigned subsequent to delivery of the 8775 when the machine serial number is known.

  Note: To ensure proper delivery of ECs, the MC should be submitted as soon as the serial number of the 8775 is known.

- Communication Cable: A 1.8 meter (6 foot) communication cable is provided for attachment to a direct or data link attached loop. If 1.8 meter cable is not desired, specify **#9405** for 4.3 meter (14 foot) cable.

  A 6.1 meter (20 foot) communication cable is provided as standard for attachment to stand-alone modems or to the communication facility when an integrated modem is used or to a communication facility when a X21 adapter is used or to the Communication facility when a DDS adapter is used. If the standard communication cable is not desired, specify **#9061** for 3.0 meter (10 foot) cable, **#9062** for 9.1 meter (30 foot) cable or **#9063** for 12.2 meter (40 foot) cable.

- Character Set:

  #9082 for EBCDIC Character Set - used in conjunction with 75-key Typewriter Keyboard or Data Entry Keyboard or 87-key EBCDIC Typewriter Keyboard.

SPECIAL FEATURES

Set Up Keylock (#1009): Controls access to change the unit address of the terminal. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1090): An alarm sounded under program control, to alert the operator to a special condition. This alarm during keyboard operation is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. **Maximum:** One. **Field Installation:** Yes.

Business Machine Clocking (#1488): Required for attachment of IBM 1200 bps Integrated Modem (#5500) or any external modem that does not provide its own clocking and operates at 1200/600 bps. **Maximum:** One. **Field Installation:** Yes.

Extended Feature Storage (#3623): Provides the storage capacity required for Enhanced Function (#3624), Enhanced Function with Magnetics (#3626), Multiple Partitions and Scrolling (#5110) or the IDTF licensed program. **Limitation:** Cannot be installed with #5580. **Maximum:** One. Refer to Specify for information on the shipment of the magnetic media to the proper location. **Field Installation:** Yes.

Note: The Enhanced Function, Enhanced Function with Magnetics, and Multiple Partitions and Scrolling features, and the IDTF licensed program, consist of four sets of data contained on magnetic media. Only one set can be loaded into the 8775 at a given time. If Enhanced Function with Magnetics (#3626) is installed then Enhanced Function Feature (#3624) or Multiple Partitions and Scrolling (#5110) may be loaded by the operator if required. If Enhanced Function (#3624) is installed then Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) may be loaded by the operator if required.

Enhanced Function (#3624): Provides the ability to display APL characters, to highlight data, display data in user-defined partitions and to validate data fields as they are entered into the display terminal from the operator keyboard. Highlight is on a per character basis in one of three user selectable modes, blink, reverse video or underscore, and, additionally, on a field basis for intensify. Partitioning provides the ability to display data in up to eight user defined rectangular partitions and for the host or user to interact individually with the data within each partition. APL provides the ability to display the space (blank), and the unique characters consisting of 94 EBCDIC, 81 APL specific, 37 characters unique to 3270 text and 10 new graphic characters.

Validation provides:

Mandatory Enter -	Data must be entered into this field to permit entry to the host.
Mandatory Fill -	All positions in this field must be filled to permit entry to the host.
Trigger Field -	Causes the contents of the field to be sent from the display when data has been entered into the field and the cursor leaves the field.

Maximum: One. **Field Installation:** Yes. **Prerequisites:** #3623, #3905 and either **#9491** or **#9492**. If APL is used, 87-key APL Typewriter Keyboard (#4626), is required. If keyboard selectable highlighting is desired, 87-key keyboards (#4626, #4627, #4640 or #4670) are required.

Enhanced Function With Magnetics (#3626): Provides the function of the Enhanced Function Feature (#3624) with the addition of the ability to read via a magnetic slot reader, dual entry magnetic slot reader or magnetic hand scanner, magnetically encoded information from alphameric character set. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3905, #3623 and either **#9491** or **#9492**. If APL is used, 87-key APL typewriter keyboard (#4626) is required. If Keyboard selectable highlighting is desired 87-key keyboards (#4626, #4627, #4640 or #4670) is required.

Feature Adapter (#3905): Provides the logic necessary to perform Enhanced Function, Enhanced Function with Magnetics, or to execute IDTF. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:**

8775 Display Terminal (cont'd)

#3624 and/or #3626 and/or **#9600**.

Monocase Switch (#4944): Provides the choice to display either uppercase characters only or both uppercase and lowercase characters. **Maximum:** One. **Field Installation:** Yes.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader, Dual Entry Magnetic Slot Reader or Magnetic Hand Scanner, which reads encoded information from a magnetic stripe. **Maximum:** One. **Field Installation:** Yes.

Multiple Partitions And Scrolling (#5110): Multiple partitions provides the ability to display data in up to eight user defined rectangular partitions and for the host or user to interact individually with data within each partition. Scrolling provides the ability with any designated partition for user interaction with data record longer than provided for by the physical size of the visible portion of that partition. The operator controls the movement of data either up or down through the use of Scrolling control keys located on the keyboard. An additional scrolling buffer of a maximum of 58 lines of 80 characters wide (4640 characters) is provided. The actual scrolling capability is dependent upon screen/partition configuration. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3623 and either **#9491** or **#9492**.

Printer Adapter (#5580): This adapter provides an interface which enables one of the following printers to be attached: 5210 mdls G01, G02 and 3230 mdl 2, 3262 mdl 13, 3268 mdl 2, 3287 mdls 1, 2, 1C and 2C, 7436 mdl 1. The user has the following print facilities. Local Copy printing in which a copy of the screen contents is printed on the attached printer, this can be initiated either by the operator or the host. Bulk printing controlled by the host processor or the use of both local copy and bulk printing in shared mode. **Limitations:** Cannot be installed with #3624, #3626, #5110 or **#9600**. **Maximum:** One. **Field Installation:** No.

Programmed Symbols (PS) (#5781, #5782): When used with Enhanced Function (#3624), or Enhanced Function with Magnetics (#3626), these features provide the storage and accessing of up to six 190 symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is equal to the number of characters in the base character set which is 94 plus space.

PS-2 (#5781) provides PS control and two 190 symbol sets. **Prerequisites:** #3624 and/or #3626.

PS-4 (#5782) provides PS control and four 190 symbol sets. **Prerequisites:** #5781.

When used with **#9600** it provides the additional storage required by IDTF licensed program for text characters and control symbols. **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** If display operator access to PS is required, select one of the following keyboards: 87-key EBCDIC typewriter overlay (#4640).

Security Keylock (#6340): A lock and key which prevents modification or display of data in the display terminal when in the "off" position. **Maximum:** One. **Field Installation:** Not recommended.

Selector Light-Pen (#6350): A hand-held, pen-like device which permits the operator to select fields of data from a display for input into the host system. The Selector Light-Pen, while not being used, can be placed in a recess of the keyboard which is used for user's incidental items. Selector Pen (and Cursor Select) operations include a new designator character "&". When this designator is used, the Read Modified operation results in the return of both the addresses and the data of all modified fields on the screen. **Maximum:** One. **Field Installation:** Yes.

Keyboards:

Refer to Type Catalog, for a picture of the keyboard layouts.

Contact IBM for RPQ keyboard descriptions.

#4621--75-Key Typewriter Keyboard: Typewriter-like layout, movable, with 49 data keys and 26 control keys. Twelve program function keys are included in the top row of data keys through use of an alternate shift key. **Prerequisites: #9082.**

#4622--75-Key Data Entry Keyboard: Movable with 35 data keys, 10 program function keys and 30 control keys. **Prerequisites: #9082.**

#4623--75-Key Data Entry Keyboard: Keypunch layout, movable, with 35 data keys, 10 program function keys and 30 control keys. This is the recommended keyboard for high volume data entry. **Prerequisites: #9082.**

#4626--87-Key EBCDIC Typewriter/APL Keyboard: 87-key EBCDIC typewriter keyboard (ref #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in basic EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC typewriter keyboard without APL (see #4627), this keyboard has only twelve program function keys (PF1 through PF12) which are the group of twelve keys to the right of the main keyboard area. **Prerequisites:** #3624, #3626 **#9082.**

#4627--87-Key EBCDIC Typewriter Keyboard: Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys and 12 program function keys (24 total PF keys). Twelve of the program function keys are included in the top row of the data keys through the use of an alternate shift key. **Prerequisites: #9082.**

#4640--87-Key EBCDIC Typewriter Overlay Keyboard: This keyboard without an overlay has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (#4627) with the 94-character EBCDIC character set. This keyboard, however, has special narrow keytops which permit the use of customer annotated overlays. These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols (PS-A through PS-F) is selected. The desired PS can be selected by the operator through use of the appropriate PF keys in upper case and alternate shift on this keyboard. **Prerequisite: #9082.**

Note: Two keyboard overlays are supplied with each keyboard. Additional overlays may be obtained via MES, see Accessories.

4670-87-Key EBCDIC Typewriter/Text Entry And Edit Keyboard: Provides all the character and function keys of an 87-key EBCDIC Typewriter Keyboard with additions for entry and edit of text. The group of 12 program function keys to the right of the main keyboard area has special narrow keytops to accommodate an IBM supplied reversible annotated overlay. One side of the overlay indicates the function key assignments when an 8775 is being used for text applications. The other side of the overlay indicates the function key assignments for data applications. These data assignments are the same as those of the 87-key EBCDIC Typewriter Keyboard (#4627). The keyboard also allows entry of additional graphics and text control characters including the characters available on the IBM 3732 Text Display Station. A different color keytop marking is used to highlight those graphics, symbols, and controls that are only active when the IDTF licensed program is downstream-loaded and the display terminal is in text state. The keyboard does not provide the ability to enter APL characters. **Prerequisites: #9082 Note:** One keyboard overlay is supplied with each keyboard. Additional overlays can be obtained via MES, see Accessories.

All Keyboards, Limitations: Keyboards used on 3275, 3276, 3277, 3278 or 3279 machines are not interchangeable with keyboards used on 8775 machines. **Maximum:** One of each of the above. **Field Installation:** Yes. A 0.9 meter (3 foot) keyboard cable is standard. Specify **#9399** if 1.8 meter (6 foot) cable is required. **Prerequisites: #9082.**

Keyboard Numeric Lock (#4690): Provides the ability to lock the keyboard, if a non-numeric key (other than 0-9, minus (-), decimal sign, or dup) is depressed in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes.

Attachment Features:

Each 8775 mdl 1 or 2 must be equipped with a loop adapter which provides the capability to attach to a direct or data link attached loop of the 4331 Processor or the 8100 System.

Loop Adapter (#4850): Provides the capability to attach to a direct-or data link-attached loop of a 4331 Processor or the 8100 System. Direct loop may operate at a data rate of 38.4K bps or 9600 bps. The data link-attached loop operates at a data rate of 2400, 4800 or 9600 bps. The Loop Adapter operating data rate of 2400, 4800, 9600 or 38.4K bps is specified by the customer at order time. Half-speed operation of the 8775 can be selected by the operator. Data link attached loops are connected to a 4331 Processor and to an 8100 processor via a 3843 Loop Control Unit. **Specify:** On initial order or by change by service representative.

#9829 for 38.4K bps
#9825 for 9600 bps
#9823 for 4800 bps
#9822 for 2400 bps

The data rate of a loop cannot be higher than that of the slowest device attached to the loop. Consideration should be given to attaching devices slower than the 8775 on a separate loop when the maximum data rate of the 8775 is required. **Maximum:** One.

Telecommunications

Each 8775 mdl 11 or 12 must be equipped with one of the following communication features. External modem interface (#3701), CCITT V35 interface (#1550), DDS Adapter (#5650 or #5651), X.21 Adapter (#5655) or 1200 bps integrated modem (#5500).

8775 Display Terminal (cont'd)

CCITT V35 Interface (#1550): (8100 attached only) Provides a CCITT V35 interface for direct connection up to 1000 feet operating without a modem. Speeds of 600, 1200, 2400, 4800 and 9600 bps are supported. Business Machine Clocking (#1488) is not required. **Limitations:** Cannot be installed with #4850, #3701, #5500, #5650, #5651 or #5655. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12.

External Modem Interface (#3701): Provides EIA RS-232C interface and appropriate code to attach either an external IBM modem or PTT mandatory modem. Refer to M2700 pages. Other external non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. Provides interface to Data Service Unit for attachment to AT&T Dataphone* Digital Service. Supports speeds of 600, 1200, 2000, 2400, 4800, 7200 and 9600 bps over nonswitched and switched facilities. Also supports direct connection to 8100 Information System or 4331 Processor. **Limitations:** Cannot be installed with: #4850, #1550, #5650, #5651, #5500 or #5655. Business Machine Clocking (#1488) required for those modems which do not provide their own clocking. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12. **Specify: #9493** for operation on public switched network (not available with **#9221, #9222**) or **#9494** for operation on nonswitched communication facilities.

IBM 1200 bps Integrated Modem (#5500): Provides an integrated modem at speeds of 1200/600 bps for operation over nonswitched communication facilities. No external modem is required. **Limitations:** Cannot be installed with #3701, #4850, #1550, #5650, #5651 or #5655. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12. **Prerequisites:** #1488. **Specify: #9651** for use with 4-wire facility or **#9652** for use with 2-wire facility.

DDS Adapter (#5650, #5651): [#5650 for point-to-point operation, #5651 for multipoint tributary operation] An adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone* Digital Service network. The DDS Adapter interfaces to a DDS channel service unit, the customer site termination of the DDS network. Specify **#9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. **Limitations:** Cannot be installed with #4850, #3701, #5500, #5655 or #1550. **Maximum:** One #5650 or #5651. **Field Installation:** Yes on mdls 11 and 12.

* Trade Mark of American Telephone & Telegraph.

X.21 Adapter For Nonswitched Networks (#5655): Provides an interface and cable for attachment to the X.21 non switched Data Circuit-Terminating Equipment (DCE) complying with CCITT recommendation X.21. See specify for length of communication cable supplied. SDLC transmission at speeds of 2400 bps **#9822**, 4800 bps **#9823** and 9600 bps **#9825** are supported. **Limitation:** Cannot be installed with #1550, #3701, #4850, #5500, #5650 or #5651. **Maximum:** One. **Field installation:** Yes on Mdls 11 and 12.

MODEL CONVERSIONS

Model changes from 1 to 2 and 11 to 12 are field installable.

ACCESSORIES

The following items are available on a purchase-only basis. Order the feature number as shown below .

BATTERY, MERCURY:

Provides power to maintain the customer set up information while the terminal is powered off.

A 4.14 volt mercury battery: This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM.

Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

Mercury Battery: P/N 1743456.

DISPLAY STATION KEYBOARD ACCESSORIES

The following keyboard accessories allow customers to define and change the messages on single position keytops of the 8775 Display Station keyboard. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered from IBM.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key)

Legendable Keytops	Part No.
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key)

Blank Keytops:	Part No.
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor: The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Keytop Extractor: P/N 9900373.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay: P/N 1742762.

A Keyboard overlay is available for the 87-key EBCDIC Typewriter/Text Entry and Edit Keyboard #4670. The overlay is reversible and is annotated on both sides. Additional overlays are available by ordering P/N 4422226.

DISPLAY STATION TILT/ROTATE ACCESSORY

An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position.

This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Tilt/Rotary Accessory: P/N 4422265.

LOCKS AND KEYS

The 8775 with the Security Set Up Keylock **#1009** special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys only to original purchaser.) Order via MSORDER (Category = Supplies/Accessories; Group Code = DP Supply Order) on AAS A letter of authorization with key identification (on customer metal tag) must accompany each order.

The 8775 Security Keylock #6340 special feature is shipped with two keys. Additional keys may be purchased only from IBM, **(P/N 4420756)**. (Vendor will supply additional keys only to original purchaser).

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites:** #4999.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM.

8775 Display Terminal (cont'd)

Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 or feature **#9440**

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5 meter cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. **Field Installation:** Yes. **Prerequisites:** #4999.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader: P/N 4123500 or feature code **#9441**.

Dual Entry Magnetic Slot Reader: P/N 4123520 or feature code **#9442**.

Note: The MHS, DEMSR and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10 character numeric only set as the 3277 operator identification card reader which is not a subset of the alphanumeric character set. For further description of both character sets, see *IBM 8775 Display Terminal Character Set*, GA33-3041. The alphanumeric character set can only be read if the Enhanced Function (#3626) is installed. **Limitation:** The 3277 like character set numeric only magnetic cards coded with alternate end of message character (hexadecimal "C") cannot be read by MSR, DEMSR or MHS. The MSR, DEMSR or MHS cannot be used to logon to a SNA network.

A variety of magnetic documents, tags and labels which the MSR, DEMSR and MHS can read, may be optained from IRD. Some, depending on length, can be encoded by devices such as the 3642 Encoder Printer. For complete information on the availability of pre-encoded striped plastic cards contact an IRD sales representative.

The following cable assemblies can be used to extend the Magnetic Slot Reader or Magnetic Hand Scanner distances. **Limitation:** Extension cables cannot be plugged into other extension cables. **Prerequisites:** Feature #4999.

Description	Feature/Part	Number
6 meter (19.7 ft.)	**#9106, P/N**	**4832986**
12 meter (39.4 ft.)	**#9107, P/N**	**4832987**

The *MSR Customer Service Manual*, GA24-3663, should be ordered.

SUPPLIES (None)

8809 MAGNETIC TAPE UNIT MDLS 1A, 1B, 2, 3

PURPOSE

Magnetic tape unit for the 4321 or 4331 Processor and 8100 Information System. Provides high-speed save/restore capability for fixed DASD as well as satisfying the DB/DC journaling, tape interchange and processing requirements of the using system.

MODELS

Model 1A	A01	First drive which attaches to the 8101 Storage and I/O unit or the 8140-BXX and CXX Processor or to the 8809 Magnetic Tape Unit Adapter on the 4321 or 4331 Processor.
Model 1B	B01	First drive which attaches to the 8130, 8140 or 8150 Processor.
Model 2	002	Second, fourth or sixth drive which attaches to the first (model 1A or 1B), third drive (model 3) or fifth drive (model 3), respectively.
Model 3	003	Third drive or fifth drive which attaches to a model 2.

Limitations: The reel inertia is critical to the 8809 motion control system. An example of a reel that does not meet the 8809 inertia requirement is the 26.7cm (10.5 inch) large hub reel (P/N 1669031) that is designed to hold 366 meters (1200 feet) of tape. A detailed description of tape reel inertias is contained in the *Tape Requirements for One-Half Inch Tape Units,* GA32-0006-5, and *The IBM 8809 Magnetic Tape Description,* GA26-1659.

Interchange of tape written on an 8809 at its extended environment with a current IBM tape drive at its non-extended environment may result in an inter-layer slippage, permanent or temporary errors. A detailed description of tape environmental requirements is contained in the *Tape Requirements for One-Half Inch Tape Units,* GA32-0006-5.

Maximum:

8100 Information System: Up to four 8809 units can be attached to an 8100 Information System mdl 1A or 1B followed by a mdl 2, mdl 3 and another mdl 2.

4321 or 4331 Processor: Up to six 8809 units can be attached to a 4331 Processor mdl 1A followed by a mdl 2, mdl 3, mdl 2, mdl 3, and another mdl 2.

Prerequisites: 8100 Information System for mdl 1A.

A. Magnetic Tape Attachment (#4521) on the 8101 Storage and I/O Unit.

B. Diskette Drive and Magnetic Tape Attachment (#1507) on the 8101 mdl A10 or A20.

C. Magnetic Tape Attachment #4901 on 8140-BXX and CXX Processor.

For the 4321 or 4331 Mdl Group 1, 2, or 11 Processor: The 8809 Magnetic Tape Unit Adapter (#4910).

Magnetic Tape: IBM Multi-System Tape (MST) or equivalents, is recommended for optimum performance. The Minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Unit* GA32-0006-5. Assuming media requirements are met, the 8809 accommodates most industry standard reel sizes of 15.9cm (6.25 inches), 17.8cm (7.0 inches), 21.6cm (8.5 inches), and 26.7cm (10.5 inches).

HIGHLIGHTS

The 8809 Magnetic Tape Unit transports tape directly from reel-to-reel without capstans or vacuum columns, with tape tension and velocity controlled electronically.

The 8809 will operate in one of two operating modes selectable by the host processor. The first mode is start/stop mode in which the 8809 runs at .3175 meters per second (12.5 inches per second) to achieve a 20,000 bytes per second instantaneous data rate. The second mode is streaming mode in which the 8809 runs at 2.54 meters per second (100 inches per second) to achieve a 160,000 bytes per second instantaneous data rate for volume dumps.

Tapes written in either start-stop or streaming mode have an identical tape format. This 63 bytes per millimeter (1600 bytes per inch) phase encoded tape format permits the compatible interchange of tapes with the 2400 and 3400 tape subsystems operating with the same recording format and density.

Note: The 8100 Information System will require dedicated operation to achieve streaming mode for save/restore volume dumps. The 4321 or 4331 Processor may require dedicated operation and/or selection of the long gap (30.5mm or 1.2") mode in order to achieve acceptable performance in streaming mode.

Checking: Each byte is parity checked while tape is being read. Data written on tape is read back and checked as in reading, with full parity check.

Error Correction: Single track error correction "in flight" takes place similar to other IBM tape products in 63 bpmm (1600 bpi) Phase Encoded Mode during read operations.

	Characteristics	
	Start/Stop	**Streaming***
Tape Speed (plus or minus 5%)	.3175m/s (12.5 ips)	2.54m/s (100 ips)
Data Rate, Instantaneous	20kb/s	160kb/s
Access Time (Write)	40 ms	335 ms
Access Time (Read)	44 ms	335 ms
IBG Time, Nominal 0.6 inch gap (1.524cm)	48 ms	6 ms
IBG Time, Nominal 1.2 inch gap (3.048cm)	96 ms	12 ms
Rewind Time (2400 ft. reel) (732 meters)	2.6 min.	2.6 min.

* Refer to *IBM 8809 Magnetic Tape Description,* GA26-1659, for additional details.

Publications:

Tape Requirements for one-half Inch Tape Units, GA32-0006-5, at: 556, 800, 1600 and 6250 bpi.
IBM 8809 Magnetic Tape Unit Description, GA26-1659.
Introduction to the IBM 8100 Information System, GA27-2875.
IBM 8100 Information System Installation Manual - Physical Planning, GA27-2877.
IBM 8100 Information System Configurator, GA27-2876.
IBM 4300 Processors Summary and Input/Output and Data Communications Equipment Configurator, GA33-1523.
Input/Output Equipment Installation Manual -- Physical Planning for S/360, S/370 and 4300 Processors, GC22-7064.

SPECIFY

Unless indicated otherwise, these specify codes are only available at time of manufacture.

- Voltage (AC, 1-phase, 60 Hz): [Not required on mdl 2] **#9911** for 120V **#9902** for 208V, **#9914** for 240V.
- 8100 System Attachment: **#9606** for mdl 1A and 1B only. Also **#9933** if the mdl 1B is attached to 8150. **Field Installation:** Yes.
- Power Cord [Not required on mdl 2]: With waterproof locking plug **#9950**. With non-locking plug **#9891**.
- 4321 or 4331 Processor Attachment: **#9607** for mdl 1A only. **Field Installation:** Yes.
- Color (4321 or 4331 Processor and for mdl 1A only):

Willow Green **#9060**	Classic Blue **#9063**
Garnet Rose **#9061**	Charcoal Brown **#9064**
Sunrise Yellow **#9062**	Pebble Gray **#9065**

SPECIAL FEATURES

8100 System Multi-Drive (#4920): [Mdl 1B] Required on Mdl 1B if more than one tape drive (additional Mdl 2 or Mdl 3) is attached to an 8100 System. **Field Installation:** Yes.

MODEL CONVERSION (None)

ACCESSORIES (None)

SUPPLIES (None)

8815 SCANMASTER I

PURPOSE

- For capturing and transmitting noncoded documents to an 4300, S/370, 303X, or 308X system.
- For capturing and transmitting noncoded documents directly to another Scanmaster I.
- For printing noncoded documents.
- For printing formatted text documents.

The Scanmaster I is an SNA/SDLC device designed for system-attached operation and terminal-to-terminal operation. It attaches to 4300, S/370, 303X, and 308X processors over switched or non-switched communication facilities at speeds up to 9600 bps. It will communicate directly with another remote Scanmaster I over a public switched telephone network or private switched or nonswitched voice facilities at speeds up to 9600 bps.

MODELS

Model 1 001
Model 3 003
Model 4 004

The Scanmaster I is available in the following three models:

Model 1: Can be tailored, i.e., equipped with appropriate features for use in system-attached and terminal-to-terminal operations. Communication features permit operation over switched or nonswitched communication facilities via an external modem at speeds up to 9600 bps. Includes Mark Sense Control for addressing and/or identifying documents, and Character Print for printing data and text documents, and messages at 12.7 cpi and 6.1 lpi in prestige-style font in system-attached operations. The Model 1 will accommodate the Keypad feature for operators to key-in document addressing and/or identification information and password to the host.

Model 3: For use in both system-attached and terminal-to-terminal operations over a switched line via a 4800 bps integrated modem. Includes Mark Sense Control for addressing and/or identifying documents, and Character Print for printing data and text documents, and messages at 12.7 cpi and 6.1 lpi in prestige-style font in system-attached operations. The Model 3 will accommodate the Keypad feature for operators to key-in document addressing and/or identification information and password to the host.

Model 4: For use in system-attached operation over a nonswitched line via a 4800 bps integrated modem. Includes Mark Sense Control for addressing and/or identifying documents, and Character Print for printing data and text documents, and messages at 12.7 cpi and 6.1 lpi in prestige-style font in system-attached operations.

Scanmaster I Model Structure

	Mdl 1	Mdl 3	Mdl 4
CCA W/O CLOCK	STD	STD	STD
4800 bps IM-SW *	-	STD	-
4800 bps IM-NSW*	-	-	STD
EIA/CCITT ** [2]	OPT	-	-
X.21 LEASED **	OPT	-	-
DDSA(USA only)**	OPT	-	-
MARK SENSE CTRL	STD	STD	STD
CHARACTER PRINT	STD	STD	STD
KEYPAD	OPT	OPT	OPT
PEDESTAL	OPT	OPT	OPT

Note:
* IM: Integrated Modem, SW: Switched, NSW: Nonswitched

** Must select one of these options on Model 1.

Prerequisites: The Scanmaster I mdl 1 requires an external modem interface, or a DDS Adapter, or an X.21 Adapter for nonswitched networks.

Customer Setup (CSU): The Scanmaster I is designated as a Customer Setup Unit, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

The Scanmaster I is a high-speed, high-quality document transceiver consisting of a controller, a scanner and a printer in one integrally-designed desk-height unit for use by casual operators.

System-attached and terminal-to-terminal operations are available. In addition to the basic transceiver functions, the Scanmaster I offers:

- A convenience copying capability, one copy at a time.
- A compression/decompression function for compressing the scanned data prior to passing it to the communication line and for decompressing the incoming noncoded communication line data prior to printing.
- A Mark Sense Control function for system-attached operations that detects addressing and identifying marks written by the user on a Cover Sheet heading the noncoded input document. The Scanmaster I transmits the digital representation of this mark pattern to the host for interpretation.
- A Keypad feature provides a 16-keypad and 10-digit readout on the operator panel to allow operators to key-in document addressing and/or identification information and password to the host.
- A message-print capability in the system-attached operations for printing host messages, such as time stamping, addressing, and buck slip information on the cover page preceding a noncoded output document.
- A Character Print function for system-attached operations for printing formatted EBCDIC-coded text and data documents.
- 4800 bps integrated modems switched and nonswitched.
- External modem interface for attaching external modems with speed up to 9600 bps with switched network backup (SNBU).
- Communication adapters for attaching to the Digital Data Service and the X.21 leased digital networks.

Controller: The controller controls all online and offline operations. The Scanmaster I communicates with another Scanmaster I or with the host system using SNA with Advanced Program-to-Program Communication (APPC) and SDLC. APPC features a new LU type (6.2) providing common session protocols for document interchange among office-oriented systems and program products. SDLC communication protocols provide accurate transmission. SDLC as used in the Scanmaster I conforms to a subset (unbalanced normal mode) of both ISO HDLC and ANSI ADCCP standards.

Scanner: The scanner is a feed-through mechanism with Automatic Document Feed (ADF). The ADF chute accepts multiple documents with dimensions of 128mm (5 in.) to 216mm (8.5 in.) wide x 128mm (5.0 in.) to 356mm (14.0 in.) long. The sum of the width and length must be a minimum of 310mm (12.2 in.). For example, if the width is 128mm (5.0 in.) the minimum allowable length is 182mm (7.2 in.). Similarly if the length is 128mm (5.0 in.) the minimum allowable width is 182mm (7.2 in.). Approximately 30 pages with a total thickness of 3mm (0.12 in.) may be inserted to minimize operator intervention. The scanning resolution is 8 dots/mm (203 dots/in.) in the horizontal direction. In the vertical direction, the scanning resolution is 7.7 lines/mm (196 lines/in.) or 3.85 lines/mm (98 lines/in.). (The selection of scanning resolution, which can be made manually, or specified by the Cover Sheet for system-attached operations, can be made based on a trade-off between transmission time and the quality requirement for the document being scanned.) Darkness is selected via the Normal Original/Light Original switch on the operator panel or via the Cover Sheet for system-attached operations. Light Original is used when copies are to be made from an original document that does not have enough contrast for normal scanning.

Printer: The printer is a high-quality, multi-stylus, electrostatic printer that uses a pressure roller as a fixing mechanism. Received documents are printed and automatically cut to the length of the transmitted documents. Printed documents are from 216mm (8.5 in.) wide x 148mm (5.8 in.) long to 216mm (8.5 in.) wide x 356mm (14.0 in.) long. A scanned document as short as 128mm (5.0 in.) will be cut to the length of 148mm (5.8 in.) due to the printer feed mechanism. A 150m (492 ft.) long paper roll can be loaded. The printing resolution is 8 dots/mm (203 dots/in.) in the horizontal direction and 7.7 lines/mm (196 lines/in.) in the vertical direction. Note that the effective print width is 200mm (7.87 in.) for a 216mm paper roll. **Note:** When the selected scanning resolution is 3.85 lines/mm (98 lines/in.), the output document is printed at 7.7 lines/mm (196 lines/in.). This is accomplished by printing each line twice. The toner reservoir in the printer can be filled with a bottle of toner (100 g), which can develop approximately 3,000 pages of typical office documents.

Communications: The Scanmaster I mdls 1 and 3 communicate with each other on a terminal-to-terminal basis using SNA/SDLC communication protocol over voice communication facilities. The Scanmaster I mdls 1, 3, and 4 communicate with a 4300, S/370, 303X, or 308X system through a 3705 communication controller, using SNA/SDLC communication protocol.

Communication Facilities: The Scanmaster I mdls 1 and 4 operate in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of 2000 (mdl 1 only), 2400/1200 (mdl 1 only), 4800/2400 bps on nonswitched facilities. The mdl 1 will also operate at transmission speed of 7200/3600 and 9600 bps on these

8815 Scanmaster I (cont'd)

nonswitched facilities. The Scanmaster I mdls 1 and 3 operate in half-duplex point-to-point mode of transmission speeds of 2400/1200 (mdl 1 only) and 4800/2400 bps on switched facilities. See M2700 pages for details of the communication facilities/services.

Performance: The performance of the Scanmaster I subsystem is dependent upon many factors such as:

1) Native speeds of the scanner and printer - 30mm/sec (1.2 in/sec).
2) Overlap operations of scanning and printing (at the Scanmaster I or remote Scanmaster I in terminal-to-terminal operation) and processing time for the last page (cut and eject).
3) Tasks executed.
4) Document content/page length and resolution selected.
5) Text format - number of print lines, number of print characters in a line, skipping, page length, etc.
6) Modem speeds
7) Quality of communication line, which affects transmission time of data.
8) Host system availability and software implementation.

Therefore, an analysis of each document is necessary to find the actual throughput/performance.

The following formulas, with notes, are included for reference to approximate the Scanmaster I performance. Refer to IBM Aids for system performance evaluation information.

Local Copy

T = N x (.9 x L + 2.5) + 14

Where: T - Total time (in seconds)
N - Number of pages to copy
L - Length of original (inches)

Note: Total time is from depression of Local Copy key to ejection of last page.

If the length of the original is less than 10 inches, the total copy time may exceed the approximated time.

Example: Copying a four-page document of letter-size pages (11 inches long)

T = 4 x (.9 x 11 + 2.5) + 14 = 64 seconds (approximately)

Text Transmission:

LPM = 800 x R / [(4.1 + .03 x C) x R + 1]

Where: LPM - Lines per minute.
R - Ratio of lines printed per page to the maximum number of lines available per page.
C - Average number of character positions in the printed lines.

T = 60 x L / LPM

Where: T - Time to print a page (in seconds).
L - Lines printed on page.
LPM - Lines per minute from above formula.

PPM = 60 / [(summation of T above) / N + 2 + 12 / N]

Where: PPM - Pages per minute.
T - Time to print a page from above formula.
N - Number of text pages

Note: Excessive skipping in successive pages will degrade throughput performance.

Example: If 22 of 66 lines on a page are printed, R=0.33. Assuming an average line length of 75 character positions (C=75), then:

LPM = 800 x .33 / [(4.1 + .03 x 75) x .33 + 1] = 85 (approximately)
T = 60 x 22/85 = 16 (sec) (approximately)

If three pages of the same text format are printed,
PPM = 60 / [(16 + 16 + 16) / 3 + 2 + 12/3] = 2.7 (approximately)

Document Transmission (terminal-to-terminal operation):

T = summation of page transmission time (*) + 17

Where: T- Total time (in seconds) from start of send operation to completion of receive operation at remote Scanmaster I including page-eject time.

Page transmission time - time per page transmission (the concurrent operation of scan, transmission, print functions are included).

Note: * For comparison of transmission time, three types of pages have been selected as; A, basic diagrams; B, double spaced typed letter, and; C, single spaced typed text. The transmission speeds shown below are under error-free conditions.

PAGE TYPE	RESOLUTIONS SELECTED	TRANSMISSION SPEED (SEC/PAGE) AT LINE SPEEDS OF (BPS) 2400 a	4800 a	4800 b	9600 b
A	Normal	34	19	17	14
	Fine Detail	49	29	27	27
B	Normal	46	26	23	16
	Fine Detail	67	40	37	29
C	Normal	94	52	46	26
	Fine Detail	137	76	69	40

a: Switched line facility b: Leased line facility

Modems: One external IBM modem, or equivalent may be attached to a Scanmaster I mdl 1 that is equipped with the prerequisite External Modem Interface #3701.

IBM Modems	Speed (bps)
3863 Mdl 1/2	2400/1200
3864 Mdl 1/2	4800/2400
3865 Mdl 1/2	9600/4800

Switched Network Backup (SNBU) available for modems provides backup for nonswitched tele-communication lines. SNBU allows restoration of operation between two point-to-point modems, or between a multipoint control modem and any multipoint tributary modem.

SNBU feature available for modems may also be used to communicate with another Scanmaster I equipped with the equivalent modem in terminal-to-terminal operations when the Scanmaster I is not being used in system-attached operations.

Four-wire Switched Network Backup is available for 3863, 3864, or 3865 modems. For communication capabilities, product utilization, and special features, see M2700, 3863, 3864, and 3865 pages.

Security: The 3845 mdls 1, 2, 11 and 12 and 3846 mdls 2 and 12, where available, can be attached to the Scanmaster I mdl 1 via the External Modem Interface (#3701) to safeguard data transmitted over unprotected communication line through cryptography.

Problem Determination Procedures: Problem determination and recovery routines and procedures have been designed into this unit to provide greater availability to the customer. See "Customer Responsibilities" below.

Network Problem Determination Application (NPDA), a program product, operates with VTAM to assist in performing communication network problem determination/isolation and enhances the availability and serviceability of the Scanmaster I. See NPDA in the Program Products section.

Customer Responsibilities: The customer is responsible for:

- Site and system preparation.
- Arranging for the telecommunication service supplier to install the appropriate communication service equipped with the required connecting device.
- Arrangements with other vendors for equipment/facilities, if necessary.
- Receipt at customer's receiving dock, unpacking, and placement of the Scanmaster I.
- Physical setup, connection of cables to communication lines/modems and IBM devices, incorporating protected customer access areas, switch settings, and checkout.
- Performing the problem determination procedures and completing a problem report form before calling for IBM service.
- Procuring the Scanmaster I consumables - Toner, Paper and Felt wiper. See "Supplies".
- Replacement of felt wiper in the printer under the cover. See "Supplies".
- Designing and procuring the Cover Sheets when using host controlled distribution of documents. See "Supplies".
- Paper and Toner are affected by temperature and humidity. Each machine location must be compared to the acceptable environmental condition to ensure satisfactory print quality. The customer must be aware of these environmental limitations.

Bibliography: See KWIC Index, G320-1621, or specific system bibliography.

8815 Scanmaster I (cont'd)

SPECIFY

Specify codes are not normally required to order a Scanmaster I. If codes are not specified, the machine is shipped with the following specifications:

- Voltage (120V AC, 1-phase, 3-wire 60 Hz):
- Power Cable Plug: Non-locking.
- Power Cable Length: 2.8 meters (9 feet).
- Communication Cable Length:

  Mdl 1 only - 6.1 meters (20 feet) for attachment to standalone modem, or to communication facility when a DDS Adapter is used, or to communication facility when an X.21 Adapter for nonswitched networks is used.

  Mdls 3, and 4 - 3.0 meters (10 feet) for attachment to a communication facility through an integrated modem in the Scanmaster I.

- Document Width: 216mm Document Chute
  216mm Paper-Roll Flange

The remainder of this Specify section can be ignored unless special circumstances require a deviation from the standard default values.

- Power Cable Length: If the standard 2.8 meter (9 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) cable.
- Communication Cable Length (Mdl 1 only): If the standard 6.1 meter (20 foot) communication cable is not desired, specify **#9261** for a 3.0 meter (10 foot) cable, **#9262** for a 9.1 meter (30 foot) cable or **#9263** for a 12.2 meter (40 foot) cable.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Keypad (#4610): Provides a 16-key keypad and 10-digit readout on the operator panel to allow operators to key-in document addressing and/or identification information and password to the host. **Limitations:** Cannot be used for terminal-to-terminal operations. **Maximum:** One. **Field Installation:** No.

Pedestal (#5501): Adds 150mm (5.91 in.) to the height. **Maximum:** One. **Field Installation:** No.

COMMUNICATION FEATURES

Scanmaster I mdls 1, 3, and 4 are provided with communication features without Business Machine Clock. Mdls 3 and 4 are equipped with a 4800 bps integrated modem for data-link attachment as follows:

Model	Integrated Data-Link Attach Capability:
003	For system-attached operations and/or terminal-to-terminal operations: A self-clocked, micro-processor based, integrated modem that operates in half-duplex mode over 2-wire, switched communication facilities at speeds of 4800/2400 bps. Speed selection is under operator, host and/or remote station control. Equalization is automatic and continuously performed. Manual originate and auto answer procedures are used to establish connection. The protective circuits required for FCC Registration are built into the Scanmaster I to allow direct attachment to the public switched network, (conditional upon FCC Registration.) When a Scanmaster I mdl 3 communicates with a 4300, S/370, 303X, or 308X system in system-attached operations, the system must be equipped with a 3864 mdl 2, or its equivalent. When a Scanmaster I mdl 3 communicates with a Scanmaster I in terminal-to-terminal operations, the second Scanmaster I must be a Scanmaster I mdl 3, or be a Scanmaster I mdl 1 equipped with a 3864 mdl 2, or its equivalent.
004	For system-attached operations and/or terminal-to-terminal operations: A self-clocked, micro-processor based, integrated modem that operates in half-duplex mode over 4-wire, nonswitched duplex communication facilities in point-to-point or multipoint mode at speeds of 4800/2400 bps. Speed selection is under operator, host and/or remote station control. Equalization is automatic and continuously performed. When a Scanmaster I mdl 4 communicates with a 4300, S/370, 303X, or 308X system in system-attached operations, the system must be equipped with a 3864 mdl 1, or its equivalent. When a Scanmaster I mdl 4 communicates with a Scanmaster I in terminal-to-terminal operations, the second Scanmaster I must be a Scanmaster I mdl 4, or be a Scanmaster I mdl 1 equipped with a 3864 mdl 1, or its equivalent.

The Scanmaster I mdl 1 must be equipped with either a #3701, or a #5650, or a #5655.

External Modem Interface (#3701): [Mdl 1 only] Provides an interface and cable for attachment to an IBM or external modem with clock that complies with EIA 232C. **Limitations:** Cannot be ordered with #5650, or #5655. **Maximum:** One. **Field Installation:** Yes.

Digital Data Service (DDS) Adapter (#5650): [Mdl 1 only] Provides an interface and cable for attachment to the AT&T nonswitched Dataphone® digital data service network at speeds of 2400 bps, 4800 bps, and 9600 bps. The DDS Adapter interfaces with a DDS channel service unit, the customer's site termination of the DDS network. **Limitations:** Cannot be ordered with #3701 or #5655. **Field Installation:** Yes. **Maximum:** One. Specify **#9822** for 2400 bps, **#9823** for 4800 bps, or **#9825** for 9600 bps.

X.21 Adapter For Nonswitched Networks (#5655): [Mdl 1 only] Provides an interface and cable for attachment to the X.21 nonswitched data circuit-terminating equipment (DCE) at speeds of 2400, 4800, and 9600 bps. **Limitations:** Cannot be ordered with #3701 or #5650. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model changes will be honored as RPQs:

From/To	001	003	004
001	-	Yes	Yes
003	No	-	Yes
004	No	No	-

ACCESSORIES

The following items are available on a purchase-only basis.

Document Chute/Paper-Roll Flange: The machine is shipped with one 216mm (8.5 in.) Document Chute and one pair of Paper-Roll Flanges. For additional Document Chutes and/or Paper-Roll Flanges, contact IBM. **Field Installation:** Yes. **CSU:** Yes. **Prerequisites:** Document Chute Label, see below.

Items	Part Number	Number Shipped
Document Chute - 216mm	6829010	one
Paper-Roll Flange - 216mm	6828968	one piece*

Note: * Two flanges are required to support a roll of paper.

Document Chute Label: Order P/N **6828258**

SUPPLIES

Toner: Toner, P/N 7038486 or equivalent, is required. **Note:** Each P/N contains six bottles of toner in a carton. Contact IBM for ordering information.

Paper Roll: The following Paper Roll, or equivalent, is required. **Note:** Each P/N contains six rolls of paper 150m (492 feet.) long in a carton. Contact IBM for ordering information.

Items	P/N
Paper Roll - 216mm (8.5 in) (Wide-Range Paper)	**7038482**
Paper Roll - 216mm (8.5 in) (Full-Range Paper)	**6109607**

Note: For operating environmental conditions and paper selection, contact IBM.

Felt Wiper: It is necessary to replace the felt wiper after each usage of six paper rolls. To order felt wipers, contact IBM. **Note:** Each P/N contains 20 felt wipers in a carton.

Note: While other combinations of commercially available papers and toners may work, machine reliability and image quality will vary widely as a function of the paper and toner used. It is recommended that IBM's systems matched supplies referenced above be used for optimum performance.

Cover Sheet: Cover Sheets may be required for system-attached operations. For IBM system-defined (for use with DISOSS, and the Image Distribution System PRPQ 5799-BJA and 5799-BJB) or customization Cover Sheets, contact IBM. A "customization" cover sheet is printed with all mark positions and timing marks so that the customer may overprint operator instructions/nomenclature for any customer applications.