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99-005 DIAGNOSTIC OVERVIEW

There are many diagnostic programs for the System/34. Some programs (wrap tests) run automatically when a load operation is performed, some are for your use with MAPs (MDIs and TUs), and others are for you to use when you are free-lancing (utilities, exercisers, and special diagnostic programs).

Note: Diagnostic information for the 1255 Magnetic Character Reader can be found in the *IBM System/34 1255 Attachment Feature Theory/Maintenance Manual*, SY31-0521.

Wrap Tests

Each time a load operation is performed from the disk or the DIAGB1 diskette, the wrap tests are executed to ensure that the various parts of the System/34 are working correctly. Wrap tests check the CP (control processor), the MSP (main storage processor) and the controllers and/or attachment circuits that are associated with the devices. (See paragraph 99-015 *CSIPL Switch Options*.) Little device testing is done by the wrap tests.

MDIs and TU Tests

The MDI program runs TU tests against a controller and attachment and then runs TU tests against the device. TU tests are routines that are written to test specific functions of the devices and attachments. For example, one TU test might determine that the print belt is up to speed on the 5211 Printer, and another might determine that a register in the attachment can be set and reset. Each time a TU test executes, it passes result bytes to the MDI supervisor program. The result bytes are used by the MDI supervisor to select the next TU test to be run. If all of the TU tests run by the MDI supervisor pass acceptable results (no errors) to the MDI supervisor, the sequence of TUs that are run is known as the *good machine path*. If any of the TU tests passes results that indicate that something is wrong, the MDI supervisor branches out of the good machine path and runs other TU tests that may aid in specifying the cause of the error.

MAPs are used with the MDIs. When the MDI supervisor program needs your aid (look at a light, probe a point, answer a question), it can either send you to a printed MAP (hard copy) or display the instruction or question on the system console (soft copy MAP).

In addition to the wrap tests and MDI diagnostics, there are diagnostic programs such as utilities, exercisers, and some special tests (MSP mini-MDIs and MDI special).

Diagnostic Utilities

See paragraph 99-055 for descriptions:

- System Configure
- System Customiz
- Display Sector
- Print Sector
- EC Update Copy and Diskette Analyze
- Program Patch
- System Records List
- Disk Analyze
- Disk Initialize
- Data Communications TRAP Print

Diagnostic Exercisers

See paragraphs 99-080 and 99-085 for descriptions:

- MSP
- Disk
- Diskette
- 3262
- 5211
- Data Communications
- 5225, 5251, 5252, and 5256

Special Diagnostic Program

In addition to wrap tests, utilities, and exercisers, there are some special-purpose diagnostic programs. These programs are for you to use when you are free-lancing (troubleshooting, but not following the MAPs).

- MSP exerciser (99-085)
- MDI-system instruction step (99-090)
- MDI special (99-090)
- MSP mini-MDI (99-095)
- Controller display/dump (99-067)
- System test (99-069)
- ERAP (99-068)
- TU select (99-064) from the CE panel for the work station attachment
- Work station and line printer step or stop on error modes (99-066)
- Work station attachment MDIs from CE panel (99-062)

99-010 CSIPL DIAGNOSTICS (WRAP TESTS)

The purpose of the CSIPL diagnostics (wrap tests) is to automatically test most of the system logic each time the Load key is pressed. When the CSIPL diagnostics find an error, either the Processor Check light turns on or the system console displays an error code that identifies the failing device. (See paragraph 99-020 for CSIPL wrap test error codes.)

99-015 CSIPL SWITCH OPTIONS

The Address/Data switches are normally set to 0000 during a CSIPL operation. This setting causes most of the system logic to be tested during each load. The following is a list of the switch settings that cause looping, bypassing, partial loading and stopping during CSIPL from diskette DIAGB1. Exceptions are:

1. 0000, FF00, and FFX options work when the CSIPL operation is from disk or diskette DIAGB1.
2. F800 option works from disk only.

Address/ Data Switches	Option	Address/ Data Switches	Option
FF00	Bypass tests that need UDT configuration data and wraps (no UDT on B1 diskette).	F181	Bypass all wrap tests, execute work station attachment TU select, and print results. (See paragraph 99-064.)
FFXX	Bypass wrap tests for the device with an ID of XX. (See paragraph 99-060 for a list of device IDs.) Note: Specifying 01, 10, CA, E1, or E3 as the device ID does not cause the corresponding wrap test to be bypassed. Therefore, do not specify one of these IDs.	F180	Bypass all wrap tests, execute work station attachment MDIs, and print results. (See paragraph 99-062.)
FEXX	Loop on CSIPL routine XX and bypass errors (except errors in routines that test control or main storage). (See paragraph 99-020 for a list of valid routine (XX) numbers.)	F101	Bypass all wrap tests, execute work station attachment TU select, and store results in work registers. (See paragraph 99-064.)
FDXX	Loop on CSIPL routine XX (routines 9 through 64). (See paragraph 99-020 for XX values.)	F100	Bypass all wrap tests, execute work station attachment MDIs, and store results in work registers. (See paragraph 99-062.)
FC02	Loop on control processor loads 1 and 2, and bypass errors.	EEXX	Load and loop the MSP MINI-MDI test specified by XX. (See paragraph 99-095 for XX values.)
FC01	Loop on control processor load 1 and bypass errors.	EE00	Load and execute all the main storage processor MINI-MDI tests. (See paragraph 99-095.)
FB02	Loop on control processor load 2 and stop on errors.	0000	Normal position-run wrap tests on all areas of the System/34 that are in the UDT configuration.
FB01	Loop on control processor load 1 and stop on errors.		
FA01	Stop after the first load of control storage and permit changing of the Address/Data switches to FB01, FB02, FC01, or FC02.		
FA02	Stop after the second load of control storage and permit changing of the Address/Data switches to FB01, FB02, FC01, or FC02.		
F800	Load the diagnostic supervisor from disk. (Use this option to read diskette MDI tests from the disk.)		

99-020 CSIPL WRAP TEST ERROR CODES

Control Processor Wrap Error Codes

If, during the CSIPL procedure, the system processor checks with the display lights byte 0 bits P0, 0, 1, and 2 off (ignore bit 3) and bits 4, 5, 6, or 7 on, this is an indication that the CP (control processor) failed in one of its bring-up diagnostic routines. To determine which routine failed (for routine numbers of 09 or larger), display WR3(L). In this register will be the number that identifies the failing routine.

To determine what function was being performed by each routine, see the following chart.

Routine #

WR3L

Contents	Description
00	Branch and addressing test—tests ability to do an unconditional branch to a selected address.
01	Conditional branching—tests all conditional branches assuming system is at a reset condition.
02	Conditional branching by setting bits on in the condition register with the SBN, SBF, load PCR instructions. Display light—byte 0—bit 2 is turned off at the end of this routine.
03	Test mask instruction—tests TM instruction using SBN and SBF.
04	Tests high selection of WR1—uses SBN, SBF, TM, and conditional branching instructions to test selecting high-order byte of WR1.
05	Load immediate (LI)—uses TM and conditional branching to test LI.

WR3L

Contents	Description
06	Compare immediate (CI).
07	Branch and link (BAL) and return (RETRN).
08	Microprocessor Sense (MPS) of Address/Data switches 1 and 2 into WR1(H). Microprocessor Sense (MPS) of Address/Data switches 3 and 4 into WR1(H). <i>Note: Starting with routine 09, the routine number is stored in WR3(L).</i>

09	Decrement register by X'01' (DEC) using LA1 instruction.
10	Increment register by X'01' (INC).
11	Decrement register by X'01' (DEC) using LA2 instruction.
12	Add registers 2 bytes + 1 byte (AR).

>>>>>>>>>>>> TC06F
CONTROLLER CYCLE STEAL TEST TC06F

THIS PROGRAM TESTS THE CYCLE STEALING
OF 6 BYTES OF DATA FROM THE CONTROLLER
TO THE HOST CONTROL STORE.

RESULT BYTE 1

0-4 NOT USED

5 CYCLE STEAL TRANSFER CHECK
SENSE BIT ON AFTER A 1 BYTE DATA
XFER FROM CONTROLLER TO HOST
6 DATA ADDRESS IN WR5IL4 WAS
INCREMENTED AFTER A 1 BYTE
DATA TRANSFER WHEN IT WAS
NOT SUPPOSED TO
7 DATA WAS NOT TRANSFERRED
CORRECTLY AFTER A 1 BYTE
CYCLE STEAL OF DATA FROM
THE CONTROLLER TO THE HOST
CONTROL STORE

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>> TC070
 CONTROLLER CYCLE STEAL TEST TC070

THIS PROGRAM TESTS THE CYCLE STEALING OF 1 BYTE OF DATA FROM THE CONTROLLER TO THE HOST MAIN STORE.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM CONTROLLER TO HOST
 6 DATA ADDRESS IN WR4IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE CONTROLLER TO THE HOST MAIN STORE

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>> TC071
 CONTROLLER CYCLE STEAL TEST TC071

THIS PROGRAM TESTS THE CYCLE STEALING OF 6 BYTES OF DATA FROM THE CONTROLLER TO THE HOST MAIN STORE.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM CONTROLLER TO HOST
 6 DATA ADDRESS IN WR5IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE CONTROLLER TO THE HOST MAIN STORE

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>> TC072
 CONTROLLER CYCLE STEAL TEST TC072

THIS PROGRAM TESTS THE CYCLE STEALING OF 1 BYTE OF DATA FROM THE HOST CONTROL STORE TO THE CONTROLLER.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM HOST TO CONTROLLER
 6 DATA ADDRESS IN WR4IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN IT SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE HOST CONTROL STORE TO THE CONTROLLER

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>> TC073
 CONTROLLER CYCLE STEAL TEST TC073

THIS PROGRAM TESTS THE CYCLE STEALING OF 6 BYTES OF DATA FROM THE HOST CONTROL STORE TO THE CONTROLLER.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM HOST TO CONTROLLER
 6 DATA ADDRESS IN WR5IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN IT SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE HOST CONTROL STORE TO THE CONTROLLER

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>> TC074
 CONTROLLER CYCLE STEAL TEST TC074

THIS PROGRAM TESTS THE CYCLE STEALING OF 1 BYTE OF DATA FROM THE HOST MAIN STORE TO THE CONTROLLER.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM HOST TO CONTROLLER
 6 DATA ADDRESS IN WR6IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN IT SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE HOST MAIN STORE TO THE CONTROLLER

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>> TC075
 CONTROLLER CYCLE STEAL TEST TC075

THIS PROGRAM TESTS THE CYCLE STEALING OF 6 BYTES OF DATA FROM THE HOST MAIN STORE TO THE CONTROLLER.

RESULT BYTE 1
 0-4 NOT USED
 5 CYCLE STEAL TRANSFER CHECK SENSE BIT ON AFTER A 1 BYTE DATA XFER FROM HOST TO CONTROLLER
 6 DATA ADDRESS IN WR7IL4 INCREMENTED AFTER A 1 BYTE DATA TRANSFER WHEN IT SHOULD NOT
 7 DATA WAS NOT TRANSFERRED CORRECTLY AFTER A 1 BYTE CYCLE STEAL OF DATA FROM THE HOST MAIN STORE TO THE CONTROLLER

RESULT BYTE 2
 0-7 NOT USED

WR3L Contents	Description
13	Add registers 2 bytes + 2 bytes (AR).
14	Subtract registers 2 bytes - 2 bytes (SR).
15	Load register from direct area of control storage (L).
16	Store register to direct area of control storage (ST).
17	Load register from control storage (LC).
18	Store register from control storage (STC).
19	Basic port tests - load and sense port register with all 256 data bytes. Sense port error byte and test for X'00'.

Second load is done here. If the load device gets a processor check, WR3(L) contains hexadecimal 90.

WR3L Contents	Description
20	Reset display light - byte 0 - bit 3: MPLF reset carry Reset carry/set equal MPLF PCRWRNX Load PCR MPS WRN(X),PCR Sense PCR
21	Subtract immediate (SI).
22	Logical arithmetic 2 (LA2) increment register (INC).
23	Logical OR function (LA1) byte-by-byte.
24	Logical AND function (LA1) byte-by-byte.
25	Shift left logical 1 byte (SLL).
26	Logical exclusive OR (XR) byte-by-byte.
27	Logical AND complemented (NCR).
28	Logical OR complemented (OCR).

WR3L Contents	Description
29	Add registers - 1 byte (AR).
30	Subtract registers - 1 byte (SR).
31	Add registers with carry - 1 byte (ACYR).
32	Subtract registers with borrow - 1 byte (SCYR).
36	Exclusive OR - 2 bytes with 2 bytes (XR).
37	OR - 2 bytes with 2 bytes (OR).
38	AND - 2 bytes with 2 bytes (AND).
39	AND - 2 bytes with complemented 2 bytes (NCR).
40	OR - 2 bytes with complemented 2 bytes (OCR).
41	Shift 2 bytes left (SLLD).
42	Subtract register (SR) - 1 byte from 2 bytes.
43	Subtract with borrow (SCYR).
44	Add 2 bytes with carry (ACYR).
45	Move zone R2 to zone R1 (MZZ); move zone R2 to numeric R1 (MZN).
46	Hexadecimal branch using numeric field of register (HBN); hexadecimal branch using zone field of register (HBZ).
47	Shift right 1 byte (SRL); shift right 2 bytes (SRLD).
48	Load and store test of direct area of the second page of control store.
49	Move register instruction (MVR) move WR1 (0000) to WR0-WR7, MAB, MAR(MC), and MAB(MC). Then test the results. Move WR1 (FFFF) to WR0-WR7, MAB, MAR(MC), and MAB(MC). Then test results.

WR3L Contents	Description
50	Zero and add register (ZAR).
51	I/O service request latch (set, reset), go latch (set, reset), sense console status byte for these latches.
53	Move MPLF and MPS Tests: MPS Constat Step mode MPS Cpuerr Sense CPU error byte MPLF resetflg Reset flag latch MPLF setflg Set flag latch
55	I/O clocks test: stop, reset, sense clocks = X'FFF' start, run for 1024 microseconds, stop, sense reset, sense clocks = X'FFFF' start, run for 65536 microseconds, sense
57	Not valid control storage address check.
58	Force ALU gate parity check.
59	Force SAR parity check, storage gate parity check, and ALU gate parity check.
60	Force ALU gate parity check, force SDR parity check, and storage gate parity check.
61	Port tests: Perform port command with not valid port address. Force not valid port in port error byte. Force not valid device address in port error byte. Force system bus out parity check by setting even parity in the port.
62	Test the I/O storage command.
63	Control storage test - part 1.
64	Control storage test - part 2. At end of this routine, reset display light byte 0 - bit 4.

Third load is done here. If the load device gets a processor check, display light - byte 0 - bit 5 remains on and WR3L contains hexadecimal 90.

WR3L Contents	Description
71	Reset display light - byte 0 - bit 5 sense of PSR, status byte 0 and status byte 2.
72	Load PSR and status byte 2.
73	Load and sense LSR registers with their addresses, X'FF', X'00', and X'01'.
74	Sense status byte 3.
75	Load and sense program mode register (PMR) and control mode register (CMR).
76	Not valid main storage address check.
77	Address translation register (ATR) ripple test.
78	Storage exception test.
79	Main storage test: Write and sense X'E0' Write and sense X'01' Write and sense X'AA' Write and sense X'55' Write and sense X'FF' Reset display light - byte 0 - bit 6.

When the control processor routines are complete, all CE byte 0 lights are reset (off) except bit 7. When all device wrap tests are complete, byte 0, bit 7 is reset (off) also.

To loop on the failing control storage routine for diagnostic purposes, do a Load operation from diskette DIAGB1 and use the CSIPL switch options FEXX and FDXX (where XX is the desired routine number). See CSIPL switch options (paragraph 99-015) for a more detailed description of the switch settings and what they do.

Main Storage Processor Wrap Error Codes

Note: Wrap errors are not valid until the disk is ready.

02000001	Main storage tests run to
02000008	before the wrap tests. Each 2K block of main storage is tested. (See MAP 0190 for details.)
02000009	No-op (with service request enabled) did not update the IAR correctly.
0200000A	Unconditional branch (with service request enabled) did not update the IAR correctly.
0200000B	Conditional branch test failed.
0200000C	Load PSR and branch on condition failed.
0200000D	Load PSR and jump on condition failed.
0200000E	Compare logical immediate test failed.
0200000F	Compare logical character test failed.
02000010	Set bits on or off test failed.
02000011	Move immediate test failed.
02000012	Move character test failed.
02000013	Test bits on or off failed.
02000014	Move hexadecimal character test failed.
02000015	Load/store register test failed.
02000016	Branch and change ARR with NSI test failed.
02000017	Load address test failed.
02000018	Add test failed.
02000019	Add logical characters test failed (CP compare).
0200001A	Add logical characters test failed (MSP compare).
0200001B	Add zoned test failed (CP compare) (POS).
0200001C	Add zoned test failed (CP compare) (NEG).
0200001D	Add zoned test failed (MSP compare) (POS).
0200001E	Subtract zoned test failed.
0200001F	Subtract logical characters test failed.
02000020	Zero and add zoned test failed.
02000021	Indexed addressing test failed.
02000022	Edit mode test failed.
02000023	Insert and test character test failed.
02000024	Load program mode register failed.
02000025	Move characters with bad parity test failed.
02000026	ATR with bad parity test failed.

1255 Magnetic Character Reader Wrap Error Code

525000XX See the *IBM System/34 1255 Attachment Feature Theory/Maintenance*, SY31-0521.

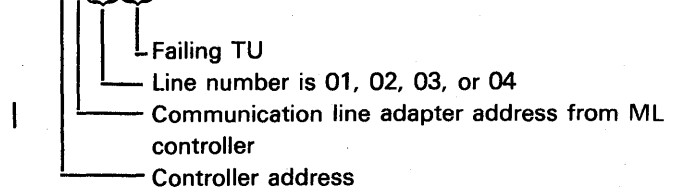
Data Communications Wrap Error Codes

First or Second Communications Adapter

80800101	Test line 1 adapter card and internal modem (if installed and in the UDT configuration)
80200201	Test line 2 adapter card and internal modem (if installed and in the UDT configuration)

MLCA

8288XXYY	High priority line
828ZXXYY	Low priority line
828ZXXYY	Low priority line
828ZXXYY	Low priority line



MLCA Controller

108000YY MLCA controller failure

where YY = Failing TU:

01	PPI initial address load
02	Load/sense PPI data buffers
06	Attachment processor program load
12	Arithmetic instruction tests
16	Storage tests
21	SILSB test
22	Load and sense data register
23	Internal wrap COR bits 0-3
24	Internal wrap COR bits with interrupt
26	Timer test with interrupt
28	Inhibit and reset interrupts
34	Force overrun condition
36	Force DBO parity check
FA	CSIPL transmit/receive test
FB	CSIPL modem data wrap test

Disk Wrap Error Codes

62EH Disk Drives

Note: X = A or B for disk drive A or B.

A0X00001	Attachment test
A0X00002	Interrupt test
A0X00003	Testing read ID command on cylinder 0
A0X00004	Testing seek function to the CE cylinder
A0X00005	Write and read data
A0X00006	Test scan command
A0X00007	Seek from CE cylinder back to cylinder 0
A0X00008	Load common BAL routines
A0X00009	Test read ID on CE cylinder

62PC Disk Drives

A1A00X01	Channel adapter tests
A1A00X02	Common adapter reset and verify disk is ready
A1A00X03	Common adapter tests
A1A00X04	Seek tests
A1A00X05	Read, write, and scan tests

Note: X = 0 for disk drive A
X = 1 for disk drive B
X = 2 for disk drive C
X = 3 for disk drive D

Work Station Attachment Wrap Error Codes

If a wrap error occurs while the work station attachment or the system console is being tested, the Console Check light comes on and the System/34 will probably not display a wrap error code on the system console.

Generally, when the work station attachment or system console wrap tests sense an error, the Processor Check and Console Check lights are on and all 3 Proc Interrupt lights are off. When this occurs, display WR2 and WR3 to see if the failing wrap error code was stored in the work registers.

If WR2 and WR3 do not contain the wrap error code, display control storage locations 07A0 and 07A1 for the first failing wrap error code, 07A2 and 07A3 for the second, and so on.

Work Station Attachment Wrap Error Codes

CAC00001	Channel and adapter reset tests
CAC0003A	Register tests
CAC0003B	PCR tests
CAC0003C	PCR tests
CAC0003D	PCR tests
CAC00047	Storage addressing test
CAC00048	Storage data test
CAC0004B	Storage data test
CAC00053	Controller microinterrupt test
CAC000A3	Line drivers test

System Console Wrap Error Codes

COC00001	Channel and adapter reset tests
COC0000B	Data bus test
COC0000D	IAR/SAR increment test
COC0000E	Controller busy test
COC0000F	System microinterrupt test
COC000A4	Poll system console (address 0,0)

Diskette Wrap Error Codes

If your system stops during a CS IPL operation from the DIAGB1 diskette or disk and displays one of the following diskette wrap error codes, select the TU Select option from the main menu to aid in specifying the cause of the wrap error.

When the system stops with the diskette wrap error displayed, do the following:

1. Record the wrap error code.
2. Press the Enter key to complete the load operation.
3. Select TU Select from the main menu.
4. Enter the last two digits of the diskette wrap error code when the TU Select program requests a TU Test number.
5. If an error occurs, the TU test result byte is displayed.
6. Select the MDI option from the main menu and run all the TUs for the diskette. (CSIPL must be from disk for MDIs to run.)

Level 1 Attachment Card Wrap Error Codes

D0D00001	Command decode test 1
D0D00002	Command decode test 2
D0D00003	JIO command decode test
D0D00005	Head load latch test
D0D00006	Inner tracks latch test
D0D00007	Head select test
D0D00032	Index counter test
D0D00071	Seek lines test
D0D00091	Data path test

Level 2 Attachment Card Wrap Error Codes

D1D00001	Configuration sense test
D1D00002	Command decode test 1
D1D00007	Head load latch test
D1D00017	Autoloader control lines test
D1D00022	Read bit ring test
D1D00023	Cylinder not match test
D1D00029	ID hit (data field) test

3262 Printer Wrap Error Codes

If your system stops during a CS IPL operation from the DIAGB1 diskette and displays one of the following printer wrap error codes, select the TU Select option from the main menu to aid in specifying the cause of the wrap error.

When the system stops with the printer wrap error displayed, do the following:

1. Record the wrap error code.
2. Press the Enter key to complete the load operation.
3. Select TU Select from the main menu.
4. Enter the last two digits of the printer wrap error code when the TU Select program requests a TU test number.
5. If an error occurs, a TU test result byte is displayed.
6. If more information is needed or no errors occur, select the MDI option from the main menu to run all the TUs for the 3262 Printer.

E2E00001	Jump I/O test
E2E00005	Adapter interrupt test
E2E00006	Controller status test
E2E00008	Controller DBO/DBI wrap (control strobe)
E2E00009	Adapter command reject
E2E0000A	131-ms time-out test
E2E0001E	Storage addressing test
E2E0002B	ALU zero/nonzero/carry test
E2E00030	Main/auxiliary register select test
E2E0004E	Load and store using DAR test
E2E00062	Printer sense test
E2E00063	Error register sense test
E2E00065	Switch register sense test
E2E00066	Data parity check test
E2E00068	Contact test
E2E0006F	Diagnostic register wrap test
E2E00079	Carriage interrupt test
E2E0007A	PCR/interrupt test
E2E00080	DMA storage switch test
E2E0008D	Data transfer system test
E2E0008F	Subscan storage addressing test
E2E00096	Belt up to speed test
E2E000A0	State hardware reset test

5211 Printer Wrap Error Codes

If your system stops during a CSIPL operation from the DIAGB1 diskette and displays one of the following printer wrap error codes, select the TU Select option from the main menu to aid in specifying the cause of the wrap error.

When the system stops with the printer wrap error displayed, do the following:

1. Record the wrap error code.
2. Press the Enter key to complete the load operation.
3. Select TU Select from the main menu.
4. Enter the last two digits of the printer wrap error code when the TU Select program requests a TU test number.
5. If an error occurs, a TU test result byte is displayed.

6. If more information is needed or no errors occur, select the MDI option from the main menu to run all the TUs for the 5211 Printer.

E0E00004	Adapter interrupt test
E0E00005	Controller status test
E0E00007	Controller DBO/DBI wrap
E0E00008	Adapter command reject
E0E0000A	Controller time-out test
E0E0002C	Controller storage addressing
E0E0002B	Controller ALU test
E0E00030	Main/auxiliary register select
E0E0004E	Load and store using DAR test
E0E00060	Print data wrap
E0E00062	Printer sense test
E0E00063	Printer error sense test
E0E00065	Printer switch sense test
E0E00067	Data parity check test
E0E00068	Printer contactor test
E0E0006F	Printer diagnostic wrap
E0E00070	Fire tier test
E0E00074	Print data strobe test
E0E00075	Timer interrupt test
E0E00076	Printer control wrap
E0E00079	Carriage interrupt test
E0E0007A	PCR/interrupt test
E0E00096	Belt up to speed test

When the Control Processor routines are complete, all CE byte 0 lights except bit 7 are reset (off). When all device wrap tests are complete, byte 0, bit 7 is reset also.

99-030 SYSTEM CLOCK STOP HALT CODES

If the diagnostic supervisor is not able to display a message on the system console, the supervisor stores a halt code in WR0 and stops the system clock.

To display WR0, do the following:

1. Set XX00 into the Address/Data switches.
2. Set the Mode Selector switch to Insn Step/Dply LSR.
3. Read the hexadecimal halt code in the CE byte 0 and 1 lights.

WR0 Contents

Halt

Code Meanings

- 0001 Work station attachment MDI test halt:
Diagnostic supervisor needs DIAGB4 diskette for the work station attachment tests. Insert DIAGB4 and press the CE Start switch.
- 0002 Work station TU select halt:
The diagnostic supervisor needs the DIAGB4 diskette to be inserted in the diskette drive and the ID of a TU test to be run.
1. Insert DIAGB4.
 2. Set the TU ID into the Address/Data switches. For example, to run the work station network analysis program TCOC1, set C0C1 into the Address/Data switches.
 3. Set the Mode Selector switch to Proc Run to loop on the TU test, or

Set the Mode Selector switch to Sys Insn Step to run the test and stop.
 4. Press the CE Start switch to start the test.

Halt Code

Meanings

- 0003 Work station attachment TU select test result halt:
The diagnostic supervisor has run a TU test and set up work registers as follows:
WR3 = TU ID
WR6 (H) = TU test result byte 1
WR6 (L) = TU test result byte 2
WR7 (H) = TU test result byte 3 (if used)
WR7 (L) = TU test result byte 4 (if used)

Press the CE Start switch to run the TU test again.
- 0005 Current diskette does not have the work station attachment diagnostics on it. Insert DIAGB4 and press CE Start.
- 0010 Work station attachment device MDI test halt:
The diagnostic supervisor has stopped when executing the work station attachment MDI tests. Display WR1 and WR2 and see the hard copy MAPs for a description of the halt.
WR1 = MDI MAP ID
WR2 = MDI MAP step number
- 0030 A diskette error occurred and work station attachment functional code is not loaded. Correct the diskette error and press CE Start to try the MDI again.
- 0031 A printer error occurred while work station tests were running. Correct the printer error and press CE Start to try the MDI again.
- 0080 Diagnostic supervisor needs DIAGB1 or DIAGB4 diskette to load the work station attachment functional microcode again.

99-040 DIAGNOSTIC SUPERVISORS

There are two diagnostic supervisors; one for concurrent maintenance and the other for dedicated maintenance. The concurrent supervisor runs concurrently with customer jobs under control of the SSP (system support program product).

Note: The concurrent supervisor cannot be run if SMF (system measurement facility) is active.

1255 tests, display tests, printer online tests, and the MLCA, BSCA, and SDLC online tests are the only diagnostics that can be run concurrently with customer jobs. (To run the BSCA online tests, see paragraph 99-075; to run the SDLC online tests, see paragraph 99-074; to run the MLCA online test, see paragraph 99-076.) The run time for concurrent tests is longer than the run time for tests running under the dedicated supervisor because more than one program is being run.

	Loaded From	Into	By	Device Needed
Dedicated	Diskette or disk	Control storage	CSIPL from diskette DIAGB1 or CSIPL from disk with F800 in the Data/Address switches	All of the system
Concurrent supervisor	Diskette	Main storage along with SSP	Enter CONCR option menu	Failing device and controller, 14K MS, diskette drive and display

99-041 Concurrent Maintenance

DANGER

If you are performing maintenance on the printer, have the operator take the printer offline to prevent the printer from being activated by an external source.

CAUTION

To protect customer data, if the printer spool function is being used, have the operator do the following:

- Stop printing from the printer spool file.
- Change (vary command) the printer to offline.

If the printer spool function is not being used, have the operator do the following:

- Stop the job queue.
- Change (vary command) the printer to offline.
- Restart the job queue.

If SMF (system measurement facility) is active, terminate SMF.

To load the concurrent supervisor, enter CONCR at the SSP command menu and follow the directions displayed on the system console. The program reads the supervisor from DIAGB1, the 5211 tests from DIAGB3, the 3262 tests from DIAGB3N, or the 1255 tests from DIAGB6.

To terminate a test running under the concurrent supervisor, do the following:

1. Press the Attn key.
2. Select option 4.
3. Press the Enter key twice.

Repeat the preceding steps until the desired concurrent display appears on the screen. (The program goes back one display each time the sequence is repeated. You can go back to the main concurrent menu using this method.)

Terminate concurrent maintenance by either of the following methods:

- If the main concurrent menu is displayed, select option 0 and press the Enter key.
- If the main concurrent menu is not displayed, press the Attn key, select option 2, and press the Enter key. (Under some conditions the Enter key may have to be pressed twice.)

Both methods return the system console to SSP command mode.

The operator may now do the following:

- Change (vary command) the printer to online.
- Start the printer spool function again.

99-043 Dedicated Maintenance

The dedicated supervisor controls device testing when all of the system is dedicated to maintenance.

Note: If the diskette is not operational, you can do a CSIPL to select the diagnostic supervisor from disk and then read the diskette MDI tests from disk. See *99-015 CSIPL Switch Options (F800)*. Also see *45-630 System Diagnostics* for a step-by-step procedure.

Two functions to remember about the dedicated supervisor are:

- When the system does not have an operational printer, the system console is selected as the output device.
- When any I/O error that is not expected occurs on devices that are not being tested, it is best to restart.

After the diagnostic supervisor is loaded, the following main menu is displayed:

1. MDI MAPs (failure location using the MDI tests).
2. EXERCISERS (no failure location—see paragraph 99-080).
3. PRINTER/DISPLAY (select system console or system printer as the system output device).
4. TU SELECT (run selected TU tests).
5. MDI SPECIAL (MDI free-lance tool—see paragraph 99-090).
6. UTILITIES (System Configure, System Customiz, Disk Analyze, and so on—see paragraph 99-055). The utilities are not available if the disk is the load device.

99-045 DIAGNOSTIC DISKETTE INFORMATION

The following diagnostic diskettes are shipped with a base system.

- DIAGA0 contains an alternative sector listing for the disks.
- DIAGA1 contains module replacements and patches used with the EC update copy utility to update microcode releases.
- DIAGB1 contains CS IPL diagnostics (wrap tests):
 - MSP diagnostics
 - System configuration (microcode for the devices that ship with your system)
 - The diagnostic supervisors
 - System test
 - Some utility programs
- DIAGB2 contains MDI diagnostics and exerciser programs for the diskette.
- DIAGB3 contains MDI diagnostics and exerciser programs for the 5211 Printer.
- DIAGB3N contains MDI diagnostics and exerciser programs for the 3262 Printer.

Note: If you have either a 3262 or 5211 Printer attached, one diagnostic diskette (either DIAGB3 or DIAGB3N) is shipped.

- DIAGB4 contains MDI diagnostics for the work station attachment.
- DIAGB7 contains MDI diagnostics, exerciser programs and the Initialize and Analyze Utility programs for the disk.

Note: There are different part numbers for the 62EH and the 62PC diagnostic diskettes.

- DIAGF1, DIAGF2, and DIAGFA contain functional microcode (I/O microcode and nucleus microcode used to support SSP); system configure, system customiz, system records list, program patch, EC update copy utilities; and the Data Communications TRAP print utility.

If your system has a data communications feature, DIAGB5 or DIAGB5ML contains MDI diagnostics, exerciser programs, and online tests for that feature.

If your system has a 1255 attached, DIAGB6 contains MDI diagnostics for the 1255 Magnetic Character Reader.

If the diskette is not operational, you can do a CS IPL to select the diagnostic supervisor from disk and then read the diskette MDI tests from disk. See 99-015 CS IPL Switch Options (F800). Also see 45-630 System Diagnostics for a step-by-step procedure.

99-050 DISPLAY STATION DIAGNOSTIC MESSAGE FORMATS

Diagnostic supervisor messages can display up to 12 lines. The screen is divided into left and right halves with a center margin.

The left half of the screen displays the main points of information; the right half of the screen is used to display additional information.

The bottom line of the screen generally contains the following information.

MDI = XXXX is the ID of the MAP that is executing.

STEP = NNN is the MDI MAP step number that is being executed.

TXNNT = The test is an MDI test that passes results to the diagnostic supervisor.

or

QXXNQ = The test is an MDI test that has a question that cannot be answered by the TU test and needs a response from you.

XX = Device ID.
NN = Test number.

SEC = Expected length of time (in seconds) that the test should run.

99-055 DIAGNOSTIC UTILITIES

Generally, the descriptions of the utilities assume that you will select the display on the system console as your output device.

System Configure Utility

The diagnostic diskettes that are shipped with each System/34 contain diagnostic tests for many devices.

System Configure means that you are instructing the system what size or type of devices were shipped with your specific system.

During the configuration process, a table is assembled that contains an entry for each device that is on your system.

The table name is UDT (unit definition table). Each UDT entry contains device ID, address, and configuration data that specifies the size or type of the unit. List the UDT (option 1 or 2) before you change an entry so that you have a printout of your specific configuration.

Once the UDT table is assembled, your specific configuration is written on the DIAGB1 diskette. (The DIAGB1, DIAGB3, (or DIAGB3N) and DIAGB4 diskettes are assembled to your hardware configuration.)

System Customiz Utility

The system customiz utility reads the functional and diagnostic microcode from the DIAGXX diskettes and writes it on the disk. As part of this process, the utility makes a number of automatic checks to record the identification of the microcode and to ensure the microcode is free of errors. The following paragraphs describe the checks and what to do to make them useful.

Prerequisite List

Correct system operation relies on the system hardware, the software, and the microcode being at compatible levels. Before starting to move any microcode to the disk, the system customiz utility displays the list of prerequisites that is stored on the DIAGF1 diskette. The list of prerequisites aids you in determining if the system hardware and SSP are at the correct level to use the microcode.

You must verify the compatibility of the system and the new microcode; the utility does not check this, but only supplies the list. If the prerequisites are not installed, cancel the system customiz utility by pressing the Attn key. When you cancel the utility, the existing system microcode is not changed.

Patch Checks

The system customiz utility checks for two types of patches: controlled patches (those patches sent to you from IBM engineering) and free-lance patches (those patches generated and installed in the field). There is a table for each type.

Controlled Patch Table: The utility checks this table and, using flags, indicates any patches that are on the disk but not on the diskettes. The program displays:

- The patch number
- The module ID of all affected modules
- The diskette ID of the source
- The date the patch was installed
- A message that says the patch will be destroyed if the system customiz utility continues

You have the option to continue with the system customiz utility and install the patch again later, or to cancel the utility and leave the system microcode as it was.

Free-lance Patch Table: The system customiz utility checks this table and displays the patches on the table by showing the module ID and the date the patch was installed. Because the utility always destroys free-lance patches, you must obtain, and later install again, any patch that is destroyed if the patch is critical to the operation of the system. If the patch is not available, you can cancel the utility by pressing the Attn key. The system microcode is not changed when you cancel the utility at this time.

Diskette Level Checks

Before moving any microcode from a DIAGXX diskette to the disk, the system customiz utility checks the part number of the diskette with the part number specified in the microcode level table as the diskette to be used. The microcode level table is on the DIAGF1 diskette (see *Microcode Level Table* later in this section). If you inserted an incorrect diskette the results of that action change with the type of diskette you inserted:

- DIAGB1, DIAGB2, or DIAGFA—the utility adds an exception part number to the disk copy of the microcode level table, and displays a warning message.
- DIAGF1 or DIAGF2—the utility stops because this is a hard error. The microcode on the disk is not changed.

Error Log Tables

System customiz keeps the old error log tables to ensure that the error data is not destroyed. (If an initialized disk is being customized, new error log tables are assembled, and the utility instructs you to enter the present date as the date the disk was customized.)

Record Keeping on the Disk

System customiz moves the microcode level table from the DIAGF1 diskette to the disk. When the diskettes you are using have part numbers that are not on the table (exceptions), the utility records their part numbers in an exception list. The disk-controlled patch table is built by making a chain of the patch tables from the DIAGB1, DIAGB2, DIAGF1, DIAGF2, and DIAGFA diskettes. The utility clears the free-lance patch table.

Control Store Directory

At the end of the system customiz program, all the microcode needed for the operation of the system has been loaded on the disk. At the same time, a control store directory is made, which includes the module ID, location, and other data that pertains to each disk microcode module. The control store directory is used by all higher level programs to locate and load microcode from the disk.

Control Store Library Space

Additional control store library space may be needed on disk when specific System/34 features are installed. System customiz will expand the library space, as well as move and store the VTOC for you. After one of these features is installed, you must back up the disk before running system customiz. (The program itself will display two warning messages before doing the expansion.) Once system customiz has been run, you must load the SSP again.

When specific features are removed from a system, the size of control store library can be decreased. System customiz will also perform this function. You must load the SSP again when system customiz is complete.

Display Sector Utility (Disk or Diskette)

This utility displays (on the system console) a hexadecimal dump of a selected sector from a disk or a diagnostic diskette. The utility supplies operator prompting.

Print Sector Utility (Disk or Diskette)

This utility supplies a hexadecimal dump to the system printer of 1 to 99 sectors from a disk or a diagnostic diskette. The utility supplies operator prompting.

EC Update Copy Utility

The EC update copy utility supplies the ability to:

- Copy all of a diskette
- Initialize a diskette
- Analyze a diskette
- Read and print diskette ID fields
- Exchange (*module replace*) the modules on a diagnostic diskette

Each of the abilities is an option in the EC update copy utility, and each option causes some changes to the control records.

Diskette Copy Option

This option permits you to completely copy the System/34 DIAGXX diskettes. The program copies only the System/34 DIAGXX diskettes. The diskette being made must be:

- A diskette initialized to the System/34 diagnostic format
- An existing System/34 DIAGXX diskette having the same diskette ID and a sequence number that is equal to or smaller than that of the diskette being copied

Note: Copying the DIAGB2 diskette does not copy the alignment tracks to the new diskette.

Diskette Initialize Option

Use this option to initialize an IBM Diskette 1 to the System/34 diagnostic format. This format includes 77 cylinders (tracks). The first cylinder is formatted as a single 4096-byte sector, and all the other cylinders are formatted as eight sectors, each containing 512 bytes. The initializing process writes all sector IDs and address markers but clears all data bytes to zero. When initialization is complete, the utility automatically starts the analyze option.

Diskette Analyze Options

The first option checks all the sectors on a DIAGXX diskette for:

- Bad sector IDs and address markers
- Errors in data comparisons
- CRC errors

Note: A single error causes the analyze option to stop.

The errors this option checks for are in one of two classes: device failures or diskette failures. A device failure is one caused by something wrong with the diskette drive; for example, bad read/write head alignment or some type of electronic failure. Diskettes with device failure errors on them can be used, but they must be initialized again. The initialization destroys all the data on the diskette. If the data on the diskette must be kept, copy the diskette before initializing it.

A diskette failure is caused by a bad area on the diskette recording surface. Do not attempt to use a diskette having a diskette failure; it cannot be used for any purpose.

The second option (microcode release 5.0 or later) analyzes any diskette written in an IBM format. The option will display or print errors as they occur, does not stop or do the operation again, and analyzes the complete diskette.

A third option (microcode release 7.0 or later) is available for attachment level 2 drives. This option reads and prints ID fields (one per track) from any diskette written using an IBM format.

Module Replacement Option

This option exchanges (*module replace*) modules on the diagnostic diskettes. You can also move patches from the DIAGA1 diskette to the correct diagnostic diskettes using the patch utility. An engineering change is still needed for module replacement, but the EC is installed by using a special DIAGA1 diskette that contains modules for several DIAGXX diskettes. This prevents having to send out new diskettes for each EC.

The DIAGA1 diskette contains:

- The modules to be moved to the DIAGXX diskettes
- A table of diskette IDs and part numbers that identify the DIAGXX diskettes to be updated
- A table that identifies the diskette ID and status of the modules—new, deleted, or exchanged (*module replace*).
- A table of stored patches to be put on the DIAGXX diskettes

In operation, this option instructs you to insert the DIAGA1 diskette and then copies all the data from the DIAGA1 diskette to the disk. The option updates the various diagnostic diskettes as follows:

- Gives you the option to update each diskette
- Exchanges (*module replace*), deletes, or adds modules
- Moves entries to the diskette patch table if the ID in the entry is A1

The option changes the module arrangement on each updated diskette so that free space on the diskette can be collected in one area. All updated diskettes have their EC number, part number, and patch information changed to show that the diskette is at the present level of release.

Program Patch Utility (Disk or Diskette)

The program patch utility has four uses. These uses:

- Permit you to install controlled patches on both the disk and the DIAGXX diskettes
- Give you a way to store controlled patches on a DIAGA1 diskette
- Enable you to install free-lance patches on a disk
- Enable you to put on DIAGXX diskette patches that are stored on a DIAGA1 diskette

The following paragraphs describe several types of microcode checking that are used for controlling errors.

Controlled Patch Option

The program patch utility uses the following control information to ensure that the patch is installed correctly:

- A patch number that pertains to no other patch
- The number of any patch that is a prerequisite to the new patch
- The diskette ID of the source of the microcode patch
- The part number of the diskette to be updated

You must enter each item on the list as part of the preparatory information.

When you enter a valid patch number for which there is a prerequisite patch, the utility searches the correct patch table for the prerequisite patch number. If the utility does not find the number, the prerequisite patch has not been installed. An error message appears on the display instructing you to install the prerequisite patch. The utility will not continue until you have installed the prerequisite patch.

The utility also verifies a correct installation by comparing the diskette ID and part number with the microcode level table (for a patch on a disk), or with the EC level record for a patch on a diskette. If the comparison does not verify an exact match, an error message is displayed.

Before entering the data for a patch, you must enter the header. The information contained in the header is:

- The module ID or name
- The offset

The header and each following part of the patch contain a checksum. Using the checksums, the utility automatically verifies your entries. After you have entered all of the patch data, enter a final checksum that must match the checksum of the complete patch. If this final checksum does not match, an error message is displayed.

If you are installing the new patch on a diskette, the utility makes another check to ensure that you inserted the correct diskette. When all the checks are correct, the patch is installed on the disk or diskette.

At the end of this operation, the utility makes an entry in the controlled patch table on the disk or diskette on which you installed the patch. The new entry is written at the start of the table. The table is a stack, and when a new entry is added to the table, all the earlier entries are pushed down. If the new entry causes the earliest entry to be lost from the table, the entry that will be lost is displayed on the system console.

If you are installing a patch on a diskette, you will be given an option to install the same patch on a similar diskette without having to enter the information again. If you are installing a patch on a disk, you will be given an option to install the patch on a DIAGXX diskette without having to enter the information again.

Store Patch on DIAGA1 Option

This option is the same as the diskette-controlled patch option except that when you have correctly entered the patch, it is not installed on a module but, instead, is stored on a DIAGA1 diskette in a special format. You can store several patches for any combination of DIAGXX diskettes.

Application of Stored Patches Option

This option permits the application of patches (patches that were stored) to a diskette using the store patch option. The program prompts for a DIAGA1 diskette; then the IDs of all diskettes that patches are stored for are displayed. Any DIAGXX diskette can then be inserted and all selected patch applications made. The patch table on the diskette is then updated with the correct entries.

Note: This option does not install patches to the disk. If this option is used to apply patches to the diskette, you must run the *Customize* utility to write the patches on disk.

Free-lance Patch Utility

CAUTION

Carefully use this utility. You can easily destroy diagnostic microcode, programming microcode, or customer information. Do not attempt to make a free-lance patch unless you have access to the microcode printouts.

You can only install a patch on a module that has a module ID; that is, a disk-based microcode module that is identified by a control store directory entry. Before you can enter a patch, you must enter the following information as a header:

- The module ID
- A code (C or M) to show where the patch is being installed:
 - C (control storage microcode)
 - M (main storage or controller microcode)
- The present date (to be used as the date the patch was installed)

Now you can enter the data for the patch. You do this by entering:

- The offset into the module where the data is to be patched
- The present contents of the data to be patched
- The new data

At the end of the operation, the utility makes an entry in the free-lance patch table. The new entry is written at the start of the table. The table is a stack, and when a new entry is added to the table, all the earlier entries are pushed down. If the new entry causes the first entry to be lost from the table, the entry that will be lost is displayed on the system console.

System Records List Utility

Using the options supplied by this utility, you can get access to all of the control records described in this section. The utility uses either the system console or the system printer as an output device. The program guides you by giving prompts. The following paragraphs describe the procedure used by the utility.

1. Select the output device.
2. Select disk-based control records, diskette-based control records, or cancel. If cancel is selected, the program goes backward one step to change the selection of the output device. At times you may need to compare records on both the disk and the diskette. The program automatically returns to this step after a list or display of each record is completed so that the selection can be changed.
3. The selection in step 2 determines the next steps:
 - If disk-based control records were selected, select one of five records:
 - The control store directory
 - The prerequisite list
 - The microcode level table
 - The controlled patch table
 - The free-lance patch table or select cancel, which takes the program back to step 2.
 - If diskette-based control records were selected, select one of five records:
 - The EC level record
 - The controlled patch table
 - The diskette VTOC
 - The prerequisite list
 - The microcode level table or select cancel, which takes the program back to step 2.

When the diskette-based control records are selected, a prompt to insert the diskette that contains the records needed is displayed. Because the prerequisite list and the microcode level table are on only the DIAGF1 diskette, the program assumes that DIAGF1 has already been inserted. If, however, the diskette is not in the diskette drive, the program prompts you to insert it.

4. The program does the next step. Using the system records list, the program locates, reads, and formats the correct record for output.
 - If the printer is selected in step 1, all of the record prints out, and the program returns to step 2.
 - If the display is selected in step 1, the record appears on the system console, 10 lines at a time. If the record needs more than 10 lines, page through the display by using the following commands:
 - F (forward)
 - B (backup)or use the scroll keys to page through the display, or select the cancel, which takes the program back to step 2.

The records selected are described in the following paragraphs. The order in which these records appear is disk-based, diskette-based, and records common to both disks and diskettes.

Disk-Based Records

Control Store Directory: This table identifies and addresses all the microcode modules that are permanent parts of the system. The directory starts at location 5555=003D; the disk model or capacity does not make any difference. The directory is variable in length, being made of 8-byte entries up to a maximum length of 10 sectors.

Free-lance Patch Table: This table is a history of the free-lance patches installed on the disk. Because these patches cannot be completely described, the table only shows which modules have patches installed on them. The table is one sector long and has space for 50 patches. The table is a stack; therefore, any entry at the start of the table pushes all the earlier entries down. If the table is full, a new entry causes the earliest entry to be lost.

The module ID for this table is X'F030'.

Diskette-Based Records

Diskette VTOC: Every DIAGXX diskette contains a VTOC (volume table of contents). The VTOC contains a list of the names of every module on the diskette and various items of status information about each module. Entries to the VTOC are a fixed length of 64 bytes. The table sector length is variable up to a maximum of twenty-four 512-byte sectors. The starting sector address of the VTOC (CCSS) appears in bytes 6 and 7 of the CCSS.

EC Level Record: This is a 12-byte record that appears on all DIAGXX diskettes. The record contains five items of status information about the original level of the diskette:

- The diskette ID
- The part number
- The EC number
- The EC sequence number
- The number of the last patch that was included in the EC

This record starts at a fixed location on each of the DIAGXX diskettes:

- DIAGB1; byte number 37 of CCSS = 0A01.
- DIAGB2, DIAGF1, DIAGF2; byte number 37 of CCSS = 0102.

Records Common to Disk and Diskette

Prerequisite List: This list shows the microcode level relative to the level of the software and the hardware. The list is at the start of the disk sector having the module ID X'F010'. On the DIAGF1 diskette, the list is included in the first eight bytes of the sector having the module name \$LEVEL.

Microcode Level Table: This table is on the disk and the DIAGF1 diskette. The table contains the 4-digit release level number of the microcode and the last patch that was included in that release. The last patch on the list means that all earlier patches were also included in the release. The table contains the following items:

- The diskette ID
- The diskette part numbers
- The EC sequence numbers for the diskette included in the release

An exception entry is made when a diskette other than those specified is used to customize the system. No exceptions are permitted for the DIAGF1 and DIAGF2 diskettes.

The Compatibility Table is an addition to the microcode level table and includes a list of part numbers of diskettes that can be used for diagnostics.

The microcode level table is included in the same sector with the prerequisite list.

Controlled Patch Table: This table is contained on the disk and all the DIAGXX diskettes. The table has a variable format and is used to show which of the controlled (not free-lance) patches have been installed on the disk or diskette. The format changes because the length of the patches changes. The limits of the record are a 9-byte minimum length and a 27-byte maximum length.

The table appears on diskettes with the module name \$PATCH and on disks with the module ID X'F020'.

62PC Disk Analyze Utility

The 62PC disk analyze utility has two options.

Option 1: Analyze Disk Surface

This option takes approximately 12 minutes to run, and verifies the following functions of the disk surface:

- The identification (ID) fields can be read and are properly written.
- The alternative sectors are properly assigned.
- All usable data records can be read without errors.
- The servo signals from the disk servo surface can keep the heads on track.

Messages from option 1 can either be displayed on the system console or be printed on the system printer. If the messages are displayed on the system console, up to seven messages can be displayed at one time. These messages can not be displayed again after the Enter key is pressed. Two format options are supplied for messages at the system console:

- The first option displays only error messages.
- The second option displays reassigned defect messages and error messages.

If the messages are printed on the system printer, three format options are supplied:

- The first option prints only error messages.
- The second option prints reassigned defect messages and error messages.
- The third option prints displaced defects, reassigned defect messages and error messages.

Sample Message

LOCATION			EXPECTED ID	ACTUAL ID	DESCRIPTION	ALTERNATIVE
SS	HD	CYL	FFSSH0CC	FFSSH0CC	'*' INDICATES AN ERROR	FFSSH0CC
1D	04	0015	08381015	0E001166	MFG REASSIGNED DEFECT	05381015

Field Description

LOCATION

SS The position of the record on the track as follows (see 83-981):

Message	Position Definition
NO RECORD FOUND	Logical record number (Hex 00-3F)
UNREADABLE RECORD FIELD	Logical record number (Hex 00-3F)
DISK SERVO SURFACE DEFECT	Field is not used
All other messages	Physical sector number (Hex 00-20)

HD The current head (Hex 0-A). Valid for all messages (see 83-971).

CYL The current cylinder (Hex 000-167). Valid for all messages (see 83-961).

EXPECTED ID The ID that the utility expected to find on the disk for the sector (see 83-951). This field is not used for the following messages:

- DISK SERVO SURFACE DEFECT
- UNREADABLE RECORD FIELD
- NO RECORD FOUND

ACTUAL ID The ID that was found on the disk for the sector (see 83-951). This field is not used for the following messages:

- DISK SERVO SURFACE DEFECT
- UNREADABLE RECORD FIELD
- NO RECORD FOUND
- NO ID FOUND

For a displaced defect that can not be read, this field contains:

FFFFFFFF

DESCRIPTION The message text. See *Output Messages* later in this section.

ALTERNATIVE The assigned alternative sector. Valid only for the following messages:

- USER REASSIGNED DEFECT
- MFG REASSIGNED DEFECT
- ALTERNATIVE DATA NOT RELIABLE

Output Messages

Option 1 of the utility has three types of output messages: error, reassigned defect, and displayed defect. The text of the message appears in the Description column of the message printed by the utility (see *Sample Message* earlier in this section). The following table defines the text of each message.

Message	Type	Description	Corrective Action
			<p>CAUTION</p> <p>The following utilities can destroy customer data.</p> <hr/> <hr/> <hr/>
SECTOR ID ERROR	Error	The actual ID did not match the expected ID, or a CRC check occurred while reading the ID.	Run the 62PC Disk initialize utility or the 62PC Disk analyze utility option 2.
NO RECORD FOUND	Error	The record ID did not match any of the ID's read.	Run the 62PC Disk initialize utility.
ALTERNATIVE DATA NOT RELIABLE	Error	Bit 0 or 1 in the alternative sector ID is on, indicating that a CRC check occurred while recovering data from the defective sector.	Have the customer run the SSP Build procedure (\$BUILD) to verify or correct the data.
UNREADABLE RECORD FIELD	Error	A CRC check occurred when reading a data field.	Run the 62PC disk initialize utility.
DISK SERVO SURFACE DEFECT	Error	The servo signals from the disk servo surface do not keep the heads on track.	Run the 62PC disk MDIs to determine the cause of this error.
UNREADABLE ID	Error	The utility could not read a sector ID.	<ol style="list-style-type: none"> 1. Run the 62PC disk MDIs. 2. If no error is found, run the analyze utility again. 3. Compare the two analyze utility printouts. If the unreadable ID is in the same physical location (cylinder, head, and sector), the disk unit is the likely cause. Replace the disk unit. If the ID is not in the same physical location, an intermittent hardware failure is the likely cause. Run the disk intermittent MAPs (see MDI 1058).
MFG REASSIGNED DEFECT	Reassigned Defect	A defective sector has been assigned to a sector on the alternative cylinder during the making of the disk.	No action required.

Message	Type	Description	Corrective Action
JSER REASSIGNED DEFECT	Reassigned Defect	A defective sector has been assigned to a sector on the alternative cylinder by the 62PC initialize utility or the system support program (SSP).	No action required.
DISPLACED DEFECT	Displaced Defect	This is the first defective sector on the track that was found when the disk was made. This sector and all following sectors are moved one sector from their original position. If the ID can not be found (a valid condition for a displaced defect), the Actual ID field contains: FFFFFFF	No action required.
DEFECTIVE ALTERNATIVE SECTOR	Displaced Defect	A sector on the alternative cylinder is bad and can not be used.	No action required.

62PC Disk Analyze Error Handling

Option 1 of the utility checks the disk drive for error conditions. If it finds any errors, it takes the following action:

- If it finds an error described by one of the utility messages, it displays or prints the correct message.
- Any other error is caused by a hardware failure. The utility stops, and then displays the error information.

When the utility stops in a way that is not normal, the error that caused the stop can be either a hardware detected error or a program (utility) detected error. A hardware detected error is a hardware failure that was detected by the disk attachment. For this type of error the utility displays the error information in the disk ERAP format (see section 82) when it stops.

A program detected error is a hardware failure that was not detected by the check detection circuits, but that the utility found. When one of these errors occurs, the utility displays one of the following messages:

Message	Required Action
INTERRUPT TIME-OUT (byte 1, bit 0)	Record the error information and run the 62PC disk MDIs to find the error.
INVALID DISK INTERRUPT (byte 1, bit 1)	Record the error information and run the 62PC MDIs to find the error.
MESSAGE MODULE NOT FOUND (byte 1, bit 2)	The DIAGB7PC diskette does not have a required program. Order a new DIAGB7PC diskette.

Option 2: Read/Write One Track of ID Fields

CAUTION

The use of the following option (option 2) can destroy customer data.

Option 2 of the 62PC disk analyze utility reads and displays one track of IDs. This option can be used to correct sector ID errors found using option 1. Perform the following steps to correct sector ID errors:

1. Use option 1 of this utility to analyze the disk. Select the printer as the output device using the format that provides a list of the displaced defects, reassigned defects, and errors. The resulting output appears like that shown in figure 99-1.
2. Look at the column of the output that is labeled Description. In that column find the SECTOR ID ERROR. This information is used to correct the ID error.
3. Use option 2 and enter the cylinder (CYL) and head (HD) of the failing sector. (In figure 99-1, the cylinder of the Sector ID Error is 002E and the head is 01.)
4. The utility reads the track of IDs from the disk and displays them in the format shown in figure 99-2.
5. The SS column in the option 1 output (figure 99-1) is the number of IDs from the beginning of the track to the ID in error (must be between hex 00 and 20). Count this number of IDs in the list of IDs from option 2. That ID should be the same as the ID in the Actual ID column of the option 1 output. (in the example, the SS value of 1D for the Sector ID Error in figure 99-1 locates an ID value of 0028042E in figure 99-2.)
6. Follow the instructions given by option 2 to replace the ID value with the correct value (the correct value is in the Expected ID column of the option 1 output—0828042E for the example).

LOCATION			EXPECTED ID	ACTUAL ID	DESCRIPTION	ALTERNATIVE
SS	HD	CYL	FFSSH@CC	FFSSH@CC	'*' INDICATES AN ERROR	FFSSH@CC

```

20 00 0000    00400000    02400000    DISPLACED DEFECT
20 00 0040    00400040    02400040    DISPLACED DEFECT
10 00 0076    00200076    0A400076    DISPLACED DEFECT
1C 00 007C    0038007C    0A40007C    DISPLACED DEFECT
09 00 00AB    001200AB    0A4000AB    DISPLACED DEFECT
04 00 00DD    000800DD    0A4000DD    DISPLACED DEFECT
0F 00 012A    001E012A    0A40012A    DISPLACED DEFECT
17 00 0164    002E0164    0A400164    DISPLACED DEFECT
20 00 0166    00400166    02400166    DISPLACED DEFECT

```

```

1C 01 0009    00280409    0A400409    DISPLACED DEFECT
12 01 0013    00140413    0A400413    DISPLACED DEFECT
14 01 0022    00180422    0A400422    DISPLACED DEFECT
1C 01 002E    0028042E    0A40042E    DISPLACED DEFECT
[1D 01 002E    0828042E    0028042E    *SECTOR ID ERROR ]
20 01 0040    00400440    02400440    DISPLACED DEFECT

```

Sector ID
Error Information

Enter Cylinder and Head
Values to Option 2

Number of ID from
Start of Track

Figure 99-1. Option 1 Output Example

```

0030042E 0032042E 0034042E 0036042E  ID'S FROM HEAD 01 CYLINDER 002E
0038042E 003A042E 003C042E 003E042E
0000042E 0002042E 0004042E 0006042E  ENTER 'R' ON THE COMMAND LINE TO
0008042E 000A042E 000C042E 000E042E  REPLACE THE ID'S
0010042E 0012042E 0014042E 0016042E
0018042E 001A042E 001C042E 001E042E  ENTER 'C' ON THE COMMAND LINE TO
0020042E 0022042E 0024042E 0026042E  CANCEL.
0A40042E 0028042E 082A042E 082C042E
082E042E  ANY UNREADABLE ID'S ARE SHOWN AS
X ----- ENTER 'R' OR 'C'  FFFFFFFF.
MDI A1J1 STEP 14 10 SEC TA1J1

```

Sector ID Error Information

Figure 99-2. Track of IDs Example

62PC Disk Initialize Utility

CAUTION

Both options of disk initialization will destroy all data on the disk. The customer must copy all the data he wants to keep before disk initialization is started.

Note: Always run the disk MDIs before either option of the initialize utility to verify that the hardware operates correctly.

Systems with three or four 62PC disk drives have two DIAGAO diskettes. The DIAGAO diskette containing the defective sector information for disk drives C and D is marked with a C/D in the lower right corner of the label.

Option 1: Initialization

This option initializes the disk drive using the information for the disk drive contained on the DIAGAO diskette. It removes all user assigned defects and ID errors. Option one takes approximately seven minutes per drive and does the following:

- Writes all IDs on the disk using the defective sector information from the DIAGAO diskette.
- Writes zeros in the data fields of all usable sectors.
- Reassigns defective sectors that are not defined by DIAGAO diskette as follows:
 - If the new defective sector is the only defect on its track, it is assigned as a displaced defect.
 - If it is not the only defect, it is assigned as a user reassigned defect. (User reassigned defects can be on the disk after running initialization.)

Note: See the 62PC section of the Theory-Diagrams manual for information about displaced and reassigned defects.

- Detects error conditions and takes action as defined in *62PC Initialize Error Handling* later in this description.

Option 2: Build the DIAGAO Diskette (Organize)

This option is used for disk drives that have not been initialized, or for disk drives for which the DIAGAO diskette has been lost. On systems with three or four 62PC disk drives, verify that you are using the correct DIAGAO diskette for the drive selected. The option takes approximately 17 minutes per drive and does the following:

- Builds a new alternative cylinder for the drive at cylinder 358 (hex 166).
- Creates a DIAGAO diskette that has the defective sector information for the disk drive.
- Writes all IDs on the disk again using the defective sector information from the DIAGAO diskette.
- Writes zeros in the data fields of all usable sectors.
- Detects error conditions and takes action as defined in *62PC Initialize Error Handling*.

Note: When building a new DIAGAO diskette for drives C and D, mark the new DIAGAO diskette with C/D in the lower right corner of the label.

62PC Initialize Error Handling

Both options of the utility check the disk drive for errors or hardware failures, and take the following action for detected problems:

- If a CRC check occurs while verifying IDs or data fields, the utility assigns an alternative sector. The utility continues to run unless the alternative track is full.
- If a No Record Found check occurs while verifying data fields, the utility assigns an alternative sector. The utility continues to run unless the alternative track is full.
- All other errors are caused by hardware failures. The utility stops and displays the error result bytes in the disk ERAP format (see section 83).

The utility stops abnormally for hardware errors detected by it or by the hardware. If the disk attachment detects a hardware failure, the error status is displayed in the disk ERAP format. Record this information and then run the 62PC MDIs to find the error.

If the utility finds a hardware failure that was not detected by the disk attachment, it displays the error status in the disk ERAP format. The utility can detect the following hardware failures:

- Interrupt time-out (byte 1, bit 0). Record the error information and run the 62PC MDIs to find the error.
- Invalid disk interrupt (byte 1, bit 1). Record the error information and run the 62PC MDIs to find the error.
- Alternative track full (byte 1, bit 1). More than 32 defects were found and assigned to the alternative track on one surface. To find the error:
 - Run the 62PC MDIs.
 - If no error is found, use the 62PC disk analyze utility (option 1) to analyze the disk and run the failing procedure again.
 - If it fails again, run the analyze utility again.
 - Compare the two analyze utility printouts. If the defects (both manufacturer assigned and user assigned) are in the same physical locations (cylinder, head and sector), the disk unit is the likely cause. Replace the disk unit. If the defects are not in the same physical locations, an intermittent hardware failure is the likely cause. Run the disk intermittent MAPs (see MDI 1058).
- Unreadable ID (byte 1, bit 3). The utility could not write an ID in at least one sector because of a utility found error or a hardware failure. To find the error:
 - Run the 62PC MDIs.
 - If no error is found, use the 62PC disk analyze utility (option 1) to analyze the disk and run the failing procedure again.
 - If it fails again, run the analyze utility again.
 - Compare the two analyze utility printouts. If the unreadable ID is in the same physical location (cylinder, head and sector), the disk unit is the likely cause. Replace the disk unit. If the ID is not in the same physical location, an intermittent hardware failure is the likely cause. Run the disk intermittent MAPs (see MDI 1058).

62EH Disk Analyze Utility

The 62EH disk analyze utility:

- Reads IDs of all sectors on the selected disk drive and checks for any errors.
- Reads data fields of all sectors that have no ID errors.
- Lists all sectors that have an active flag and any sectors that contain errors.

Two types of messages are associated with the 62EH disk analyze utility: information type messages and error messages. The information type messages and a description of each are:

- *Assigned Alternative* (sector ID flag byte = X'01'): Indicates that a sector on the alternative track is assigned to a defective primary sector.
- *Defective Primary* (sector ID flag byte = X'02'): Indicates that a primary sector is defective and that the sector ID indicates the assigned alternative sector ID.
- *Defective Secondary* (sector ID flag byte = X'03'): Indicates that a sector on the alternative track is not usable.

The error messages and a description of each are:

- *Sector ID Field Error*: Indicates any of the following:
 - An ID was not as expected.
 - A status error occurred on a read ID operation.
 - A primary sector ID was defective (identified by an active sector ID flag), but an alternative sector was not assigned to the primary sector.
 - An alternative sector ID was assigned (identified by an active sector ID flag), but a primary sector was not assigned to the alternative sector.
- *Read Data Error*: Indicates that a CRC check or some other check occurred during a read data operation or that the data field is missing a sync byte.
- *Read ID Proc Interrupt Error*: Indicates that a machine check occurred during a read ID operation or that an ID field is missing a sync byte.
- *Alt Sector Data Not Verified*: An alternative sector ID flag byte of X'05' indicates that data was read from a sector with CRC checks. Use the build program to verify the data.
- *Read Data Proc Interrupt Error*: Indicates any of the following:
 - A machine check occurred during a read data operation.
 - A sync byte is missing from a data field.
 - A data field was not written again after an extended ID was exchanged with a normal ID.
- *Sector Must Not be Defective*: Indicates an active sector ID flag on cylinder 0 or on cylinder 1, or it indicates that sector 30 (X'1E') on the CE cylinder is defective.

62EH Disk Initialize Utility

CAUTION

Disk initialization will destroy all data on the disk. The customer must copy all the data he wants to keep before disk initialization is started.

Options 1 and 2

- Write sector IDs on all sectors and write zeros in all usable data fields of all sectors with a valid ID flag byte of either X'00' or X'01'.
 - Flag defective sectors and assign and write alternative sector IDs for all primary sectors with an active sector ID flag.
 - Use DIAGAO diskette for record of defective sectors:
 - Use the defective sectors record from the DIAGAO diskette for initialization if the serial number of the selected disk drive is on the DIAGAO diskette record.
 - Generate the defective sector record for the DIAGAO diskette if the serial number of the selected disk drive is not on the DIAGAO diskette record, and then initialize the selected disk drive.
 - a. If the selected disk drive is not initialized in System/34 format, all sector IDs are read and any sector ID flags are used to generate the defective sector list for the DIAGAO diskette and to initialize the disk drive.
 - b. If the selected disk drive is initialized in System/34 format, the alternative track IDs are read and all active sector ID flags are shown on a printout or display for review. If the list is not in error, use the list for generating the DIAGAO diskette record and for initializing the selected disk drive. If the list is in error, enter the defective sectors from the keyboard.
- Note:** The original list of all defective sectors is on a label(s) on the disk enclosure.
- c. If the DIAGAO diskette is lost, the DIAGB7 diskette can be used to complete the initialization, and a temporary DIAGAO diskette record will be generated on the DIAGB7 diskette.

Options 3 and 4

These options update the DIAGAO diskette record for the selected disk drive after all defective sector IDs are entered from the keyboard. However, there is no disk drive initialization with these options.

Options 5 and 6

Options 5 and 6 are the same as options 3 and 4 except that after the DIAGAO diskette record is updated, the selected disk drive is initialized.

Data Communications TRAP Print Utility

The TRAP utility program works with a stereo tape recorder (part 2439634), which is a branch office tool. The recorder is used to record data from the data communications line to magnetic tape. The TRAP utility program interprets and prints the recorded data.

In order to use the TRAP utility program to print the contents of a recorded tape, you need a dedicated System/34 under control of the diagnostic supervisor (not SSP). The System/34 does *not* need to have data communications feature installed to print the contents of the tape.

The TRAP utility is on the DIAGF1 diskette and is selected through the utility option on the diagnostic supervisor main option menu. The TRAP utility will print the data in binary, hexadecimal, and EBCDIC formats. If the data is in ASCII format, use the binary printout to translate the data; or transmit the data to a Datascope¹ which can translate the data for you.

¹Datascope is a trademark of the Spectron Corporation.

99-060 LIST OF DEVICE IDs

01 = control processor

02 = main storage processor

10 = attachment controller 2 (MLCA)

C0 = system console

CA = work station attachment

D0 = diskette drive (level 1 attachment)

D1 = diskette drive (level 2 attachment)

A0 = disk drive(s) (62EH)

A1 = disk drive(s) (62PC)

E0 = printer (5211)

E1 = printer (5256)

E2 = printer (3262)

E3 = printer (5224 or 5225)

52 = magnetic character reader

80 = data communications (first or second communications adapter only)

82 = MLCA communication lines

99-061 HOW TO RUN THE WORK STATION VERIFICATION TEST UNDER SSP (TEST REQ)

The work station verification test can be used to exercise any local or remote work station (display station or printer). When system IPL is completed, the test program can be loaded from any active display station. To load the test program, you must perform one of the following:

1. When the sign-on screen is displayed, press the Test Req command key.
2. When the command screen is displayed, enter TESTREQ on the keyboard.

The functions that may be exercised by TESTREQ are as follows:

- Display all graphic characters and attributes on the display screen.
- Verify proper operation of the roll and cmd keys.
- Verify data entry into specific field types that are displayed on the screen.
- Print a fixed pattern on the printer when exercising the SNA character string (SCS) commands.
- Display the configuration for the current local or remote work station.
- Verify special feature functions attached to the displays (for example, magnetic stripe reader).

For additional information on how to run the work station verification test under SSP, see the *online test procedures* in the display station maintenance **information** manual.

99-062 HOW TO RUN WORK STATION ATTACHMENT MDIs FROM THE CE PANEL

Work station attachment MDIs are run from the CE panel. Generally, you will run them in automatic mode first. There are approximately 90 TU tests in the good machine path. If they all run and pass good results (no failures) to the MDI processor, the run time is from 1 to 3 minutes. TCOA5 is the last TU test in the *Good Machine Path*. You can verify that the tests ran without errors by displaying WR3(H) when the system stops. If the work register contains hexadecimal A5, the MDIs did not branch out of the good machine path and have normally completed the MDI.

If the system console is operational when the attachment MDIs complete, TU test TCOA5 displays a message on the console that indicates the diagnostics ran without errors.

If you select a mode that uses a line printer to print messages, only the 5211 and 3262 printers should be used. The selected mode will not function correctly when a printer that is attached to the work station controller is selected.

If the controller tests do not normally complete the MDI, see MAP 1198 for more diagnosis.

There are four ways to run the controller MDIs from the CE panel:

1. *Automatic mode*—Set the Address/Data switches to F100 and set the Mode Selector switch to Proc Run. The MDIs either automatically run all TU tests in the good machine path, and Stop with TU results in work registers if there is a failure; or stop when the good machine path has been normally completed (see *Procedure for Using Automatic Mode*).
2. *Automatic mode with printed error results*—Set the Address/Data switches to F180 and the Mode Selector switch to Proc Run. The MDIs run in automatic mode, and if a TU test finds a failure, the line printer (5211 or 3262 only) prints a message that will identify the failing FRU or points to a hard MAP for more diagnostics (see *Procedure for Using Automatic Mode*).

3. *Step mode*—Set the Address/Data switches to F100 and the Mode Selector switch to Sys Insn Step. Each time you press the CE Start switch, a TU test in the good machine path runs, and the system stops with TU results in work registers (see *Procedure for Using Step Mode*).
4. *Step mode with printed TU test results*—Set the Address/Data switches to F180 and the Mode Selector switch to Sys Insn Step. Each time you press the CE Start switch, a TU test in the good machine path runs, and the system stops with a TU description and the results are printed on the line printer (5211 or 3262 only) (see *Procedure for Using Step Mode*).

Procedure for Using Automatic Mode

1. Set the CE panel switches as follows:
 - a. CSIPL to Diskette
 - b. MSIPL to Diskette
 - c. Mode Selector to Proc Run
 - d. All other CE Panel switches to the down position
2. Set F100 into the Address/Data switches and load from DIAGB1.

Note: If you set F180 into the Address/Data switches, the MDIs run automatically and the line printer (5211 or 3262 only) will identify a FRU if there is a failure or points to a hard-copy MAP for more diagnostics.

3. When the system stops with hexadecimal 0001 in WR0, set the Mode Selector switch to Proc Run, insert DIAGB4 and press CE Start.
4. If the system stops before being normally terminated and WR3(H) does not contain X'A5', display WR1 for the hexadecimal MAP ID number; WR2 for the hexadecimal step number; and WR3(H) for the test ID.

If the system continues to run and the System In Use and all Processor Interrupt lights are on, go to step 3 of MAP 1198.

5. Find the MAP and step numbers in the hard-copy MAPs and follow the instructions given.

Procedure for Using Step Mode

1. Set the CE Panel switches as follows:
 - a. CSIPL to Diskette
 - b. MSIPL to Diskette
 - c. Mode Selector to Proc Run
 - d. All other CE Panel switches to the down position.
2. Set F100 into the Address/Data switches and load from DIAGB1.
3. When the system stops with hexadecimal 0001 in WR0, insert DIAGB4, set the Mode Selector switch to Sys Insn Step, and press the CE Start switch.
4. Each time you press CE Start, the next TU test runs, and the system stops. Since there are approximately 90 TU tests in the good machine path, run time will be 1 to 3 minutes. Each time the system stops, work registers 0 through 7 contain the following information:

WR0 = 0010 (MDI halt ID)
WR1 = MDI MAP ID
WR2 = MDI step number

The following register contents are additional information and not needed by the MAPs:

WR3 (H) = TU ID (last two digits)
WR4 = Expected TU result bytes 1 and 2
WR5 = Expected TU result bytes 3 and 4
WR6 = Received TU result bytes 1 and 2
WR7 = Received TU result bytes 3 and 4

(See paragraph 99-999 for TU result byte bit meanings.)

Step Mode with printed TU test results:

This procedure can be used only on systems with a 5211 or 3262 line printer.

1. Set the CE Panel switches as follows:
 - a. CSIPL to Diskette
 - b. MSIPL to Diskette
 - c. Mode Selector to Proc Run
 - d. Comm Display to Off
2. Set F180 into the Address/Data switches and load from DIAGB1.
3. When the system stops with hexadecimal 0001 in WR0, insert DIAGB4, set the Mode Selector switch to Sys Insn Step, and press CE Start. Each time you press CE Start, the next TU test runs, and the system stops. The TU test description and results are printed.

When the last TU test in the good machine path runs, the printer repeats the same MAP and step numbers each time you press the CE Start key, and the system console (if operational) displays a message that the diagnostics ran without errors.

9-064 HOW TO RUN TU SELECT FOR THE WORK STATION ATTACHMENT FROM THE CE PANEL

The purpose of the TU select program is to enable you to select any TU test, run it (or loop it), and observe the results of the test.

Two main procedures are available: standard and alternate.

Standard Procedure

Use the alternate procedure with the following exception:

Dial F181 into the Address/Data switches (instead of F101). The test results will print on the line (belt) printer.

Alternate Procedure

1. Set the CE panel switches as follows:
 - a. CSIPL to Diskette
 - b. MSIPL to Diskette
 - c. Mode Selector to Proc Run
 - d. Comm Display to Off
 2. Dial F101 into the Address/Data switches and load from DIAGB1.
 3. System stops with hexadecimal 0002 in WRO.
 4. Insert DIAGB4, and set the TU ID (last 4 digits) into the Address/Data switches.
 5. Set Mode Selector switch to Proc Run if you want to loop on the TU test; or set Mode Selector switch to Sys Insn Step if you want to run the test and stop.
 6. Press CE Start.
7. If your option was to run the test and stop, when the system stops, the test results are in WR6 and WR7. (See paragraph 99-999 for bit meanings in result bytes.) Use the following procedure to display the test results.
 - a. Set the Mode Selector switch to Insn Step/Disp LSR.
 - b. Set the Data switches to X'06' to read the first 2 bytes.
 - c. Set the Data switches to X'07' to read the second 2 bytes.

Notes:

1. Once a test is either looping or in run mode, you can switch to the other mode by turning the Mode Selector switch to the correct position and pressing CE Start:

Mode Selector = Proc Run—Loop the selected test.

Mode Selector = Sys Insn Step—Run the test and stop.
2. In order to run a test different than the test selected in step 4 of this procedure, repeat steps 1 through 6 and enter the ID of the new test to be executed.

99-065 HOW TO RUN DEVICE TU SELECT

The purpose of device TU select is to enable you to select any TU test, run it (or loop), and observe the results of the test.

The device TU select is selected from the diagnostic supervisor main option menu. The next display shows all the devices that have TU select programs that can be executed. Once a device has been selected and the correct diagnostic diskette has been inserted, the select menu for that device is displayed.

To run the device TU select, do the following:

1. Enter the last two digits of the TU ID to be run. These digits can be determined by doing a scroll through the TU select menus until the desired TU is located.
2. The program responds with a description of the TU and the meaning of the TU result byte. You can either scroll the description and meaning or press Enter to continue.
3. The TU is then loaded into control storage and the run option is displayed. You can then either execute the TU once and display the results or loop on the TU, displaying the result bytes.

Note: Pressing the Attn key causes the preceding option to be returned.

99-066 I/O STEP OR STOP ON ERROR MODES FOR WORK STATIONS AND LINE PRINTERS

I/O Step Mode Under SSP Control

The purpose of the I/O step mode is to permit you to step the commands going to the work station or system printer controller. When using the I/O step mode on the work station controller, the selected terminal number that I/O step mode is to work with, must be entered (C000 for the system console on cable 0, C010 for a terminal on cable 1, C020 for a terminal on cable 2, etc). Since the line printer controller has only one device, the printer is activated by entering E000 (5211) or E200 (3262). All other devices on the system will operate normally.

Using I/O step mode, it is possible to step any specific terminal through the sequence of *gets* and *puts* that set up a screen (or print a few lines). The terminal unit block, station parameter list, and field format table (described in the *Data Areas and Diagnostic Aids Manual*) may be observed (by using the various display features under Alter/Display) and decisions made on the correct function of the operation.

To set up I/O step mode:

1. Press the Stop key to go into alter/display mode.
2. Select I/O step:
 - a. Choose option 9 on menu and press the Field Exit key.
 - b. Select I/O step mode option and enter device/unit address:

Work station COXY X = cable address
Y = station address

3262 Line Printer E200
5211 Line Printer E000

- c. Press the Enter key.
3. Press the Field Exit key to exit alter/display mode.

Each time a *get* or *put* is sent to the device, the alter/display option menu is displayed on the system console. Press the Field Exit key to continue to the next *get* or *put*.

I/O Stop on Error Mode Under SSP Control

I/O stop on error mode permits you to set up a specific display station, work station printer, or the system printer to stop executing more I/O commands (*Gets* and *Puts*) as soon as an error is found. All other processing will continue normally. The Alter/Display option menu appears each time an I/O error occurs.

After the stop on error occurs, the critical control areas of the system may be looked at through the various options of the Alter/Display function. These areas are described in the *Theory/Diagrams and Functions Reference Manuals*.

To set up I/O stop on error mode:

1. Press the Stop key to go into alter/display mode.
2. Select I/O Stop on Error:
 - a. Select option 9 of the alter/display option menu and press the Field Exit key
 - b. Select I/O Stop on Error
 - c. Enter device/unit address:

Work station COXY X = cable address
Y = station address

3262 Printer E200
5211 Printer E000

- d. Press the Enter key
3. Press the Field Exit key to exit alter/display mode.

99-067 I/O CONTROLLER DISPLAY/DUMP UNDER SSP CONTROL

I/O Controller Display

Option 8 of the alter/display option menu permits the display of storage in any I/O controller attached to the system. The alter/display options are described in the *Theory/Diagrams, Data Areas and Diagnostic Aids*, and the *Functions Reference Manuals*.

To start this option:

1. Press the Stop key to go into alter/display mode.
2. Select I/O controller display
 - a. Select option 8 on the menu and press the Field Exit key
 - b. Enter:
 - D for display
 - Starting address (4 digits)
 - Controller
 - C0 = work station controller
 - E0 = line printer controller
3. With this option, the display may be moved through storage by entering the new address at the cursor location (4 digits).

To terminate this option, move the cursor to the position *after* the 4-digit address and enter an E.

4. Press the Field Exit key to exit alter/display mode.

Note: When you exit from alter/display mode after interrupting the line printer controller with an 8 option, various registers and counters are set to zero or initialized. You cannot continue executing the interrupted printer program.

I/O Controller Dump

A dump of the I/O controllers is written on the disk when a system dump occurs.

To dump the system to disk:

1. Press the System Reset key.
2. Press the CE Start key.
3. Permit 2 seconds for the dump to complete.

To print the controller portions of the dump:

1. Set the MSIPL and CSIPL switches to Disk.
2. Press the Load key.
3. Enter sign-on information and press the Enter key twice.
4. Enter the command DUMP IOC and follow the prompts.

99-068 HOW TO RUN ERROR RECORDING ANALYSIS PROCEDURE (ERAP)

1. Enter ERAP at the SSP command menu and select the desired option.
2. Press the Field Exit key.
3. Follow the directions that are displayed.

See paragraph 80-111 for information on how to interpret ERAP displays and printouts.

99-069 HOW TO RUN SYSTEM TEST (SYSTST)

System Test is an exerciser that runs in *dedicated* mode under control of SSP. The following parts of the System/34 can be tested:

- Disks
- Diskette

Note: Any standard formatted scratch diskette can be used.

- Display stations.

Note: Only local display stations can be tested, and all display stations must be signed off except the system console.

- Printers (local printers only).
- Magnetic Character Reader (see the *IBM System/34 1255 Attachment Feature Theory/Maintenance* manual, SY31-0521).

Note: The magnetic character reader test is a stand-alone concurrent exerciser.

- Main storage processor (MSP)

Local display stations that are not signed on by a user are the only displays that can be tested. Default is to the requested terminal if all other displays selected are signed on or powered off.

(MSP testing is automatic. When the MSP is not doing I/O operations, it is executing logical and arithmetic instructions under control of the system test program.)

Enter SYSTST at the SSP command menu to start system test. Before the program requests which devices you want to test, it runs a series of failure locating tests on the work station controller. If an error occurs during the controller tests, 5 bytes of sense information are displayed. These 5 bytes of sense information, described in paragraph 87-200, are as follows:

- Byte 1 = Controller/host status
- Byte 2 = Controller/cable status
- Byte 3 = Device/cable status

- Byte 4 = Not used
- Byte 5 = Device status byte 0

Note: Device status byte 1 is not used and is not displayed.

After the controller tests are complete, devices are selected and the test can begin. If a data compare error occurs, the system console displays a data not compare message. Data not compare errors are the only type of errors that the system test error counters log. If a non-recoverable error occurs on a device, SYSTST is terminated. You can get more information on errors that occur while system test is running by running ERAP.

(See paragraph 99-068 for how to run ERAP.)

Note: Starting with Release 6.0 of the DIAGB1 diskette, the SYSTST Display Results option swaps SYSTST to the disk and loads ERAP. Terminating ERAP causes SYSTST to be loaded again and the selection status remains the same. The SSP must be a Release 4.0 or later to perform this function.

If you operate the system console along with the line printer and the line printer has a forms problem, the Message Waiting indicator on the system console will come on. Use the following procedure to display the message and then restart SYSTST:

1. Press the Attn key.
2. Press Sys Req and then the Enter key.
3. The last line on the display screen is the message that was waiting.
4. After you correct the printer forms problem, press the Sys Req and Enter keys again.
5. Select option 0, restart SYSTST.

Press the Attn key and select option 4 to halt SYSTST.

99-070 DATA COMMUNICATIONS DIAGNOSTIC PROGRAMS

This major section contains the following information:

- 99-071 Summary of Data Communications Diagnostic Programs
- 99-072 Data Communications Fault Locating Tests
- 99-073 Data Communications Stand-alone Tests
- 99-074 SDLC Online and Utilities Test
- 99-075 BSCA Online Test
- 99-076 MLCA Concurrent Wrap Test and Trace Dump Driver Program (COMMTST)
- 99-077 Data Communications Tables

Service Procedure for MLCA

You should use the following procedures and aids for maintenance on MLCA in the sequence shown.

1. Concurrent hardware maintenance
2. Dedicated hardware maintenance
3. Undirected and/or microcode maintenance

The procedure used relies on the type of problem, the system being available, and the level of remote site support.

Concurrent Hardware Maintenance

The following aids are available for support of concurrent hardware maintenance for MLCA:

1. Wrap test for MLCA communications adapters and IBM modems
2. MLCA controller wrap test
3. BSC and SDLC online test
4. MLCA microcode data trace

The primary method used to isolate problems to a subsystem (MLCA controller, communications adapter, IBM modem, communications network, or remote device) is the concurrent use of wrap modules and/or online test and/or microcode data trace. During normal operation, SDLC or BSC programs can start the wrap tests to test the MLCA controller, storage, communications adapter, and IBM modem when a permanent error condition is present. In some cases, this method can isolate the problem to a field-replaceable unit (FRU). These wrap tests can also be selected by you or the customer in a concurrent mode through the use of the COMMTST program. The adapter and the modem wrap test operate concurrently with the microcode, therefore leaving the other lines operating.

If the MLCA controller is the failing unit, none of the communications lines will work; however, the controller wrap test can run concurrently with the remainder of the system. If a problem occurs and you cannot isolate the problem through these concurrent methods, then dedicated hardware maintenance is needed. If the concurrent tests using the wrap tests can sense no problem, the problem is either with the network or a remote device, or an MLCA problem is indicated.

To isolate external problems, the online tests aid in troubleshooting network or remote device problems in concurrent mode without any interference to other communications lines. In addition, microcode data traces aid in locating logic problems, both in high-level software and the remote device, by supplying information on the data exchanges between the system and the remote device.

To isolate difficult MLCA problems, you may need to use the dedicated hardware maintenance procedure.

Dedicated Hardware Maintenance

Dedicated hardware maintenance is used when a problem cannot be sensed by the concurrent tests, or when you need to isolate FRUs. The following aids are available to support dedicated hardware maintenance:

1. CSIPL checkout (diagnostic tests)
2. MDI (MAP diagnostic integration) for problem location in MLCA controller
3. MDI for problem location in MLCA communications adapters, line adapters, cables, and IBM modems
4. Hard MAPs
5. SDLC and BSC online test (loaded under control of SSP)

The primary method used to isolate problems is to run MDIs. Using this method, you can load a diagnostic control program (DCP) that performs a supervisor function to permit selecting the MLCA diagnostic programs by selecting from prompts displayed on the system console.

The MDI modules then execute and select test units (TUs) to perform tests and to instruct you to make adjustments to switches, install jumpers, or report failures, or to direct you into hard MAPs to isolate the problem. Always test the MLCA controller before testing communications line hardware. For most problems, you can isolate a FRU using hard MAPs.

For solid IMPL problems and processor checks, use the CSIMPL module to isolate between the MLCA controller and other communications hardware. You *must* use the system entry MAPs correctly to isolate an FRU.

Undirected Maintenance

The following items aid you in performing undirected maintenance on the MLCA and the associated communications system:

1. Field service logics
2. Stand-alone tests
3. Intermittent failure replacement list
4. Error logs
5. Trap print utility

Microcode Maintenance

Microcode logic errors could cause MLCA to operate not correctly. The following aids are available to support the diagnostic of these and other programming errors:

1. Microcode data trace
2. Microcode queue trace
3. System trace of SVCs
4. MLCA controller storage dump
5. System main/control storage dump
6. Alter/display system storage

Use a microcode trouble report (MTR) to report any microcode problem that occurs.

99-071 Summary of Data Communications Diagnostic Programs

Failure Locating Tests (MDI)

Function: Test data communication logic and isolate failure to logic card, internal clock card (if this feature installed), modem interface cables or modem. If the IBM integrated modem is installed, the modem card or cards are isolated. If an external IBM modem is installed, failure locating tests indicate only that the modem is failing.

Locations of Programs: DIAGB5 (first or second communications adapter)
DIAGB5ML (MLCA)

Type of Program: Diagnostics written in microcode operate under the diagnostic supervisor.

Data Communications Stand-alone Tests

Function: To aid you in the free-lance mode of operation. These are independent tests that are not included in the data communications MAPs and must be selected by you from the diagnostic supervisor under the exerciser, TU select, or utility option.

Locations of Programs: DIAGB5 (first or second communications adapter)
DIAGB5ML (MLCA)

Type of Program: Diagnostics written in microcode operate under the diagnostic supervisor.

SDLC Online Test

The SDLC online test is also known as the SDLC link test.

Function: Operate and test the communications adapter, modem and all of the communications link to verify the system integrity and analyze difficult communications problems.

Location of Program: DIAGB5 (first or second communications adapter)
DIAGB5ML (MLCA)

Name of Program: SDLCTST

Type of Program: Written in main storage code and operates under SSP (system support program product).

Note: When a customer uses a communication line for only BSC, the SDLC online test can also be run on the same communication line to devices that support the SDLC online test. However, it is important that the NRZI switch on the adapter card be set to the correct position for SDLC operation so that both devices in the communications link are using the same encoding; that is, they are both using NRZI or they are not using NRZI. (See paragraph 30-200 (MLCA) or 31-200 (first or second communications adapter) for the setting of the NRZI switch on the adapter card.) After the test is complete, the NRZI switch must be set to its original position.

BSCA Online Test

Function: Operate and test the communications adapter, modem and all of the communications link to verify system integrity and analyze difficult communications problems.

Location of Program: DIAGB5 (first or second communications adapter)
DIAGB5ML (MLCA)

Name of Program: BSCATST

Type of Program: Written in main storage code and operates under SSP (system support program product).

Note: When a customer uses a communication line for only SDLC, the BSC online test can also be run on the same communication line to devices that support the BSC online test. The NRZI switch on the adapter card does not have to be set to any specific position because the microcode disables the NRZI function for BSC.

MLCA Concurrent Wrap Test and Trace Dump Driver Program (COMMTST)

Function: Permit wrap tests for the communications line and the MLCA controller, and supply programs to print traced data and commands.

Location of Program: DIAGB5ML

Name of Program: COMMTST

Type of Program: Written in main storage code and operates under SSP (system support program product).
Runs concurrently with other system operations.

99-072 Data Communications Failure Locating Tests

These tests are on diskette DIAGB5 (first or second communications adapter) or DIAGB5ML (MLCA) and are used to isolate failures either in the data communication logic card, internal clock card (if installed), interface cable, or the modem. Access the tests by using the diagnostic supervisor main menu. If the modem is an IBM integrated modem, the test combined with the MAPs isolates the failure to a modem part or group of modem parts within the modem.

The tests are described in the prompting menu. You can get more details about a specific test by selecting that test under the TU select option of DCP.

99-073 Data Communications Stand-alone Tests and Utilities

The stand-alone tests found under the exerciser or TU select option are for your use when you desire some additional information from the system, or when you have reached the point where some free-lance troubleshooting is necessary. The MAPs may also direct you to use these tests.

Transmit Stand-alone Test

Transmit of X'00', X'FF', X'55', X'7E', X'16', or X'32'.

Description: For free-lance troubleshooting, this is a test that transmits data (specified by you) to the modem and to the communications line.

Note: This test does not function on X.21 configurations.

The exerciser option permits several modes of running the test. Use the Halt After Each Cmd or Scope Loop option to run the test. The Halt After Each Cmd option will post an error. The Scope Loop option can be used to cause a continuous transmission of data. Press the Attn key to terminate the test.

The test permits 2 minutes for Clear to Send to come back from the modem before timing out; the test will then post an error in Halt After Each Cmd mode or restart the test in loop mode.

If this test is being used on a switched network, you should dial and make a telephone connection after the test is executing. You have 2 minutes to dial and make a connection before the test will time out and post an error or restart. In Halt After Each Cmd mode on a switched network, starting the test again will drop the line.

Bit Rate Stand-alone Test

Description: Measure the modem clock speed in bits per second while transmitting data through the modem at full rate. Results are shown on the system console.

Run the test only in Halt After Each Cmd mode. The test can be used on modems that supply their own clock function and on DDSA.

For the first or second communications adapter, the results of the test are changed to the nearest 100 bits.

For MLCA, the results are accurate to ± 25 bps.

Notes:

- 1. This test cannot be used for line speeds larger than or equal to 10,000 bps.
- 2. This test does not function on X.21 configurations.

Error Condition: If the test takes longer than 5 seconds, an error condition is present and you should check the modem and cable attachments to the modem.

DDSA Remote Loop-Back Stand-alone Test

Access the DDSA remote loop-back stand-alone test by selecting the TU select option of the diagnostic supervisor main menu. The test unit used is T8080 (first or second communications adapter) on DIAGB5 or T82A0 (MLCA) on DIAGB5ML.

Directions for running this test are given in MAP 3801 for first or second communications adapter and MAP 3074 for MLCA. This test wraps alternate 1's and 0's through a remote system or device that is in wrap mode. Output is in the form:

XX XX XX XX
↑

is the hexadecimal number of alternate 1's and 0's transmitted and received correctly.

A no-error condition results in a display of:

00 00 (for MLCA)

or

00 00 00 64 (for first or second communications adapter).

Data Communication Trap Print Program

The trap print program prints the data that has been recorded on a CE trap. The output is a formatted and/or binary printed list of the data that was trapped on the communication line. SDLC header information is formatted to read easily.

The recorded information can be in one of the following formats:

- BSC
- SDLC
- SDLC/NRZI

This program is loaded from diagnostic diskette DIAGF1 and runs under control of the diagnostic supervisor through the utility option.

The data read from the trap is loaded into storage buffer and can be printed again with the same or different options. To terminate the program and return to DCP, press the Attn key. To change Address switch settings while the program is running, always turn the Mode Selector switch to the Insn Step/Dply LSR position, then change the Address switch. Set the Mode Selector switch to the Proc Run position and press the CE Start key on the CE panel.

LPDA Local/Remote Status Report Tests (MLCA only)

These tests are used for the IBM 3863, 3864, and 3865 modems and integrated types, such as the System/34 4800 BPS Integrated Modem, that support LPDA commands.

Access the tests by selecting the TU select option from the diagnostic supervisor main menu. Diagnostic diskette DIAGB5ML contains the test units (T8296 and T8298).

Directions for running these tests are given in MAP 303H.

99-074 SDLC Online Test

The SDLC online test is a standard test program used to communicate between most SDLC systems or devices attached to your system.

The corresponding online test must be loaded in the remote system. See the other system diagnostic user's guide for loading and operating procedures.

Note: To run this test for a remote work station, the remote work station's control unit must be powered on but not in use (not online).

Purpose of program:

- Verify correct operation for all of the communications link.
- Supply remote site support.
- Analyze difficult communications problems.

The online test has two routines: a requester station routine and a responder station routine. The requester station routine is used when the system is to be used to transmit a selected test message. The test message is sent by the requester station the number of times specified by you. The message or frame content is determined by the XX value entered before starting the test if the station is a requester station. The station address loaded into the configuration program is the address of the responder station. This address must be changed through the scan/alter SDLC configuration option to match the address of the remote terminal when communicating with work stations.

The test TYPE numbers and the data they represent are described in Step 7 under *Operating Procedures for SDLC Online Test Requester Station Routine* later in this section. The transmission sequence is shown in this section. The requester station transmits the specified message and expects to receive the same data (except for messages 07 and 10 - transmit only).

The type of operation performed when using test message 00, 09, and 10 options relies on the control byte entered by you in the data field entry and the remote operating system or program.

The responder routine is used to support other systems that are transmitting a test.

When the responder station routine is selected, it will go into a receive condition waiting for a test message. When one is received, it is transmitted back as received. A time-out will terminate this sequence.

If your system is the requester, the other system must have a responder routine available. If your system is the responder, the other system must have a requester routine loaded.

Note: The SDLC online test does not change the error recording area on the disk that is normally updated when customer programs are executed.

Online Test Sequence

The requester station sends a test command frame (with or without data) to the responder station. The responder station returns all that it received to the requester station. This sequence repeats for as many times as you specified in the YY value.

How to Terminate the Online Test

Requester: The online test is terminated after all frames (as specified by you) are received and the terminate option is selected (option 4 for the first or second communications adapter, or option 2 for MLCA) or by the Attn key and option 2.

Note: If you want to terminate the SDLC online test, do so only when this option menu is displayed, when the test (specified by message number xx) has completed, or when an error is displayed. Any attempt to terminate the test at any other time could result in a system hang condition.

When on a switched network, using the ATTN key and option 2 to stop the program (instead of the program's normal termination option) may not disconnect the telephone line. Reload the online test and select the normal termination option to disconnect the telephone line.

Responder: By the Attn key and option 2.

Note: The inactivity time-out will not cause the online test to disconnect the switched line connection.

Online Test Frame Format

PAD F A C DD BC BC F

Where:

- PAD = X'AA' for modem clock functions
= X'0000' for internal clock functions (2 bytes)
- F = X'7E' - Flag character
- A = X'***' - ** represents secondary station address
- C = X'??' - ?? represents control field. (See *SDLC Control Characters* later in this section for control field character definitions.)
- DD = Optional data determined by XX value
- BC = Frame check character
- F = X'7E' - Flag character

Operating Procedures for SDLC Online Test Requester Station Routine

Step 1. Configuration must have been done earlier.

Step 2.

Note: If the customer is using the system (but not data communications on the desired line), skip this step and go to step 3.

If the customer is not using the system, perform the following steps:

- Set the CSIPL and MSIPL switches (CE panel) to Disk and press the Load key (operator panel).
- Enter the required information at the system console to load the SSP.

Step 3. Enter SDLCTST on the command screen and press the Enter key.

Step 4.

If the system uses the first or second communications adapter (not MLCA), perform the following steps:

- Insert DIAGB5 diskette and press the Enter key.
- Set the Comm Dply switch (CE panel) to the On position.
- If two communications lines are installed, set the Comm 1/Comm 2 switch (CE panel) to the position of the communications line you are testing.
- Select the code most often used by the customer. If you do not know that code, select the secondary code.

Note: For World Trade, selecting the primary code does not supply an answer tone; selecting the secondary code does supply an answer tone.

If the system uses MLCA (not the first or second communications adapter), perform the following steps:

- Insert DIAGB5ML diskette and press the Enter key.
- Set the Comm Dply switch (CE panel) to the On position.
- Set the Comm Select switch (CE panel) to the line you are testing.
- Select the option for the correct line number.

Step 5. If you want to terminate the test at this time, see the preceding paragraph, *How to Terminate the Online Test*, in this section.

Step 6. At this time, you can select program options. (See *SDLC Online Test Options* later in this section.) If necessary, change the station address to match the station address of the called responder station. Make the change through the scan/alter SDLC configuration option. For the remote work station address, see the remote work station network diagram, or see the remote work station configuration display.

- Step 7.** The other station should be ready with the same or similar *SDLC Responder Station Routine* loaded. For systems with the first or second communications adapter, perform the following steps:
- Select 1 (Requester Station Routine) and press the Enter key.
 - Enter the two-digit message type number (XX) (see Figure 99-3) and press the Enter key.

- For systems with MLCA, perform the following steps:
- Select 1 (Continue Test) and press the Enter key.
 - Enter the two-digit message type number (XX) (see Figure 99-3) and press the Enter key.

XX

Value Content of Message

00	Data entered by operator (requester station sends message from storage that you have entered into storage.)
01	All 256 characters (EBCDIC)
02	A-Z, 0-9 (36 EBCDIC characters)
03	40 X'AA's and 40 X'55's (80 EBCDIC characters)
04	256 X'00's
05	256 X'FF's
06	X'F3' (SDLC TEST command)
07	Transmit only all 256 characters
08	Random data of specified block size
09	Repeated character (block size)
10	Transmit only data entered (you enter the data message into storage)

Notes:

- If no data is entered, the message number (XX) will default to 06, and the repeat number (YY) to 01. (To end the test and return to the main menu, type E and press the Enter key.)
- Test message numbers (xx) 00, 08, 09, and 10 are used as a freelance aid. Before executing these selected test messages, you should completely understand the task to be performed and the expected results to be returned from the remote system.
- If you enter a control byte other than hex F3, the requester routine (except for option 10) expects to receive the same message that was transmitted. The requester routine records an error if the remote system responds differently (this is normal operation).

- Step 8.** Making the telephone connection for the test is different for switched and nonswitched lines and for telephone systems either in the United States and Canada, or in other World Trade countries. Select from the following procedures for making the telephone connection.

U.S. and Canada—Switched:

- Press the Enter key (ignore the dialing message for World Trade countries).
- Enter the two-digit repeat number (YY), but do not press the Enter key. A YY count of 00 defaults to one transmission.
- Put the telephone in talk mode and dial the other system.
- Wait for the 3-second answer tone (when calling systems with autoanswer) or for the operator at the other system to answer the phone.
- After the answer tone ends or after the operator at the other system goes to data mode, put your telephone in data mode and/or put the handset on the cradle (on the hook).
- When the Data Set Ready indicator appears (a few seconds after going to data mode), press the Enter key.

Other Countries—Switched:

- Put the telephone in talk mode and dial the other system.
- Wait for the 3-second answer tone (when calling systems with autoanswer) or for the operator at the other system to answer the phone. The other system should now be in (or go to) data mode.
- Press the Enter key. The Data Set Ready indicator should appear in a few seconds.
- Put the handset on the cradle (on the hook).
- Enter the two-digit repeat number (YY). A YY count of 00 defaults to one transmission.
- Press the Enter key.

All Countries—Not Switched:

- Enter the two-digit repeat number (YY). A YY count of 00 defaults to one transmission.
- Press the Enter key.

Figure 99-3. Message Numbers for SDLC Online Test

Step 9. The test should start.

On a switched network, if there is a delay before the link is connected, the program may try more times than its retry count and then terminate the program. In this case, re-enter the XX and YY numbers and press the Enter key when the link is finally connected. Stations on a switched network can disconnect the line within approximately 25 seconds if there is no action on the line, or if too much time occurs between making the connection and the first transmission.

Step 10. While the link test is being executed, the CE panel communications indicators (receive data and send data) should flash on and off. For the first or second communications adapter only, the interrupt, the interrupt level 2 light should flash on and off.

The only expected output during the running of the requester routine is one of the following:

- Error messages
- SDLC test option menu (test ran error free)
- Status messages for MLCA with the X.21 line adapter

Notes:

1. Do not terminate the test before the error message or status message is displayed or before the end of the test.
2. See *How to Interpret SDLC Online Test Error Messages* later in this section for a description of the error messages.
3. See *How to Interpret Status Messages for MLCA with the X.21 Line Adapter* later in this section for a description of the status messages.

Step 11. When the menu appears again, the test has completed without errors, and the program is ready for another message type to be selected or the program to be terminated.

To terminate the online test, type E and press the Enter key. This returns to the SDLC main menu. Then select option 4 (first or second communications adapter) or option 2 (MLCA) to terminate the test and return to the SSP.

Operating Procedures for Online Test Responder Station Routine

Steps 1-6: Follow steps 1 through 6 as described for SDLC online test requester station (*Operating Procedures for SDLC Online Test Requester Station Routine*).

For World Trade countries with a switched connection, make the telephone connection now (see step 8 of the *Operating Procedures for SDLC Online Test Requester Station Routine*).

Step 7: The other station should be available with the same or similar SDLC online test requester routine loaded.

For the first or second communications adapter only:

Select 2 - Responder Station Routine and press the Enter key.

For MLCA only:

Select 1 - continue test.

Step 8: The other station should now start its test. (If switched and not World Trade, dial the station and start the test.) The test should start at this time. The CE panel communications indicators (receive data and send data) should flash repeatedly if the test is running correctly. The interrupt level 2 light will flash also.

Step 9: The test continues until an error occurs. Or, the responder continues to send back each frame it receives until it terminates.

Step 10: If you want the SDLC program terminated (return to SSP), press the Attn key and select option 2 or 3. This returns to the SSP command menu. This procedure will terminate the test and also disconnect the line if this is a switched network. This procedure is needed on a switched line before another connection can be made.

SDLC Online Test Options

1. Scan or Alter Communication Feature Configuration (option 1 for first or second communications adapter, option 3 for MLCA).

Selecting this option lets you check the present configuration of the communications feature. You can alter the configuration data (in storage) at the same time. However, if you change the configuration data by option 1, this changes the preceding configuration only for the time during this program. If the program is loaded again, the configuration goes back to the original configuration.

Station Address (one hexadecimal byte)?

This display determines the local station address. This data is used only for the running of the SDLC online test.

Line Configuration?

- 1-Multipoint
- 2-Point-to-point nonswitched
- 3-Switched line

The configuration should not normally be changed. It can be changed to match characteristics of an alternate modem, or to permit testing of an SNBU (switched network backup) line if one is available.

Answer Tone?

(World Trade switched line option.) This display makes reference to those switched lines that need an answer tone generated by the adapter.

Communications Line?

This display determines the network that is selected to be tested on the local station.

Switched Network Backup?

Switched network backup (SNBU) makes reference to a switched line that can be used when the nonswitched line has a failure, and if an SNBU modem is installed or available. Selection of this option selects the SNBU line instead of the nonswitched line. For MLCA, the SNBU feature can be selected only if you have an external modem that has the SNBU feature installed.

Line Speed?

- 1-Half
- 2-Full

You can select either of two transmission rates. If the 2400-bps integrated modem is installed (2-line communications only), either 2400- or 1200-bps transmission rate can be selected by the entry above. Similarly, if the 1200-bps integrated modem is installed, either 1200- or 600-bps transmission rate can be selected. Also, if the 4800-bps integrated modem is installed (MLCA only), either 4800- or 2400-bps transmission rate can be selected. This entry determines the bps rate for the online test. If the modem does not have the half-speed function, it must specify full rate.

Clocking?

- 1-Internal
- 2-Modem

This display requests the type of clock function used by the modem. The internal clock feature is an oscillator card (A-A2Q2 for the first or second communications adapter or A-B3U2 for MLCA) that supplies clock pulses for modems that need business machine clocking. It is important that this display question be answered correctly for correct operation.

2. Specify message block size (option 2 for first or second communications adapter) (option 4 for MLCA).

Size can be 0001-0100 (256 decimal).

This option permits transmitting data of any block size between 1 and 256. This block size will be used only if XX message 08 or 09 is selected.

3. Data Field Entry (option 3 for first or second communications adapter) (option 5 for MLCA)

Enter up to 15 hexadecimal bytes. The first byte will be the control byte. Only messages XX=00, XX=09, and XX=10 use this data.

This option permits you to specify the data you want transmitted. For message XX=00, the entered data is sent exactly as entered.

4. Additional Options

First or Second Communications Adapter (Option 4)?

Selecting 1 - *enable print* will print the data transmitted and the data received if an error is recognized. If the printer spool function is active, the data will be written to disk and can be printed later.

Selecting 2 - *loop on first message selected* used only by the requester routine. If this option is selected, the first message type and the repeat count that you select is automatically used for the next test as soon as the preceding sequence has completed.

With this option you can set the test to run repeatedly without any interrupts.

Selecting 3 - Same as selecting both 1 and 2.

MLCA?

- Option 1 Continue test
- Option 2 Terminate test
- Option 6 Enable printing (for a description, see Selecting 1)
- Option 7 Loop on first message selected (for a description, see Selecting 2)
- Option 8 Enable print and loop on message (same as selecting option 6 and 7)

Note: Options are reset by reloading the online test.

How to Interpret SDLC Online Test Error Messages

If option 1, 3, or 4 was selected, an error will terminate the online test and an error display will occur.

Error Statistics Table:

FMS RECVD	Total number of frames received.
VALID FMS RECVD	Total number of valid frames received.
BCC ERRORS	Total number of BCC checks.
BUFFER OVERRUNS	A message is longer than the receive modem buffer length.
ADAPTER CHKS	Total number of adapter checks.
INVALID FMS	Total number of not valid frames.

A list of error messages is contained under *Error Messages for Online Test*.

How to Interpret Status Messages for MLCA with the X.21 Line Adapter

The following describes the call progress signal:

XX Value	Description
01	Terminal called
02	Redirected call
03	Connect when ready
20	No connection
21	Number busy
22	Selection signal procedure error
23	Selection signal transmission error
41	Access barred
42	Changed number
43	Not obtainable
44	Out of order
45	Controlled not ready
46	Uncontrolled not ready
47	DCE power off
48	Invalid facility request
49	Network fault in local loop
51	Call information service
52	Incompatible user class of service
61	Network congestion
71	Long-term network congestion
72	Network out of order
81	Registration/cancellation confirmed
82	Redirection activated
83	Redirection de-activated

Sample error printout:

```
BCC CHECK
****ERROR****
XX IS 02 YY IS 07
CURRENT YY IS 04
```

(See the preceding error statistics table.)

Data compare error

```
Data transmitted was
F3C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6
D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4
F5F6F7F8F9
```

```
Data received was
F3C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6
D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5
F6F7F8FD
```

Notes:

1. All preceding error outputs make reference to the last transmit and receive operations performed.
2. If the error message fills the screen, press the Enter key to view the remainder of the message.

BCC Check indicates possible line hit. Data Compare Error indicates data received was not as expected. Then the data from the last transmit and receive instruction is printed.

Because message 02 should be 36 characters (A-Z, 0-9 starting with C byte), the last data byte F9 was probably changed to FD by noise on line (line hit).

Error Messages for Online Test

TIMEOUT CHECK	Time-out occurred.
BCC CHECK	BCC check.
INVALID FRAME	Flag detected off boundary or not valid characters.
ADAPTER CHECK ON RECEIVE	SDLC hardware error.
ADAPTER CHECK ON TRANSMIT	SDLC hardware error.
ABORTIVE DISCONNECT CHECK	Data Set Ready was made not active.
NO DATA SET READY	Data Set Ready is not on or the transmit clock failed to function in transmit mode.
NO UDT EXISTS CONFIGURE THE SYSTEM	Data communications is not in the UDT configuration.
NO RESPONSE AFTER 90 SECS	No response received after 90 seconds.
XX OR YY INVALID	XX or YY values entered from keyboard are not correct.
DATA COMPARE ERROR	Expected data messages did not compare with data received.

SDLC Control Characters

Format	Control Field Bit Configuration							Command/Response Description				
	0	1	2	3	4	5	6		7			
I	Nr		P/F	Ns				0	Sequenced Information Frame			
S	Nr		P/F		0	0	0	1	Receive Ready			
	Nr		P/F		0	1	0	1	Receive Not Ready			
NS		0	1	0	P		0	0	1	1	Disconnect	
			0	1	0	F		0	0	1	1	Request Disconnect
			0	1	1	F		0	0	1	1	Unnumbered Acknowledge
			1	0	0	P		0	0	1	1	Set Normal Response Mode
			1	1	1	P/F		0	0	1	1	Test
			1	0	0	F		0	1	1	1	Frame Reject
			1	0	1	P/F		1	1	1	1	Exchange Identification
		0	0	0	F		1	1	1	1	Disconnected Mode	

Notes:

1. I = Information, S = Supervisor control function, and NS = Nonsequenced.
2. Nr is the sequence number of the next expected frame. Ns is the sequence number of the last frame that was sent.
3. P/F is either the poll bit from the primary station, or the last bit from the secondary station.
4. If errors occur on receive operations, the control field byte may not be valid.

99-075 BSCA Online Test

Operating Procedures for BSCA Online Requester

This test is sometimes known as link requester or over-the-line test.

Step 1. Configuration of the communications feature must have been done earlier.

Step 2. If the customer is not using the System/34, set the CSIPL and MSIPL switches to Disk, press the Load key, and then go to step 3. If the customer is using the System/34 (but not data communications on the desired line), go to step 3.

Step 3. Enter the following on the command screen:

Type BSCATST and press the Enter key.

Step 4. Insert DIAGB5 diskette (first or second communications adapter) or DIAGB5ML diskette (MLCA) and press the Enter key.

Set the Comm Dply switch (on CE panel) to the On position. If two communications lines are installed, set the Comm 1/Comm 2 switch (on CE panel) to the position of the communications line you are testing. If MLCA is installed, set the Comm Select switch (on CE panel) to the line you are testing.

For the MLCA, select the option from the display screen for the correct line number. For a description of any options selected in the following steps, see *BSCA Online Test Options* later in this section.

Step 5. If you want to terminate the test now, type 4 (first or second communications adapter) or type 3 (MLCA) and press the Enter key. If you want to terminate the test later, press the Attn key and select option 2.

Note: If you want to terminate the BSCA online test, do so only when this option menu is displayed, when the test (specified by message number XX) has completed, or when an error is displayed. Any attempt to terminate the test at any other time could result in a system hang condition.

When on a switched network, using the ATTN key and option 2 to stop the program (instead of the program's normal termination option) may not disconnect the telephone line. Reload the online test and select the normal termination option to disconnect the telephone line.

If *Printer Spool Function* is active when you press the Print key on the keyboard, the display is written to the *Printer Spool File*.

Step 6. At this time, you may select test options if desired or needed. The following conditions need an option to be selected:

- The system is a multipoint tributary (an address must be entered).
- An ID (verified identification) is needed.
- A configuration change is needed for this test. For the first or second communications adapter, select option 4; or for MLCA, select the option from the display screen.

(See *BSC Online Test Options* later in this section for more details.)

Step 7. The other station should be ready with the same or similar BSCA online responder loaded.

Select 1 - *Requester Routine* and press the Enter key.

Note: For 1200 integrated modems on World Trade switched networks, dial the telephone number as indicated in step 8 at this time. Do not hang up until after step 7 is completed.

Select a line code EBCDIC or ASCII. (Default is EBCDIC.)

Step 8. Determine message type number wanted (see Table 6 in 99-077).

Enter 2-digit message type number and 2-digit repeat number. (These numbers are decimal.) For all leased modems and 1200 integrated modems on World Trade switched networks, press the Enter key and go to step 9. Do not press the Enter key if this is a switched network. Press the Enter key if this is a nonswitched or multipoint network.

If the BSCA is point-to-point switched, the telephone number must be dialed. Put the telephone in talk mode and dial the other system. If the other system has autoanswer, you should hear a high frequency tone for 3 seconds. After the tone ends or after the person on the other end goes to data mode, put your telephone in data mode and/or put the handset on the cradle (on the hook). Press the Enter key. The Data Set Ready indicator should appear a few seconds after going to data mode.

Step 9. For point-to-point switched networks, and for multipoint networks the test should start.

Note: Some error outputs may occur on switched networks before the link is connected (time-outs or data set not ready).

On a switched network, if there is a delay before the link is connected, the program may recognize the link as not being connected, and try more times than its retry count. The program then will terminate and post errors. In this case, enter again the XX and YY numbers and press the Enter key when the link is connected.

Step 10. While the requester routine is being executed, the CE panel indicator lights Transmit Space and Receive Space should pulse (flash on and off). Also, interrupt level 2 light should pulse.

The only expected output during the running of the requester routine follows:

A. Output of the XX and YY values selected:

XX is _____ YY is _____

(This is displayed immediately after entry and before communication is started.)

B. Output after test is complete:

TEST COMPLETED

Any outputs other than the preceding are error messages or status messages.

Notes:

1. See *How to Interpret BSCA Online Test Error Messages* for a description of the messages.
2. See *How to Interpret Status Messages for MLCA with the X.21 Line Adapter* later in this section for a description of the status messages.

Step 11. When TEST COMPLETED occurs, the test is complete and the program is ready for another message type to be selected or the program to be terminated.

If you want the BSCA online test to be terminated, type END and press the Enter key. This returns to the BSCA Online Test menu. Select the terminate option to terminate the test and return to SSP (see step 5 for test termination).

Operating Procedures for Online Responder

This test is sometimes known as *link responder* or *over-the-line responder* test.

Steps 1-6. These steps are the same as BSCA online requester (see *Operating Procedures for BSCA Online Requester*).

Step 7. Select 2 - *Responder Routine*, and press the Enter key. Select a line code EBCDIC or ASCII.

Step 8. The other station should now start the online requester test (if switched, the other station dials and starts the test). The test should start at this time (the BSCA CE panel indicators Transmit Space and Receive Space should flash repeatedly if the test is running correctly). (The interrupt level 2 light will also flash.)

Step 9. The only output (except errors) during the running of the responder routine follows:

A. XX is _____ YY is _____

This is an output of the message type and number of times repeated as sent by other station. This is after the test is complete.

B. A TEST COMPLETED output indicates test is complete.

Step 10. When TEST COMPLETED is reached, the responder program goes back to a receive instruction and waits for the next test request by the other system. If no more tests are requested by the other system, no ENQ during receive and no data received messages will print.

Note: On switched lines, when the operation is completed ensure that the telephone line is disconnected (to terminate the call).

If you want the BSCA program to be terminated (return SSP), press the Attn key and select option 2 or option 3. This procedure terminates the test and also disconnects the line if switched network. This procedure is needed on a switched line before another connection can be made.

BSCA Online Test Options

1. Scan or Alter BSCA Configuration (option 1 for first or second communication adapter) (option 4 for MLCA).

Selecting this option lets you check the present configuration of the BSCA. You can change the configuration data (in storage) at the same time. However, if you alter the configuration data, this changes the preceding BSCA configuration only for the time of this program. If the program is loaded again, the configuration changes back to the original configuration. This changing of the configuration data does not affect any other program.

World Trade? Y or N

Line Configuration?

This line configuration display determines the basic type of communications network for the system.

1—MULTIPOINT TRIBUTARY

2—POINT-TO-POINT NONSWITCHED

3—SWITCHED LINE

The configuration should not normally be changed unless an alternate modem is available, or to permit testing of a nonswitched line on an SNBU (switched network backup) configuration.

Switched Network Backup? (SNBU)

Switched network backup (SNBU) makes reference to a switched line that can be used when the nonswitched line has a failure, and if a SNBU modem is installed or available. Selection of this option selects the SNBU line instead of the nonswitched line (the standby line). For the MLCA, the SNBU feature can be selected only if you have an external modem that has the SNBU feature installed.

Line Speed?

1—Half

2—Full

You can select either of two transmission rates. If the 2400-bps integrated modem is installed (2-line communications only), either 2400- or 1200-bps transmission rate can be selected by the entry above. Similarly, if the 1200-bps integrated modem is installed, either 1200- or 600-bps transmission rate can be selected. Also, if the 4800-bps integrated modem is installed (MLCA only), either 4800- or 2400-bps transmission rate can be selected. This entry determines the bps rate for the link test. If the modem does not have the half-speed function, it must specify full rate.

Communication Line?

This display determines the network that is selected to be tested on the local station.

Answer Tone?

(World Trade switched line option.) This display makes reference to these switched lines that need an answer tone generated by the adapter.

Clocking?

1—Internal

2—Modem

This display requests the type of clock function used by the modem. The internal clock feature is an oscillator card (A-A2Q2 for first or second communications adapter or A-B3U2 for MLCA) that supplies clock function pulses for modems that need business machine clocking. This card must be installed for internal clock selection. It is important that this display question be answered correctly for proper operation.

2. ID or Multipoint Address Entry (option 2 for first or second communications adapter; option 5 for MLCA).

Selecting this option allows entry of an ID (if required) or up to 15 bytes. Or if the system is a multipoint tributary station, 2 bytes of address must be entered. (Both entries are hexadecimal.) The BSCA configuration determines if the data entered is either an ID or an address.

Note: If you are going to use this procedure to run with a system that needs an ID, use the following ID sequence:

For EBCDIC, enter: 61F(N)F(N)F(N)61(SS)(SS)(SS)
61F(X)F(X)F(X)F(X) (no spaces)

For ASCII, enter: 2F3(N)3(N)3(N)2F(SS)(SS)(SS)
2F3(X)3(X)3(X)3(X) (no spaces)

(N)(N)(N) = Your branch office number in hexadecimal.

(SS)(SS)(SS) = Security code in hexadecimal.

(X)(X)(X)(X) = The machine type (5340) in hexadecimal.

Note: To translate the security code characters to hexadecimal, use an ASCII or EBCDIC conversion chart. These charts can be found in Appendix F of the *IBM System/34 Functions Reference*, SA21-9243, or Appendix J of the *IBM System/34 System Data Areas and Diagnostic Aids Manual*, LY21-0049.

3. Message 00 or 01 Data Entry (option 3 for first or second communications adapter) (option 6 for MLCA).

This special type of message permits you to enter any data as a test message.

The message can be up to 15 bytes long and must include the frame control characters (STX, ETX, or DLE STX, DLE ETX).

If you do not enter any data for message 00 or 01, it will default to STX X'40' ETX for both messages.

The transmission sequence for message type 00 and 01 are shown in tables 1, 2, and 3.

4. Additional Options:

First or Second Communications Adapter (option 4)?

Select 1 - *Enable Printing* will enable any error data outputs during the BSCA Online test. Outputs indicate error conditions. If printed output is not enabled, error headings and error data are displayed. This option is used by both requester and responder routines.

Select 2 - *Loop On First Message Selected* is used only by the requester routine. If this option is selected, the first message type (XX value) and the repeat count (YY value) selected by you are automatically used for the next test as soon as the preceding sequence has completed.

With this option, you can set the BSCA to run repeatedly without any interrupts.

Select 3 - Same as selecting both 1 and 2.

MLCA?

- Option 1 Requester routine
- Option 2 Responder routine
- Option 3 Terminate test
- Option 7 Enable printing (for a description, see Select 1)

- Option 8 Loop on first message selected (for a description, see Select 2)
- Option 9 Enable print and loop on message (same as selecting both options 7 and 8)

Note: Options are reset by loading the online test again.

How to Interpret BSCA Online Test Error Messages

A list of error messages is under *Error Messages for BSCA Online Test*. To determine the problem, compare the output to the line control tables 1 through 5 of the message type selected.

Example 1

Sample error output:

```
XX IS 01 YY IS 10
**** ERROR ****
CURRENT YY IS 10
SENT RFT EXP ACK1
```

Looking at the line control (Table 2) for message 01 point-to-point and the output that no ACK1 was received after sending our RFT (request-for-test) message (SOH% etc) indicates communication took place (we sent ENQ and received an acknowledgment of ACK0 from the other station) but then a failure occurred. Current YY is ____ means the present condition of the YY counter (its value is decreased after each receive operation).

Example 2

Sample error output:

```
XX IS 14 YY IS 07
CRC/LRC/VRC CHECK
**** ERROR ****
XX IS 14 YY IS 07
CURRENT YY IS 04
DATA COMPARE ERROR
DATA TRANSMITTED WAS
1061
DATA RECEIVED WAS
02C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6
D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4
F5F6F7F8FD03
```

Note: All preceding error output makes reference to the last transmit and receive operation performed.

The output CRC/LRC/VRC CHECK indicates possible line hit. DATA COMPARE ERROR indicates data received was not as expected. Then the data from the last transmit and receive instruction is printed. Data transmitted is 1061 (ACK1) which is a positive response to the last block of received data. Since message 14 should be 36 characters (A-Z, 0-9 framed by STX and ETX), the last data byte F9 was probably changed to FD by noise on the line (line hit).

Error Messages for BSCA Online Test

Messages for both requester and responder routines

3 SECOND TIMEOUT CHECK3.25 sec timeout occurred.
CRC/LRC/VRC CHECKBCC check.
INVALID ASCII CHECKCharacter received or transmitted was not 00-7F.
ABORTIVE DISCONNECT CHECKData set ready was dropped.
DATA SET READY IS OFFData set ready not on or the transmit clock failed to function
when in transmit mode.
OVERRUNHardware error.

Messages for requester routine

WRONG POLL SEQEither poll address or ENQ was not present during multipoint
receive initial.
XX OR YY INVALIDXX or YY values entered are not applicable.
DATA COMPARE ERRORExpected data messages did not compare with actual received.
SENT RFT EXP ACK1Sent RFT messages (SOH% etc) but ACK1 was not replied.
SENT 10 RFTS RCVD 10 NAKS10 RFT messages were sent but NAK was received each time.
WRONG SELECTION SEQ.Either selection address or ENQ was not present (multipoint selection).
SENT ENQ NO ACK0No ACK0 reply was received after ENQ was sent.
RCVD NAK EXPTD ACK0/1Sent message and received NAK.
EXP ACK0/1Sent message but received invalid response.
GOT EOT BUT YY NOT YET 0Receive EOT but message count is not yet zero.
NO EOT RCVD BUT YY IS 0Message count is zero but no EOT was received.
SENT EOT EXP ENQSent EOT but no ENQ was sent to start line bid.

Messages for responder routine

YY IS ZERO BUT NO EOT RECEIVEDMessage count is zero but no EOT was received.
INVALID XX VALUEThe message number obtained from the RFT message was invalid.
INVALID YY VALUEThe message count obtained from the RFT message was invalid.
SENT ACK1 RECEIVED NO EOTAfter sending ACK1 in reply to RFT no EOT was received.
SENT MESSAGE RECEIVED NAKA NAK was received after transmitting message.
SENT ENQ RECEIVED NO ACK0After receiving RFT and EOT sent EOT but no ACK0 was received.
DATA COMPARE ERRORExpected data message did not compare with actual received.
WRONG SELECTION SEQUENCEEither selection address or ENQ was not present (multipoint selection).
NO ENQ DURING RECEIVEDuring first receive operation no ENQ was received.
NO RESPONSE AFTER SENDING ACK0After replying ACK0 to initial ENQ nothing was received.
INVALID RFT RECEIVEDThe request for test message received contained invalid format.
SENT MESSAGE EXP ACK0/1After sending message an invalid response was detected.
25 WACKS RECEIVEDA delay at the other station has caused WACKS to be sent.
NO EOT AFTER RFTAn EOT was expected after the other station sent RFT.
INVALID DATA RECEIVEDNo valid ENQ character was detected after receiving data.
EXP ENQ NOT RECD AFTER DELAYExpected ENQ not received after 33 seconds.
TERMINATED AFTER 3 TIMEOUTSENQ received, but nothing followed it within 3 timeouts.
NO DATA RECEIVEDData was expected on the line, but none came within timeout.
NO DATA TRANSMITTEDExpected to send data, but none was sent.

The following describes the call progress signal:

XX	
Value	Description
01	Terminal called
02	Redirected call
03	Connect when ready
20	No connection
21	Number busy
22	Selection signal procedure error
23	Selection signal transmission error
41	Access barred
42	Changed number
43	Not obtainable
44	Out of order
45	Controlled not ready
46	Uncontrolled not ready
47	DCE power off
48	Invalid facility request
49	Network fault in local loop
51	Call information service
52	Incompatible user class of service
61	Network congestion
71	Long-term network congestion
72	Network out of order
81	Registration/cancellation confirmed
82	Redirection activated
83	Redirection de-activated

99-076 MLCA Concurrent Wrap Test and Trace Dump Driver Program (COMMTST)

Function: Permits the running of three programs under option control:

Option	Description
1.	Line wrap test
2.	Controller wrap test
3.	Print CE trace
4.	Print automatic trace
5.	End test

See selected program descriptions for more details.

Location of Program: DIAGB5ML

Name of Program: COMMTST

Type of Program: Written in main storage code and operates under SSP. Program runs concurrently with other system operations. For restrictions, see selected options.

Line Wrap Test (COMMTST Option 1, MLCA Only)

CAUTION

If this line is DDSA and a tributary on a multipoint line, running this test can cause up to one second of errors on the network.

This wrap test (\$MLWR) tests the communications adapter card, the line adapter card (if DDSA), and the IBM connected modem. This test indicates either failure of hardware or no failure found, but the test is not as complete as the MDI test.

When this test is selected, a part of the wrap test code moves the receive/transmit data traces and command queue traces (stored in the controller) for all four communications lines, from the MLCA controller to a disk storage area. These traces can be read from disk and displayed by using COMMTST option 3 or 4 (MLCA trace dump program).

This test is automatically selected by BSC and SDLC programs when a communications line has a permanent error. In this case, the traces are moved to disk area \$MLTA and are displayed by using COMMTST option 4.

This test can also be selected by you in a concurrent mode through the use of COMMTST. The test can be run only on a line that is not in use. It runs concurrently with other system operations and while other communications lines are in use. It is to be used when the system is not available for dedicated maintenance, or when some testing is wanted before the complete system is taken down.

To start the test, enter COMMTST when the SSP command display appears, and insert diskette DIAGB5ML. Select option 1. Traces that are stored in the controller storage are moved to disk storage area \$MLTC and can be read from disk and displayed by using COMMTST option 3.

This program can be used when troubleshooting a suspected microcode problem, a lost frame problem, or a wrong command problem. First, run the failing program or exerciser on a communications line; then, select this test to run on a not used line. The receive/transmit data traces and command queue traces for all four lines can then be displayed by using COMMTST option 3.

Note: In Japan, set the Modem Cable switch to the Test position before running the line wrap test. Set the Modem Cable switch to the operate position when the line wrap test is complete.

Controller Wrap Test (COMMTST Option 2)

This program (\$MLXX) tests the MLCA controller and controller storage. This test indicates either failure of hardware or no failure found, but the test is not as complete as the MDI test.

When this test is selected, a part of the code moves the transferred data traces, command queue traces, and the MLCA controller check status, for all four communications lines, from the MLCA controller to a disk storage area. The controller check status is also moved to this disk area. These traces and status bytes can be read from disk and displayed by using COMMTST option 3 or 4 (MLCA trace dump program).

This test is selected automatically when an MLCA controller check is sensed. The traces are then moved to disk area \$MLTA and are displayed by using COMMTST option 4.

This test can also be selected by you in a concurrent mode through the use of COMMTST. The test can be used only if no communications lines are in use or enabled. The test runs concurrently with other system operations; use it when the system is not available for dedicated maintenance or when some testing is wanted before the complete system is taken down.

To start the test, enter COMMTST when the SSP command display appears and insert diskette DIAGB5ML. Select option 2. Traces generated during the test are moved to disk storage area \$MLTC and can be read from disk and displayed by using COMMTST option 3.

Note: When this test is selected by you, the error transient will automatically post a system message that an MLCA controller check has occurred. Ignore this message.

Print CE Trace or Print Automatic Trace (COMMTST Options 3 and 4)

This program reads from disk and prints stored MLCA receive/transmit data traces, command queue traces, and MLCA controller check status.

Note: For a description of trace dump data areas, see the *Data Areas and Diagnostic Aids Manual*, LY21-0049.

During normal operation, microcode stores the following information for each communication line:

- For BSC, the first 3 bytes and the last byte of the latest 101 transmit and/or receive messages
- For SDLC, the first 12 bytes of the latest 39 transmit and/or receive messages
- Status byte of the IOB if there is an error. If there is no error, hexadecimal FF is stored for a transmitted message and hexadecimal 00 is stored for a received message

When an MLCA controller check occurs, microcode also stores controller check status.

Option 3 reads data from disk area \$MLTC. The traces were written to storage by the data communications line wrap test (COMMTST option 1), or the MLCA controller wrap test (COMMTST option 1 or 2).

Option 4 reads data from disk area \$MLTA. These traces were written when a communications line had a permanent error and the line wrap test was run automatically, or when an MLCA controller error was sensed and a good controller wrap test was run automatically (no check condition prevented traces from being moved to disk storage).

Note: For option 4, the date the traces were moved to storage compares to the last entry in the line or controller ERAP table.

99-077 BSCA Online Test Messages and Control Characters

Table 1. Online test transmission sequence for message type XX = 00 point-to-point

Requester	Responder
ENQ	
SOH	ACK0
% 0 YY 0	
STX	
ETX	ACK1
(DLE)	
STX	
TEXT	
(DLE)	
ETX	ACK0/1 (See Note 1.)
TEXT and CONTROL CHARACTERS REPEATED YY-1 TIMES	ACK0/1 REPEATED YY-1 TIMES (See Note 1.)
EOT	

Notes:

1. System/34 sends only even acknowledgments (ACK0) when receiving data, but will receive either even acknowledgments or odd acknowledgments (ACK0 or ACK1) to data it sends.
2. System/34 can only be a requester on a multipoint network.

Table 1A. Online test transmission sequence for message type XX = 00 multipoint (See Note 2.)

Requester	Responder
	EOT
	POLL
	ENQ
SOH	
% 00 YY 0	
STX	
ETX	
	ACK1
(DLE)	
STX	
TEXT	
(DLE)	
ETX	
	ACK0/1 (See Note 1.)
TEXT and CONTROL CHARACTERS REPEATED YY-1 TIMES	
	ACK0/1 REPEATED YY-1 TIMES (See Note 1.)
EOT	

Table 2. Online test transmission sequence for message type XX = 01 point-to-point

Requester	Responder
ENQ	
	ACK0
SOH	
% 1 YY 0	
(DLE)	
STX	
TEXT	
(DLE)	
ETX	
	ACK1
EOT	
	ENQ
ACK0	
	(DLE)
	STX
	TEXT
	(DLE)
	ETX
ACK0/1 (See Note 1.)	TEXT and CONTROL CHARACTERS REPEATED YY-1 TIMES
ACK0/1 REPEATED YY-1 TIMES (See Note 1.)	EOT

If the system is the requester, the message (text) must have been put in storage earlier.

Notes:

1. System/34 sends only even acknowledgments (ACK0) when receiving data, but will receive either even acknowledgments or odd acknowledgments (ACK0 or ACK1) to data it sends.
2. System/34 can only be a requester on a multipoint network.
3. System/34 in responder mode for message 01 can receive messages of 296 bytes, but can transmit messages of only 285 bytes.

Table 3. Online test transmission sequence for message type XX = 01 multipoint (See Note 2.)

Requester	Responder
	EOT POLL
	ENQ
SOH	
% 1 YY N	
ADDR	
(DLE)	
STX	
TEXT	
(DLE)	
ETX	
EOT	ACK1
	EOT
	ADDRESS
	ENQ
ACK0	(DLE)
	STX
	TEXT
	(DLE)
	ETX
ACK0/1 (See Note 1.)	TEXT AND CONTROL CHARACTERS REPEATED YY-1 TIMES
ACK0/1 REPEATED YY-1 TIMES	EOT

If the system is the requester, the message (text) must have been put in storage earlier.

Table 4. Online test transmission sequence for message type XX = 02-19 point-to-point

Requester	Responder
ENQ	
	ACK0
SOH	
% XX YY NN	
STX	
ETX	
	ACK1
EOT	ENQ
ACK0	STX
	TEXT
	ETX
	REPEATED YY TIMES
ACK0/1 REPEATED YY TIMES (See Note 1.)	EOT

Text is specified by XX.
(See Table 6.)

Notes:

1. System/34 sends only even acknowledgments (ACK0) when receiving data, but will receive either even acknowledgments or odd acknowledgments (ACK0 or ACK1) to data it sends.
2. System/34 can only be a requester on a multipoint network.

Table 5. Online test transmission sequence for message type XX = 02-19 multipoint (See Note 2.)

Requester	Responder
	EOT
	POLL
	ENQ
SOH	
% XX YY N	
ADDR	
STX	
ETX	
EOT	ACK1
	EOT
	ADDRESS
	ENQ
ACK0	(DLE)
	STX
	TEXT
	(DLE)
	ETX
	REPEATED
	YY TIMES
ACK0/1	
REPEATED	
YY TIMES	
(See Note 1.)	EOT

Text is specified by XX.
(See Table 6.)

Table 6. Message Numbers for BSCA Online Test.

Code Type or Feature	Transparency Mode	Applicable Messages
<i>Requester Routine</i>		
Multipoint	YES or NO	00, 01, 02, 04, 14, 15, 16, 19
EBCDIC	YES	00, 01, 02, 04, 14, 15, 16, 19
EBCDIC	NO	00, 01, 04, 14, 15, 16
ASCII	NO	00, 01, 05, 06
<i>Responder Routine</i>		
Multipoint		No applicable messages
EBCDIC	YES	00, 01, 02, 04, 14, 15, 16, 19, 20, 21 & 22
EBCDIC	NO	00, 01, 04, 14, 15, 16
ASCII	NO	00, 01, 05, 06
XX Value (message number)	Content of Message	
00	Requester sends message from storage (you must put message in storage)	
01	Requester receives message from storage (you must put message in storage)	
02	256 EBCDIC characters (transparent)	
04	245 EBCDIC characters (all EBCDIC except DLC)	
05	117 ASCII characters (all ASCII except DLC)	
06	36 ASCII characters: A-Z, 0-9	
14	36 EBCDIC characters: A-Z, 0-9	
15	80 EBCDIC characters: 74 X'00' and 6 SYNS	
16	80 EBCDIC characters: 40 AA and 40 X'55'	
19	290 EBCDIC characters: 280 X'00' and 10 SYNS (transparent)	
20	80 EBCDIC characters: A-Z, 0-9 and 00 through 3F (transparent)	
21	120 EBCDIC characters: A-Z, 0-9, and 00 through 53 (transparent)	
22	144 EBCDIC characters: A-Z, 0-9, and 00 through 6B (transparent)	

Table 7. Communications Control Characters

Name of Function	Functional Mnemonic	EBCDIC Code	ASCII Code
Start of heading.	SOH	01	01
Start of text.	STX	02	02
End of transmission block.	ETB	26	17
End of text.	ETX	03	03
End of transmission.	EOT	37 pad (see note)	04 pad (see note)
Attn.	ENQ	2D	05
Negative acknowledge.	NAK	3D pad (see note)	15 pad (see note)
Synchronous idle.	SYN	32	16
Data link escape.	DLE	10	10
End of intermediate transmission block.	ITB	1F	1F
Even acknowledge.	ACK0	1070	1030
Odd acknowledge.	ACK1	1061	1031
Wait before transmit positive acknowledge.	WACK	106B	103B
Mandatory disconnect.	DISC	1037	1004
Reverse interrupt.	RVI	107C	103C
Temporary text delay.	TTD	022D	0205
Transparent start of text.	XSTX	1002	
Transparent intermediate block.	XITB	101F	
Transparent end of text.	XETX	1003	
Transparent end of transmission block.	XETB	1026	
Transparent synchronous idle.	XSYN	1032	
Transparent block cancel.	XENQ	102D	
Transparent TTD.	XTTD	1002102D	
Data DLE in transparent mode.	XDLE	1010	

Note: Pad is 4 low-order bits of 1's (more bits may optionally be on).

99-080 HOW TO RUN DEVICE EXERCISERS

This exerciser program does not include the option to exercise the work station controller, the 5251 and 5252 display stations, or the 5256 and 5225 printers. An online diagnostic is available to exercise these units under SSP control. See the *IBM 5251 Display Station Maintenance Information Manual*, SY31-0461-Online Diagnostics.

The device exercisers are selected from the diagnostic supervisor main option menu. The next display shows all devices that have exerciser programs. After selecting a device and inserting the correct diskette, the command menu for that device is displayed.

1. Select commands from the command menu to assemble a table of commands.
2. The program then displays the selected commands and requests if you want the data fields option menu. (This is used for moving data to and from disk or diskette and is not valid for other devices.)
3. The program requests if you want to set options (scope loops, delay between commands, loop on command table) along with executing the selected commands.
4. The program then executes the table of commands.

Note: The Attn key can be used to interrupt your table of commands and change options, data fields, or your sequence of tests.

99-085 HOW TO RUN THE MAIN STORAGE PROCESSOR EXERCISER

The MSP (main storage processor) exerciser is selected from the exerciser option menu. There are three programs or functions that can be performed.

1. *Sense/Load MSP Registers*—This program will sense and display the contents of all the registers in the MSP. Some of the registers can also be loaded with new data. This permits you to preset registers such as the IAR (instruction address register) or the index registers (XR1 and XR2) to new values.
2. *Sense/Load Address Translation Registers (ATRs)*—This program will sense and display the contents of all the ATRs. The contents of the task ATRs can also be changed.
3. *Enter Main Storage Processor Instructions*—With this program you can enter system instructions and any necessary data into main storage. The instructions are entered in machine language in hexadecimal (see *MSP Instruction Execution in the 5340 System Unit Theory Diagrams Manual*).

Ignore the following displays:

- A display that requests a need for preset data fields.
- A display that permits option selections (for example, halt on error, step mode, loop on command table).
- A display that inquires if you need a printed list of the commands. These displays are displayed by the exerciser supervisor program and are not valid for the MSP exerciser.

After you enter your last system instruction, the program will add an SVC (F4) instruction. The SVC is used to branch back to the op-code of your first instruction if you select *Loop Program and Sync Scope*, or to stop the MSP if you select *Run Program Once*.

The option *Set CP Interference* causes the control processor to frequently interrupt (or interfere with) your MSP program. This option is a good interrupt exerciser, but you would not want to select *Set CP Interference* if you want a tight scope loop.

Scope Loop Sync Point: If you select *Loop Program and Sync Scope*, you can sync your scope by using the following procedure:

1. Set the Address/Data switches to 0050.
2. Set the Stor Sel switch to Ctl.
3. Set the Add Comp switch to Run.
4. Attach the scope sync lead to A1K2D12.
5. The 'Address Compare Sync' line will trigger your scope sweep just before the fetch cycle of the first system instruction.

99-090 FREE-LANCING WITH MDIs—SYSTEM INSTRUCTION STEP AND MDI SPECIAL

There are two ways to free-lance with the MDI tests:

- System instruction step.
- MDI special.

System Instruction Step:

1. Set the CSIPL and MSIPL switches to Diskette (or to Disk when free-lancing with diskette MDIs), insert DIAGB1, and press the Load key.
2. When the main menu is displayed, set the Mode Selector switch to Sys Insn Step.
3. Press the CE Start key (starts the control processor clock).
4. Select MDI option.
5. Select a device to test.
6. Insert the correct diskette.
7. Observe the next menu (a description of all MDI tests for the device).
8. Select the MDI to run.

9. The next menu requests the starting step number. Select the step. (Step 1 is recommended.)
10. MDI starts executing when you press the Enter key.

Note: With the Mode Selector switch in Sys Insn Step, the MDI executes in step mode. With the Mode Selector switch in Proc Run, the MDI executes with no stops. You can change the mode of executing the MDI test at any time by changing the Mode Selector switch.

MDI special:

CAUTION

If a not valid step number or no step number is entered, a system processor check may occur.

-
-
-
1. Before using this option, do the following:
 - a. Figure out the MDI path to test using the preceding free-lance method.
 - b. Record the MDI ID (IDID) and step numbers (NNN) for use in step 4.

2. Select MDI special from main menu.
3. Select a device to test.
4. Enter 4-digit MDI ID (IDID) and step numbers (NNN) to start and end executing the MDI test.
5. Select L or S option.

L = Loop on selected MDI path
 S = Execute path once and return to MDI special menu.

If you do not select either L or S, the default is to loop.

Note: The L/S (loop/stop) option is valid only when the executed MDI reaches ending MAP/Step ID.

6. Select Y or N option.

Y = Stop on yes answer
 N = Stop on no answer
 X = Do not check answer

For intermittent failures, you can use the MDI special program to loop on the *Good Machine Path* until a failure occurs.

1. Select MDI special from the main menu.
2. Select the failing device.
3. Enter the *Good Machine Path* starting and ending MAP ID (IDID) and step numbers (NNN) (see note).
4. Select the loop option.
5. Select stop on a no answer.

When a failure occurs, the system stops and displays the failing MAP ID, step numbers, and the TU ID of the TU test that sensed the error.

Choose the TU Select option from the main menu to loop on the TU test until another failure occurs. Use the result bytes from the TU test to aid in specifying the cause of the failure.

Note: How to determine the starting and ending MAP and step numbers in a *Good Machine Path*:

Good Machine Path starting MAP and step numbers:

- 1-Select MDIs from the main menu.
- 2-Select a device, insert the correct diskette, and press the Enter key.
- 3-The first display shows you the starting MAP and step numbers for the good machine path. For example, the starting MAP and step numbers for the 62EH disk are 0901 001.

Good Machine Path ending MAP and step numbers:

- 1-Select MDI Special from the main menu.
- 2-Enter the starting MAP and step, no ending MAP or step, X, and stop on a no answer.
- 3-When you press the Enter key, the *Good Machine Path* will be followed until the MDI test is normally completed.
- 4-The system stops with the ending MAP and step numbers displayed. For example, the ending numbers for the 62EH disk are 0902 059.

Because the starting and ending steps contain programmed halts that need your input, you can bypass those halts by entering 0901 003 and 0902 057 as starting and ending MAP and step numbers. This will let the system run the MAPs continuously until a failure occurs.

99-095 FREE-LANCING THE MAIN STORAGE PROCESSOR USING THE MSP MINI-MDI

The MSP mini-MDI tests the MSP hardware used to access main storage. It does this in three basic steps. The first step ensures a correct data path to and from main storage. The second step tests main storage to ensure that there are no out-of-parity bytes and that storage addressing is working correctly. The third step loads a system instruction into main storage and causes the MSP to execute this instruction. The various MSP registers and main storage are checked to verify the instruction executed correctly.

The MSP mini-MDI has three options that can be used for free-lance:

1. Run all tests again without having to load the MSP mini-MDIs again.
2. Step through the tests one test at a time.
3. Loop on one specific test.

To load the MSP mini-MDI:

1. Insert the DIAG B1 diskette.
2. Set the CSIPL and MSIPL switches to the Diskette position.
3. Set the Address/Data switches to EE00.
4. Press the Load key.

When the MSP mini-MDI is normally terminated, the display directs you to MAP 0190, Entry Point B.

To run the tests again without loading the MSP mini-MDI again, press the Enter key on the system console.

To step through the test, set the Address/Data switches to EE00 and press the Reset key and CE Start switch on the CE panel after the MSP mini-MDI has been loaded. Each time the Enter key on the system console is pressed, the next test name to be executed is displayed. When the Enter key is pressed again, the test will run and the received results are displayed. This continues until an error is detected or until all tests have been run.

To loop on one specific test, press the Reset key on the CE panel, set the Address/Data switches to EE00 and press the CE Start key. The MSP mini-MDI will loop on the test indicated by XX. (XX is the rightmost two digits of the test name. See the following list for a description of each test.) When the MSP mini-MDI is looping on a test, a control storage address compare stop can be done by changing the Address/Data switches to the address and putting the Add Comp switch in the Stop position. To stop looping and run the MAP again, press the CE Reset key, set the Address/Data switches to EEFF, and press the CE Start key.

XX Value	Description	XX Value	Description
01	Issue check reset and sense status byte 3.	26	Load and sense the address translation register (ATRs) with their addresses.
02	Sense CPU error byte.	27	Address translation register (ATR) ripple test.
03	Issue check reset, disable checks, and test MSAR low.	28	Load ACRE with X'AA' and sense the ACRE.
05	Load BMR with X'00' and sense the BMR.	29	Load and sense main store with X'FF'. Test run in translated mode.
06	Load BMR with X'55' and sense the BMR.	30	Load and sense main store with X'00'. Test run in translated mode.
07	Load BMR with X'AA' and sense the BMR.	31	Load and sense main store with X'01'. Test run in translated mode.
08	Load CMR with X'00' and sense the CMR.	32	Issue an MSP reset and sense the PSR.
09	Load CMR with X'55' and sense the CMR.	33	Load the MSP PSR with X'3C' and sense.
10	Load CMR with X'AA' and sense the CMR.	34	Sense the MSP Q register.
11	Load PMR with X'00' and sense the PMR.	35	Load and sense MSP OP 2 high byte with X'00'.
12	Load PMR with X'55' and sense the PMR.	36	Load and sense MSP OP 2 high byte with X'FF'.
13	Load PMR with X'AA' and sense the PMR.	38	Load and sense MSP PSR with X'00'.
14	Load CCR with X'00' and sense the CCR.	39	Initialize OP 1 high to X'AA', XR1 high to X'55' and sense OP 1 high.
15	Load CCR with X'55' and sense the CCR.	40	Initialize OP 1 high to X'AA', IAR high to X'55' and sense OP 1 high.
16	Load CCR with X'AA' and sense the CCR.	41	Initialize OP 1 high to X'AA', OP 2 high to X'55' and sense OP 1 high.
17	Load ACR(L) with X'00' and sense the ACR(L).	42	Load main store with X'FF' and sense. Test run in translated mode.
18	Load ACR(L) with X'55' and sense the ACR(L).	43	Load MSP PSR with X'01'. Check for SDR P-check.
19	Load ACR(L) with X'AA' and sense the ACR(L).		
20	Load ACR(H) with X'00' and sense the ACR(H).		
21	Load ACR(H) with X'55' and sense the ACR(H).		
22	Load ACR(H) with X'AA' and sense the ACR(H).		
23	Load ACRE with X'00' and sense the ACRE.		
24	Load ACRE with X'55' and sense the ACRE.		
25	Storage Control Card register single addressing test.		

XX Value	Description
45	Main store 1 address-1 byte test. This test is run in translated mode. Addressing is from highest to lowest.
46	Main store 1 address-1 byte test. This test is run in translated mode. Addressing is from lowest to highest.
47	Main store 1 address-1 byte test. This test is run in real mode. Addressing is from highest to lowest.
48	Main store 1 address-1 byte test. This test is run in real mode. Addressing is from lowest to highest.
49	BMR 16K-byte hardware switch test. This test is run in real mode.
50	BMR 16K-byte hardware switch test. This test is run in real mode.
51	BMR 16K-byte hardware switch test. This test is run in translated mode.
52	BMR 16K-byte hardware switch test. This test is run in translated mode.
53	Reserved.
54	Load BMR with X'03' ARR with X'AA'. Sense BMR and test for X'03'.
55	Sense MSP PSR.
56	Load and sense OP 2 low byte with X'00'.
57	Load and sense OP 2 low byte with X'FF'.
58	Initialize OP 2 low to X'55', OP 2 high to X'AA', and sense OP 1 low.
59	Load MSP PSR with X'FF' and sense.
60	Sense all MSP registers and ATRs.
61	Store bad parity into address X'00' of the MSP registers.

XX Value	Description
62	Reset the MSP and sense status byte 2.
63	Main storage not valid address check test. This test uses real addressing.
64	Main storage not valid address check test. This test uses translated addressing.
65	Load main storage address 0000 with X'80' and sense data.
66	Reserved.
68	ATR storage exception test.
69	Main storage data path flow test.
6A	Main storage data path flow test (extended).
70	ATR utilization test.
72	Main store 16K block address selection test. Lowest address to highest.
73	Main store 16K block address selection test. Highest address to lowest.
74	Issue MSP reset and sense status bytes 0 and 1.
75	Execute a not valid OP with the MSP and check results in status bytes 0 and 2.
76	Execute a not valid OP with the MSP and check results in status bytes 0 and 2.

XX Value	Description	XX Value	Description
77	Execute a not valid OP with the MSP and check results in status bytes 0 and 2 and checks the data in the LCRR.	90	Execute a Move Character instruction in the MSP and stop after EA time. The instruction is in indexed mode.
78	Execute a Move Character instruction in the MSP and stop after the OP byte has been executed.	92	Execute a Move Character instruction in the MSP. PMR is set to EB translated.
79	Execute a Move Character instruction in the MSP and stop after the 0 byte has been executed.	93	Execute a Move Character instruction in the MSP. PMR is set to EA translated.
80	Execute a Move Character instruction in the MSP and stop after the first byte of operand 1 has been executed.	94	Execute a Move Character instruction in the MSP. PMR is set to I translated.
81	Execute a Move Character instruction in the MSP and stop after the second byte of operand 1 has been executed.	95	Execute a Move Character instruction in the MSP. PMR is set to all translated mode.
82	Execute a Move Character instruction in the MSP and stop after the high byte of operand 2 has been executed.	96	Storage protection test.
83	Execute a Move Character instruction in the MSP and stop after the low byte of operand 2 has been executed.	97	Execute a Move Character instruction where operand 2 points to an address containing bad parity. MSP is in check mode.
84	Execute a Move Character instruction in the MSP and stop after the EA cycle has been executed.	98	Execute a Move Character instruction and access main store from CP while instruction is operating.
85	Execute a Move Character instruction in the MSP and stop when completed. The MVC results are then checked.	99	Execute a Move Character instruction where operand 2 points to an address containing bad parity. MSP not in check mode.
86	Execute a Move Character instruction in the MSP and stop after OP time. The instruction is in indexed mode.	A0	Load bad parity into an ATR and use this ATR while executing an MSP instruction.
88	Execute a Move Character instruction in the MSP and stop after 0 time. The instruction is in indexed mode.	A1	Load bad parity into the low byte of the IAR and execute an MSP instruction.
89	Execute a Move Character instruction in the MSP and stop after IX1 time. The instruction is in indexed mode.	A2	Load bad parity into the high byte of the IAR and execute an MSP instruction.
		A3	Execute an MSP instruction using ATRs 0 and 31.

99-999 TU TEST DESCRIPTIONS FOR THE WORK STATION ATTACHMENT

This section of the maintenance manual is a printout that describes all the TU tests for the work station attachment. The printout is supplied so you can use it with paragraph 99-064 *How to Run TU Select for the Work Station Attachment from the CE Panel.*

If a display station is not operational, it cannot display the available TU tests. For that reason, the test descriptions are in *hard copy.*

The printout has a short description of what each TU test does, and has the meanings of significant bits in the result bytes that are passed from the TU test to work registers 6 and 7. (See paragraph 99-062 for instructions on *How to Run Work Station Attachment MDIs from the CE Panel.*)

Test Number	Description
TC001	ADAPTER RESET
TC002	DIAGNOSTIC MODE ENABLE/DISABLE
TC003	DIAG SET CS XFER ERROR
TC004	U-INTERRUPT REQUEST ENABLE
TC005	SET SERVICE REQUEST
TC006	SET COMMAND PENDING
TC007	CONTROLLER LOAD SET/RESET
TC008	SINGLE CYCLE SET/RESET
TC009	CONTROLLER RESET SET/RESET
TC00A	JIO FUNCTIONS
TC00B	CONTROLLER DBO/DBI WRAP
TC00C	U-INTERRUPT REQUEST SET
TC00D	X-SAR BIT 2, CONTROLLER LOAD
TC00E	CONTROLLER BUSY
TC00F	CONTROLLER TO CHANNEL
TC010	CONTROLLER OP CHECK LATCH
TC011	CONT DBO/DBI PARITY LATCH
TC012	COMMAND PENDING SENSE TEST
TC013	SERVICE REQUIRED
TC014	CYCLE STEAL TRANSFER
TC020	CONTROLLER 4-BIT BUS
TC031	CONTROLLER DAR SELECT
TC032	CONTROLLER DAR DATA (5)
TC033	CONTROLLER DAR DATA (A)
TC034	CONTROLLER REG/AUX REGS SELECT
TC035	CONTROLLER REG SELECTION
TC036	CONTROLLER REG DATA (5)
TC037	CONTROLLER REG DATA (A)
TC038	CONTROLLER AUX REG SELECTION
TC039	CONTROLLER AUX REG DATA (5)
TC03A	CONTROLLER AUX REG DATA
TC03B	CONTROLLER ALU
TC03C	CONTROLLER ALU
TC03D	CONTROLLER ALU
TC03E	CONTROLLER ALU
TC03F	CONTROLLER ALU
TC040	CONTROLLER ALU TEST
TC041	CONTROLLER ALU TEST
TC042	CONTROLLER ALU TEST
TC043	CONTROLLER ALU TEST
TC044	CONTROLLER ALU TEST
TC045	CONTROLLER ALU TEST
TC046	CONTROLLER ALU TEST
TC047	CONTROLLER MEMORY ADDRESSING
TC048	CONTROLLER MEMORY TEST
TC04B	MEMORY TEST (000-255)

Test Number	Description
TC051	CONTROLLER BRANCH AND LINK TEST
TC052	CONTROLLER BRANCH AND LINK TEST
TC053	CONTROLLER BRANCH AND LINK TEST
TC054	CONTROLLER BRANCH AND LINK TEST
TC055	CONTROLLER LONG TIME-OUT TEST
TC056	CONTROLLER LONG TIME-OUT TEST
TC057	CONTROLLER LONG TIME-OUT TEST
TC058	CONTROLLER BRANCH VIA DAR TEST
TC059	CONTROLLER, AI, AND ACYR TEST
TC05A	CONTROLLER, SR, AND SCYR TEST
TC05B	CONTROLLER SRS, AND SIS TEST
TC05C	CONTROLLER AND CR TEST
TC05D	CONTROLLER NR TEST
TC05E	CONTROLLER NI TEST
TC05F	CONTROLLER AND NRH TEST
TC060	CONTROLLER NIH TEST
TC061	CONTROLLER, CR, AND NRS TEST
TC062	CONTROLLER, CR, AND NRS TEST
TC063	CONTROLLER, SR, AND NRHS TEST
TC064	CONTROLLER, CR, AND NIHS TEST
TC065	CONTROLLER OR TEST
TC066	CONTROLLER OI TEST
TC067	CONTROLLER ORH TEST
TC068	CONTROLLER OIH TEST
TC069	CONTROLLER XR TEST
TC06A	CONTROLLER XI TEST
TC06B	CONTROLLER XRH TEST
TC06C	CONTROLLER XIH TEST
TC06D	CONTROLLER CYCLE STEAL TEST
TC06E	CONTROLLER CYCLE STEAL TEST
TC06F	CONTROLLER CYCLE STEAL TEST
TC070	CONTROLLER CYCLE STEAL TEST
TC071	CONTROLLER CYCLE STEAL TEST
TC072	CONTROLLER CYCLE STEAL TEST
TC073	CONTROLLER CYCLE STEAL TEST
TC074	CONTROLLER CYCLE STEAL TEST
TC075	CONTROLLER CYCLE STEAL TEST
TC0A1	CONTROLLER P-CHK U-INT
TC0A2	SERDES SHIFT TEST
TC0A3	DRIVER/RECEIVER ACTIVITY CHECK
TC0A4	W/S CONSOLE POLL
TC0A5	W/S MDI VALID STOP DISPLAY
TC0C0	WORK STATION TRANSMIT
TC0C1	W/S NETWORK ANALYSIS PROGRAM
TC0W1	WORK STATION WRAP INITIALIZATION
TC0W2	LATOM MACRO SUBROUTINE

>>>>>>>>>> TC001
ADAPTER RESET TC001

THIS PROGRAM ISSUES ADAPTER RESET AND SENSES REGISTERS 1, 2 AND 3. THE PROGRAM COMPARES THE RESULTS WITH A STANDARD, LOGS ANY DEVIATIONS AND REPORTS THE ERROR.

RESULT BYTE 1
0-3 NOT USED
4 SENSE BYTE 1 IN ERROR
5 SENSE BYTE 2 IN ERROR
6 SENSE BYTE 3 IN ERROR
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 SENSE BYTE 1 RETURNS
ANY BIT ON INDICATES ERROR

RESULT BYTE 3
0-7 SENSE BYTE 2 RETURNS
ANY BIT ON INDICATES ERROR

RESULT BYTE 4
0-7 SENSE BYTE 3 RETURNS
ANY BIT ON INDICATES ERROR

>>>>>>>>>> TC002
DIAGNOSTIC MODE ENABLE/DISABLE TC002

PROGRAM SETS THE 'DIAGNOSTIC MODE' LATCH, AND RESETS THE LATCH, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 ENABLE DIAGNOSTIC MODE FAILED
5 DISABLE DIAGNOSTIC MODE FAILED
6 NOT USED
7 ADAPTER RESET FAILED (RESET DIAGNOSTIC MODE INDICATOR)

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC003
DIAG SET CS XFER ERROR TC003

PROGRAM SETS THE 'CS XFER ERROR' LATCH, AND RESETS THE LATCH, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 DIAG SET CS XFER FAILED
5-6 NOT USED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC004
U-INTERRUPT REQUEST ENABLE TC004

TESTS THE ABILITY OF THE PROCESSING UNIT TO ENABLE AND DISABLE THE 'U-INTERRUPT REQUEST' LATCH. THE PROGRAM SETS THE LATCH, RESETS, AND SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 ENABLE U-INT REQ FAILED
5 DISABLE U-INT REQ FAILED
6 HOT INTERRUPT SERVICED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC005
SET SERVICE REQUEST TC005

TESTS THE ABILITY OF THE PROCESSING UNIT TO SET AND RESET THE SERVICE REQUEST LATCH. THE PROGRAM SETS, RESETS, SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 SET SERVICE REQUEST FAILED
5-6 NOT USED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC006
SET COMMAND PENDING TC006

TESTS THE ABILITY OF THE PROCESSING UNIT TO SET AND RESET THE 'COMMAND PENDING' LATCH. THE PROGRAM SETS, RESETS, SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 SET COMMAND PENDING FAILED
5-6 NOT USED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>>> TC007
CONTROLLER LOAD SET/RESET TC007

TESTS THE ABILITY OF THE PROCESSING UNIT TO SET AND RESET THE 'CONTROLLER LOAD' LATCH. THE PROGRAM SETS, RESETS, SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 SET LOAD MODE FAILED
5 RESET LOAD MODE FAILED
6 NOT USED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>>> TC008
SINGLE CYCLE SET/RESET TC008

TESTS THE ABILITY OF THE PROCESSING UNIT TO SET AND RESET THE 'SINGLE CYCLE' LATCH. THE PROGRAM SETS, RESETS, SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 SET CONTROLLER SINGLE CYCLE FAILED
5 RESET CONTROLLER SINGLE CYCLE FAILED
6 NOT USED
7 ADAPTER RESET FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>>> TC009
CONTROLLER RESET SET/RESET TC009

TESTS THE ABILITY OF THE PROCESSING UNIT TO SET AND RESET THE 'CONTROLLER RESET' LATCH. THE PROGRAM SETS, RESETS, SETS, AND THE ADAPTER RESETS THE LATCH AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 SET CONTROLLER RESET FAILED
5 RESET CONTROLLER RESET FAILED
6 NOT USED
7 ADAPTER RESET FAILED TO SET BIT

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>>> TC00A
JIO FUNCTIONS TC00A

TESTS THE JIO FUNCTIONS AVAILABLE TO THE CPU. THE PROGRAM EXERCISES THE JIO'S AND COMPARES THE RESULTS WITH A STANDARD AND REPORTS THE RESULTS.

RESULT BYTE 1
0-3 NOT USED
4 'NOT ANY ERROR' JIO FAILED
5 'CONTROLLER ERROR' JIO FAILED
6 DIAGNOSTIC TRUE JIO FAILED
7 DIAGNOSTIC FALSE JIO FAILED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>>> TC00B
CONTROLLER DBO/DBI WRAP TC00B

THIS TEST PROGRAM SENDS 'AA', '55' AND 'FE' OUT THE DBO LINES AND COMPARES THE RETURN FROM THE DBI LINES. ANY MISCOMPARE IS FLAGGED AND THE BIT POSITIONS THAT DO NOT COMPARE ARE PLACED IN WR6 (H), THE DATA IN WR6 (L), AND THE ERROR DETECTED CODE IN WR7 (L).

RESULT BYTE 1
0-4 NOT USED.
5 BAD STATUS RETURNED ON IOS
6 BAD DATA RETURNED FROM LOOP
7 NOT USED.

RESULT BYTE 2
0-7 LINES FAILING

RESULT BYTE 3
0-7 NOT USED

RESULT BYTE 4
0-7 DATA SENT TO CONTROLLER

>>>>>>>>>>>>>>>> TC00C
U-INTERRUPT REQUEST SET TC00C

TESTS THE ABILITY OF THE PROCESSING UNIT TO CAUSE AN INTERRUPT TO LEVEL 4 AND RETURN TO LEVEL 0. THE PROGRAM SETS UP AN INTERRUPT ROUTINE, WHICH CAUSES THE INTERRUPT, TRACKS THE INTERRUPT THROUGH LEVEL 4 AND BACK TO LEVEL 0, AND REPORTS ANY DEVIATION.

RESULT BYTE 1
0-3 NOT USED
4 DIAG SET U-INT REQ FAILED
5 DIAG RESET U-INT REQ FAILED
6 LEVEL 4 INT NOT FROM WORK STATION
7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC00D
X-SAR BIT 2, CONTROLLER LOAD TC00D

THIS TEST LOADS A NO-OP TO THE CONTROLLER MEMORY, WHICH FILLS. WHEN IT REACHES THE MAXIMUM OF STORAGE CAPABILITIES, X-SAR BIT 2 COMES ON. THIS TESTS THE ABILITY OF CONTROLLER MEMORY TO BE ADDRESSED TO ITS MAXIMUM.

RESULT BYTE 1
0 X-SAR BIT 2 FAILED TO SET AT PROPER TIME, CONTROLLER LOAD NOT COMPLETED PROPERLY.
1 X-SAR BIT 2 ON AT WRONG TIME, CONTROLLER LOAD NOT COMPLETED PROPERLY.
2 X-SAR BIT 2 FAILED TO RESET, CONTROLLER LOAD NOT COMPLETED PROPERLY.

3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC00E
CONTROLLER BUSY TC00E

THIS TEST CAUSES THE CONTROLLER TO SET AND RESET THE 'CONTROLLER BUSY' LATCH AND THE CHANNEL TO SENSE THE RESULTS.

RESULT BYTE 1
0 CONTROLLER BUSY BIT HOT
1 CONTROLLER FAILED TO SET CONTROLLER BUSY LATCH
2 CONTROLLER FAILED TO RESET CONTROLLER BUSY LATCH
3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC00F
CONTROLLER TO CHANNEL TC00F
U-INTERRUPT REQUEST

TESTS THE ABILITY OF THE CONTROLLER, WHICH CAUSES AN INTERRUPT IN THE PROCESSING UNIT. THIS TEST CAUSES THE CONTROLLER TO INTERRUPT THE CHANNEL IN ENABLE AND DISABLE MODE AND REPORTS THE RESULTS.

RESULT BYTE 1
0 INTERRUPT NOT FROM WORK STATION
1 CONTROLLER INT. REQ. FAILED
2 CHANNEL RESET INT. REQ. FAILED
3 HOT INT. REQ. FROM CONTROLLER
4 DISABLE INTERRUPT FAILED
5-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC010
CONTROLLER OP CHECK LATCH TC010

TESTS THE ABILITY OF THE CONTROLLER TO SET AND RESET THE 'OP CHECK' LATCH. THIS TEST CAUSES THE CONTROLLER TO SET AND RESET THE 'CONTROLLER OP CHECK' LATCH AND THE CHANNEL TO SENSE AND REPORTS THE RESULTS.

RESULT BYTE 1
0 CONTROLLER OP CHECK HOT
1 CONTROLLER FAILED TO SET CONTROLLER OP CHECK LATCH
2 CONTROLLER FAILED TO RESET CONTROLLER OP CHECK LATCH
3 JIO 'NOT ANY CHECK' FAILED ON 'OP CHECK' LATCH SET
4 JIO 'NOT ANY CHECK' FAILED ON 'OP CHECK' LATCH RESET
5-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC011
CONT DBO/DBI PARITY LATCH TC011

TESTS THE ABILITY OF THE CONTROLLER TO SET AND RESET THE 'CONT DBO/DBI P' LATCH. THIS TEST CAUSES THE CONTROLLER TO SET AND RESET THE 'CONT DBO/DBI P' LATCH AND THE CHANNEL TO SENSE AND REPORTS THE RESULTS.

RESULT BYTE 1
0 CONTROLLER DBO/DBI PARITY CHECK HOT
1 CONTROLLER FAILED TO SET CONTROLLER DBO/DBI PARITY CHECK LATCH
2 CONTROLLER FAILED TO RESET CONTROLLER DBO/DBI PARITY CHECK LATCH
3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TC012
COMMAND PENDING SENSE TEST TC012

TESTS THE ABILITY OF THE CONTROLLER TO SENSE THE 'COMMAND PENDING' LATCH SET BY THE PROCESSING UNIT. THIS TEST CAUSES THE CONTROLLER TO SENSE THE COMMAND PENDING BIT WHEN IT IS SET BY THE PROCESSING UNIT. THE CONTROLLER SENDS THE RESULTS TO WSCH AND THE CPU ANALYZES AND REPORTS THE RESULTS.

RESULT BYTE 1
0 COMMAND PENDING BIT HOT
1 SET COMMAND PENDING FAILED
2 CONTROLLER FAILED TO RESET COMMAND PENDING LATCH
3 CONTROLLER FAILED TO SENSE COMMAND PENDING LATCH
4-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC013
SERVICE REQUIRED TC013

THIS TEST CAUSES THE CONTROLLER TO SENSE THE SERVICE REQUIRED BIT ON WHEN SET BY THE CHANNEL. THE CONTROLLER DBO SENDS THE ANALYZED AND REPORTED RESULTS BACK TO THE CHANNEL.

RESULT BYTE 1
0 SERVICE REQUIRED BIT HOT
1 SET SERVICE REQUIRED FAILED
2 CONTROLLER FAILED TO RESET SERVICE REQUIRED
3 CONTROLLER FAILED TO SENSE SERVICE REQUIRED
4-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC014
CYCLE STEAL TRANSFER TC014

THIS TEST CAUSES THE CONTROLLER TO SENSE THE CYCLE STEAL TRANSFER CHECK SET BY THE CHANNEL AND TO REPORT ITS STATUS TO THE CHANNEL VIA THE CONTROLLER DBO. THE CHANNEL ANALYZES AND REPORTS THE RESULTS.

RESULT BYTE 1
0 CYCLE STEAL XFER CHECK BIT HOT
1 SET CYCLE STEAL XFER CHECK FAILED
2 CONTROLLER FAILED TO RESET CYCLE STEAL TRANSFER CHECK
3 CONTROLLER FAILED TO SENSE CYCLE STEAL TRANSFER CHECK
4-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC020
CONTROLLER 4-BIT BUS TC020

THIS TEST PASSES AN 'A' AND A '5' AND AN 'A' RETURNS WITH A STORED PATTERN OF '5A'. ANY MISCOMPARE IS A NONFUNCTIONING BIT.

RESULT BYTE 1
0-7 BITS FAILING TO RESPOND

RESULT BYTE 2
0-7 COMPARE DATA

>>>>>>>>>> TC031
CONTROLLER DAR SELECT TC031

THIS TEST LOADS EACH DAR ADDRESS IN EACH DAR AND THEN SENDS THIS VALUE BACK TO THE CONTROL STORE PROGRAM FOR VERIFICATION.

RESULT BYTE 1
0 DAR SELECT TEST FAILED

1-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC032
CONTROLLER DAR DATA (5) TC032

THIS TEST LOADS A DATA PATTERN OF '5' IN EACH DAR AND THEN SENDS THIS VALUE BACK TO THE CONTROL PROGRAM FOR VERIFICATION.

RESULT BYTE 1
0 DAR DATA TRANSFER TEST FAILED

1-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>> TC033
CONTROLLER DAR DATA (A) TC033

THIS TEST LOADS A DATA PATTERN OF 'A' IN EACH DAR AND THEN SENDS THIS VALUE BACK TO THE CONTROL STORE PROGRAM FOR VERIFICATION.

RESULT BYTE 1
0 DAR DATA TRANSFER TEST FAILED

1-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC034
CONTROLLER REG/AUX REGS SELECT TC034

THIS TEST SELECTS REGS AND AUX
REGS BY USE OF THE 'WIOR'
COMMAND. THE PROGRAM SENSES
THE STATUS OF THE REG SELECTION
AND THIS VALUE IS SENT TO THE
PROCESSOR FOR VERIFICATION.

RESULT BYTE 1

0-3 NOT USED

4 AUX REGS NOT SELECTED
CORRECTLY

5 PRIMARY REG SENSE BIT NOT
ON AFTER ADAPTER RESET

6 PRIMARY REG SENSE BIT ON
AFTER SELECTING AUX REGS

7 PRIMARY REG SENSE BIT NOT
ON AFTER SELECTING PRIMARY
REGS

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC035
CONTROLLER REG SELECTION TC035

THIS TEST WRITES EACH REG
ADDRESS IN EACH REG AND THEN
SENDS THIS VALUE BACK TO THE
CONTROL STORE PROGRAM FOR
VERIFICATION.

RESULT BYTE 1

0 REG SELECT TEST FAILED

1-7 NOT USED

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC036
CONTROLLER REG DATA (5) TC036

THIS TEST LOADS A DATA PATTERN
OF '5' IN EACH REG AND THEN
SENDS THIS VALUE BACK TO THE
CONTROL STORE PROGRAM FOR
VERIFICATION.

RESULT BYTE 1

0 REG DATA TRANSFER TEST FAILED

1-7 NOT USED

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC037
CONTROLLER REG DATA (A) TC037

THIS TEST LOADS A DATA PATTERN
OF 'A' IN EACH REG AND THEN
SENDS THIS VALUE BACK TO THE
CONTROL STORE PROGRAM
FOR VERIFICATION.

RESULT BYTE 1

0 REG DATA TRANSFER TEST FAILED

1-7 NOT USED

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC038
CONTROLLER AUX REG SELECTION TC038

THIS TEST WRITES EACH AUX REG
ADDRESS IN ITSELF AND THEN
SENDS THIS VALUE BACK TO
THE CONTROL STORE PROGRAM
FOR VERIFICATION.

RESULT BYTE 1

0 AUX REG SELECT TEST FAILED

1-7 NOT USED

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>>> TC039
CONTROLLER AUX REG DATA (5) TC039

THIS TEST LOADS A DATA PATTERN OF '5' IN EACH AUX REG AND THEN SENDS THIS VALUE BACK TO THE CONTROL STORE PROGRAM FOR VERIFICATION.

RESULT BYTE 1
0 AUX REG DATA TRANSFER
TEST FAILED

1-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>> TC03A
CONTROLLER AUX REG DATA TC03A

THIS TEST LOADS A DATA PATTERN OF 'A' IN EACH AUX REG, THEN SENDS THIS VALUE BACK TO THE CONTROL STORE PROGRAM FOR VERIFICATION.

RESULT BYTE 1
0 AUX REG DATA TRANSFER
TEST FAILED

1-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>> TC03B
CONTROLLER ALU TC03B

TEST SETTING OF ALU ZERO INDICATION WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST GENERATES A ZERO CONDITION IN THE ALU. THE CONTROL STORE PROGRAM SENSES THIS CONDITION AND CHECKS FOR ALU ZERO ON, ALU NON-ZERO, AND ALU CARRY OFF.

RESULT BYTE 1
0 ALU ZERO INDICATION NOT ON
1 ALU CARRY INDICATION NOT OFF
2 ALU NONZERO INDICATION
NOT OFF

3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>> TC03C
CONTROLLER ALU TC03C

TEST SETTING OF ALU NONZERO INDICATION WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST GENERATES A NONZERO CONDITION IN THE ALU. THE CONTROL STORE PROGRAM SENSES THIS CONDITION AND CHECKS ALU NONZERO IS ON, AND ALU ZERO AND ALU CARRY ARE OFF.

RESULT BYTE 1
0 ALU NONZERO INDICATION
NOT ON
1 ALU ZERO INDICATION
NOT OFF
2 ALU CARRY INDICATION
NOT OFF

3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>> TC03D
CONTROLLER ALU TC03D

TEST SETTING OF ALU CARRY INDICATION WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST GENERATES A CARRY CONDITION IN THE ALU. THE CONTROL STORE PROGRAM SENSES THIS CONDITION AND CHECKS ALU CARRY IS ON, AND ALU NONZERO AND ALU ZERO ARE OFF.

RESULT BYTE 1
0 ALU CARRY INDICATION
NOT ON
1 ALU NON-ZERO INDICATION
NOT OFF
2 ALU ZERO INDICATION
NOT ON

3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>>> TC03E
CONTROLLER ALU TC03E

TEST SETTING OF ALU CARRY AND NONZERO INDICATION WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST GENERATES CARRY AND NONZERO CONDITIONS IN THE ALU. THE CONTROL STORE PROGRAM SENSES THESE CONDITIONS AND CHECKS IF BOTH ARE ON AND IF ALU ZERO IS OFF.

RESULT BYTE 1
0 ALU CARRY AND NONZERO NOT ON
1 ALU ZERO INDICATION NOT OFF

3-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>>>> TC03F
CONTROLLER ALU

TC03F

TEST SETTING OF ALU ZERO AND NONZERO INDICATIONS WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST GENERATES ZERO AND NONZERO CONDITIONS IN THE ALU. THE CONTROL STORE PROGRAM SENSES THESE CONDITIONS AND CHECKS IF BOTH ARE ON AND IF ALU CARRY IS OFF.

RESULT BYTE 1

0 ALU ZERO AND NONZERO NOT ON
1 ALU CARRY INDICATION NOT OFF

3-7 NOT USED

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>> TC040
CONTROLLER ALU TEST

TC040

TEST SETTING OF ALU CARRY, ZERO, AND NON ZERO INDICATIONS WITH CONTROL STORE SENSE INSTRUCTION: THIS TEST WILL GENERATE CARRY, ZERO, AND NON ZERO CONDITIONS IN CONTROLLER ALU. THE CONTROL STORE PROGRAM SENSES THESE CONDITIONS AND CHECKS FOR THEM ALL BEING ON.

RESULT BYTE 1

0-6 NOT USED
7 ALU ZERO, NONZERO, AND CARRY INDICATIONS NOT ON

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>> TC041
CONTROLLER ALU TEST

TC041

TEST SETTING OF ALU ZERO INDICATION: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT. THIS TEST WILL GENERATE A ZERO CONDITION IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1

0-2 NOT USED
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>> TC042
CONTROLLER ALU TEST

TC042

TEST SETTING OF ALU NON ZERO INDICATION: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT: THIS TEST GENERATES A NON ZERO CONDITION IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1

0-2 NOT USED
3 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>> TC043
CONTROLLER ALU TEST

TC043

TEST SETTING OF ALU ZERO AND CARRY INDICATIONS: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT: THIS TEST GENERATES ZERO AND CARRY CONDITIONS IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1

0-2 NOT USED
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC044
CONTROLLER ALU TEST TC044

TEST SETTING OF ALU NON ZERO AND CARRY INDICATIONS: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT: THIS TEST GENERATES NON ZERO AND CARRY CONDITIONS IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0-2 NOT USED
3 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
6 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC045
CONTROLLER ALU TEST TC045

TEST SETTING OF ALU ZERO AND NON ZERO INDICATIONS: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT: THIS TEST GENERATES ZERO AND NON ZERO CONDITIONS IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0-2 NOT USED
3 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC046
CONTROLLER ALU TEST TC046

TEST SETTING OF ALU ZERO, NON ZERO, AND CARRY CONDITIONS: THIS PROGRAM TESTS THAT ALL BRANCHES THAT SHOULD BRANCH, DO, AND THAT ALL BRANCHES THAT SHOULD NOT BRANCH, DO NOT. THIS TEST GENERATES ZERO, NON ZERO AND CARRY CONDITIONS IN THE CONTROLLER ALU. THEN THE PROGRAM CHECKS ALL BRANCH CONDITIONS WITH AN ERROR BIT PASSED TO THE CONTROL STORE PROGRAM TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0-2 NOT USED
3 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC047
CONTROLLER MEMORY ADDRESSING TC047

THIS TEST WRITES ALL LOCATIONS OF RAM CONTROLLER MEMORY WITH THE XR RESULT OF ITS OWN ADDRESS HI AND LO BYTES. THE CONTROLLER THEN READS THE TEST LOCATION AND COMPARES THE XR RESULT OF LOCATION HI AND LOW BYTES WITH THE VALUE READ. ANY VALUE OTHER THAN ZERO INDICATES AN ERROR.

RESULT BYTE 1
0-7 HI-ORDER BYTES OF
FAILING ADDRESS

RESULT BYTE 2
0-7 LO-ORDER BYTES OF
FAILING ADDRESS

>>>>>>>>>>> TC048
CONTROLLER MEMORY TEST TC048

TESTS THE CONTROLLER MEMORY FROM HEX 2000 TO THE END OF INSTALLED MEMORY.

RESULT BYTE 1
0-7 HI-ORDER BYTES OF
FAILING ADDRESS

RESULT BYTE 2
0-7 LO-ORDER BYTES OF
FAILING ADDRESS

>>>>>>>>>>>>>> TC055
 CONTROLLER LONG TIME-OUT TEST TC055

THIS TEST ENABLES THE LONG TIME-OUT AND DELAY, AND EXPECTS THE CONTROLLER TO INTERRUPT THE PROCESSOR.

RESULT BYTE 1
 0-2 NOT USED

- 3 UNKNOWN ERROR
- 4-6 NOT USED
- 7 LONG TIME-OUT DID NOT CAUSE A CONTROLLER INTERRUPT

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>>>> TC056
 CONTROLLER LONG TIME-OUT TEST TC056

THIS TEST ENABLES AND DISABLES THE LONG TIME-OUT AND EXPECTS NO LONG TIME-OUT INTERRUPT TO THE PROCESSOR.

RESULT BYTE 1
 0-2 NOT USED

- 3 UNKNOWN ERROR
- 4-6 NOT USED
- 7 LONG TIME-OUT CAUSED A CONTROLLER INTERRUPT AFTER A DISABLE LONG TIME-OUT WAS GIVEN

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>>>> TC057
 CONTROLLER LONG TIME-OUT TEST TC057

THIS TEST ENABLES AND RESETS THE LONG TIME-OUT AND EXPECTS NO LONG TIME-OUT INTERRUPT TO THE PROCESSOR.

RESULT BYTE 1
 0-2 NOT USED

- 3 UNKNOWN ERROR
- 4-6 NOT USED
- 7 LONG TIME-OUT CAUSED A CONTROLLER INTERRUPT AFTER A RESET LONG TIME-OUT WAS GIVEN

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>>>> TC058
 CONTROLLER BRANCH VIA DAR TEST TC058

THIS TEST PERFORMS A SERIES OF BRANCH INSTRUCTIONS USING THE VALUE IN THE DAR AS THE BRANCH TO ADDRESS.

RESULT BYTE 1
 0-3 NOT USED

- 4 UNKNOWN ERROR
- 5 BRANCH WENT TO INCORRECT LOCATION
- 6 BRANCH VIA DAR (BR) TO LOCATION 0AAA DID NOT BRANCH
- 7 BRANCH VIA DAR (BR) TO LOCATION 0554 DID NOT BRANCH

RESULT BYTE 2
 0-7 NOT USED

>>>>>>>>>>>>>> TC059
 CONTROLLER, AI, AND ACYR TEST TC059

TEST SETTING OF ALU ZERO AND CARRY INDICATIONS WITH THE 'AI' INSTRUCTION: THIS PROGRAM TESTS THAT THE 'ACYR' INSTRUCTION USES THE CARRY BIT AND THEN RESETS IT. THE PROGRAM ALSO TESTS THAT ALL INSTRUCTIONS THAT SHOULD BRANCH, DO, AND THAT ALL INSTRUCTIONS THAT SHOULD NOT BRANCH, DO NOT. THE PROGRAM PASSES ERROR CODES TO THE PROCESSOR TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1

- 0 BRANCH ON NEGATIVE (BN) DID BRANCH AND SHOULD NOT
- 1 BRANCH ON NEGATIVE (BN) DID NOT BRANCH AND SHOULD
- 2 BRANCH ON NOT ZERO (BNZ) DID NOT BRANCH AND SHOULD
- 3 BRANCH ON NOT ZERO (BNZ) DID BRANCH AND SHOULD NOT
- 4 BRANCH ON NEGATIVE (BN) DID BRANCH AND SHOULD NOT
- 5 BRANCH ON CARRY (BCY) DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ) DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B) DID NOT BRANCH AND SHOULD

RESULT BYTE 2
 0-6 NOT USED

- 7 BRANCH ON NOT ZERO (BNZ) DID BRANCH AND SHOULD NOT

>>>>>>>>>>>>>>>> TC05A
CONTROLLER, SR, AND SCYR TEST TC05A

TEST SETTING OF ALU ZERO AND
CARRY INDICATIONS WITH THE 'SR'
INSTRUCTION: THIS PROGRAM TESTS
THAT THE 'SCYR' INSTRUCTION USES
THE CARRY BIT AND THEN RESETS IT.
IT ALSO TESTS THAT ALL INSTRUCTIONS
THAT SHOULD BRANCH, DO, AND THAT
ALL INSTRUCTIONS THAT SHOULD NOT
BRANCH, DO NOT. THE PROGRAM PASSES
ERROR CODES TO THE PROCESSOR TO
INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
1 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
2 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-6 NOT USED

7 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>>>>>>> TC05B
CONTROLLER SRS, AND SIS TEST TC05B

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE
'AR' AND 'SRS' INSTRUCTIONS: THIS
PROGRAM TESTS THAT THE 'SIS'
INSTRUCTION ADDS THE CARRY
INDICATION WITHOUT RESETTNG
THE ZERO AND NON ZERO INDICATIONS.
ALSO, IT TESTS THAT ALL BRANCHES
THAT SHOULD BRANCH, DO, AND THAT
ALL BRANCHES THAT SHOULD NOT BRANCH,
DO NOT. THE PROGRAM PASSES ERROR
CODES TO THE PROCESSOR TO INDICATE
THE RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
1 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-5 NOT USED

6 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
7 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD

>>>>>>>>>>>>>>>> TC05C
CONTROLLER AND CR TEST TC05C

TEST SETTING OF ALU ZERO AND
CARRY INDICATIONS WITH THE 'CR'
INSTRUCTION: THIS PROGRAM TESTS
THAT ALL INSTRUCTIONS THAT SHOULD
BRANCH, DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THIS PROGRAM PASSES ERROR CODES TO
THE PRCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0-2 NOT USED

3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>>>>>>> TC05D
CONTROLLER NR TEST TC05D

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'NR'
INSTRUCTION: THIS PROGRAM TESTS
THAT ALL INSTRUCTIONS THAT SHOULD
BRANCH, DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THIS PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED

4 'Y' REG NOT ZERO AFTER 'AND'
FUNCTION USING 1 AND 0
5 'Y' REG IS ZERO AFTER 'AND'
FUNCTION USING 1 AND 1
6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>>>>>>>>>>>>> TC05E
CONTROLLER NI TEST

TC05E

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'NI'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THIS PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

- 0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
- 2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
- 3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
- 4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
- 5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

- 0-3 NOT USED
- 4 'Y' REG NOT ZERO AFTER 'AND'
FUNCTION USING 1 AND 0
- 5 'Y' REG IS ZERO AFTER 'AND'
FUNCTION USING 1 AND 1
- 6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
- 7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>>>>>>>>>>>>> TC05F
CONTROLLER AND NRH TEST

TC05F

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'NRH'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS THAT
SHOULD NOT BRANCH, DO NOT.
THIS PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

- 0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
- 2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
- 3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
- 4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
- 5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

- 0-3 NOT USED
- 4 'Y' REG IS ZERO AFTER
'AND INHIBIT'
FUNCTION USING 1 AND 0
- 5 'Y' REG IS ZERO AFTER
'AND INHIBIT'
FUNCTION USING 1 AND 1
- 6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
- 7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>> TC060
CONTROLLER NIH TEST

TC060

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'NIH'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS THAT
SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

- 0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
- 2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
- 3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
- 4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
- 5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

- 0-3 NOT USED
- 4 'Y' REG IS ZERO AFTER
'AND IMMEDIATE INHIBIT'
FUNCTION USING 1 AND 0
- 5 'Y' REG IS ZERO AFTER
'AND IMMEDIATE INHIBIT'
FUNCTION USING 1 AND 1
- 6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
- 7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>> TC061
CONTROLLER, CR, AND NRS TEST

TC061

TEST SETTING OF ALU ZERO AND
CARRY INDICATIONS WITH THE 'CR'
INSTRUCTION: THIS PROGRAM TESTS THAT
THE 'NRS' INSTRUCTION ADDS THE NON
ZERO CONDITION. IT ALSO TESTS THAT
ALL INSTRUCTIONS THAT SHOULD
BRANCH, DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

- 0-2 NOT USED
- 3 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
- 4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
- 5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC062
CONTROLLER, CR, AND NRS TEST

TC062

TEST SETTING OF ALU ZERO AND
CARRY INDICATIONS WITH THE 'CR'
INSTRUCTION: THIS PROGRAM TESTS
THAT THE 'NRS' INSTRUCTION ADDS THE
NON ZERO CONDITION. IT ALSO TESTS
THAT ALL INSTRUCTIONS THAT SHOULD
BRANCH, DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

- 0-2 NOT USED
- 3 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
- 4 BRANCH ON NEGATIVE (BN)
DID BRANCH AND SHOULD NOT
- 5 BRANCH ON CARRY (BCY)
DID NOT BRANCH AND SHOULD
- 6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
- 7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-7 NOT USED

>>>>>>>>>>> TC063
CONTROLLER, CR, AND NRHS TEST TC063

TEST SETTING OF ALU ZERO AND CARRY INDICATIONS WITH THE 'CR' INSTRUCTION: THIS PROGRAM TESTS THAT THE 'NRHS' INSTRUCTION ADDS THE NON ZERO CONDITION. IT ALSO TESTS THAT ALL INSTRUCTIONS THAT SHOULD BRANCH, DO, AND THAT ALL INSTRUCTIONS THAT SHOULD NOT BRANCH, DO NOT. THE PROGRAM PASSES ERROR CODES TO THE PROCESSOR TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0-1 NOT USED
2 'Y' REG IS ZERO AFTER 'AND INHIBIT SUMMARY' INST
3 BRANCH ON NOT ZERO (BNZ) DID NOT BRANCH AND SHOULD
4 BRANCH ON NEGATIVE (BN) DID NOT BRANCH AND SHOULD
5 BRANCH ON CARRY (BCY) DID BRANCH AND SHOULD NOT
6 BRANCH ON ZERO (BZ) DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B) DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC064
CONTROLLER, CR, AND NIHS TEST TC064

TEST SETTING OF ALU ZERO AND CARRY INDICATIONS WITH THE 'CR' INSTRUCTION: THIS PROGRAM TESTS THAT THE 'NIHS' INSTRUCTION ADDS THE NON ZERO CONDITION. IT ALSO TESTS THAT ALL INSTRUCTIONS THAT SHOULD BRANCH, DO, AND THAT ALL INSTRUCTIONS THAT SHOULD NOT BRANCH, DO NOT. THE PROGRAM PASSES ERROR CODES TO THE PROCESSOR TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0-1 NOT USED
2 'Y' REG IS ZERO AFTER 'AND INHIBIT SUMMARY' INST
3 BRANCH ON NOT ZERO (BNZ) DID NOT BRANCH AND SHOULD
4 BRANCH ON NEGATIVE (BN) DID NOT BRANCH AND SHOULD
5 BRANCH ON CARRY (BCY) DID BRANCH AND SHOULD NOT
6 BRANCH ON ZERO (BZ) DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B) DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>> TC065
CONTROLLER OR TEST TC065

TEST SETTING OF ALU ZERO AND NON ZERO INDICATIONS WITH THE 'OR' INSTRUCTION. THIS PROGRAM TESTS THAT ALL INSTRUCTIONS THAT SHOULD BRANCH, DO, AND THAT ALL INSTRUCTIONS THAT SHOULD NOT BRANCH, DO NOT. THE PROGRAM PASSES ERROR CODES TO THE PROCESSOR TO INDICATE THE RESULTS OF THE TEST.

RESULT BYTE 1
0 BRANCH ON NEGATIVE (BN) DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ) DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B) DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ) DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY) DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN) DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ) DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B) DID NOT BRANCH AND SHOULD

RESULT BYTE 2
0-3 NOT USED
4 'Y' REG NOT ZERO AFTER 'OR' FUNCTION USING 0 AND 0
5 'Y' REG IS ZERO AFTER 'OR' FUNCTION USING 0 AND 1
6 BRANCH ON ZERO (BZ) DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY) DID BRANCH AND SHOULD NOT

>>>>>>>>>> TC066
CONTROLLER OI TEST

TC066

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'OI'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS THAT
SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
4 'Y' REG NOT ZERO AFTER 'OI'
FUNCTION USING 0 AND 0
5 'Y' REG IS ZERO AFTER 'OI'
FUNCTION USING 0 AND 1
6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>> TC067
CONTROLLER ORH TEST

TC067

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'ORH'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS THAT
SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
4 'Y' REG NOT ZERO AFTER 'ORH'
FUNCTION USING 0 AND 0
5 'Y' REG NOT ZERO AFTER 'ORH'
FUNCTION USING 0 AND 1
6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>> TC068
 CONTROLLER OIH TEST

TC068

TEST SETTING OF ALU ZERO AND
 NON ZERO INDICATIONS WITH THE 'OIH'
 INSTRUCTION: THIS PROGRAM TESTS THAT
 ALL INSTRUCTIONS THAT SHOULD BRANCH,
 DO, AND THAT ALL INSTRUCTIONS THAT
 SHOULD NOT BRANCH, DO NOT.
 THE PROGRAM PASSES ERROR CODES TO
 THE PROCESSOR TO INDICATE THE
 RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
 DID NOT BRANCH AND SHOULD
 1 BRANCH ON NOT ZERO (BNZ)
 DID NOT BRANCH AND SHOULD
 2 BRANCH UNCONDITIONAL (B)
 DID NOT BRANCH AND SHOULD
 3 BRANCH ON NOT ZERO (BNZ)
 DID BRANCH AND SHOULD NOT
 4 BRANCH ON CARRY (BCY)
 DID BRANCH AND SHOULD NOT
 5 BRANCH ON NEGATIVE (BN)
 DID NOT BRANCH AND SHOULD
 6 BRANCH ON ZERO (BZ)
 DID NOT BRANCH AND SHOULD
 7 BRANCH UNCONDITIONAL (B)
 DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
 4 'Y' REG NOT ZERO AFTER 'OIH'
 FUNCTION USING 0 AND 0
 5 'Y' REG NOT ZERO AFTER 'OIH'
 FUNCTION USING 0 AND 1
 6 BRANCH ON ZERO (BZ)
 DID BRANCH AND SHOULD NOT
 7 BRANCH ON CARRY (BCY)
 DID BRANCH AND SHOULD NOT

>>>>>>>>>> TC069
 CONTROLLER XR TEST

TC069

TEST SETTING OF ALU ZERO AND
 NON ZERO INDICATIONS WITH THE 'XR'
 INSTRUCTION: THIS PROGRAM TESTS THAT
 ALL INSTRUCTIONS THAT SHOULD BRANCH,
 DO, AND THAT ALL INSTRUCTIONS THAT
 SHOULD NOT BRANCH, DO NOT.
 THE PROGRAM PASSES ERROR CODES TO
 THE PROCESSOR TO INDICATE THE
 RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
 DID NOT BRANCH AND SHOULD
 1 BRANCH ON NOT ZERO (BNZ)
 DID NOT BRANCH AND SHOULD
 2 BRANCH UNCONDITIONAL (B)
 DID NOT BRANCH AND SHOULD
 3 BRANCH ON NOT ZERO (BNZ)
 DID BRANCH AND SHOULD NOT
 4 BRANCH ON CARRY (BCY)
 DID BRANCH AND SHOULD NOT
 5 BRANCH ON NEGATIVE (BN)
 DID NOT BRANCH AND SHOULD
 6 BRANCH ON ZERO (BZ)
 DID NOT BRANCH AND SHOULD
 7 BRANCH UNCONDITIONAL (B)
 DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
 4 'Y' REG NOT ZERO AFTER 'XR'
 FUNCTION USING 1 AND 1
 5 'Y' REG IS ZERO AFTER 'XR'
 FUNCTION USING 0 AND 1
 6 BRANCH ON ZERO (BZ)
 DID BRANCH AND SHOULD NOT
 7 BRANCH ON CARRY (BCY)
 DID BRANCH AND SHOULD NOT

>>>>>>>>>>> TC06A
CONTROLLER XI TEST

TC06A

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'XI'
INSTRUCTION: THIS PROGRAM TESTS
THAT ALL INSTRUCTIONS THAT SHOULD
BRANCH, DO, AND THAT ALL INSTRUCTIONS
THAT SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
4 'Y' REG NOT ZERO AFTER 'XI'
FUNCTION USING 1 AND 1
5 'Y' REG IS ZERO AFTER 'XI'
FUNCTION USING 0 AND 1
6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>> TC06B
CONTROLLER XRH TEST

TC06B

TEST SETTING OF ALU ZERO AND
NON ZERO INDICATIONS WITH THE 'XRH'
INSTRUCTION: THIS PROGRAM TESTS THAT
ALL INSTRUCTIONS THAT SHOULD BRANCH,
DO, AND THAT ALL INSTRUCTIONS THAT
SHOULD NOT BRANCH, DO NOT.
THE PROGRAM PASSES ERROR CODES TO
THE PROCESSOR TO INDICATE THE
RESULTS OF THE TEST.

RESULT BYTE 1

0 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
1 BRANCH ON NOT ZERO (BNZ)
DID NOT BRANCH AND SHOULD
2 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD
3 BRANCH ON NOT ZERO (BNZ)
DID BRANCH AND SHOULD NOT
4 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT
5 BRANCH ON NEGATIVE (BN)
DID NOT BRANCH AND SHOULD
6 BRANCH ON ZERO (BZ)
DID NOT BRANCH AND SHOULD
7 BRANCH UNCONDITIONAL (B)
DID NOT BRANCH AND SHOULD

RESULT BYTE 2

0-3 NOT USED
4 'Y' REG NOT ZERO AFTER 'XRH'
FUNCTION USING 1 AND 1
5 'Y' REG IS ZERO AFTER 'XRH'
FUNCTION USING 0 AND 1
6 BRANCH ON ZERO (BZ)
DID BRANCH AND SHOULD NOT
7 BRANCH ON CARRY (BCY)
DID BRANCH AND SHOULD NOT

>>>>>>>>>>>> TCOA1
CONTROLLER P-CHK U-INT TCOA1

THIS TEST FORCES A MEMORY CHECK BY ATTEMPTING TO READ FROM NONEXISTENT STORAGE. THE TEST ALSO ANALYZES THE U-INTERRUPT IN THE CHANNEL TO VERIFY THE ABILITY OF THE CONTROLLER TO REPORT A MEMORY PARITY CHECK.

RESULT BYTE 1

- 0 INTERRUPT NOT FROM WS
- 1 HOT INTERRUPT REQ FROM CONTROLLER
- 2 NO INTERRUPT TAKEN
- 3 'NOT ANY CHECK' JIO FAILED
- 4 NO 'MEMORY P CHK' REPORTED
- 5-7 NOT USED

RESULT BYTE 2
0-7 CONTENTS OF SENSE BYTE 2
'CONTROLLER CHECK BYTE'

>>>>>>>>>>>> TCOA2
SERDES SHIFT TEST TCOA2

THIS TEST CHECKS THE CONTROLLER'S ABILITY TO SHIFT DATA INTO AND OUT OF THE SHIFT REGISTERS. IT ALSO CHECKS THE INTERRUPT AND CONTROLLER STOP FUNCTIONS OF THE DIAGNOSTIC SHIFT COMMAND.

RESULT BYTE 1

- 0 BAD STATUS ON DATA XFER
- 1 BAD DATA ON 'AA' DATA LOAD
- 2 BAD DATA ON 'AA' COMMAND LOAD
- 3 BAD DATA ON SHIFTED 'AA' DATA
- 4 BAD DATA ON SHIFTED 'AA' CMD
- 5 BAD DATA ON '55' DATA LOAD
- 6 BAD DATA ON '55' COMMAND LOAD
- 7 BAD DATA ON SHIFTED '55' DATA

RESULT BYTE 2
0 BAD DATA ON SHIFTED '55' DATA
1-7 NOT USED.

>>>>>>>>>>>> TCOA3
DRIVER/RECEIVER ACTIVITY CHECK TCOA3

THE DRIVER/RECEIVER ACTIVITY REGISTERS ARE CAUSED TO INCREMENT THEIR COUNT AND ANY THAT FAIL TO INCREMENT ARE REPORTED IN ERROR.

RESULT BYTE 1

- 0 CABLE ADDRESS 0 FAILED TEST
- 1 CABLE ADDRESS 1 FAILED TEST
- 2 CABLE ADDRESS 2 FAILED TEST
- 3 CABLE ADDRESS 3 FAILED TEST
- 4-7 NOT USED

RESULT BYTE 2
0-7 NOT USED

>>>>>>>>>>>> TCOA4
W/S CONSOLE POLL TCOA4

THIS PROGRAM POLLS THE WORK STATION CONTROL CONSOLE AND REPORTS ANY ERRORS OR CHECKS ENCOUNTERED.

RESULT BYTE 1

- 0 PROPER RESPONSE RECEIVED
- 1 GO LATCH FAILED TO RESET
- 2 TRANSMIT FAILED
- 3 RECEIVE ENABLE FAILED
- 4 NO RESPONSE
- 5 NO EOB
- 6 RECEIVER NOT DISABLED AFTER EOB
- 7 MULTIFRAME RESPONSE

RESULT BYTE 2
0 SERIAL PARITY CHECK
1 CONTROLLER FAILURE
2-7 NOT USED

RESULT BYTES 3 AND 4
LAST FRAME RETURNED FROM TERMINAL

>>>>>>>>>>>> TCOA5
W/S MDI VALID STOP DISPLAY TCOA5

THIS PROGRAM CAUSES A 'VALID STOP' MESSAGE TO BE DISPLAYED ON THE SYSTEM CONSOLE CRT AT THE END OF THE WORK STATION DIAGNOSTIC PGM RUN.

RESULTS

THERE ARE NO RESULTS TO REPORT FROM THIS TEST UNIT.

>>>>>>>>>>>> TCOA6
WORK STATION TRANSMIT TCOA6

THIS UTILITY TRANSMITS THE DATA SET INTO CE PANEL SWITCHES 2, 3 AND 4 TO THE DEVICE ON THE CABLE ADDRESS SET ON CE SWITCH 1.
CE PANEL SWITCH 1 -> CABLE ADDRESS
CE PANEL SWITCH 2-4-> DATA

WORK STATION TRANSMIT UTILITY

THIS IS NOT A FUNCTIONAL TEST THERE ARE NO RESULTS TO REPORT. REGISTER 6(H) HIGH NIBBLE HAS THE CABLE ADDRESS OF THE WORK STATION BEING ADDRESSED.
REGISTER 6, NIBBLES 1, 2, AND 3 HAVE THE DATA BEING SENT TO THE WORK STATION BEING TESTED.

>>>>>>>>>>>> TCOA7
W/S NETWORK ANALYSIS PROGRAM TCOA7

THIS PROGRAM CATEGORIZES AND REPORTS ALL POLLING PROBLEMS ENCOUNTERED WHILE POLLING ALL VALID ADDRESSES ON THE WORK STATION CONTROLLER BUS.

RESULTS ARE PRESENTED IN GRAPH FORM ON THE SYSTEM CONSOLE CRT