Catalog No. 43458

DIAGNOSTIC ILLUSTRATIONS

IBM 9020A AND 9020/DE SYSTEMS

STUDY GUIDE

JUNE 1979

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

MIKE MONRONEY AERONAUTICAL CENTER

FAA ACADEMY

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43458

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INTRODUCTION TO DIAGNOSTICS

9020 A/D/E

OPERAND--COMMENTS FIELD

The OPERAND–COMMENTS field contains the operand and contents of the comments field specified in the BAL source statement.

IDENT FIELD

The IDENT field contains the contents of columns 73 -- 80 of the BAL source statement, which are used by the SPT edit program or for card identification and sequencing.

Cross-Reference Listing Of Symbols

When the ANALYZ option on the $BAL control card is specified, the symbolic analyzer is called to produce a cross-reference listing of all symbols used in a program. This option is valid only when a program listing is also requested. The NLISTed statements are not processed by the BAL analyzer. Consequently, any multidefined symbols, system symbol redefinitions, etc. which occur in NLISTed code will not be detected by the analyzer and the appropriate flags will not appear in the listing. The cross-reference listing, entitled "Symbolic References," appears after the relocation dictionary listing in Appendix G.

The symbolic analyzer is a part of the assembler, and the use of this option requires at least one additional pass to produce the cross-reference listing. The listing gives the line number of each symbol definition and the line numbers of all statements that refer to the symbol. Multidefined symbols and redefined system symbols are flagged. A separate listing of any undefined symbols is printed after the symbol listing. The symbolic analyzer can handle any number of references, but if more than 255 undefined symbols occur, only the first 255 are printed and a diagnostic message, stating that there are unlisted and undefined symbols, will be printed.

Diagnostics

The assembler prints a diagnostic message in the program listing for errors discovered during processing of a BAL source program. The diagnostic message(s) is printed immediately after the erroneous statement. If no LIST option was present on the $BAL card, or if an NLIST is in effect for the erroneous statement, the assembler will force printing of the statement and all unsuppressed diagnostics. The asterisks that precede each message are for ease of identification in the program listing.

Execution Permitted	Message
No	***** FIELD n HAS INVALID PUNCTUATION
No	***** FIELD n HAS FOUND INVALID CHARACTER
No	***** FIELD n HAS A SYMBOL OR NUMBER WHICH IS TOO LONG
No	***** FIELD n HAS AN EXPRESSION WHICH IS LONG OR COMPLEX
No	***** (symbol) IS AN UNDEFINED SYMBOL
No	***** FIELD n HAS AN INVALID USE OF *
No	***** FIELD n IS INVALIDLY COMPLEX RELOCATABLE
Yes	***** FIELD n HAS A VOID EXPRESSION POSSIBLE ERROR
Yes	***** FIELD n HAS BEEN TRUNCATED – POSSIBLE ERROR
No	***** FIELD n HAS A RELOCATABLE SYMBOL WHICH IS MULTIPLIED OR DIVIDED
No	***** FIELD n HAS TOO MANY ELEMENTS IN AN EXPRESSION
No	***** (symbol) IS A MULTI-DEFINED SYMBOL
Yes	***** USE OF A PRIVILEGED OP CODE – POSSIBLE ERROR
No	***** FIELD n HAS AN EXPRESSION INVALIDLY TERMINATED
Yes	***** PSEUDO-OP IS MISPLACED – POSSIBLE ERROR
Yes	***** HALF WORD ALIGNMENT HAS OCCURRED – POSSIBLE ERROR
No	***** FIELD n HAS A RELOCATABLE IN PLACE OF ABSOLUTE
No	***** FIELD n HAS AN ERROR IN LITERAL DEFINITION
Yes	***** DC SPECIFIED BUT NO VALUE LIST – POSSIBLE ERROR
Yes	***** FIELD n HAS UNUSED REGISTER SPECIFIED FOR DROP – POSSIBLE ERROR

DIAGNOSTIC OVERVIEW

SUBJECTS TO BE CONSIDERED:

1. TERMINOLOGY
2. SYSTEMS DIFFERENCES, 9020 A/D/E
3. TYPES OF TROUBLESHOOTING TESTS
4. SECTION IDENTIFICATION LABELS
5. TAPE OR DISK FORMATTING
6. LOADING TECHNIQUES
7. INPUT MESSAGES AND ASSOCIATED FORMATS
8. OUTPUT MESSAGES AND FORMATS
9. GO/NO-GO LISTING ANALYSIS
10. BASIC STORE LISTING ANALYSIS
11. HARDCORE LISTING ANALYSIS
12. INITIAL DIAGNOSTIC MONITOR (IDM) ANALYSIS
13. SECTIONS RELATIVE TO SDM/MDM

LESSON OBJECTIVES

1. DESCRIBE THE VARIOUS TYPES OF TROUBLESHOOTING TESTS AVAILABLE FOR MAINTAINING THE 9020 COMPUTER COMPLEX.

2. DESCRIBE THE DIAGNOSTIC PROGRAMS AVAILABLE FOR 9020 "SYSTEM" TROUBLESHOOTING.

3. NAME THE SEQUENCE OF PROGRAMS AS THEY EXSIST ON THE DIAGNOSTIC TAPE OR DISK.

4. STATE THE ORDER PROGRAMS THAT WILL BE EXECUTED IF LOADED VIA A CE OR IOCE.

5. LOCATE AND DESCRIBE THE FORMATS FOR THE VARIOUS TYPES OF RECORDS.

USE OF DIAGNOSTICS

1. INITIAL FACTORY CHECK-OUT OF EQUIPMENT.

2. SITE ACCEPTANCE (SEVA MODULE).

   A. SAFE STORE TEST.

   B. COMPUTING TIME ADJUSTMENT FACTOR.

   C. DISPLAY INSTRUCTIONS PERFORMANCE TEST.

   D. CHANNEL DATA RATE TEST.

3. ROUTINE/CORRECTIVE MAINTENANCE.

4. SYSTEM/SUBSYSTEM CHECK-OUT.

TROUBLESHOOTING TESTS

1. ELEMENT/DEVICE TESTING:

   A. TAPE DRIVES, HIGH SPEED PRINTER, CARD READER/PUNCH, FLIGHT STRIP PRINTER, USING OFF-LINE TESTING DEVICES.

   B. FRONT PANEL TESTING, USING CUSTOMER ENGINEERING PANELS:

      (1) DISK IN-LINES

      (2) RIPPLE LOCAL STORE (CE/IOCE)

      (3) CE/IOCE STORE-FETCH

      (4) MANUAL BRING-UPS

   C. FAULT LOCATING TESTS (FLT's)

      (1) HARDWARE CHECKING OF ELEMENTS (CE/IOCE)

      (2) MOST BASIC ELEMENT TESTING

      (3) FOUNDATION FOR HIGHER ORDER DIAGNOSTICS

SYSTEM ORIENTED TESTS

1. DIAGNOSTIC MAINTENANCE TAPE OR DISK:

   A. GENERAL TESTING, GO/NO-GO, BASIC STORE, HARDCORE/IDM, SDM AND MDM.

   B. SPECIFIC MDM TESTS FOR 9020 SYSTEMS:

      (1) SYSTEM CHECK-OUT OF PERIPHIAL EQUIPMENT (SCOPE/D70C3)

      (2) SYSTEM EVALUATION (SEVA/DE0A3):

         (A) TWO PASSES OF SEVA AND DD8A0 FOR RECONFIGURATION TESTING.

         (B) USED FOR CERTIFICATION OF THE NAS CCC COMPLEX.

2. DIAGNOSTICS AIMED AT HARDWARE/SOFTWARE COMPATIBILITY IN TERMS OF NAS OPERATIONAL STATUS:

   A. SIM-CERTIFY (NCST-xxx)

   B. DYNAMIC SIMULATION.

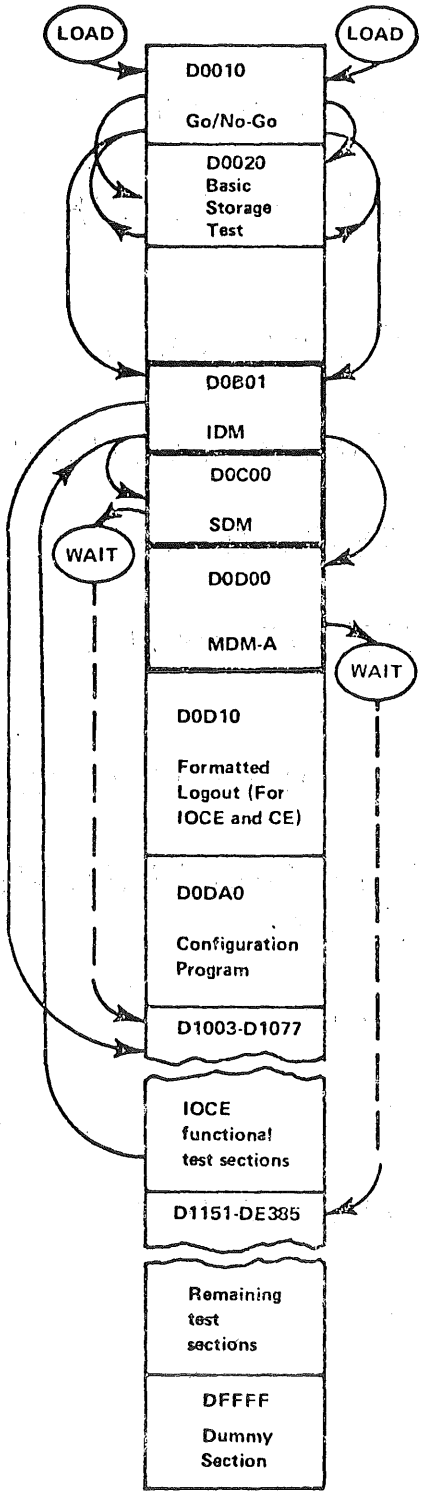
   C. QUICK ANALYSIS OF RADAR (QARS/D74C1).

   D. CERTIFY (NCST-ON LINE)

A. 9020A System Maintenance Tape

When loading via IOCE:

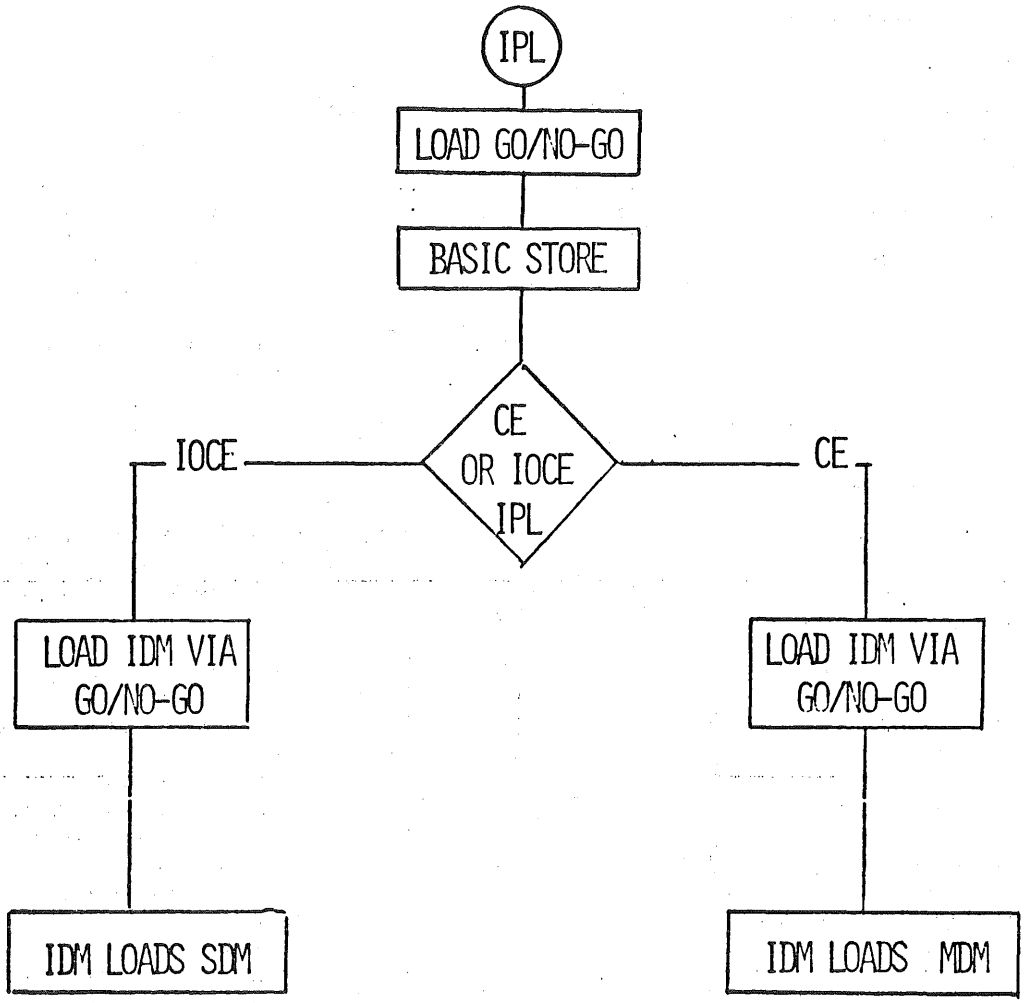
1. IPL loads Go/No-Go.
2. Go/No-Go tests IOCE and then loads Basic Storage Test.
3. Basic Storage Test tests MACH storage and then returns to Go/No-Go for loading of IDM.
4. IDM tests IOCE by sequentially loading and running sections D1003-D1077 and then loads SDM.
5. SDM waits for entry of input messages. Additional sections that can be run, depending on availablity of units, are:
   - D1401 IOCE Internal Timer
   - D1403 IOCE Delay Instruction
   - D1501 IOCE Diagnose Kernal, Part 3
   - D2008 MACH to Main Storage
   - D2101 IOCE Local Storage
   - D2740 MACH Storage
   - D3051-D3155 Channel Tests
   - D4050-D4060 Tape Tests
   - D6251-D6262 2540 Reader Punch
   - D6351-D6356 1403 Printer
   - D6651-D6653 1052 Printer Keyboard
   - D6A51-D6A58 2821 Control Unit
   - D8051-D806A DASF
   - DCC51 PAM and Adapters
   - DCC61 Flight Strip Printer



When loading via CE:

1. IPL loads Go/No-Go.
2. Go/No-Go tests CE and then loads Basic Storage Test.
3. Basic Storage Test test first 128K (decimal) of SE and then returns to Go/No-Go for loading of IDM.
4. IDM tests CE and then loads MDM-A.
5. MDM-A waits for entry of input messages. Sections that can be run, depending on availability of units, are:
   - D0DA0 Configuration Tests
   - D1151-D11EE CE Functional Tests
   - D11F6-D11F8 CE Diagnose Kernals
   - D11FA SCON
   - D11FC IATR
   - D11FD SATR, Part 1
   - D14A1 CE Internal Timer
   - D14A3 CE Delay Instruction
   - D16A1 Error Checking
   - D1DA1 Direct Control
   - D1EA6 SATR, Part 2
   - D1EA8 ATR Controls
   - D20A0, D20AA Main Storage
   - D21A1 CE Local Storage
   - D3051-DCC61 Same as IOCE (at left)
   - D46A0 TCU Dual Interface
   - D6AA0 2821 Dual Interface
   - D6CA4 7265-02 System Console
   - DCCA0 PAM Dual Interface
   - DD6A1 DAR/SR
   - DDDA1 IOCE Processor
   - DE0A1-DE3CC SEVA Program Acceptance Test Sections

FIGURE 1-1. OPERATION OF SYSTEM MAINTENANCE TAPE (PART 1 OF 2)



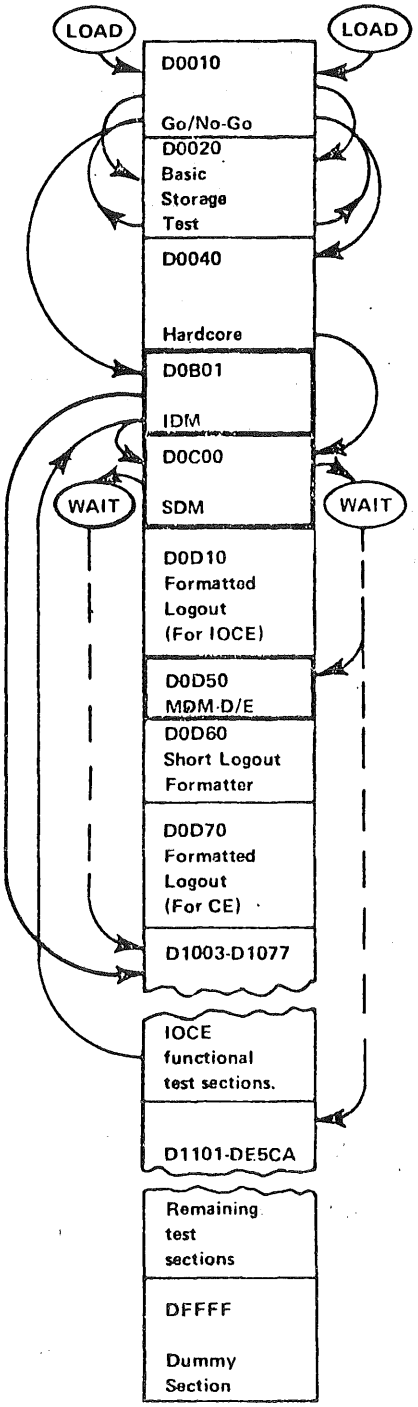
RESULT OF "A" SYSTEM

IPL

B. 9020D and 9020E System Maintenance Tape

When loading via IOCE:

1. IPL loads Go/No-Go.
2. Go/No-Go tests IOCE and then loads Basic Storage Test.
3. Basic Storage Test tests MACH storage and then returns to Go/No-Go for loading of IDM.
4. IDM tests IOCE by sequentially loading and running sections D1003-D1077 and then loads SDM.
5. SDM waits for entry of input messages. Additional sections that can be run, depending on availability of units, are:
   - D1401 IOCE Internal Timer
   - D1403 IOCE Delay Instruction
   - D1501 IOCE Diagnose Kernel, Part 3
   - D2101 IOCE Local Storage
   - D2308 MACH to Main Storage
   - D2740 MACH Storage
   - D3051-D3155 Channel Tests
   - D4050-D4060 Tape Tests
   - D6251-D6262 2540 Reader Punch
   - D6351-D6356 1403 Printer
   - D6651-D6653 1052 Printer Keyboard
   - D6A51-D6A58 2821 Control Unit
   - D8051-D806A DASF
   - D9051 Reconfiguration Unit
   - DA051 Channel-to-Channel Adapter
   - DB051, DB052 2701 Data Adapter Unit
   - DCC51 PAM and Adapters
   - DCC61 Flight Strip Printer

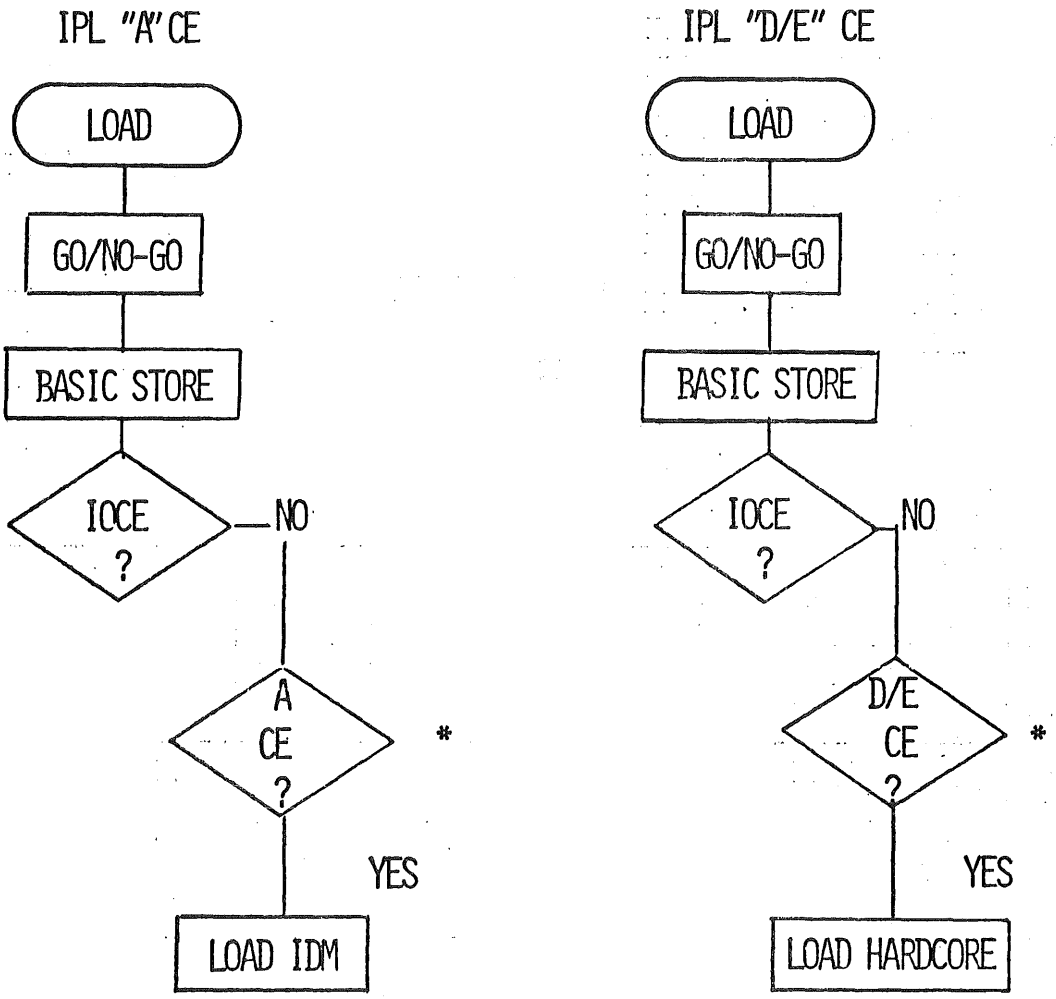


When loading via CE:

1. IPL loads Go/No-Go.
2. Go/No-Go tests CE and then loads Basic Storage Test.
3. Basic Storage Test tests first 128K (decimal) of SE and then returns to Go/No-Go for loading of Hardcore.
4. Hardcore tests CE and then loads SDM.
5. SDM waits for entry of input messages. Sections that can be run, depending on availability of units are:
   - D1101-D1103 Basic CE Test
   - D1108 Basic Diag and Logout
   - D1111-D1115 CEDA
   - D1151-D13C8 CE Function Tests
   - D13CD CE Random
   - D1DA3 Direct Control
   - D22A0-D22AA SE and DE Storage
   - D3051-DCC61 Same as left but also including
     - D6CA6 7265-03 Config Console
6. Enter LMDM/ message to SDM at any time to load MDM-D/E. All the above listed sections plus the following run under MDM-D/E:
   - D24A0 DE/DG Interface
   - D46A0 TCU Dual Interface
   - D6AA0 2821 Dual Interface
   - D6CA4 7265-02 System Console
   - D80A0 DASF Two Channel Sw
   - DB0A1 DAU Two-Processor Sw
   - DCCA0 PAM Dual Interface
   - DD6A2 DAR/DAR Mask
   - DD8A0 Configuration Control
   - DD9A0 ATR Controls
   - DDAA0 SSU Multi-Element
   - DDDA1 IOCE Processor
   - DE0A3-DE5CA SEVA Program Acceptance Test Sections

FIGURE 1-1. OPERATION OF SYSTEM MAINTENANCE TAPE (PART 2 OF 2)

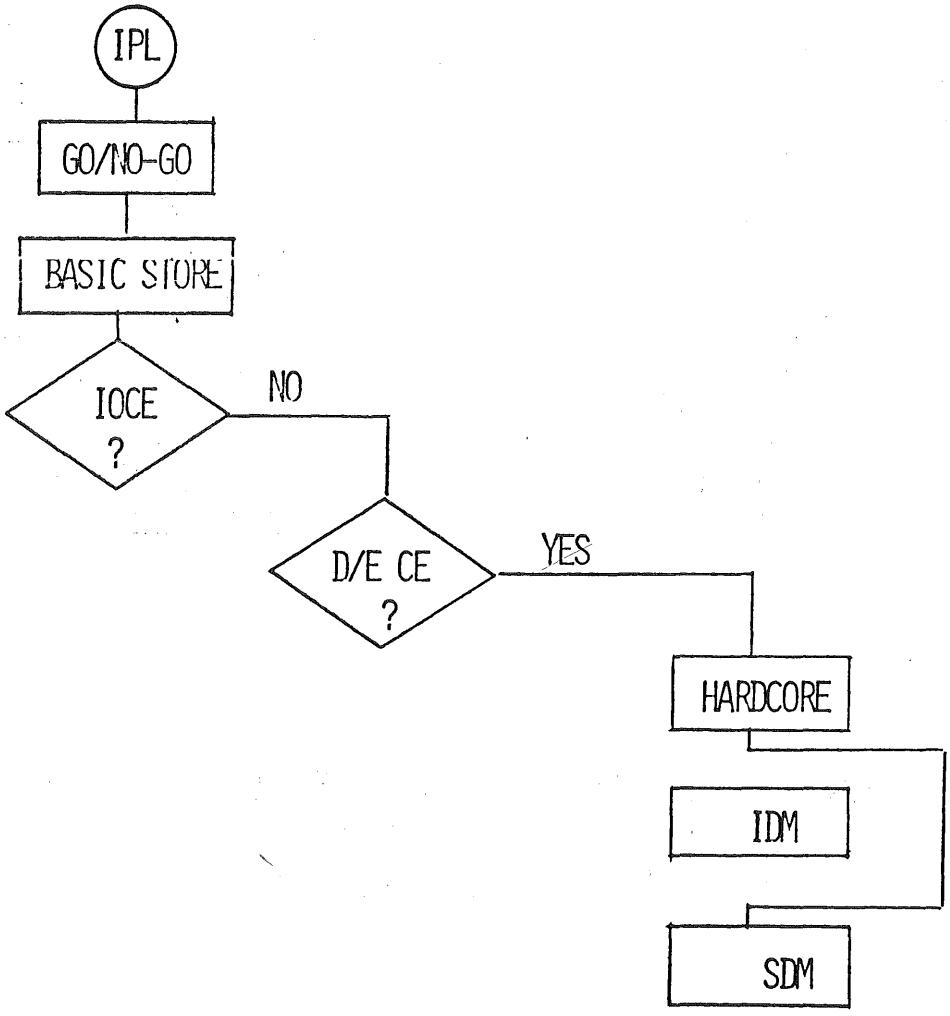
"A" AND "D/E" CE IPL COMPARED



* THIS DECISION IS MADE WHEN THE DIAGNOSTIC TAPE IS BUILT. THE "A" SYSTEM TAPE DOES NOT HAVE HARDCORE, AND THE "D/E TAPE IS DESIGNED TO BY-PASS IDM VIA PROGRAM CONTROL.

"D/E" CE AND HARDCORE

1. APPLICABLE TO D/E COMPUTE ELEMENT ONLY.
2. BY-PASSES IDM AND LOADS SDM
3. TESTS THE STANDARD INSTRUCTION SET FOR THE D/E CE.
4. LOADED BY GO/NO-GO AND CONTAINS NO MONITOR.



BOOTSTRAP CONCEPT

DIAGNOSTICS ASSUMES THAT:

1. MINIMUM EQUIPMENT IS OPERATIONAL.

2. FLT's HAVE RUN ERROR FREE. ← NOT ALWAYS TRUE

3. THE LPSW INSTRUCTION WORKS AND CAN SET THE CONDITION CODE AND INSTRUCTION COUNTER.

4. FIRST ONE K (HEX) STORAGE IS OPERATIONAL.

BOOTSTRAP:

USE LPSW TO TEST AN INSTRUCTION, (LPSW) USE THIS INSTRUCTION TO ESTABLISH CERTAIN CONDITIONS, BRANCH ON THIS CONDITION TO TEST THE NEXT INSTRUCTION. AS EACH INSTRUCTION IS TESTED AND VERIFIED, IT IS ADDED TO THE GROUP THAT CAN BE USED TO VERIFY FOLLOWING INSTRUCTIONS.

ULTIMATE GOAL:

ESTABLISH AND VERIFY ENOUGH BASIC INSTRUCTIONS AND CORE STORAGE TO LOAD AND SUPPORT LARGER, MORE SOPHISTICATED, DIAGNOSTIC PROGRAMS. (SDM/MDM)

DIAGNOSTIC PROGRAM GO/NO-GO
(D0010)

1. PURPOSE:

   A. TEST 15 BASIC INSTRUCTIONS REQUIRED BY THE BASIC STORE HARDCORE OR IDM DIAGNOSTIC PROGRAMS.

   B. TEST THE ABILITY TO FORM AN EFFECTIVE ADDRESS.

   C. TEST THE ABILITY TO START INPUT/OUTPUT OPERATIONS.

2. DETAILS"

   A. STAND-ALONE, NON-RELOCATABLE.

   B. MUST BE FOLLOWED BY BASIC STORE.

   C. LOADS AND TRANSFERS CONTROL TO BASIC STORE.

   D. RESIDES IN PSA OF MACH (IOCE IPL) OR MAIN STORAGE (CE IPL) UNTIL OVERLAYED BY HIGHER ORDER DIAGNOSTIC PROGRAMS.

DIAGNOSTIC PROGRAM BASIC STORE

(D0020)

1. PURPOSE:

   A. TEST THE ABILITY TO STORE AND FETCH IN MACH (IOCE IPL) OR MAIN STORAGE (CE IPL).

   B. TEST THE ABILITY TO ADDRESS MACH OR MAIN STORAGE.

2. DETAILS:

   A. STAND-ALONE NON-RELOCATABLE.

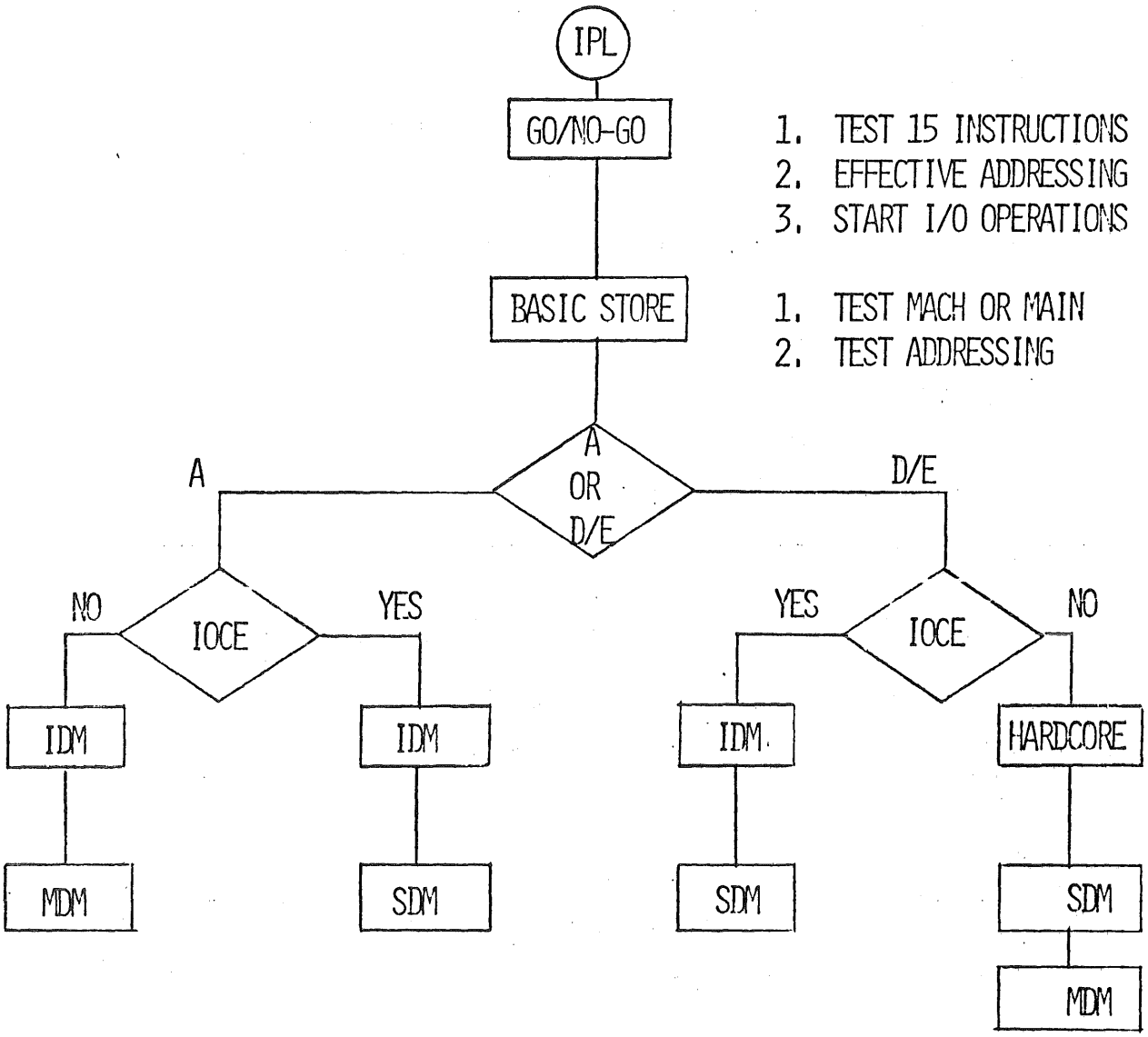
   B. LOADED BY GO/NO-GO.

   C. RETURNS CONTROL TO GO/NO-GO UPON SUCCESSFUL COMPLETION.

   D. PROVIDES FOR TESTING FROM ADDRESS 800 (HEX) THROUGH 20 K (HEX) MAIN STORAGE AND 800 (HEX) THROUGH 19 K (HEX) MACH STORAGE.

* NOTE: THE UPPER 1K (HEX) OF MACH STORAGE IS NOT TESTED BY BASIC STORE. THIS AREA IS RESERVED FOR I/O DEVICES AND IS CALLED THE UCW (UNIT CONTROL WORD) AREA.

HARDCORE OR IDM?



INITIAL DIAGNOSTIC MONITOR (IDM)

D0B01

1. PURPOSE:

   A. PROVIDE CONTROL FUNCTIONS REQUIRED TO RUN CPU BRING-UPS FOR THE A AND D MODEL IOCE's AND THE A MODEL CE.

   B. "A" IOCE SECTIONS D1000 THRU D1080.

   C. "D" IOCE SECTIONS D1000 THRU D1077.

   D. "A" CE SECTIONS D1150 THRU 11F0.

2. DETAILS:

   A. TESTS THE STANDARD INSTRUCTION SET.

   B. USES INSTRUCTIONS TESTED IN GO/NO-GO.

   C. USES ADDITIONAL STORAGE TESTED BY BASIC STORE.

3. LOADING:

   A. LOADS SDM FOR A AND D MODEL IOCE's AND MDM-A FOR THE A MODEL CE.

   B. BY-PASSED (NOT RUN) FOR D/E MODEL CE.

HARDCORE (D0040)

1. PURPOSE:

   HARDCORE TESTS THE INSTRUCTIONS (STANDARD INSTRUCTION SET) USED BY SDM.

2. DETAILS:

   A. STAND-ALONE PROGRAM WITH NO INPUT/OUTPUT CAPABILITY.

   B. ASSUMES THAT MOST FLT'S (CE ASSOCIATED) HAVE RUN ERROR FREE AND THAT GO/NO-GO, AND BASIC STORE PROGRAMS WERE RUN SUCCESSFULLY.

   C. USES INSTRUCTIONS AND STORAGE PREVIOUSLY TESTED. (BOOT-STRAP CONTINUATION.

3. LOADING:

   LOADED BY GO-NO-GO, AFTER BASIC STORE IS COMPLETED, WHEN THE ENVIRONMENT IS A D/E MODEL COMPUTE ELEMENT. APPLICABLE ONLY TO THE D/E SYSTEM COMPUTE ELEMENT.

SUBSYSTEM DIAGNOSTIC MONITOR

DØCØØ

1. PURPOSE:

   PROVIDES A FULL SET OF CONTROL FUNCTIONS TO SEQUENTIALLY TEST IN A SINGLE PROCESSOR ENVIRONMENT.

2. DETAILS:

   A. FOLLOWS IDM FOR AN A OR D IOCE IPL.

   B. FOLLOWS HARDCORE FOR A COMPUTE ELEMENT IPL D/E.

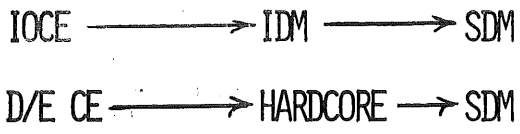
   C. MAJOR MONITOR RESIDENT, CAN COMMUNICATE VIA INPUT/OUTPUT MESSAGES.

   D. ENTERS WAIT STATE WHEN LOADED AND EXECUTES TASKS AS DIRECTED BY COMMAND.

   E. <u>CANNOT</u> BE EXECUTED ON THE "A" SYSTEM COMPUTE ELEMENT.

3. LOADING:

   LOADED BY IDM OR HARDCORE BASED ON THE IPL SOURCE.



MULTIPROCESSING DIAGNOSTIC MONITOR (MDM)

(DODOO AND DOD50)

A D/E

1. PURPOSE:

   PROVIDES A FULL SET OF CONTROL FUNCTIONS TO FULLY TEST A 9020 SYSTEM.

2. DETAILS:

   A. 9020 A ONLY (DODOO) ASSUMES GO/NO-GO, BASIC STORE AND IDM RUN WITHOUT ERROR (MDM-A).

   B. 9020 D/E ONLY (DOD50) ASSUMES GO/NO-GO, BASIC STORE HARDCORE AND SDM RUN WITHOUT ERROR (MDM-D/E).

   C. EMPLOYS MULTI-PROCESSING AND MULTI-PROGRAMMING TECHNIQUES TO PROVIDE TESTING CAPABILITY IN A TOTAL "SYSTEMS" ENVIRONMENT.

   D. PROVIDES THE VERSATILITY AND FLEXABILITY NEEDED TO ISOLATE "SYSTEMS" FAULTS.

3. LOADING:

   MDM IS LOADED BY IDM WHEN IN THE "A" ENVIRONMENT AND CE IPL IS EMPLOYED.

   MDM IS LOADED BY SDM, UPON COMMAND, WHEN OPERATION IS IS IN THE D/E ENVIRONMENT AND CE IPL IS EMPLOYED.

CRITERION 1

1. List the 4 general uses of the diagnostic programs.

2. Front panel testing, using customer engineering panels, allows the testing of:

   a. Systems.

   b. Elements/Devices

   c. Software

   d. Devices only.

   e. Elements only

3. What is the purpose of Fault Locating Tests (FLT's)?

4. What kind of testing is accomplished using the Diagnostic "SCOPE"?

5. At what environment is the diagnostic "SEVA" aimed.

6. Assume an "A" system environment, and an IOCE IPL, what will be the sequence of programs that will be executed?

7. In the following examples, cross out the diagnostic programs that will not be executed based on the source of the IPL.

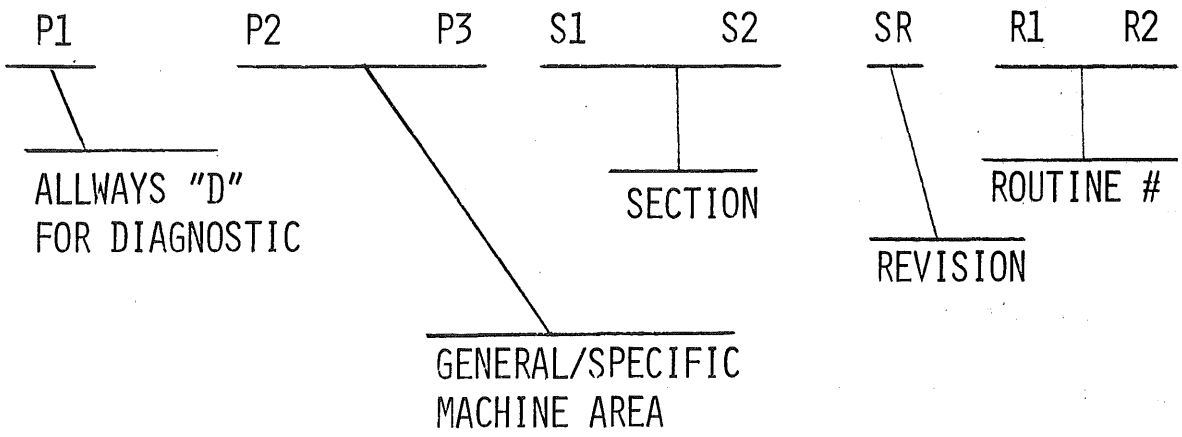
Source	System	Programs
IOCE	A	Go/No-Go, Basic Store, IDM, Hardcore, SDM, MDM
CE	A	Go/No-Go, Basic Store, IDM, Hardcore, SDM, MDM
IOCE	D/E	Go/No-Go, Basic Store, IDM, Hardcore, SDM, MDM
CE	D/E	Go/No-go, Basic Store, IDM, Hardcore, SDM, MDM

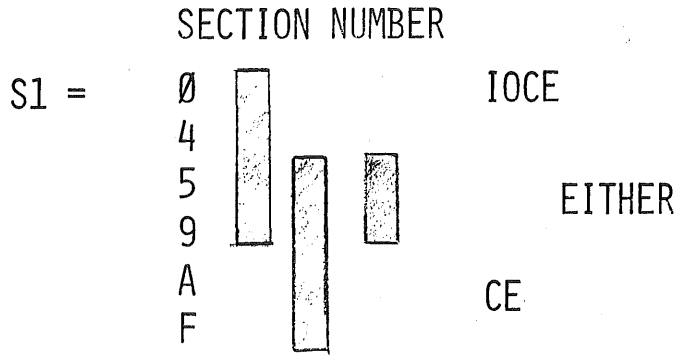
8. What is the difference in the Basic Store program in terms of an IOCE vs a CE IPL?

9. What is the sequence of programs on the tape or disk, irrespective of the source of the IPL?

10. What program is available to the D/E system that is not available for A system?

DIAGNOSTIC SECTION LABELING





IDENTITY PPPSSSAA 12312r12	NAME	CPU		MONITOR			System Model Only Multiprogram Op Intervention Section Sense Sw Additional Units	DESCRIPTION		LISTING
		IOCE	CE	IDM	SDM	MDM-D/E		Ref	Vol	Vol
D0000	IPL Card Deck Loader	X	X					DMMM	I	None
D0001	Utility Library Loader	X	X					DMMM	I	VI
D0010	Go/No-Go	X	X					DMMM	I	VI
D0020	Basic Storage Test	X	X					DMMM	I	VI
D0040	Hardcore		X					DMMM	I	VI
D0B01	Initial Diagnostic Monitor	X						DMMM	I	VI
D0C00	Subsystem Diagnostic Monitor	X	X					DMMM	I	VI
D0CF0	Storage Dump	X	X					DMMM	I	VI
D0D10	Formatted Logout	X			X			DMMM	I	VI
D0D50	Multiprocessing Diagnostic Monitor D/E		X					DMMM	I	VII
D0D60	Short Logout Formatter	X	X		X	X		DMMM	I	VII
D0D70	Formatted Logout		X		X	X		DMMM	I	VII
D1003	LA	X		X	X			1003	II	VIII
D1004	L	X		X	X			1003	II	VIII
D1005	ST	X		X	X			1003	II	VIII
D1006	A	X		X	X			1003	II	VIII
D1007	S, C	X		X	X			1003	II	VIII
D1008	CL	X		X	X			1003	II	VIII
D1009	N, O, X	X		X	X			1003	II	VIII
D100C	AL, SL	X		X	X			1003	II	VIII
D1010	LR Part 1	X		X	X			1010	II	VIII
D1011	LR Part 2	X		X	X			1010	II	VIII
D1012	LR Part 3	X		X	X			1010	II	VIII
D1013	LR Part 4	X		X	X			1010	II	VIII
D1014	AR	X		X	X			1010	II	VIII
D1015	SR, CR	X		X	X			1010	II	VIII
D1016	CLR	X		X	X			1010	II	VIII
D1017	NR	X		X	X			1010	II	VIII
D1018	OR	X		X	X			1010	II	VIII
D1019	XR	X		X	X			1010	II	VIII
D101A	LPR, LNR, LTR, LCR	X		X	X			1010	II	VIII
D101B	ALR, SLR	X		X	X			1010	II	VIII
D101F	BCR, BC	X		X	X			101F	II	IX
D1020	BLR, BAL	X		X	X			101F	II	IX
D1021	BCT, BCTR	X		X	X			101F	II	IX
D1022	BXH, BXLE	X		X	X			101F	II	IX
D1023	Branch Instructions	X		X	X			101F	II	IX
D1027	LH, STH, AH, SH, CH	X		X	X			1027	II	IX
D102A	SRL, SRA, SLL, SLA	X		X	X			102A	II	IX
D102D	TM	X		X	X			102D	II	IX
D102E	CLI	X		X	X			102D	II	IX
D102F	MVI	X		X	X			102D	II	IX

IDENTITY PPPSSSAA 12312r12	NAME	CPU		MONITOR			System Model Only Multiprogram Op Intervention Section Sense Sw Additional Units	DESCRIPTION		LISTING
		IOCE	CE	IDM	SDM	MDM-D/E		Ref	Vol	Vol
D1030	NI	X		X	X			102D	II	IX
D1031	QI	X		X	X			102D	II	IX
D1032	XI	X		X	X			102D	II	IX
D1037	STM	X		X	X			1037	II	IX
D1038	STM, LM	X		X	X			1037	II	IX
D103C	SVC, LPSW, SPM, SSM	X		X	X			103C	II	IX
D103F	MH	X		X	X			103F	II	IX
D1040	M	X		X	X			103F	II	IX
D1041	MR	X		X	X			103F	II	IX
D1042	D	X		X	X			103F	II	IX
D1043	DR	X		X	X			103F	II	IX
D1045	IC, STC	X		X	X			1045	II	IX
D1047	SRDL, SRDA, SLDL, SLDA	X		X	X			1047	II	IX
D104A	CLC	X		X	X			104A	II	X
D104B	CLC	X		X	X			104A	II	X
D104C	CLC, MVC	X		X	X			104A	II	X
D104D	NC	X		X	X			104A	II	X
D104E	OC	X		X	X			104A	II	X
D104F	XC	X		X	X			104A	II	X
D1050	MVO	X		X	X			104A	II	X
D1051	MVN	X		X	X			104A	II	X
D1052	MVZ	X		X	X			104A	II	X
D1053	MVW	X		X	X			1053	II	X
D105A	CVB, CVD	X		X	X			105A	II	X
D105C	TR	X		X	X			105A	II	X
D105D	TRT	X		X	X			105A	II	X
D105E	PACK, UNPK	X		X	X			105A	II	X
D105F	PACK, UNPK	X		X	X			105A	II	X
D1060	Boundary Test of NC, OC, XC, MVO, MVN, MVZ	X		X	X			1060	II	X
D1063	EX, Small Binary Set; Part 1	X		X	X			1063	II	X
D1064	EX, Small Binary Set; Part 2	X		X	X			1063	II	X
D1065	EX, Small Binary Set; Part 3	X		X	X			1063	II	X
D1066	EX, Standard Set; Part 1	X		X	X			1063	II	X
D1067	EX, Standard Set; Part 2	X		X	X			1063	II	X
D1068	LDA, LI, TS, WRD; Part 1	X		X	X			1068	II	X
D1069	LDA, LI, TS, WRD; Part 2	X		X	X			1068	II	X
D106B	Program Interrupts, Part 1	X		X	X			106B	II	XI
D106C	Program Interrupts, Part 2	X		X	X			106B	II	XI

IDENTITY	NAME	CPU		MONITOR						DESCRIPTION		LISTING
PPPSSSAA 12312r12		IOCE	CE	IDM	SDM	MDM-D/E	System Model Only	Multiprogram	Op Intervention Section Sense Sw Additional Units	Ref	Vol	Vol
D106D	Program Interrupts, Part 3	X		X	X					106B	II	XI
D106E	Operation Exceptions	X		X	X					106E	II	XI
D1071	EX, Program Interrupts; Part 1	X		X	X					1071	II	XI
D1072	EX, Program Interrupts; Part 2	X		X	X					1071	II	XI
D1075	Pair Instruction Scrambler	X		X	X					1075	II	XI
D1076	Diagnose Kernels, Part 1	X		X	X					1076	II	XI
D1077	Diagnose Kernels, Part 2	X		X	X					1076	II	XI
D1101	Basic CE Test, Part 1		X		X	X	M	S		1101	II	XII
D1102	Basic CE Test, Part 2		X		X	X	M	S		1101	II	XII
D1103	Basic CE Test, Part 3		X		X	X	M	S		1101	II	XII
D1108	Basic Diagnose and Logout		X		X	X	M	S		1108	II	XII
D1111	CEDA, Part 1		X		X	X	M	S		1111	II	XIII
D1112	CEDA, Part 2		X		X	X	M	S		1111	II	XIII
D1113	CEDA, Part 3		X		X	X	M	S		1111	II	XIII
D1114	CEDA, Part 4		X		X	X	M	S		1111	II	XIII
D1115	CEDA, Part 5		X		X	X	M	S		1111	II	XIII
D1151	LA		X		X	X	M			1151	II	XIV
D1152	L		X		X	X	M			1151	II	XIV
D1153	ST		X		X	X	M			1151	II	XIV
D1154	A		X		X	X	M			1151	II	XIV
D1155	S, C		X		X	X	M			1151	II	XIV
D1156	CL		X		X	X	M			1151	II	XIV
D1157	N, O, X		X		X	X	M			1151	II	XIV
D115A	AL, SL		X		X	X	M			1151	II	XIV
D115C	LR, Part 1		X		X	X	M			115C	II	XIV
D115D	LR, Part 2		X		X	X	M			115C	II	XIV
D115E	LR, Part 3		X		X	X	M			115C	II	XIV
D115F	LR, Part 4		X		X	X	M			115C	II	XIV
D1160	AR		X		X	X	M			115C	II	XIV
D1161	SR, CR		X		X	X	M			115C	II	XIV
D1162	CLR		X		X	X	M			115C	II	XIV
D1163	NR		X		X	X	M			115C	II	XIV
D1164	OR		X		X	X	M			115C	II	XIV
D1165	XR		X		X	X	M			115C	II	XIV
D1166	LPR, LNR, LTR, LCR		X		X	X	M			115C	II	XIV
D1167	ALR, SLR		X		X	X	M			115C	II	XIV
D1169	BCR, BC		X		X	X	M			1169	II	XV
D116A	BALR		X		X	X	M			1169	II	XV
D116B	BCT, BCTR		X		X	X	M			1169	II	XV
D116C	BXH, BXLE		X		X	X	M			1169	II	XV
D116D	Branch Instructions		X		X	X	M			1169	II	XV
D116F	LH, STH, AH, SH, CH		X		X	X	M			116F	II	XV

IDENTITY PPPSSSAA 12312r12	NAME	CPU		MONITOR			System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units	DESCRIPTION		LISTING
		IOCE	CE	IDM	SDM	MDM-D/E						Ref	Vol	Vol
D1171	SRL, SRA, SLL, SLA		X		X	X		M				1171	II	XV
D1173	TM		X		X	X		M				1173	II	XV
D1174	CLI		X		X	X		M				1173	II	XV
D1175	MVI		X		X	X		M				1173	II	XV
D1176	NI		X		X	X		M				1173	II	XV
D1177	OI		X		X	X		M				1173	II	XV
D1178	XI		X		X	X		M				1173	II	XV
D1179	TS		X		X	X		M				1179	II	XV
D117B	STM		X		X	X		M				117B	II	XV
D117C	STM, LM		X		X	X		M				117B	II	XV
D117E	SVC, LPSW, SPM, SSM		X		X	X						117E	II	XV
D1180	MH		X		X	X		M				1180	II	XV
D1181	M		X		X	X		M				1180	II	XV
D1182	MR		X		X	X						1180	II	XV
D1183	D		X		X	X		M				1180	II	XV
D1184	DR		X		X	X		M				1180	II	XV
D1186	SRDL, SRDA, SLDL, SLDA		X		X	X		M				1186	II	XVI
D118A	CLC, MVC		X		X	X		M				118A	II	XVI
D118B	NC		X		X	X		M				118A	II	XVI
D118C	OC		X		X	X		M				118A	II	XVI
D118D	XC		X		X	X		M				118A	II	XVI
D118E	MVO		X		X	X		M				118A	II	XVI
D118F	MVN		X		X	X		M				118A	II	XVI
D1190	MVZ		X		X	X		M				118A	II	XVI
D1191	MVW		X		X	X		M				1191	II	XVI
D1192	IC, STC, ISK, SSK		X		X	X		M				1192	II	XVI
D1196	CVD, CVB		X		X	X		M				1196	II	XVI
D1197	TR		X		X	X		M				1196	II	XVI
D1198	TRT		X		X	X		M				1196	II	XVI
D1199	PACK, UNPK; Part 1		X		X	X		M				1196	II	XVI
D119A	PACK, UNPK; Part 2		X		X	X		M				1196	II	XVI
D119B	Boundary Test of NC, OC, XC, MVN, MVZ, TR, TRT		X		X	X		M				1196	II	XVI
D119C	SPSB, LPSB, LI; Part 1		X		X	X						119C	II	XVI
D119D	SPSB, LPSB, LI; Part 2		X		X	X						119C	II	XVI
D11A2	LE, STE, LD, STD, CE, CD		X		X	X		M				11A2	II	XVI
D11A6	LER, CER, LDR, CDR, LTER		X		X	X		M				11A2	II	XVI
D11A9	LTDR, LCER, LCDR		X		X	X		M				11A2	II	XVI
D11AC	LPER, LPDR, LNER, LNDR		X		X	X		M				11A2	II	XVII
D11B0	AER, ADR, AE, AD		X		X	X		M				11A2	II	XVII
D11B4	AUR, AWR, AU, AW		X		X	X		M				11A2	II	XVII
D11B8	SER, SDR, SE, SD		X		X	X		M				11A2	II	XVII
D11BC	SUR, SWR, SU, SW		X		X	X		M				11A2	II	XVII
D11C0	HER, HDR		X		X	X		M				11A2	II	XVII

IDENTITY PPPSSSAA 12312r12	NAME	CPU IOCE	CPU CE	MONITOR IDM	MONITOR SDM	MONITOR MDM-D/E	System Model Only Multiprogram Op Intervention Section Sense Sw Additional Units	DESCRIPTION Ref	DESCRIPTION Vol	LISTING Vol
D11C2	MER, MDR, ME, MD		X		X	X	M	11A2	II	XVII
D11C6	DER, DDR, DE, DD		X		X	X	M	11A2	II	XVII
D11CA	Multiply and Divide Reliability		X		X	X	M	11A2	II	XVII
D11CD	AP, Part 1		X		X	X	M	11CD	II	XVII
D11CE	AP, Part 2		X		X	X	M	11CD	II	XVII
D11CF	SP		X		X	X	M	11CD	II	XVII
D11D0	CP		X		X	X	M	11CD	II	XVII
D11D1	ZAP		X		X	X	M	11CD	II	XVII
D11D3	MP, Part 1		X		X	X	M	11CD	II	XVII
D11D4	MP, Part 2		X		X	X	M	11CD	II	XVII
D11D5	DP, Part 1		X		X	X	M	11CD	II	XVII
D11D6	DP, Part 2		X		X	X	M	11CD	II	XVII
D11D7	ED		X		X	X	M	11CD	II	XVII
D11D8	EDMK		X		X	X	M	11CD	II	XVII
D11DA	EX, Small Binary Set; Part 1		X		X	X	M	11DA	II	XVIII
D11DB	EX, Small Binary Set; Part 2		X		X	X	M	11DA	II	XVIII
D11DC	EX, Small Binary Set; Part 3		X		X	X	M	11DA	II	XVIII
D11DD	EX, Standard Set; Part 1		X		X	X	M	11DA	II	XVIII
D11DE	EX, Standard Set; Part 2		X		X	X	M	11DA	II	XVIII
D11DF	EX, Floating Point Set; Part 1		X		X	X	M	11DA	II	XVIII
D11E0	EX, Floating Point Set; Part 2		X		X	X	M	11DA	II	XVIII
D11E1	EX, Decimal Set		X		X	X	M	11DA	II	XVIII
D11E4	Program Interrupts, Small Binary Set		X		X	X		11E4	II	XVIII
D11E5	Program Interrupts, Standard Set		X		X	X		11E4	II	XVIII
D11E6	Program Interrupts, Floating Point Set		X		X	X		11E4	II	XVIII
D11E7	Program Interrupts, Decimal Set		X		X	X		11E4	II	XVIII
D11E8	Program Interrupts, Suppression Completion		X		X	X		11E4	II	XVIII
D11E9	Operation Exception		X		X	X	M	11E9	II	XVIII
D11EB	Execute Pgm Irpt, Small Binary Set		X		X	X		11EB	II	XVIII
D11EC	Execute Pgm Irpt, Standard Set		X		X	X		11EB	II	XVIII

IDENTITY	NAME	CPU		MONITOR								DESCRIPTION		LISTING
							System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units			
PPPSSSAA 12312r12		IOCE	CE	IDM	SDM	MDM-D/E						Ref	Vol	Vol
D11ED	Execute Pgm Irpt, Floating Point Set		X		X	X						11EB	II	XVIII
D11EE	Execute Pgm Irpt, Decimal Set		X		X	X						11EB	II	XVIII
D13A0	Interval Timer		X		X	X			O			13A0	II	XVIII
D13A5	360/9020 Mode Differences of Operation		X		X	X				S		13A5	II	XVIII
D13B0	SPSB, LPSB, LI, SCON, IATR SATR, DLY, MVW		X		X	X			O			13B0	II	XVIII
D13BA	Diagnose, Scan-In, and Logout		X		X	X			O			13BA	II	XIX
D13C0	CSS, LC		X		X	X				S		13C0	II	XIX
D13C1	CVWL		X		X	X				S		13C1	II	XIX
D13C2	RPSB		X		X	X				S		13C2	II	XIX
D13C8	Interrupt Priority Test		X		X	X			O	S		13C8	II	XIX
D13CD	Random		X		X	X				S		13CD	II	XIX
D1401	Interval Timer	X			X				O			1401	II	XIX
D1403	DLY Instruction	X			X							1403	II	XIX
D1501	Diagnose Kernels, Part 3	X			X						A	1501	II	XIX
D1DA3	Direct Control		X		X	X			O	S		1DA3	II	XX
D2101	Local Storage	X			X							2101	II	XX
D22A0	Storage and Display Storage Diagnostic		X		X	X				S		22A0	II	XX
D22A4	Storage and Display Storage Error Checks		X		X	X				S		22A4	II	XX
D22AA	Storage and Display Storage Protection		X		X	X		M		S		22AA	II	XX
D2308	MACH-TO-SE Diagnostic	X			X					S	A	2308	II	XX
D24A0	DE/DG Interface Functions		X			X	E			S		24A0	II	XX
D2740	MACH Storage Diagnostic	X			X					S		2740	II	XX
D3051	Multiplexor Channel Functional, Part 1	X	X		X	X					A	3051	III	XXI
D3052	Multiplexor Channel Functional, Part 2	X	X		X	X					A	3051	III	XXI
D3053	Multiplexor Channel Functional, Part 3	X	X		X	X					A	3051	III	XXI
D3054	Multiplexor Channel Invalid Specifications	X	X		X	X					A	3054	III	XXI
D3055	Multiplexor Channel SPCI	X	X		X	X					A	3055	III	XXI
D3151	Selector Channel Functional, Part 1	X	X		X	X					A	3151	III	XXI
D3152	Selector Channel Functional, Part 2	X	X		X	X					A	3151	III	XXI

IDENTITY PPPSSSAA 12312r12	NAME	CPU IOCE	CPU CE	MONITOR IDM	MONITOR SDM	MONITOR MDM-D/E	System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units	DESCRIPTION Ref	DESCRIPTION Vol	LISTING Vol
D3153	Selector Channel Functional, Part 3	X	X		X	X					A	3151	III	XXI
D3154	Selector Channel Invalid Specifications	X	X		X	X					A	3154	III	XXI
D3155	Selector Channel SPCI	X	X		X	X					A	3055	III	XXI
D4050	2400/2800 Tape; Sense, Read, Write	X	X		X	X				S	A	4050	III	XXII
D4051	2400/2800 Tape; Backspace, Forward Space	X	X		X	X				S	A	4050	III	XXII
D4052	2400/2800 Tape, Characters as Tape Marks	X	X		X	X				S	A	4050	III	XXII
D4053	2400/2800 Tape; TIO, Count 5, CU Busy	X	X		X	X				S	A	4050	III	XXII
D4054	2400/2800 Tape; SIO, TIO, Clear Status	X	X		X	X				S	A	4050	III	XXII
D4055	2400/2800 Tape; Flags, CAW Valid and Invalid	X	X		X	X				S	A	4050	III	XXII
D4056	2400/2800 Tape; SIO, HIO	X	X		X	X				S	A	4050	III	XXII
D4057	2400/2800 Tape; Data Chaining	X	X		X	X				S	A	4050	III	XXII
D4058	2400/2800 Tape; 7 Track Mode Density	X	X		X	X				S	A	4050	III	XXII
D4059	2400/2800 Tape; 7 Track Mode	X	X		X	X				S	A	4050	III	XXII
D405A	2400/2800 Tape; Translator	X	X		X	X				S	A	4050	III	XXII
D405B	2400/2800 Tape, Data Converter	X	X		X	X				S	A	4050	III	XXII
D405C	2400/2800 Tape, Data Converter	X	X		X	X				S	A	4050	III	XXII
D405D	2400/2800 Tape, Data Converter Set	X	X		X	X				S	A	4050	III	XXII
D405E	2400/2800 Tape; Rewind, Unload, End of Tape	X	X		X	X			O	S	A	4050	III	XXII
D405F	2400/2800 Tape, Inter-changeability	X	X		X	X			O	S	A	4050	III	XXII
D4060	Tape Inter-Block Gap Tests	X	X		X	X				S	A	4060	III	XXII
D46A0	TCU Dual Interface		X			X				S	A	46A0	III	XXII
D6251	2540 Punch	X	X		X	X			O	S	A	6251	III	XXIII
D6261	2540 Reader, Part 1	X	X		X	X			O	S	A	6261	III	XXIII
D6262	2540 Reader, Part 2	X	X		X	X			O	S	A	6261	III	XXIII
D6351	Printer Functional, Part 1	X	X		X	X		M	O	S	A	6351	III	XXIII
D6352	Printer Functional, Part 2	X	X		X	X		M		S	A	6351	III	XXIII
D6353	Printer Functional, Part 3	X	X		X	X		M		S	A	6351	III	XXIII
D6354	Printer Ripple Print Test	X	X		X	X		M		S	A	6354	III	XXIII

IDENTITY PPPSSSAA 12312r12	NAME	CPU IOCE	CPU CE	MONITOR IDM	MONITOR SDM	MONITOR MDM-D/E	System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units	DESCRIPTION Ref	DESCRIPTION Vol	LISTING Vol
D6355	Printer Functional, Part 4	X	X		X	X		M	O	S	A	6355	III	XXIII
D6356	Printer Carriage	X	X		X	X		M	O	S	A	6356	III	XXIII
D6651	1052, Basic Operation and Write Tests	X	X		X	X		M	O	S	A	6651	III	XXIII
D6652	1052, Mechanical Test	X	X		X	X		M	O	S	A	6651	III	XXIII
D6653	1053, Read Test	X	X		X	X		M	O	S	A	6651	III	XXIII
D6A51	2821/2540 Channel Register Test	X	X		X	X				S	A	6A51	III	XXIII
D6A52	2821/2540 Control Program	X	X		X	X				S	A	6A52	III	XXIII
D6A53	2821/2540 Buffer Addressing Test	X	X		X	X				S	A	6A53	III	XXIII
D6A54	2821/1403 Print Buffer	X	X		X	X				S	A	6A54	III	XXIII
D6A55	2821/1403 UCS Buffer	X	X		X	X				S	A	6A54	III	XXIII
D6A56	2821/1403 Print Buffer Data Reg FLT	X	X		X	X				S	A	6A54	III	XXIII
D6A57	2821/1403 UCB Data Reg FLT	X	X		X	X				S	A	6A54	III	XXIII
D6A58	2821/1403 UCB Restore	X	X		X	X				S	A	6A54	III	XXIII
D6AA0	2821 Dual Interface		X			X				S	A	6AA0	III	XXIII
D6CA4	7265-02 System Console		X			X	D		O	S	A	6CA4	IV	XXIII
D6CA6	7265-03 Configuration Console		X		X	X	E		O	S	A	6CA6	IV	XXIII
D9051	Reconfiguration Cntl Unit	X	X		X	X	E	M		S	A	9051	IV	XXIV
DA051	Channel-to-Channel Adapter	X	X		X	X					A	A051	IV	XXIV
DB051	2701 DAU, Part 1	X	X		X	X	E			S	A	B051	IV	XXIV
DB052	2701 DAU, Part 2	X	X		X	X	E			S	A	B051	IV	XXIV
DB0A1	2701 DAU Two Proc Switch		X			X	E		O	S	A	B0A1	IV	XXIV
DCC51-00	PAM, Control Section	X	X		X	X	D				A	CC51	IV	XXV
DCC51-02	Adapter Common Test	X	X		X	X	D				A	CC51	IV	XXV
DCC51-04	GPO Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-06	GPI Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-08	RVDP Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-09	CD Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-0A	INTI Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-0C	INTO Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-0E	TTYLL Adapter, Read	X	X		X	X	D				A	CC51	IV	XXV
DCC51-0F	TTYLL Adapter, Write	X	X		X	X	D				A	CC51	IV	XXV
DCC51-10	1052 Adapter	X	X		X	X	D				A	CC51	IV	XXV
DCC51-12	FDEP Adapter, Part 1	X	X		X	X	D				A	CC51	IV	XXV
DCC51-13	FDEP Adapter, Part 2	X	X		X	X	D				A	CC51	IV	XXV
DCC51-14	PAM Common Test, Part 1	X	X		X	X	D				A	CC51	IV	XXV

IDENTITY	NAME	CPU		MONITOR									DESCRIPTION		LISTING
		IOCE	CE	IDM	SDM	MDM-D/E	System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units		Ref	Vol	Vol
PPPSSSAA 12312r12															
DCC51-15	PAM Common Test, Part 2	X	X		X	X	D				A		CC51	IV	XXV
DCC51-16	BP Adapter	X	X		X	X	D				A		CC51	IV	XXV
DCC61-00	FSP/FSPCU, Control Section	X	X		X	X	D				A		CC61	IV	XXVI
DCC61-01	Automatic Functions	X	X		X	X	D			S	A		CC61	IV	XXVI
DCC61-02	Timing	X	X		X	X	D		O		A		CC61	IV	XXVI
DCC61-03	Manual Functions	X	X		X	X	D			S	A		CCA0	IV	XXVI
DCCA0	PAM Dual Interface		X			X	D						D6A2	V	XXVI
DD6A2	DAR and DAR Mask Register		X			X			O				D8A0	V	XXVI
DD8A0-00	Configuration, Control Section		X			X				S	A		D8A0	V	XXVI
DD8A0-01	Overlays		X			X							D9A0	V	XXVII
DD9A0	ATR		X			X			O	S	A		DDA1	V	XXVII
DDDA1	IOCE Processor Test, CE Control		X			X		M	O	S			DDA1	V	XXVII
DDDA2	IOCE Processor Test, IOCE Control	X						M					E0A3	V	XXVII
DE0A3	SEVA Control Section		X			X				S			E0B2	V	XXVII
DE0B2	SEVA SE Random		X			X		M					E0B6	V	XXVII
DE0B6	SEVA 1052		X			X		M		S	A		E0B8	V	XXVII
DE0B8	SEVA Card Reader/Punch		X			X		M			A		E0C1	V	XXVIII
DE0C1	SEVA CE Super Scramble		X			X		M		S			E0C3	V	XXVIII
DE0C3	SEVA Read/Write Direct Data		X			X		M			A		E0C5	V	XXVIII
DE0C5	SEVA ELC Generate and Receive		X			X		M					E0C7	V	XXVIII
DE0C7	SEVA Acceptance Automatic Reconfig Demonstration		X			X		M	O		A		E0C8	V	XXVIII
DE0C8	SEVA Channel-to-Channel Adapter		X			X		M		S			E0C9	V	XXVIII
DE0C9	SEVA CE Random		X			X		M					E1B3	V	XXVIII
DE1B3	SEVA PAM 1		X			X	D	M			A		E1B5	V	XXVIII
DE1B5	SEVA IOCE Processor 1		X			X		M					E1C4	V	XXVIII
DE1C4	SEVA Sel Chan, TCU 1, and Tapes		X			X		M		S	A		E1C6	V	XXIX
DE1C6	SEVA RCU and DAU (IOCE 1)					X	E	M			A		E1C7	V	XXIX
DE1C7	SEVA Printer 1		X			X		M			A		E1CA	V	XXIX
DE1CA	SEVA DE 1		X			X		M					E1B3	V	XXIX
DE2B3	SEVA PAM 2		X			X	D	M			A		E1B5	V	XXIX
DE2B5	SEVA IOCE Processor 2		X			X		M					E1C4	V	XXIX
DE2C4	SEVA Sel Chan, TCU 2, and Tapes		X			X		M		S	A		E1C6	V	XXIX
DE2C6	SEVA RCU and DAU (IOCE 2)					X	E	M			A		E1C7	V	XXIX
DE2C7	SEVA Printer 2		X			X		M			A		E1CA	V	XXIX
DE2CA	SEVA DE 2		X			X	E	M			A		E1CA	V	XXIX

IDENTITY	NAME	CPU		MONITOR								DESCRIPTION		LISTING
PPPSSSAA 12312r12		IOCE	CE	IDM	SDM	MDM-D/E	System Model Only	Multiprogram	Op Intervention	Section Sense Sw	Additional Units	Ref	Vol	Vol
DE3B3	SEVA PAM 3		X			X	D	M			A	E1B3	V	XXIX
DE3B5	SEVA IOCE Processor 3		X			X		M				E1B5	V	XXX
DE3C4	SEVA Sel Chan, TCU 3, and Tapes		X			X		M		S	A	E1C4	V	XXX
DE3CA	SEVA DE 3		X			X	E	M			A	E1CA	V	XXX
DE4CA	SEVA DE 4		X			X	E	M			A	E1CA	V	XXX
DE5CA	SEVA DE 5		X			X	E	M			A	E1CA	V	XXX
DF0A1	Safe Store Tests (Acceptance Only)		X									F0A1	V	XXX
DF0B0-00	Computing Time Adjustment Factor (Acceptance Only)		X			X		M				F0B0	V	XXX
DF0B0-01	Time Sample Problem 1		X			X						F0B0	V	XXX
DF0B0-02	Time Sample Problem 2		X			X						F0B0	V	XXX
DF0B0-03	Time Sample Problem 3		X			X						F0B0	V	XXX
DF0B0-04	Time Sample Problem 4		X			X						F0B0	V	XXX
DF0B0-05	Time Sample Problem 5		X			X						F0B0	V	XXX
DF0B0-06	Time Sample Problem 6		X			X						F0B0	V	XXX
DF0B0-07	Time Sample Problem 7		X			X						F0B0	V	XXX
DF0B0-08	Time Sample Problem 8		X			X						F0B0	V	XXX
DF0C0	Display Instr Performance Test (Acceptance Only)		X			X	E				A	F0C0	V	XXX
DFFFF	Dummy Section	X	X		X	X						DMMM	1	None

LAST PAGE

CRITERION 2

GIVEN THE FOLLOWING SECTION LABEL:

D3151001

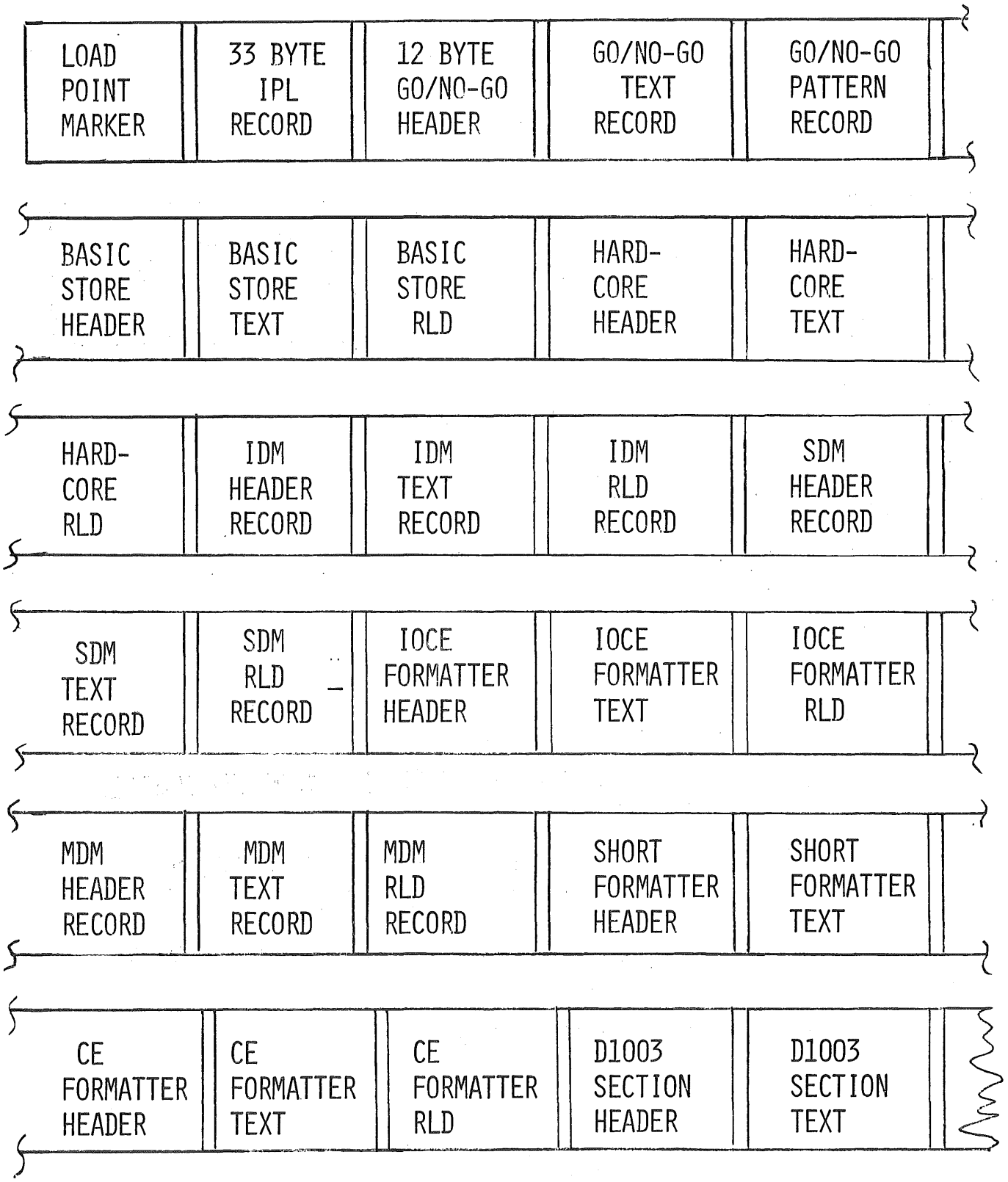
ANSWER THESE QUESTIONS.

1. WHAT KIND OF TEST IS THIS?
2. WHICH CPU CAN EXECUTE THIS TEST? (CE/IOCE)
3. WHICH CHANNEL IS BEING TESTED? (MULTIPLEXOR/SELECTOR)
4. WHAT IS THE REVISION LEVEL?
5. WHAT IS THE ROUTINE NUMBER?

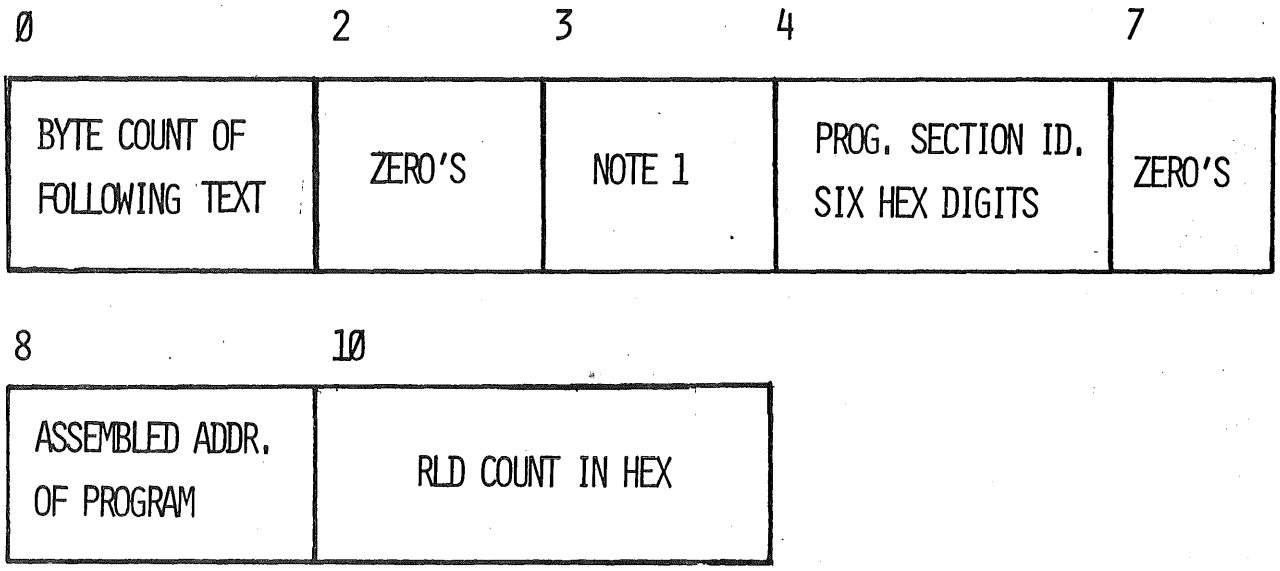
PRACTICE PROBLEMS: ANSWER QUESTION 1-5 ABOVE FOR THE FOLLOWING SECTION LABELS.

1. D1003025
2. D2008104

DIAGNOSTIC LIBRARY TAPE FORMAT



HEADER RECORD FORMAT



NOTE 1 BYTE # BREAKDOWN

BITS 0-3 NUMBER OF 1K HEX ADDITIONAL BLOCKS OF CORE REQUIRED BY DIAGNOSTIC PROGRAM.

BIT 4 EXCLUSIVE CPU BIT. IF A 1 SECTION CANNOT RUN IN A MULTIPROGRAM SITUATION. (ONE CE ONLY)

BIT 5 EXCLUSIVE SYSTEM BIT. IF A 1 THE SYSTEM IS NEEDED IN IT'S ENTIRETY BY THE SECTION.

BITS 6-7 RECORD IDENTIFICATION

00 = TEXT RECORD
01 = HEADER RECORD
10 = OVERLAY SECTION HEADER
11 = RLD RECORD

IPL PROCESS (DIAGNOSTIC TAPE)

1. PRESS LOAD PUSHBUTTON.

2. HARDWARE BUILDS A CCW TO READ 24 BYTES OF DATA FROM DEVICE IN LOAD UNIT SWITCHES. THIS DATA IS STORED STARTING AT ADDRESS ZERO (Ø).

3. CHANNEL END/DEVICE END IS GENERATED WHEN TAPE REACHES THE END OF THE 33 BYTE IPL RECORD.

4. THIS CAUSES HARDWARE TO EXECUTE CCW1 AT ADDRESS X'8'.

   A. CCW1 IS A READ OPERATION WITH CHAIN CMD FLAG SET.

   B. READS GNG HEADER RECORD (12 BYTES IN LENGTH).

      1. 12 BYTES OF DATA STORED STARTING AT ADDRESS X'16'. ADDRESS X'16' IS THE BYTE COUNT FOR CCW2.

      2. THE FIRST TWO BYTES OF HEADER RECORD CONTAIN BYTE COUNT OF TEXT RECORD.

3. THIS ACTION HAS MODIFIED CCW2 TO REFLECT THE BYTE COUNT OF THE GNG TEXT RECORD.

4. CCW1 IS CMD CHAINED TO CCW2.

C. CCW2 IS A READ OPERATION WITH NO CHAINING.

1. GNG TEXT RECORD IS READ FROM TAPE AND STORED STARTING AT ADDRESS X'8'.

2. GNG TEXT RECORD NOW OVERLAYS CCW1 AND CCW2.

5. I/O INTERRUPT (CHN END/DEVICE END) CAUSES HARDWARE TO LOAD IPSW AND MAKE IT CURRENT SINCE CCW CHAINING IS BROKEN.

1. INSTRUCTION ADDRESS OF IPSW IS ADDRESS OF FIRST EXECUTABLE INSTRUCTION.

2. THE GNG PROGRAM IS NOW BEING EXECUTED.

43458

SUBSYSTEM DIAGNOSTIC MONITOR AND MULTI-PROCESSING DIAGNOSTIC MONITOR

For example, the certifier could run the entire series of diagnostics, additional tests, or the defined minimum subset. Such a decision is allowable in the current guidelines for hardware certification.

(3) External Non-Automation Hardware Systems. En route ARTCC radar and beacon hardware and communication hardware not included in the automation subsystem, are certified in accordance with Order 6000.15A guidelines.

(4) Element and Equipment Level. Element and equipment certification encompasses the certification of the major CCC, CDC and DCC elements/equipment. This level also falls under the basic provisions of Order 6000.15A.

d. Certification Responsibility.

(1) General.

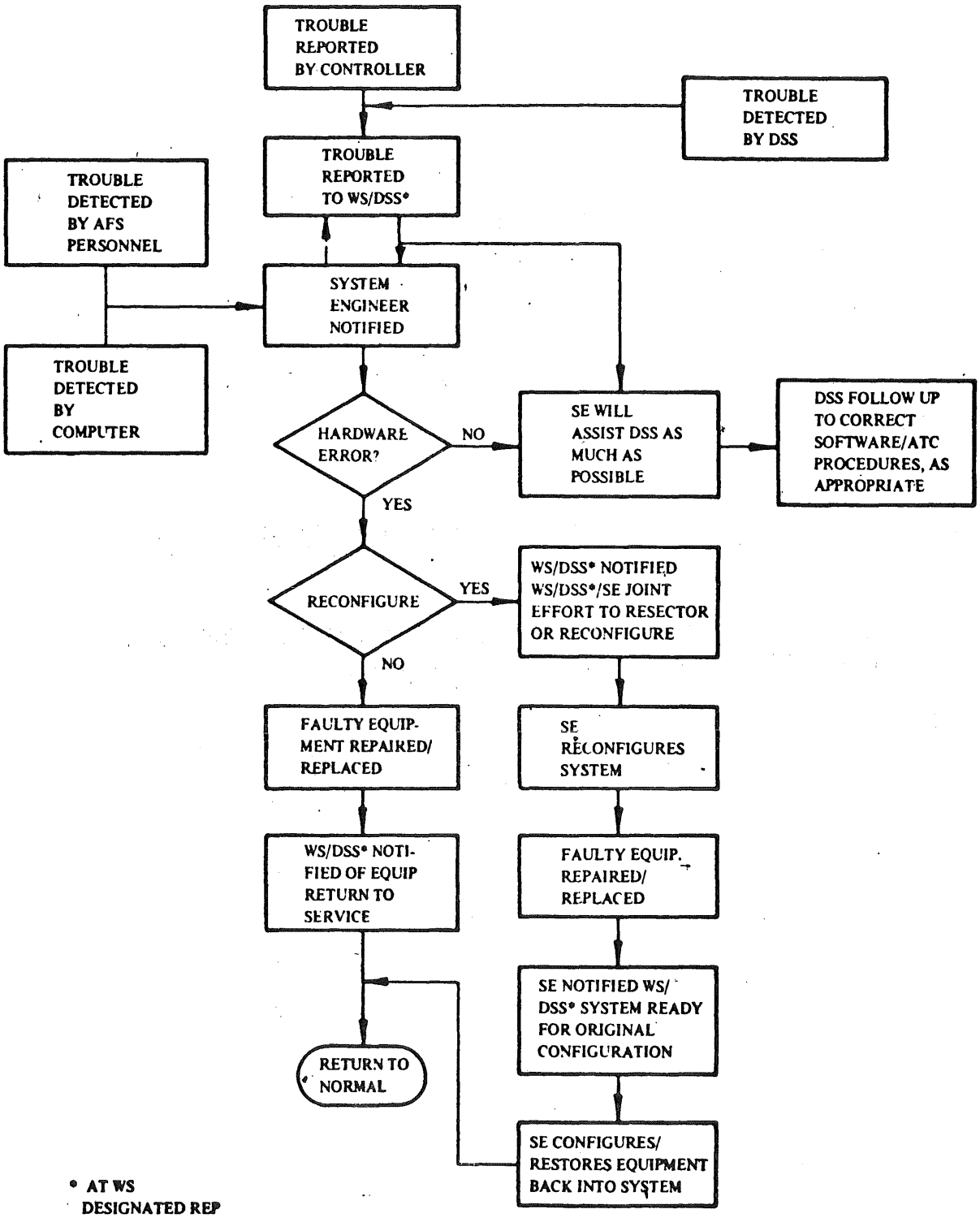
General certification authority (responsibility) will be assigned to appropriate technical personnel who hold certification credentials granted under the provisions of Order 3400.3D or subsequent versions of the Airway Facilities Maintenance Personnel Certification Program Handbook. Certification authority will be assigned to those who are responsible for the maintenance function within an assigned job category and who, in the judgement of the sector manager, possess the technical knowledge and skills to certify the operational status of the system, subsystem, or equipment. With few exceptions, NAS certification authority will parallel the system structure as described in NAS-MD-109 in terms of organizational structure and in accordance with the most current version of Orders 1100.121A, Management of Air Traffic Control Automation Systems and 1100.127A, Airway Facilities Sector Configuration.

(2) Certification Responsibilities.

(a) Service Level. Certification responsibility at this level is assigned to the system engineer (SE).

(b) System Level. Certification of the services provided by the CCC/DCC and CDC systems are assigned to CCC/DCC, or display channel technician.

(c) Element/Equipment Level. Appropriate CCC/DCC, communication, peripheral device, display channel, or remote site technicians are responsible for certifying the elements and equipment they normally maintain. *



System Fault Procedures Flow Diagram.

SDM/MDM MONITOR

INPUT MESSAGES

OBJECTIVES:

A. DEFINE THE FORMAT OF EACH INPUT MESSAGE.

B. TYPE A SERIES OF MESSAGES TO THE MONITOR THAT WILL CAUSE IT TO EXECUTE A LOAD REQUEST.

231. SUBSYSTEM

Item	Reference Paragraph	Standard	Initial Tolerance	Operating Tolerance
a. Output Data Rate	*			
★ (1) Sequential Mode		14.9 characters/sec	± 0.3 character/sec	± 0.5 character/sec
(2) Simultaneous Mode		14.9 characters/sec	± 0.3 character/sec	± 0.5 character/sec ★
b. Input Data Rate		Operator limited	Operator limited	Operator limited
c. Error Rate		Less than 1 error in 128K characters transmitted	Not more than 3 errors in 128K characters transmitted	Not more than 5 errors in 128K characters transmitted

*1052 I/O Typewriter Subprogram (D76A11) User's Manual

232. PRINTER-KEYBOARD ADAPTER

Use applicable instruction book standards and tolerances.

233. PRINTER KEYBOARD

Use applicable instruction book standards and tolerances.

234. – 239. RESERVED

S8	Overvoltage Check	6 months
S9	Thermal Checks	6 months
S10	Undervoltage Check	6 months

e. 7251 Storage Element

(1) 7251-04, 08

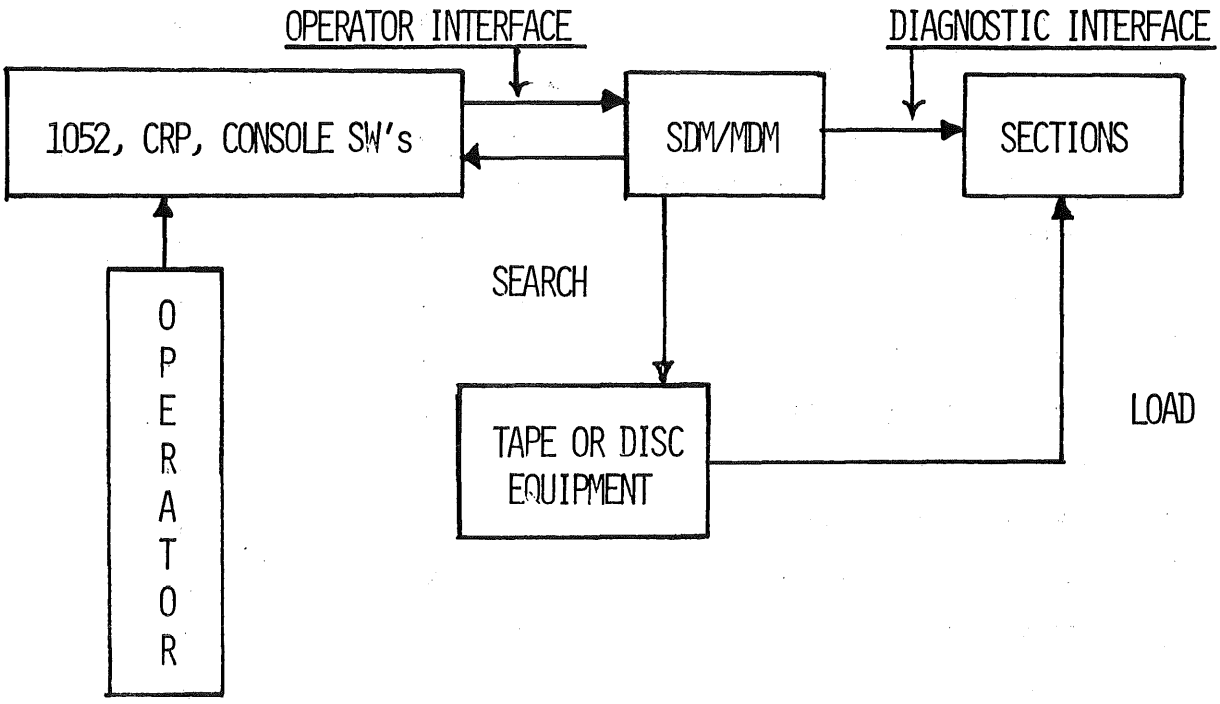
Code	Task	Frequency
T1	Diagnostics	2 weeks
B1	Bias Diagnostics	2 months
Q1	Battery Check	3 months
Q2	Filters and Fans. Clean floor under SE	3 months
S1	Strobe and Timing	6 months
S2	Shmoo Check	6 months
S3	Power Supply Voltage and Ripple	6 months

(2) 7251-09

Code	Task	Frequency
M1	Indicator Test	Monthly
M2	Operational Limits Check Routine (Shmoo)	Monthly
B1	Scope matrix switch driver output	2 months
Q1	Remove and clean or replace the air filters	3 months
Q2	Check blowers and fans	3 months
Q3	Check seating of all cards, cable connectors, and array-terminating-resistor cards	3 months
S1	Check and as required tighten electrical connections (power supplies, distribution	6 months
S2	Check BSM array temperatures	6 months
S3	Check cycling of green indicator light for SP array heater	6 months
S4	Check and as required adjust all logic voltages	6 months
S5	Check all storage protect arrays	6 months
S6	Check all storages on system with D22A0 Shmoo routines 3 passes	6 months
S7	Run the complete D22AO and D22AA diagnostics	6 months

SDM/MDM

INTERFACING



OPERATOR INTERFACE:

ALLOWS THE INPUT MESSAGES TO SPECIFY TO THE MONITOR (SDM/MDM) WHICH SECTION(S) ARE TO BE LOADED, EXECUTED, OPTIONS DESIRED OR REQUIRED AND CONTROL PARAMETERS.

DIAGNOSTIC INTERFACE:

PROVIDES THE COMMUNICATIONS LINK BETWEEN THE SPECIFIED PROGRAM SECTIONS AND THE MONITOR (SDM/MDM).

TABLE 35. INPUT MESSAGE TABLE

Input Msg.	Function	Used by SDM	Used by MDM	Msgs. Required	*Msg. Entry
A	Add Unit to Monitor Tables	X	X	X	S
B	Begin Job	X	X	X	A
C	Cycle Section or Routine	X	X		A
D	Define Storage for SE Programs	X	X		A
E	Enter Data into Storage	X	X		A
F	Free the Cycling Selection, Routine, or Task	X	X		A
H	Halt Section or Task Execution	X	X		A
I	Initialize	X	X		AB
K	Read Another Card		X		AB
L	Load Test Sections into Storage	X	X	X	
M	Print Monitor Tables	X	X		AB
N	Negate Pending Load Message		X		A
O	Operator Intervention Desired	X	X		A
P	Print Cycle Count	X	X		A
Q	Free Form Input		X		A
S	Set Sense Switches	X	X		S
T	Type Out Contents of Core	X	X		AB
U	Unit and System Definition	X	X		B
V	Verify Preceding Msgs. Start Loading		X	X	A
W	Withdraw Unit from Monitor Table	X	X		B
Z	Direct Following Msgs. to specific CE or SE		X		B
1	Read cards until a B/ is encountered	X	X		AB

*Msg. Entry Code
A = after load message
B = prior to load message
AB = either before or after load message
S = special case – see details under appropriate input message.

MESSAGE CHARACTERISTICS

(SDM/MDM)

1. ALL INPUT MESSAGES MUST BEGIN WITH A ONE LETTER VERB (ALPHA) A THROUGH Z.

2. EACH INPUT MESSAGE MUST END WITH THE CHARACTER (/) SLANT BAR. FAILURE TO OBSERVE THIS RULE RESULTS IN AN OUTPUT MESSAGE FROM THE MONITOR "RPM." "REPEAT MESSAGE"

3. PERIODS (.) AND COMMAS (,) ARE USED IN SOME INPUT MESSAGES AS DELINEATORS.

4. INPUT MESSAGES FROM THE 1052 KEYBOARD MAY BE IN UPPER CASE OR LOWER CASE, WITH BLANKS BEING IGNORED.

5. MAXIMUM INPUT CHARACTERS ARE 80 FOR SDM AND 160 FOR MDM FOR A SINGLE ENTRY.

6. MULTIPLE MESSAGE TYPES, WITH APPROPRIATE DELINEATORS, MAY BE INPUT PROVIDING THE PROPER SEQUENCE AND VALIDITY ARE CONSIDERED.

7. MESSAGES MAY BE CANCELLED IN TWO WAYS:

   (A) DEPRESS CANCELL BUTTON - ENTIRE MESSAGE IS CANCELLED

   (B) @ CANCELL A SINGLE CHARACTER FOR EACH @ ENTERED

USE OF TAPE OR DISK DIAGNOSTICS

PROCEDURE:

1. CONFIGURE SYSTEM (MANUALLY-NAS-NOSS)
2. READY ALL INPUT/OUTPUT DEVICES TO BE USED.
3. MOUNT DIAGNOSTIC TAPE OR DISK FILE, AS APPROPRIATE.
4. SELECT LOADING DEVICE, STORAGE IN THE LOAD UNIT SWITCHES (CE/IOCE) AND IPL THE SYSTEM.
5. STAND ALONE PROGRAMS EXECUTE AND IF NO ERROR IS ENCOUNTERED SDM IS LOADED AND BECOMES RESIDENT.
6. INDICATIONS OF A SUCCESSFUL SDM LOAD ARE:
   A. IOCE IPL, WAIT LIGHT ON, INSTRUCTION COUNTER = X'02'.
   B. CE IPL, WAIT LIGHT ON, INSTRUCTION COUNTER =X'A'.
7. PRESS 1052 REQUEST PUSH BUTTON, SDM MONITOR RESPONDS ON 1052:

   SDM REVISION N READY
   ENTER SYSTEM ID
   REPLY EITHER A, D, OR E

8. RESPOND TO ABOVE OUTPUT MESSAGE BASED ON THE SYSTEM IN USE.
9. SDM MONITOR IS READY TO ACCEPT INPUT MESSAGES TO ACCOMPLISH SPECIFIC DIAGNOSTIC TASKS.

SDM/MDM INPUT MESSAGE CATEGORIES

1. SYSTEM DEFINITION:

   A. USED TO DEFINE, TO THE MONITOR, THOSE ELEMENTS/DEVICES FOR USE BY THE MONITOR OR FOR INCLUDING THOSE EQUIPMENTS THAT ARE TO BE TESTED.

   B. EXAMPLES: ADD (A), DEFINE STORAGE (D), DEFINE PAM (G) , DEFINE SYSTEM (U), AND WITHDRAW (W).

2. TASK REQUESTS:

   A. USED TO REQUEST SPECIFIC TASKS TO BE ACCOMPLISHED BY THE MONITOR. REQUESTS ARE MADE VIA THE OPERATOR INTERFACE.

   B. EXAMPLES: LOAD (L), PRINT MONITOR TABLES (M), PRINT CYCLE COUNT (P), TYPE OUT (T).

3. CONTROL:

   A. USED TO ESTABLISH PARAMETERS OVER WHICH THE OPERATOR HAS CONTROL (OPTIONS).

   B. EXAMPLES: BEGIN (B), CYCLE (C), ENTER DATA (E), FREE (F), HALT (H), AND INITILIZE (I).

DEFINE SYSTEM ("U") MESSAGE

1. PURPOSE:

USED TO DEFINE THE ENTIRE SYSTEM OR SUBSYSTEM AVAILABLE FOR USE BY THE MONITOR (SDM OR MDM). THE MONITOR'S UNIT DEFINITION TABLE IS ALTERED.

2. USE:

THE "U" MESSAGE FINDS ITS MOST USEFUL APPLICATION UNDER SDM/MDM TO DEFINE MULTIPLE SYSTEMS WITH ONE INPUT MESSAGE.

3. ELEMENTS/DEVICES ARE ELIGIBLE FOR DEFINITION, AND ALL I/O DEVICES TO BE USED BY THE MONITOR MUST BE INCLUDED, EXCEPT THOSE DEFINED VIA INTERRUPTS IN THE LOADING OR INITILIZATION PROCESS.

"U" MESSAGE EXAMPLES

1. SDM VIA IOCE IPL (SUBSYSTEM)

   U33,41,4,63,3,C3,66/

2. SDM VIA CE IPL (SYSTEM)

   U11,21,31,41,0,1,2,3,63,1,66,6C,C1,66/

3. MDM MULTIPLE ("DUPLEX") SYSTEM

   U11,21,31,41,1,2,42,0,1,3,62,63,1,66,91,12,22,24,32,43,1,2,
   C1,66/

SYMBOLIC ADDRESSING

"U" MESSAGE EXAMPLE

U11.21.31.41,1,2.42,0,1,3.62.63,1.66.91.12

SECOND CE= START OF NEXT SYSTEM

APPOOOCUU/ MESSAGE	APP/MESSAGE AND U-MESSAGE	UNIT IDENTIFICATION
-	1X	CE X
-	2X	SE X
-	3X	IOCE X
40	4X, Y,---,Y	TCU X WITH ATTACHED TAPE DRIVES OF DEVICE ADDRESSES Y,---, & Y.
4D (9020A)		CHANNEL TO CHANNEL ADAPTER
-	5X	DE X
62	62	2540 CARD READER
63	63 (9020A)	1403 PRINTER
63	63,Y (9020 D/E)	1403 PRINTER WHERE Y (1, OR 2) IS DEFINED BY THE POSITION OF THE PRINTER IN THE MASTER UDT.
66	66	1052 PRINTER KEYBOARD
6B	6B	2540 CARD PUNCH
6C	6C	CONSOLE
80	8X,Y---,Y	DASF X WITH DSU'S OF DEVICE ADDRESSES Y,---, AND Y.
90	9X	RCU X. DEFINE NONE OR ONE/IOCE.
A0	AX 9020 D/E	CHANNEL TO CHANNEL ADAPTER X.
B0	BX	DAU X.
CC	CX	PAM X. DEFINE NONE, 1 OR 2 PER IOCE

"U" MESSAGE FORMATS

FORMATS	COMMENTS
UPX.---.4X,Y---,Y.---.63,Y.---/	SEE EXAMPLES
UASN.PX.---(AS ABOVE)---/	MDM ONLY

WHERE: U IS THE MESSAGE IDENTIFIER.

PX, 4X,Y---,Y, 63,Y } ARE SYMBOLIC ADDRESSES AS LISTED IN FIGURE 2-4

A IS AN OPTIONAL SUB-IDENTIFIER CAUSING MDM TO BYPASS TABLE CLEARING

SN IS AN OPTIONAL SUB-IDENTIFIER DEFINING THE MAINT-SYSTEM STATE.

N IS 0, 1, 2, OR 3.

., (PERIODS AND COMMAS) ARE REQUIRED.

SYSTEM DEFINITION

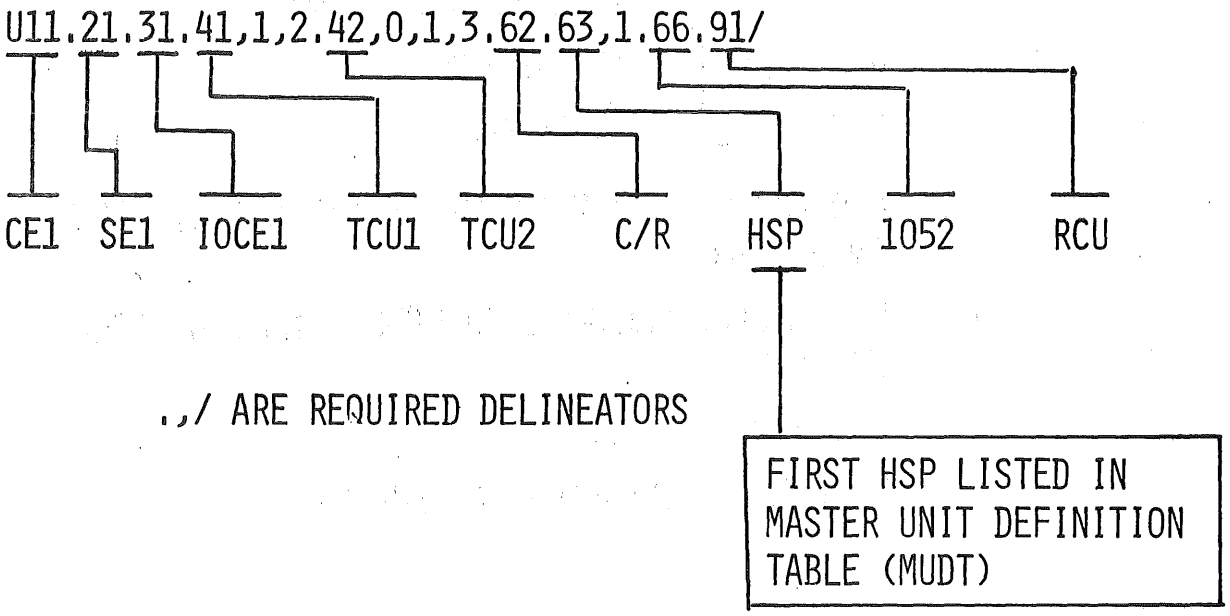
"U" MESSAGE

DEFINES AN ELEMENT OR UNIT SYMBOLICALLY WITH 2 DIGITS:

A. FIRST DIGIT DEFINES THE ELEMENT TYPE.

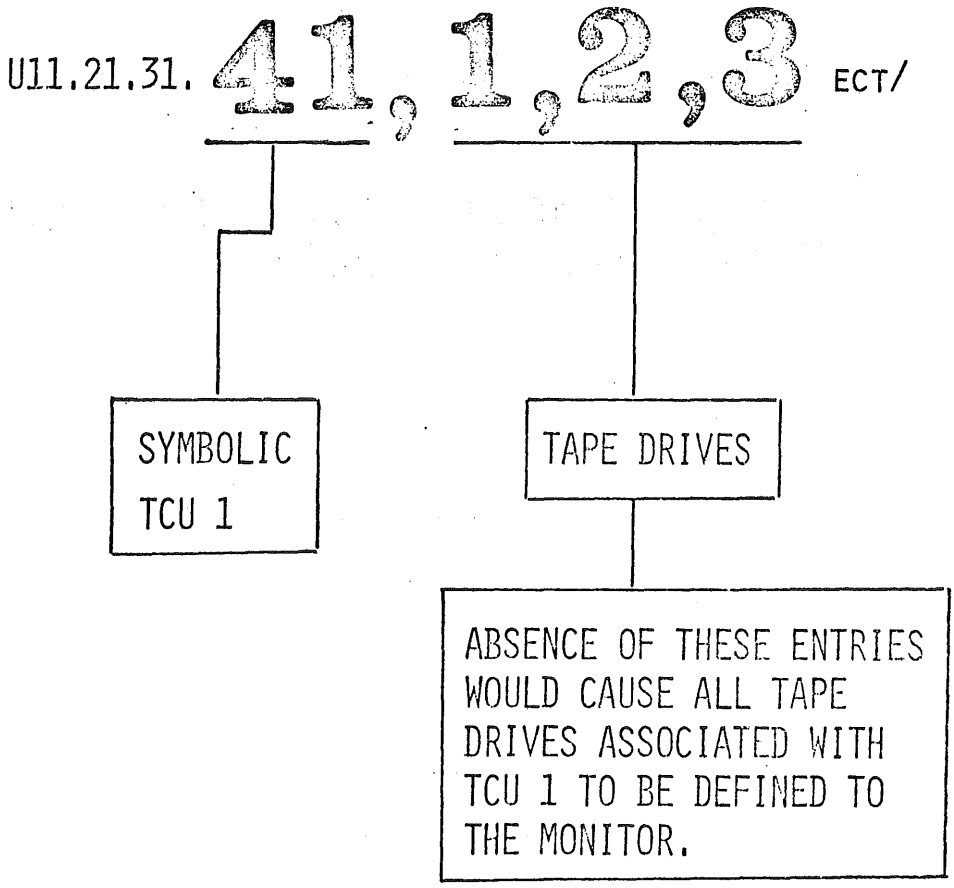
B. SECOND DIGIT DEFINES THE LOGICAL ELEMENT OR DEVICE NUMBER.

EXAMPLE



UNIT DEFINITION USING "U" MESSAGE

EXAMPLE



PRACTICE PROBLEM

CRITERION

THE FOLLOWING "U" MESSAGE HAS BEEN ENTERED UNDER THE DIAGNOSTIC MONITOR "MDM".

U12.22.32.42,0,2,7.63,1.66.C1.66/

Q. WHAT EQUIPMENT (ELEMENTS/DEVICES) HAS BEEN DEFINED AS A SYSTEM TO THE MONITOR?

12 = _____

22 = _____

32 = _____

42 = _____

0,2,7 = _____

63 = _____

1 = _____

66 = _____

C1 = _____

66 = _____

PRACTICE PROBLEM CRITERION ("U" MESSAGE)

Assume MDM has just been loaded, and a subsystem consisting of CE1, SE1, IOCE1, TCU1 and associated TAPE DRIVES are configured and in state zero:

A. Write the initial "U" message to define this equipment as a system to the MDM monitor.

B. It is desired to add SE3, SE4, SE5, HSP Ø5 and PAM 1 1052 to this system. Write the system definition message ("U" message) to accomplish this.

C. Place all of the above ELEMENTS/DEVICES into the monitor tables of MDM, but establish STATE 3.

ADD MESSAGES

1. PURPOSE AND USE:

   A. ADD DEVICES TO THE MONITOR UNIT DEFINITION TABLE (UDT).

   B. ALLOWS DEVICES TO BE USED BY THE MONITOR OR TESTED.

   C. NORMALLY USED AFTER A SYSTEM HAS BEEN DEFINED AND A JOB HAS BEEN STARTED.

2. THREE FORMATS ARE AVAILABLE:

   A. LONG

   B. SHORT

   C. ABBREVIATED.

3. EXAMPLES"

   A. APPOOOCUU/ (LONG ADD)

   B. A,CUU/ (SHORT ADD)

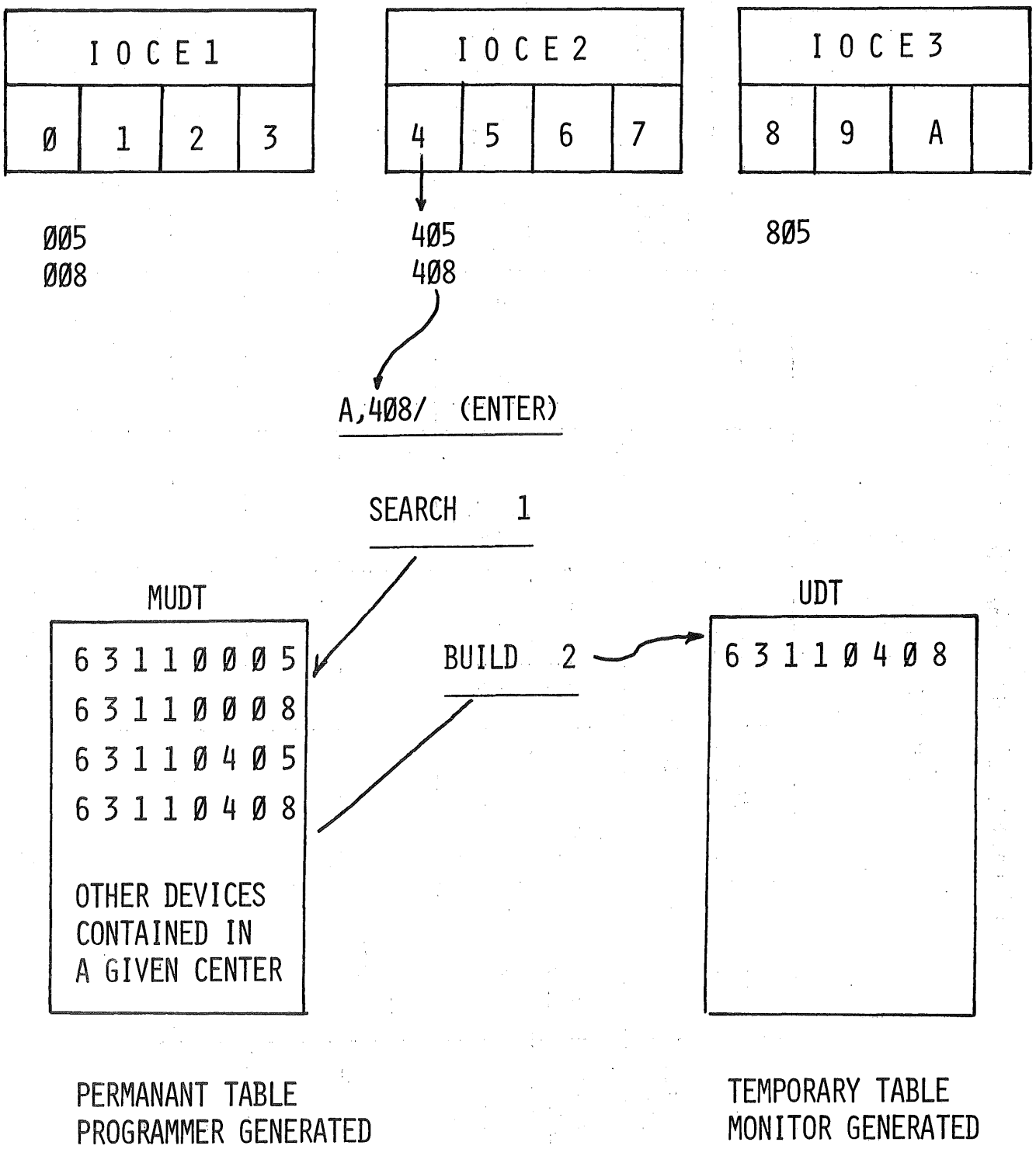
   C. APP/ (ABBREVIATED ADD)

RELATIONSHIP OF ADD MESSAGES TO I/O OPTIONS

A P P O O O C U U

I/O Device	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Tape	USASCII Code	Model Number in Binary					Read While Write TCU	Data Converter
2540	USASCII Code	Card Image	Punch-Read-Feed	51 Column Read				
1403	USASCII Code	Selective Tape Lister	60 Character Set	Universal Character Set	Hi-Speed Version	120 Print Positions	01 = PN Chain-Normal 10 = HN Chain-Special 11 = E-Patch Into Section	
CTC Adapter		No 'Not Ready' Feature						
7265-03 Config Console								Expanded Addressing
RCU								Expanded Addressing
DAU							Two-Processor Switch	Multidevice Attachment

FIGURE 2-1. I/O DEVICE OPTIONS


IOCE1
0
1
2
3
IOCE2
4
5
6
7
IOCE3
8
9
A
005
008
405
408
805
A,408/ (ENTER)
SEARCH 1
MUDT
6 3 1 1 0 0 0 5
6 3 1 1 0 0 0 8
6 3 1 1 0 4 0 5
6 3 1 1 0 4 0 8
OTHER DEVICES
CONTAINED IN
A GIVEN CENTER
BUILD 2
UDT
6 3 1 1 0 4 0 8
PERMANANT TABLE
PROGRAMMER GENERATED
TEMPORARY TABLE
MONITOR GENERATED

FEDERAL AVIATION ADMINISTRATION ACADEMY
DATA PROCESSING SECTION
DCP COURSE UNIT

43458 DIAGNOSTIC PROGRAMS
LOADING THE DIAGNOSTIC LIBRARY

LABORATORY EXPERIMENT 1

PURPOSE

To provide the student with the necessary procedures for loading the 9020 System Diagnostic Library.

OBJECTIVES

A. To learn how to load the Diagnostic Library.

B. To learn how to bypass the running of IOCE bring-ups.

C. To become aware of the IAR indication when SDM has been loaded into storage.

PROCEDURE I IPL FROM A COMPUTE ELEMENT

A. Obtain a configured subsystem of 1 CE, 1 IOCE, 1 SE, 1 TCU. Configure the system.

B. Mount a copy of the Diagnostic Library Tape on any 9 track tape drive available to your subsystem. Be sure that the tape mounted includes the bring-up sections.

C. IPL the tape from your CE. Be sure that the SE rotary switch selects your SE# and the 3 load unit switches select the tape drive over the proper channel number.

D. After successful IPL, the following tests run automatically and require no operator intervention unless an equipment failure occurs.

   1. GO/NO-GO

   2. BASIC STORAGE TEST (Check the SE)

   3. HARDCORE

E. Upon successful completion of HARDCORE, the tape will rewind to load point and be read forward until SDM is loaded into storage. At this time, the CE will be in the WAIT STATE with IC = ØØØØØA. (The "D" Reg will contain X'ØØØØ5Ø'.)

F. Depress REQUEST on any 1Ø52 typewriter available to your subsystem. SDM will respond with SDM REVISION XX READY.

G. At this point, SDM is ready to accept operator messages. Do not attempt to enter any messages as this will be accomplished in the next lab experiment.

PROCEDURE II IPL FROM AN IOCE

When IPL is performed from an IOCE, the program being loaded goes into MACH storage of the IOCE. Consequently, the CE and SE are not needed for this portion of the experiment. However, the IOCE must be in Diagnose Mode (no CE communication bits on in the IOCE - CCR) before IPL can function. Place the IOCE in Diagnose Mode at this time.

A. Rewind the Diagnostic Library Tape and make it ready.

B. IPL the Diagnostic Library Tape from your IOCE.

C. During the next 4 minutes or so, the following programs run automatically can require no operator intervention unless an equipment failure occurs.

1. GO/NO-GO

2. BASIC STORAGE TEST (Check Mach Store)

3. IDM (Run IOCE-Bring-Ups)

D. Upon successful completion of the IOCE-Bring-Ups, the tape will rewind and be read forward until SDM is loaded into core (MACH STORE).

E. When SDM is loaded, IAR = ØØØØØ2 and the IOCE is in the WAIT STATE.

F. Depress REQUEST on your 1Ø52 typewriter. The response should be

SDM REVISION XX READY.

PROCEDURE III IPL FROM IOCE (BYPASS IOCE-BRING-UPS)

A. Rewind the Diagnostic Library Tape and make it ready.

B. IPL the tape again from your IOCE.

C. When IAR bits 17 and 18 come on, depress the Interrupt button on the IOCE console. This causes IDM to bypass the running of the IOCE-Bring-Ups.

D. The tape will rewind and be read forward until SDM is loaded into MACH STORE. IAR = ØØØØØ2 and WAIT STATE.

E. Depress REQUEST on your 1Ø52 and again the response will be

SDM REVISION XX READY.

F. This concludes the experiment. Reconfigure the IOCE such that it can work with your CE again. Do this manually. Also, rewind the Diagnostic Library Tape and place the tape back into the proper reel container.

SUMMARY

A. When the Diagnostic Library Tape is IPL'd from a D/E Compute Element, the following programs run automatically.

1. GO/NO-GO
2. BASIC STORAGE TEST (Check the SE)
3. HARDCORE

B. If the three items in (A) run successfully, SDM will automatically be loaded and IAR = ØØØØØA, WAIT STATE, indicating SDM is in storage.

C. IPL from either a CE or IOCE always causes SDM to get loaded into storage.

D. When the Diagnostic Library Tape is IPL'd from an Input/Output Control Element, the following programs run automatically.

1. GO/NO-GO
2. BASIC STORAGE TEST (Check MACH STORE)
3. IDM (Run IOCE-Bring-Ups)

E. If the three items in (D) run successfully, SDM will automatically be loaded into MACH STORE and IAR = ØØØØØ2, WAIT STATE, indicating SDM is in storage.

F. IOCE - IPL or CE-IPL never cause MDM to be loaded.

G. When IPL is from an IOCE, the Bring-Up Sections executed under IDM can be bypassed as follows:

1. Wait until IAR bits 17 and 18 come on. This indicates completion of GO/NO-GO and the Storage Test and further indicates IDM is in storage.

2. With IDM in storage and anywhere within the Bring-Ups, depress the INTERRUPT button.

3. The tape will rewind and cause SDM to be loaded. The resident monitor (SDM) is indicated being in core by WAIT STATE and IAR = ØØØØØ2.

H. Upon an IOCE, it is up to the user's discretion whether the Bring-Up Sections will be bypassed or not; IPL from CE or IOCE eventually gets to SDM.

I. All programs (Bring-Up-Sections) that run under control of IDM can also be run under control of SDM. The major difference is that an error in IDM causes the program to halt. No error messages can be printed under control of IDM. If the failing program (section) is run under control of MDM or SDM, error messages are printed and testing then continues. IDM can run without the necessity of a typewriter or printer where SDM and MDM generally require one or both as output devices.

J. SDM and MDM can run many programs (sections) not executable under IDM.

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INPUT MESSAGES

SDM/MDM

(CONTINUED)

REVIEW QUIZ 1

1. WRITE A "U" MESSAGE TO DEFINE CE2, IOCE1, SE4, TCU2, TAPE DRIVES 6 & 7, PAM2, PAM IOT, CARD READER 03 AND HSP 08.

2. AFTER DEFINING THE ABOVE SYSTEM, ADD TAPE DRIVES 4 AND 5, AND SE 1 AND 2.

3. WHAT IS MEANT BY THE TERMS:
   A. OPERATOR INTERFACE?
   B. DIAGNOSTIC INTERFACE?

4. WHAT ARE THE THREE GENERAL CATEGORIES OF INPUT MESSAGES?

5. AN EQUIPMENT SYSTEM MUST BE CONFIGURED TO RUN THE DIAGNOSTIC PROGRAMS. WHY IS THIS TRUE?

6. WHAT IS THE PURPOSE OF THE "U" MESSAGE?

7. WHAT IS THE DIFFERENCE BETWEEN A "U" MESSAGE AND A "UA" MESSAGE?

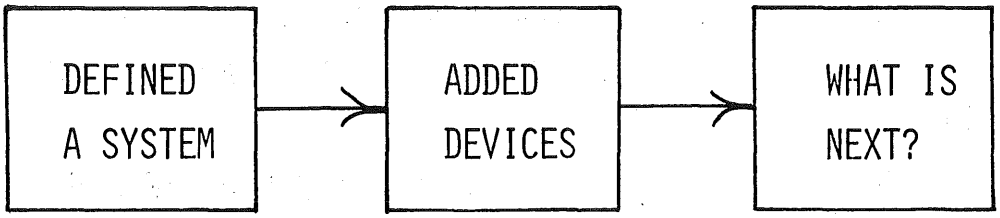
8. LIST THE THREE FORMATS OF THE ADD "A" MESSAGE AND WRITE VALID EXAMPLES OF EACH.

9. WHEN IS THE LONG ADD MESSAGE AN ABSOLUTE REQUIREMENT? EXPLAIN HOW YOU WOULD USE IT.

10. WHAT IS THE GENERAL PROCESS THE MONITOR GOES THROUGH WHAN A SHORT ADD MESSAGE IS ENTERED.

11. WHEN IS THE ABBREVIATED ADD MESSAGE "APP/" INVALID?

12. GIVEN IOCE3 AND TCU2, WRITE THE ADD MESSAGE THAT WOULD CAUSE THE MONITOR TO ENTER TAPE DRIVE 3 INTO THE UDT.

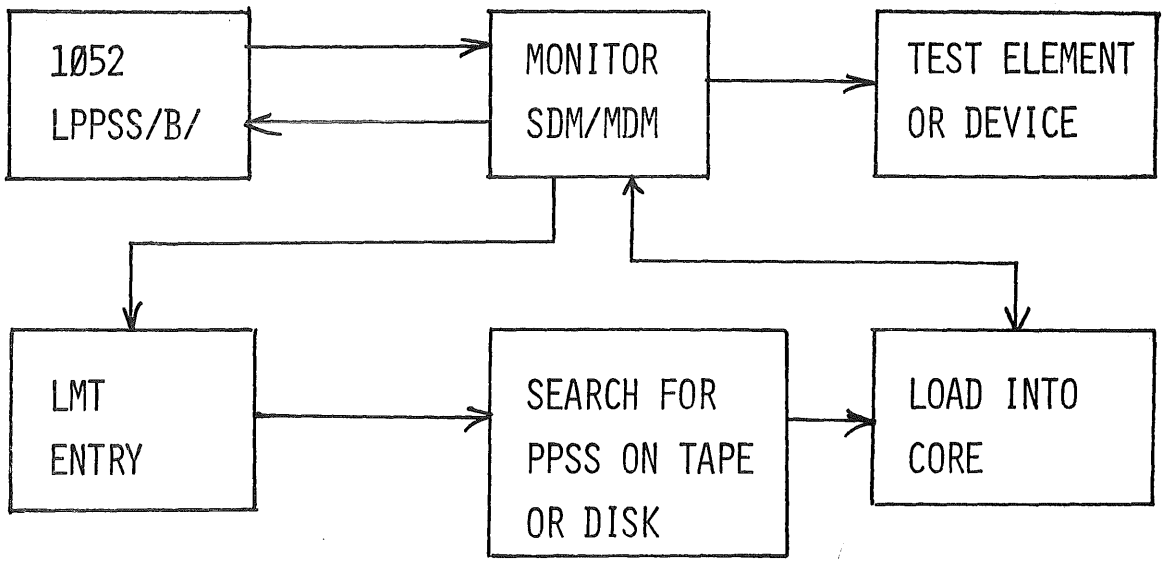


U	APPOOOCUU/
UA	A,CUU/
UASx	APP/

LOAD MESSAGES

1. PURPOSE: USED FOR TASK ASSIGNMENT.
   A. CREATES ENTRIES INTO THE MONITOR LOAD MESSAGE TABLE (LMT).
   B. MUST BE GIVEN BEFORE THE MONITOR CAN EXECUTE.
   C. MULTIPLE FORMATS ARE PROVIDED FOR FLEXABILITY .

2. EXAMPLE OF OPERATION VIA:
   A. OPERATOR/MONITOR INTERFACE.
   B. MONITOR/DIAGNOSTIC INTERFACE.



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INPUT MESSAGES (CONTINUED)

OBJECTIVES:

1. DEFINE THE FORMAT OF EACH INPUT MESSAGE.

2. TYPE A SERIES OF MESSAGES TO THE MONITOR THAT WILL CAUSE IT TO EXECUTE A LOAD REQUEST.

LOAD (L) MESSAGE FORMATS

```
L/
LPPSS/
LMPPSS/          MDM ONLY
LSPPSS/          MDM ONLY
LO.PPSS/
LPPSS.O/
LPPSS.PPSS/
LPPSS,CUU,---,CUU/
LPPSS.PPSS,CUU,---,CUU/
LPPSS,CUU,CU,C,---,CUU/        SDM ONLY
LPPSS.PPSS,CUU,CU.C,---,CUU/   SDM ONLY
L,CUU/                         MDM ONLY
LMDM/                          SDM ONLY
```

WHERE: L IS THE MESSAGE IDENTIFIER

PPSS IS THE SECTION DESIGNATOR

M DENOTES THE SECTION IS TO BE LOADED INTO IOCE MACH STORAGE BUT NOT RUN.

S DENOTES SECTION IS TO BE LOADED INTO MAIN STORAGE BUT NOT RUN

CUU IS ADDRESS OF DEVICE TO BE TESTED

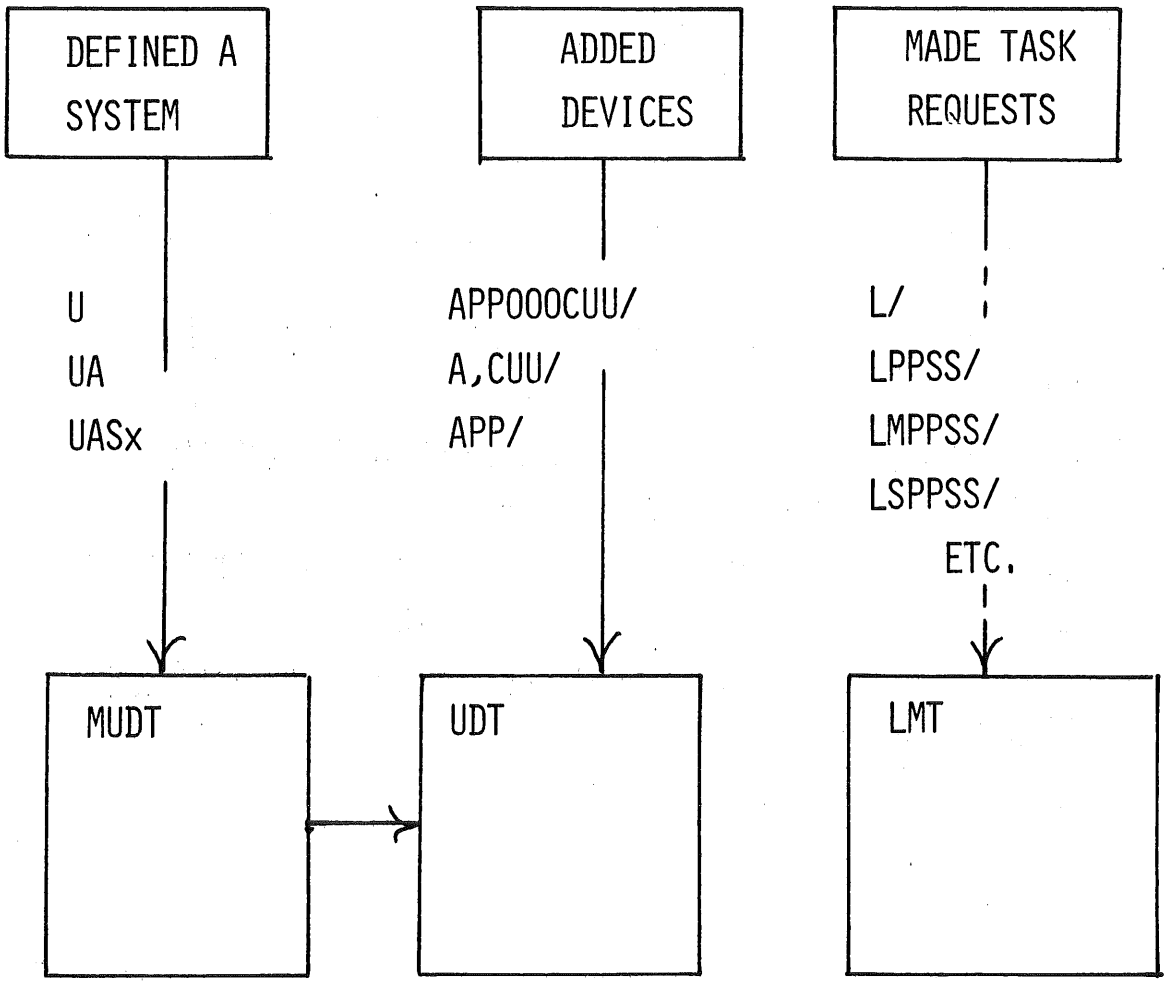
CU IS TAPE CONTROL UNIT ADDRESS: ALL TAPE DRIVES CONNECTED AND ASSIGNED TO THAT CONTROL UNIT ARE TO BE TESTED

C IS CHANNEL ADDRESS, AND ALL ASSOCIATED UNITS

O., (ZERO, PERIOD, AND COMMAS) ARE REQUIRED.

MDM IS THE MDM D/E DESIGNATOR

SYSTEM IPL AND CONFIGURATION ASSUMED



STEPS INVOLVED:

1. SYSTEM CONFIGURATION.
2. INITIAL PROGRAM LOAD (IPL).
3. SYSTEM DEFINITION (U MESSAGE OR A MESSAGE).
4. DEVICES ADDED (TO BE TESTED).
5. SPECIFIC TASK REQUESTS MADE.

WHAT GETS TEST STARTED?????????

TASK CONTROL

BEGIN MESSAGE B/

1. PURPOSE: REQUIRED TO BEGIN PROCESSING AN ASSIGNED TASK.

   A. FOLLOWING A LOAD MESSAGE, TO BEGIN LOADING PROCEDURES.

   B. FOLLOWING A SECTION THAT HAS BEEN TEMPORARILY HALTED BY THE HALT (H/) MESSAGE.

   C. FOLLOWING A HALT CAUSED BY OPERATOR INTERVENTION REQUIRED MESSAGE HAVING BEEN EMPLOYED.

   D. FOLLOWING CERTAIN ERROR HALTS INVOLVING THE USE OF SENSE SWITCH OPTIONS.

EXAMPLE

```
U11.21.31.41,Ø.63,1.66/
A,113/
L4ØØØ/
B/
```

INITIALIZE MESSAGES

1. GENERAL:

A. USED TO TERMINATE TASK ASSIGNMENTS, BY RE-SETTING MONITOR TABLES.

B. USED TO ASSIGN OR RE-ASSIGN THE MONITOR I/O DEVICES.

C. TWO FORMATS:

(1) I/ RESETS THE MONITOR TABLES.

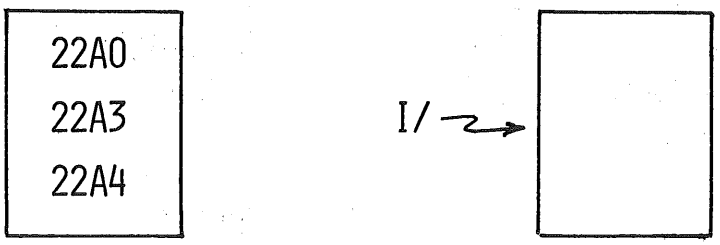
(2) I,CUU_1,CUU_2,CUU_3,CUU/ ASSIGNS I/O DEVICES TO THE MONITOR IN TERMS OF SPECIFIC FUNCTIONS.

D. CAN BE USED BEFORE OR AFTER LOAD MESSAGES.

EXAMPLE

L22A0/L22A3/L22A4/B/

MONITOR BUILDS LOAD MESSAGE TABLE (LMT)



LMT LMT CLEARED

EXAMPLE I/O DEVICE ASSIGNMENT

$I, CUU_1, CUU_2, CUU_3, CUU/$

WHERE:

CUU_1 = PRIMARY INPUT DEVICE

CUU_2 = PRIMARY OUTPUT DEVICE

CUU_3 = SECONDARY OUTPUT DEVICE

CUU = LOADER DEVICE

(CUU = CHANNEL AND UNIT ADDRESS)

APPLICATION

I, 0 0 3, 0 0 2, 0 0 5/

CARD READER PRIMARY INPUT	1052 PRIMARY OUTPUT	HSP SECONDARY OUTPUT

(LOADER UNCHANGED)

PRINT MONITOR TABLES (M/)

1. PURPOSE: CAUSES THE MONITOR TO PRINT MONITOR TABLES.

   A. VALID UNDER SDM AND MDM.

   B. TABLES INDICATE MONITOR ENVIRONMENT IN TERMS OF DEVICES AND THEIR SPECIFIC ASSIGNMENT. (UDT)

   C. TABLES ARE PRINTED ON THE SECONDARY OUTPUT DEVICE, IF ASSIGNED.

2. DEVICES ARE INCLUDED IN THE TABLES IF:

   A. THEY HAVE BEEN ASSIGNED AS A RESULT OF IPL.

   B. THEY HAVE BEEN ASSIGNED BY THE U OR A MESSAGE.

3. TABLES ARE USEFUL TO THE OPERATOR TO DETERMINE HOW THE SYSTEM IS CURRENTLY DEFINED, FOR TEST PURPOSES.

UNIT DEFINITION TABLE (SDM)

UDT SDM

```
000640   00110000 FFFFFFFF 00000000 00000000   3B0000FF 00000FFF 00000000 00000000
000660   3C0001FF 00000FFF 00000000 00000000   3F000FFF 00000FFF 00000000 00000000
000680   D40003FF 00000FFF 00000000 00000000   D50003FF 00000FFF 00000000 00000000
0006A0   40000111 03000FFF 00000000 00000000   66000002 01000FFF 00000000 00000000
0006C0   63110005 01000FFF 00000000 00000000   62000003 00000FFF 00000000 00000000
0006E0   6B000004 00000FFF 00000000 00000000   40300110 00000FFF 00000000 00000000
0C0700   40300112 00000FFF 00000000 00000000   40200113 00000FFF 00000000 00000000
000720   40300114 00000FFF 00000000 00000000   40210115 00000FFF 00000000 00000000
000740   40000116 00000FFF 00000000 00000000   00000FFF 00000000 00000000 00000000
000760   00000FFF 00000000 00000000 00000000   00000FFF 00000000 00000000 00000000
000780 - 00083F  IDENTICAL TO LINE ABOVE
000840   00000000 00000000 00000000 00000000
```

UNIT DEFINITION TABLE (SDM)
(CONTINUED)

```
  IAT SDM
0009B4                                                  00000000 00000000 00000000
0009C0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
0009E0 - 0009FF IDENTICAL TO LINE ABOVE
000A00   00000000 00000000
  LMT SDM
0008E4            00000000 00000000 00000000   00000000 00000000 00000000 00000000
000900   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
000920 - 00099F IDENTICAL TO LINE ABOVE
0009A0   00000000 00000000 00000000 00000000   00000000
  DMI SDM
000600   66000002 06B08A89 000002F0 0C00004E   66000002 06B08A89 000002E0 0C000000
000620   63000005 06C00009 000002E0 0C000000   40000111 06A00201 00000000 00000000
  PST SDM
0C0348   00000000 00000000 00000000 00000000
  SRT SDM
0001F8                                                              00000003 47F0D19A
000200   00000208 7C650005 0C000F02 00000000   0007FFFF 0098BF00 00000100 00000000
```

UNIT DEFINITION TABLE (MDM)

```
UDT
001160   00000000 00000000 0000000E 66009002   20080000 000028A0 0C0000EE 62000003
001180   0008000  00000000 00000000 6B000004   00080000 00000000 00000000 63114005
0011A0   20080000 0007F010 0C000000 3B00000F   00080000 00000000 00000000 40000110
0011C0   00080000 00000000 00000000 40002111   20080000 00000000 00000000 40000112
0011E0   00080000 00000000 00000000 40000113   00080000 00000000 00000000 40000114
001200   00080000 00000000 00000000 40000115   00080000 00000000 00000000 40000116
001220   00080000 00000000 00000000 3C0001FF   00080000 00000000 00000000 3F000FFF
001240   000F0000 00000000 00000000
```

UNIT DEFINITION TABLE (MDM)

(CONTINUED)

SRT

```
001060   00080000 00000000 00000000 01000000   0000EDE0 00001105 0D000002 00000000
001080   10000000 00000084 3E800804 B8000080   FE000000 00000000 00000000 00000000
0010A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
0010C0   00000000 00000000 00000000 00000000   00000000 00000000 82000411 00000000
0010E0   00000000 00000000 00000000 00000000   00000000 22000004 00000000 00000000
001100   00000000 00000000 22000804 00000000   00000000 00000000 00000000 00000000
001120   00000000 00000000 00000000 00000000   00000000 00000000 22840884 00000000
001140   00000000 00000000 00000000 00000000   00000000 00000000 00000000 22800800
001160   00000000 00000000
```

PST-CE1

BYTES FROM 000220 TO 00053F CONTAIN 00

WITHDRAW MESSAGE (W,CUU/)

1. PURPOSE: INFORMS THE MONITOR TO REMOVE THIS DEVICE (CUU) FROM THE UNIT DEFINITION TABLE (UDT).

   A. THE DEVICE CANNOT BE USED FOR ANY PURPOSE FOLLOWING THIS INPUT MESSAGE.

   B. MESSAGE WILL BE REJECTED IF THIS DEVICE (CUU) HAS BEEN ASSIGNED TO MONITOR FUNCTIONS, FOR EXAMPLE THE LOADING DEVICE.

2. EXAMPLE APPLICATION:

W,005/	REMOVES THE HIGH SPEED PRINTER 005
A,008/	ADDS 008 TO THE UNIT DEFINITION TABLE.

3. TYPICAL IF TESTING ON 005 HAS BEEN COMPLETED AND 008 IS TO BE TESTED.

FREE MESSAGE (F/)

1. TWO FORMATS:

   A. F/ WILL TERMINATE A SECTION THAT IS CURRENTLY RUNNING, AND TESTING WILL CONTINUE WITH THE NEXT SEQUENTIAL SECTION PROVIDED IT HAS BEEN PREVIOUSLY LOADED.

   B. FPPSS/ WILL TERMINATE THE SECTION SPECIFIED BY PPSS ASSUMING THAT IT HAS BEEN PREVIOUSLY LOADED.

2. THIS MESSAGE IS USEFUL TO REGAIN CONTROL OF A RUN-AWAY DIAGNOSTIC SECTION WITHOUT RE-IPL.

HALT MESSAGE (H/)

1. USED TO HALT A SECTION CURRENTLY RUNNING. DOES NOT TERMINATE THE SECTION.

2. APPLICATION: USEFUL TO PAUSE FOR:

   A. EQUIPMENT ADJUSTMENTS.

   B. TEST EQUIPMENT HOOK-UP.

   C. ANY OTHER NEED.

3. FORMATS:

   A. H/ CAUSES THE MONITOR TO IDLE, B/ IS REQUIRED TO CONTINUE WITH THE SECTION.

   B. HPPSS/ USED TO HALT A PARTICULAR SECTION IN MULTI-PROGRAMMING OR MULTI-PROCESSING. (MDM ONLY)

DEFINE STORAGE MESSAGE

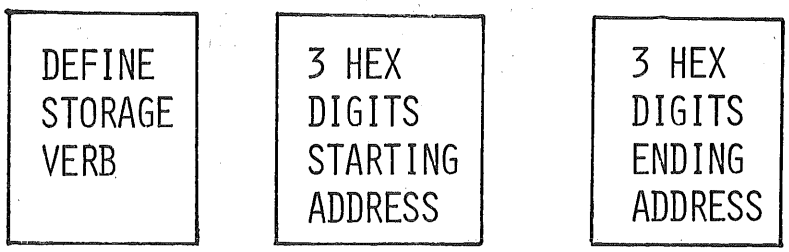
1. PURPOSE. USED TO DEFINE STORAGE BLOCKS FOR:

   A. STORAGE ELEMENT TESTING.

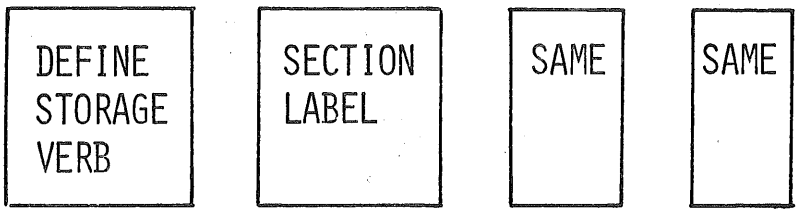
   B. DISPLAY ELEMENT TESTING D/E SYSTEM.

2. FORMATS:

   A. $D.H_1H_1H_1.H_2H_2H_2/$



   B. $DPPSS.H_1H_1H_1.H_2H_2H_2/$



EXAMPLE (SHMOO)

L22A0/D.000.020/B/

RESULT: CAUSES 22A0 ON A SINGLE BSM TO BE EXECUTED.

STORAGE ADDRESSING 9020A SYSTEM

SE

ATR SLOT	1	2	3	4	5	6	7	8	9	10	11	12
BSM	000	040	080	0C0	100	140	180	1C0	200	240	280	2C0
UPPER BSM	040	080	0C0	100	140	180	1C0	200	240	280	2C0	300
RANGE	020	060	0A0	0E0	120	160	1A0	1E0	220	260	2A0	2E0
LOWER BSM	000	040	080	0C0	100	140	180	1C0	200	240	280	2C0

STORAGE ADDRESSING 9020 D/E SYSTEM

	SE					SE/DE				
	1	2	3	4	5	6/1	7/2	8/3	9/4	A/5
BSM	000	080	100	180	200	280	300	380	400	480
LOW EVEN	020	0A0	120	1A0	220	2A0	320	3A0	420	4A0
LOW ODD	040	0C0	140	1C0	240	2C0	340	3C0	440	4C0
HIGH EVEN	060	0E0	160	1E0	260	2E0	360	3E0	460	4E0
HIGH ODD	080	100	180	200	280	300	380	400	480	500

ALTER SENSE SWITCH MESSAGE (S)

1. GENERAL: USED TO ALTER SENSE SWITCHES (OPTIONS) WITHIN THE MONITOR OR DIAGNOSTIC SECTIONS.

   A. 32 BIT POSITIONS (SWITCHES).

   B. CAN BE SET OR RE-SET.

   C. TWO BASIC FORMATS:

      (1) LONG - USEFUL IN CHANGING MANY OPTIONS AT ONE TIME.

      (2) SHORT - CHANGE LIMITED OPTIONS.

2. FORMATS:

   A. LONG:

      (1) SO.HHHHHHHH/

      (2) SPPSS.HHHHHHHH/

   B. SHORT SET FORMAT:

      (1) SSO.D.---.DD/

      (2) SPPSS.D.---.DD/

   C. SHORT RE-SET FORMAT:

      (1) RSO.D.---DD/

      (2) RSPPSS.D.---.DD/

OPERATOR INTERVENTION (O)

1. USED TO INFORM MONITOR THAT OPERATOR INTERVENTION IS REQUIRED BEFORE RUNNING THE FIRST SECTION PENDING IN THE L-MESSAGE.

2. MUST BE ENTERED BEFORE THE SECTION IS RUN.

3. AFTER SECTION HAS BEEN LOADED, OPERATOR INTERVENTION IS INDICATED BY AN OUTPUT MSG (OIR).

4. FORMAT:

   O/ MDM ONLY

   OPPSS/

   WHERE: O IS MESSAGE VERB
   PPSS IS SECTION DESIGNATOR

5. EXAMPLE:

   L4051/O/B/ SECTION 4051 IS LOADED AND AN OIR OUTPUT MSG WILL APPEAR ON 1052.

   B/ STARTS SECTION AFTER USER HAS COMPLETED THE INTERVENTION TASK

TYPE OUT (T)

1. USED TO PRINT UP TO 65,536 BYTES OF STORAGE (X'FFFF').

2. MESSAGE MAY BE ENTERED ANYTIME THE DESIGNATED SECTION IS RESIDENT.

3. MESSAGE CANNOT BE QUEUED.

4. FORMAT:

   TPPSS.AAAAAA.CCCC/

   WHERE: "T" IS MSG VERB.
   "PPSS" IS SECTION DESIGNATOR.
   "AAAAAA" IS STARTING LISTING (ASSEMBLED) ADDRESS IN HEX. LEADING ZEROES MAY BE OMITTED.
   "CCCC" IS HEX BYTE COUNT TO BE PRINTED.
   PERIODS ARE REQUIRED.

   NOTE: THIS FORMAT WILL DUMP CORE RELATIVE TO SECTION ASSEMBLED ADDRESSING.

4. (CONT'D)

TA.AAAAAA.CCCC/

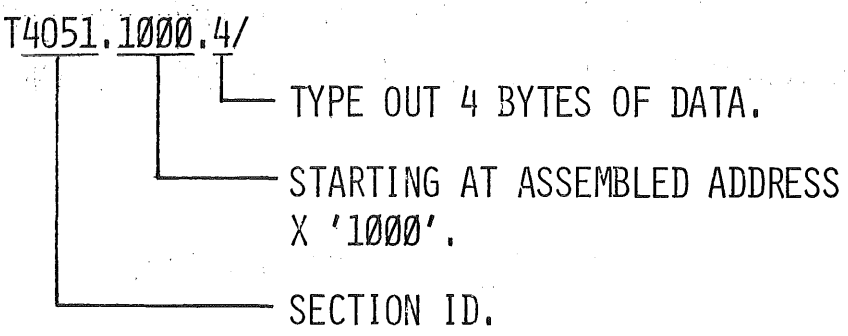
WHERE: "A" SIGNIFIES THAT STARTING ADDRESS (AAAAAA) IS ABSOLUTE.

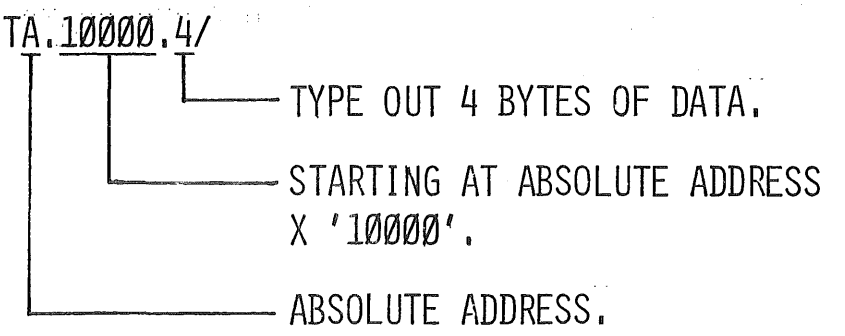
NOTE: THIS FORMAT WILL DUMP STORAGE STARTING AT THE SPECIFIED ABSOLUTE (CORE) ADDRESS.

TPPSS/

NOTE: THIS FORMAT WILL DUMP STORAGE FROM BEGINNING OF SECTION TO END OF SECTION.

5. EXAMPLES:





LISTING ADDR RELATIVE TO CORE ADDR

1. ALL SECTIONS ARE ASSEMBLED STARTING AT ADDR X '1000'.

   A. CORE LOCATIONS OF SECTION LOADED WILL NOT AGREE WITH SECTION LISTING.

      (1) SDM, FOR EXAMPLE, STARTS AT ADDR X '000008' AND IS 67D8 HEX BYTES IN LENGTH.

      (2) MONITOR DETERMINES WHERE THE SECTIONS WILL BE LOCATED IN CORE.

2. CORE/LISTING ADDRESS DETERMINATION USING THE LOAD (L), OPERATOR INTERVENTION (O), AND TYPE OUT (T) INPUT MESSAGES.

   A. IPL DIAGNOSTIC TAPE AND LOAD MONITOR.

   B. LOAD SECTION OF INTEREST AND ENTER OPERATOR INTERVENTION MESSAGE.

L4051/O/B/

2. (CONT'D)

C. ENTER TPPSS.AAAAAA.CCCC/ MESSAGE.

(1) THE DATA AT THE ABSOLUTE ADDRESS RELATIVE TO THE SPECIFIED ASSEMBLED ADDRESS (AAAAAA) WILL BE TYPED OUT.

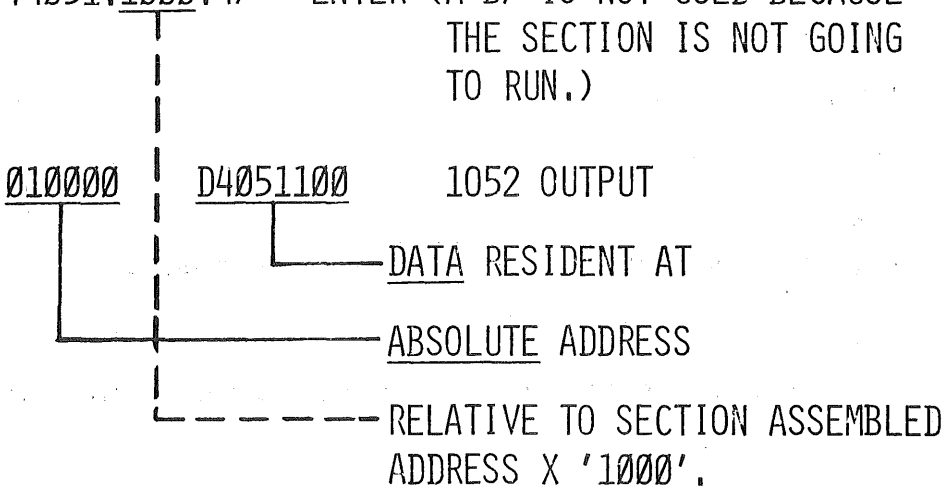
3. EXAMPLE:

```
L4Ø51/O/B/        ENTER

OIR  D4Ø511       1052 OUTPUT

T4Ø51.1ØØØ.4/     ENTER (A B/ IS NOT USED BECAUSE
                         THE SECTION IS NOT GOING
                         TO RUN.)

Ø1ØØØØ  D4Ø511ØØ  1052 OUTPUT
```



THE MONITOR HAS LOADED SECTION 4Ø51 STARTING AT ABSOLUTE ADDRESS X '1ØØØØ'.

CRITERION TEST 1

("U" and "A")

1. Write a "U" message defining a system consisting of the following:

   CE2
   SE4
   IOCE 2
   TCU 2 with Tape Drives 2 & 3
   Card Reader Ø3
   HSP Ø8
   Card Punch Ø4
   Sys Console 1052
   DCU 2 with DSK Drives Ø & 1
   PAM 2
   PAM 1052

2. After defining the above system, use a "U" message format to further define the system to include TAPE DRIVES 1 & 4 and SE's 1 & 2 while operating under MDM.

3. What is meant by the terms:

   A. OPERATE INTERFACE?

   B. DIAGNOSTIC INTERFACE?

4. What are the three general categories of input messages?

5. The equipment must be configured to run the diagnostic programs. Why is this true?

6. What is the purpose of the "U" message?

7. What is the difference between a "U" message and a "UA" message?

8. List the three formats of the ADD message and write valid examples of each.

9. When is it mandatory to use the long ADD message format?

10. What is the general process the monitor goes through when a short add message is entered?

11. When is the abbreviated add message (APP/) invalid?

12. Given IOCE 3 and TCU 3, write the ADD message that would cause TAPE DRIVE 33 to be entered in the UDT while operating under MDM.

BIT	MEANING WHEN CLEAR	MEANING WHEN SET	SDM	MDM
0-11		(For Internal DM Use Only)		
12		(For Internal DM Use Only)		
13	Assign Only 1 Required I/O Device to Each Multiprogrammed Section	Assign All Available I/O Devices to Multiprogrammed Section		X
14	CTC Connections Are between IOCE's	CTC Connection Wrap to Same IOCE's	X	D/E
15	Allow Forced CE Errors	Inhibit Forced CE Errors	X	X
16	Set Sequential Mode	Set Multiprogramming Mode		X
17	Set Simplex Mode	Set Multiprocessing Mode		X
18		(For Internal DM Use Only)		
19	Format Logouts in Binary (Long)	Format Logouts in Hex (Short)	X	X
20	Execute Section After 1st Begin	Wait Before Executing Section	X	X
21	Allow Manual Interventions	Bypass Manual Interventions	X	X
22	Do Not Reprint Primary Messages	Print Primary Message on Secondary		X
23	Do Not Print CPPSSRRHH Cycle Count	Print CPPSSRRHH Cycle Count	X	X
24	Print Section S and T Messages	Do Not Print Section S and T Messages	X	X
25	Do Not Halt On Error	Halt On Error	X	X
26	Do Not Repeat Entire Task Request	Repeat Entire Task Request	X	X
27	Allow Printing	Inhibit All Printing	X	X
28	Print Logouts	Bypass Logout Printing	X	X
29	Allow Operational Printouts	No Operational Printout		X
30	Print Error	Do Not Print Errors	X	X
31	Input Device Is Not DATA Switches	Data Area Contains Keyed-in Message	X	

FIGURE 2-3. MONITOR SENSE SWITCHES FOR OPERATOR'S USE

CRITERION 1

1. ASSUME SYSTEM 2 CONFIGURED AND MDM IS LOADED. WRITE AN "I" MESSAGE TO INITIALIZE CARD READER 03 TO BE THE PRIMARY INPUT, CONSOLE 1052 THE PRIMARY OUTPUT AND HSP 08 THE SECONDARY OUTPUT.

2. FOLLOWING A SECTION LOAD MESSAGE, WHAT IS REQUIRED TO START THE SECTION EXECUTION?

3. HOW CAN IT BE DETERMINED THAT THE INPUT MESSAGE LMDM/ HAS BEEN EFFECTIVE? WHAT ARE THE INDICATIONS AND IMPLICATIONS OF A SUCCESSFUL MDM LOAD?

4. HOW CAN A DEVICE BE REMOVED FROM THE MONITOR UDT TABLE?

5. HOW DOES THE MONITOR DETERMINE WHETHER OR NOT A DEVICE IS ELIGIBLE FOR TESTING?

6. A GIVEN TASK HAS BEEN STARTED, AND IS RUNNING. IT IS DESIRED TO MAKE SOME EQUIPMENT ADJUSTMENTS. DESCRIBE THE PROCESS WHEREBY THIS CAN BE ACCOMPLISHED.

7..WHAT IS THE PURPOSE OF THE "D" MESSAGE IN GENERAL TERMS?

8. ASSUME SE6 IS IN ATR SLOT 6 (D/E SYSTEM), WRITE THE "D" MESSAGE TO SPECIFY THE TESTING OF ONE BSM OF THIS SE.

9. HOW MANY SENSE SWITCH OPTIONS ARE AVAILABLE IN THE DIAGNOSTIC PROGRAMS AND WHERE ARE THEY? (MONITOR/SECTION HINT)

10. WHAT DOES THE M/ MESSAGE CAUSE THE MONITOR TO DO?

FEDERAL AVIATION ADMINISTRATION ACADEMY
DATA PROCESSING SECTION
DCP COURSE UNIT

43458 DIAGNOSTICS PROGRAMS
OPERATOR MESSAGES I
LABORATORY EXPERIMENT 2

PURPOSE

To provide the student with input message procedures for operating SDM/MDM.

OBJECTIVES

A. Gain proficiency in using the following messages.

   1. "U"
   2. "L"
   3. "I"
   4. "A"
   5. "B"
   6. "M"

B. Become aware of monitor responses.

PROCEDURE I-----IPL SDM from a CE.

A. IPL from a CE, Bypass Hardcore and bring SDM into control.

B. Assign all 1Ø52's and Tape Drives available to your system with the message.

C. Assign all high speed printers available to your system with the A message.

D. Job 1.

   1. Start a printout of the Monitor tables (M/).
   2. Cancel the task with an I/.
   3. Reassign a high speed printer as Secondary Output Data.
   4. Print the Monitor tables (M/).

E. Job 2.

1. Execute Section D4Ø6Ø on all available tape drives.

2. Execute Sections D4Ø5Ø thru D4Ø56 on all available tape drives.

3. Execute Section D4Ø6Ø on only 1 of the tape drives.

4. Execute Sections D4050 thru D4056 on only 1 of the tape drives.

PROCEDURE II-----Bring in MDM.

Repeat items B thru E of Procedure I while executing under MDM.

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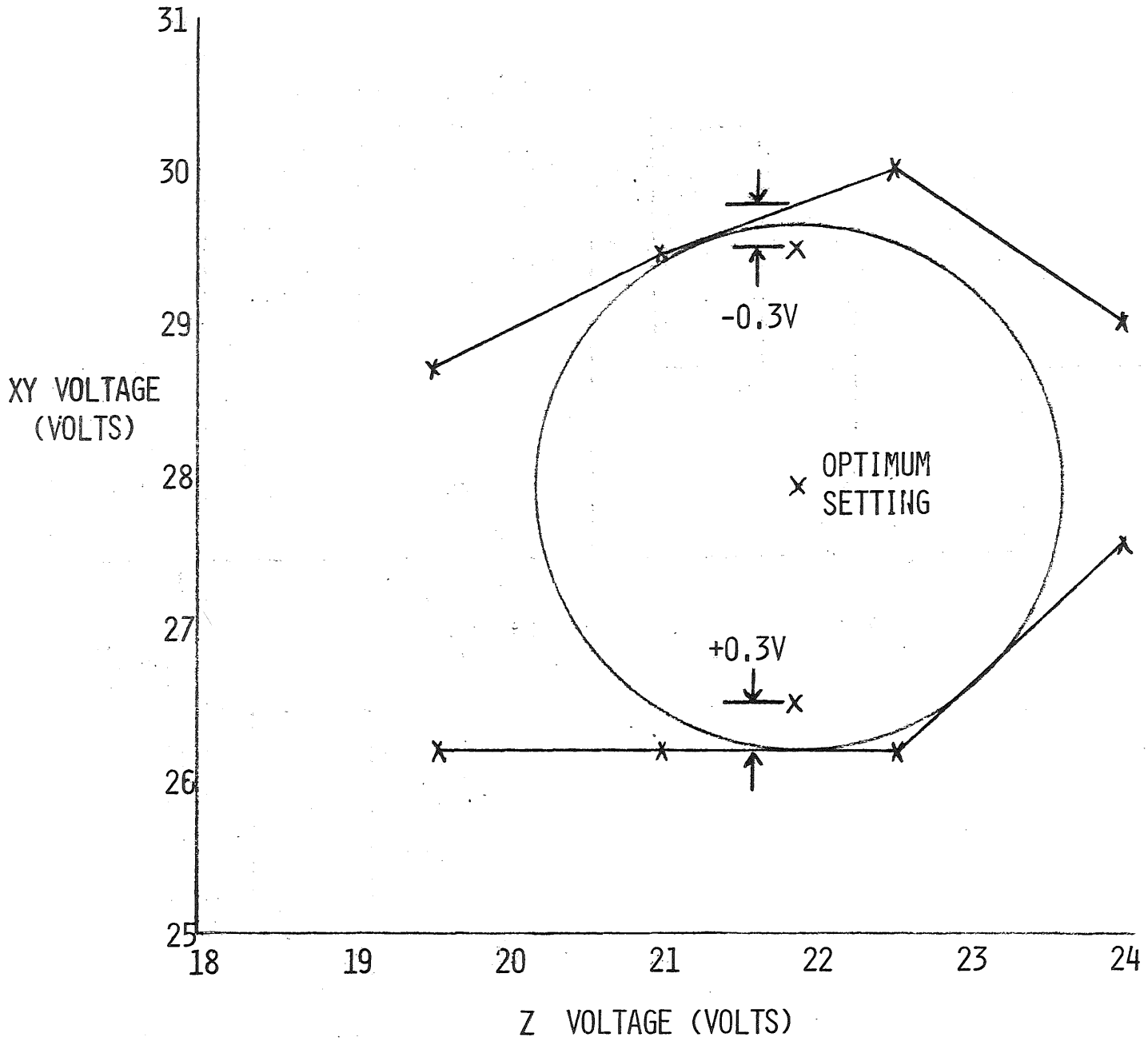
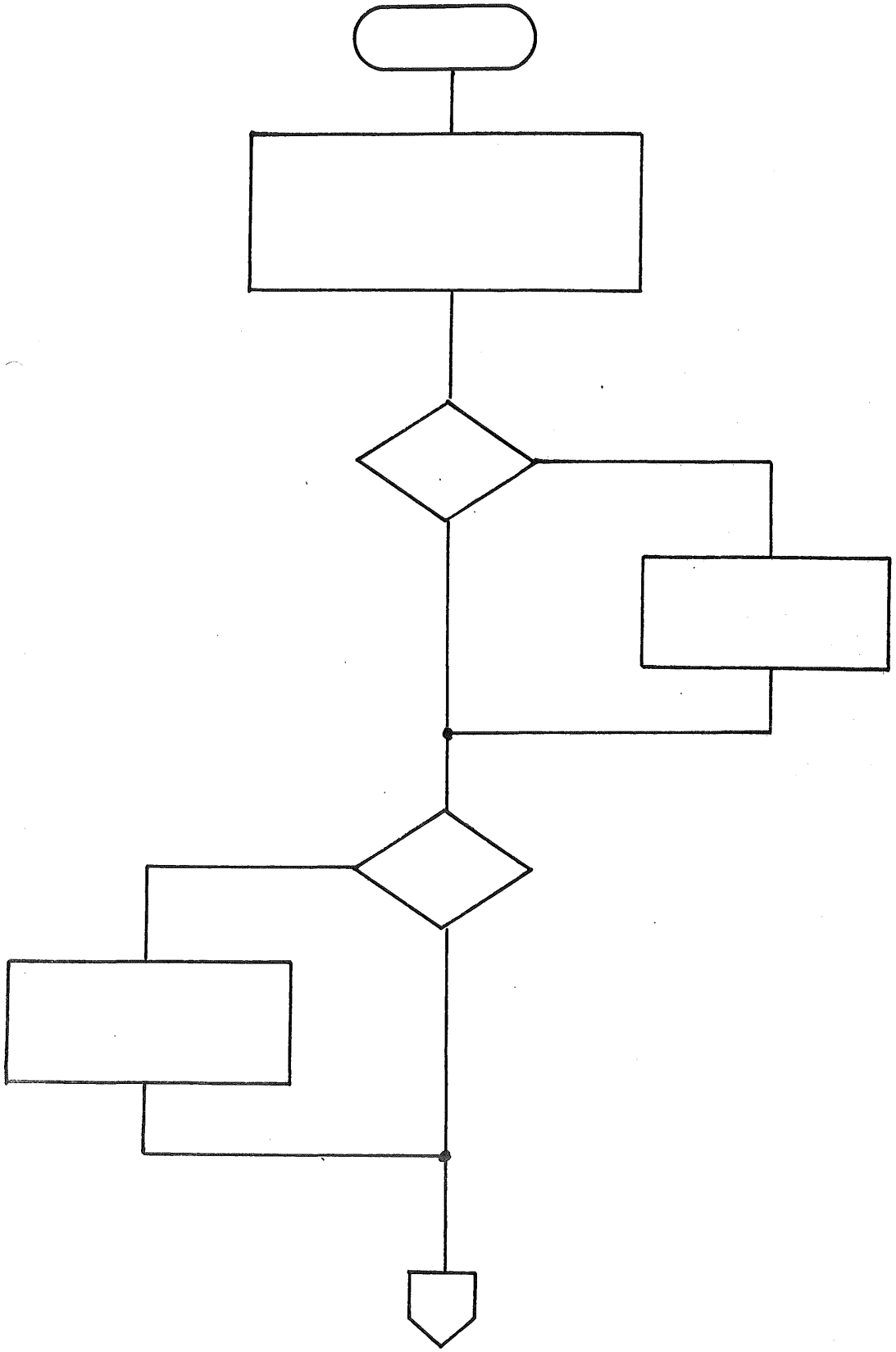
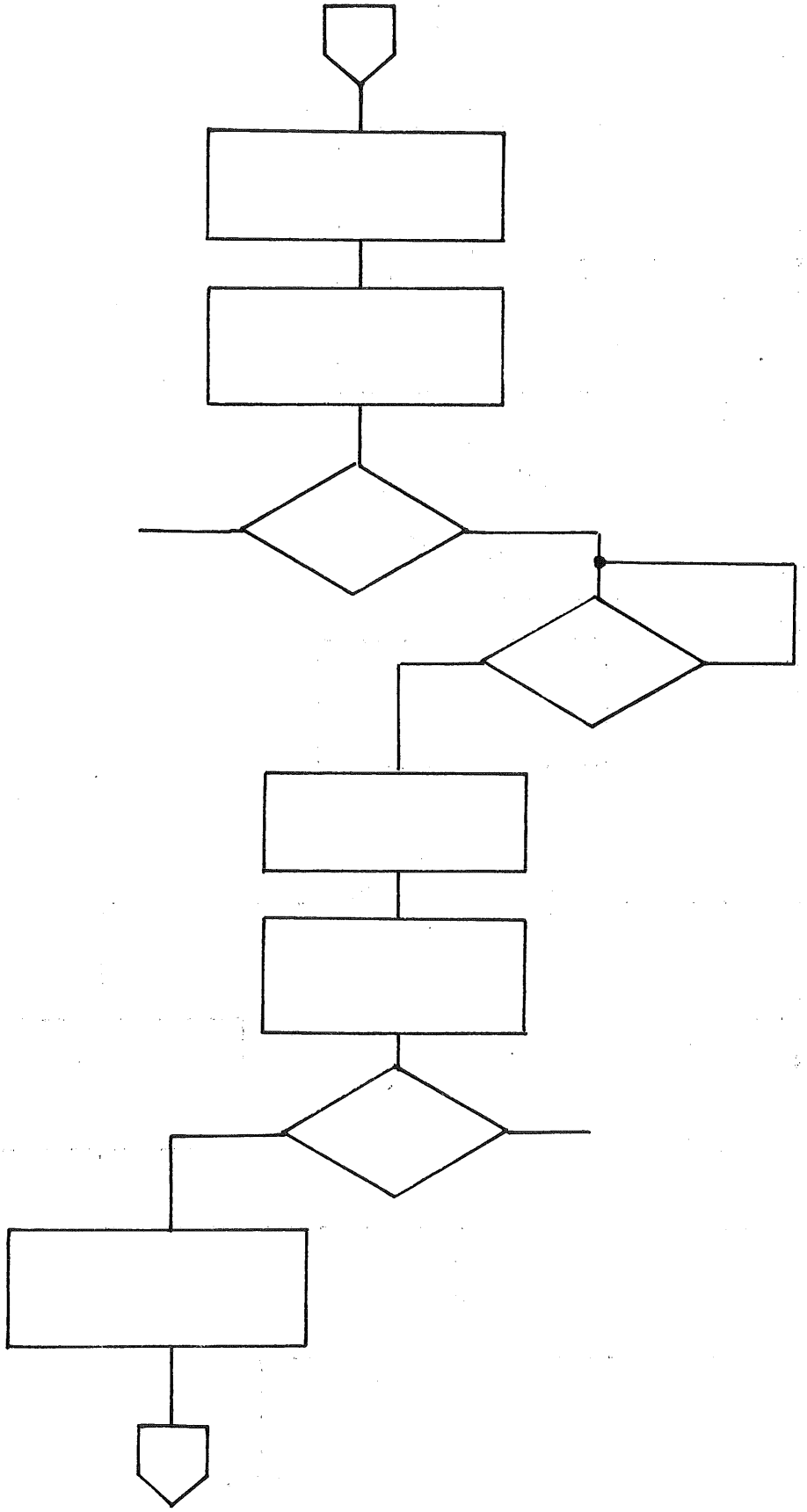
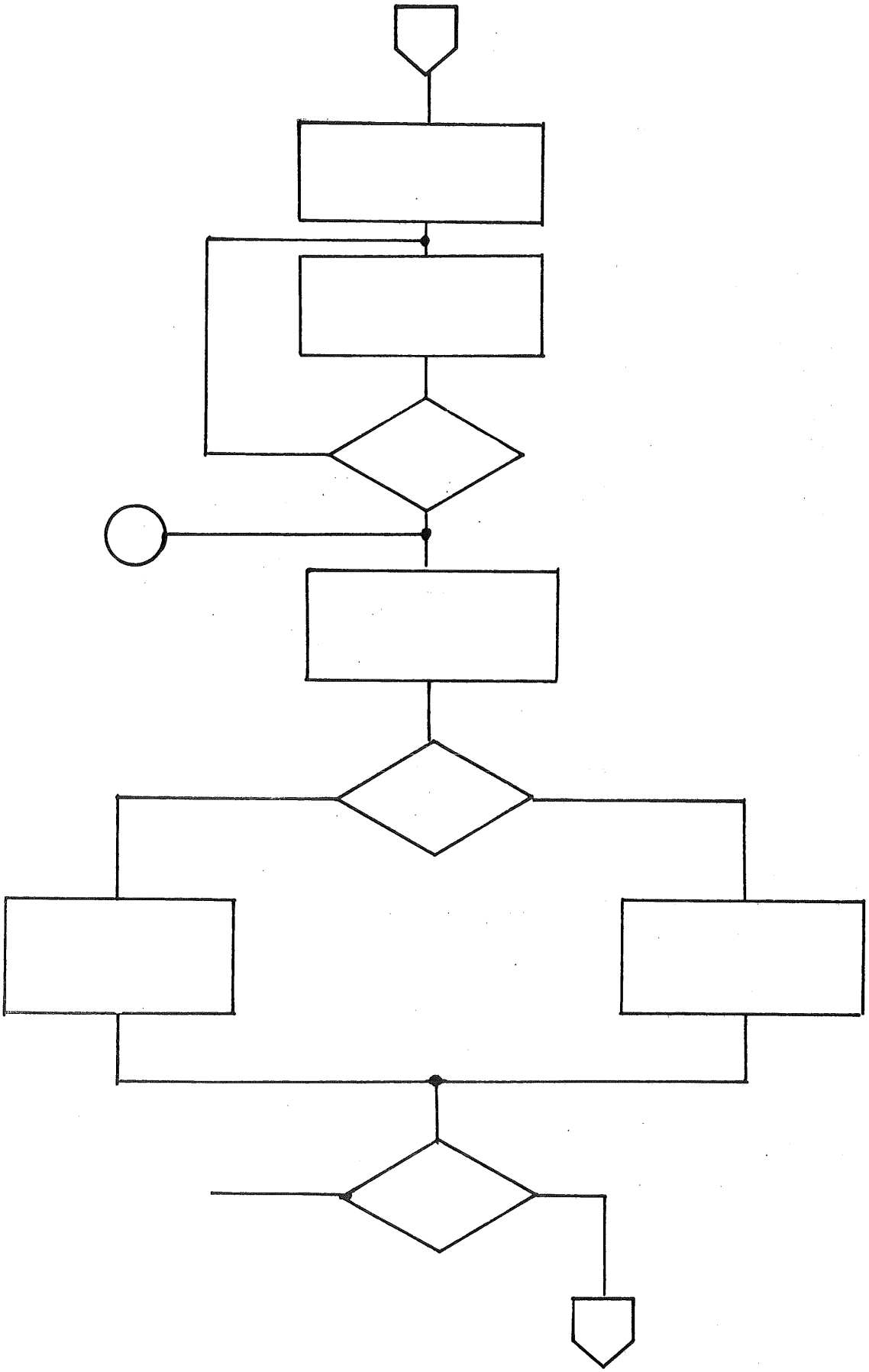
SDM/MDM OUTPUT MESSAGES

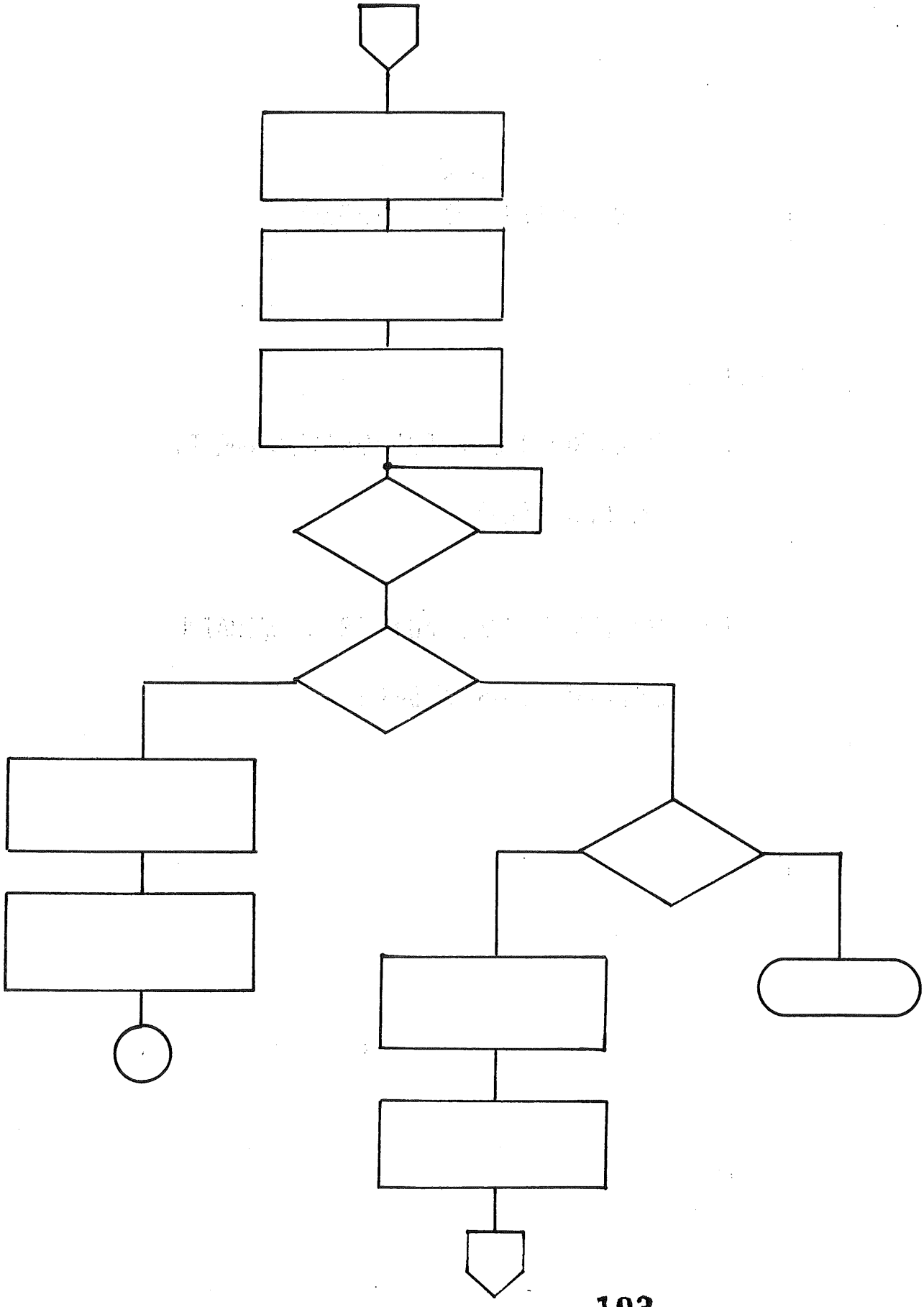
TWO INT SHMOO











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OUTPUT MESSAGES (SDM/MDM)

OBJECTIVES:

1. INTERPRET THE OUTPUT MESSAGES DUE TO OPERATOR ERROR.

2. INTERPRET NORMAL MONITOR TO OPERATOR COMMUNICATIONS MESSAGES.

TABLE 38. OUTPUT MESSAGE CODE TABLE

MSG CODE	MEANING	STATUS WORD	MDM	SDM
*ISC	Invalid Supervisor Call	PSW	X	X
*PGM	Unexpected Program Interruption	PSW	X	X
OIR	Operator Intervention Required		X	X
IRQ	Invalid I/O Request (from section)			X
HLT	Section or DM has been halted	PSW	X	X
PNF	Section not found during loading		X	X
*MCK	Machine Check Interruption	PSW	X	X
STI	Source Tape Invalid		X	
*UIO	Unassigned I/O Interruption	CSW	X	X
*UEX	Unassigned External Interruption	PSW	X	
RNV	Requested or Required Unit not Available			X
RPM	Repeat Input Message			X
DIO	Monitor I/O Error	CSW		X
*EIE	External Interrupt Error	PSW	X	X
*IOE	I/O Error Unexpected I/O Interrupt	CSW	X	X
TBF	Table (UDT, PST, LMT, IAT, ETC.) full			X
INV	Invalid Setup (from Field Engineer)			X

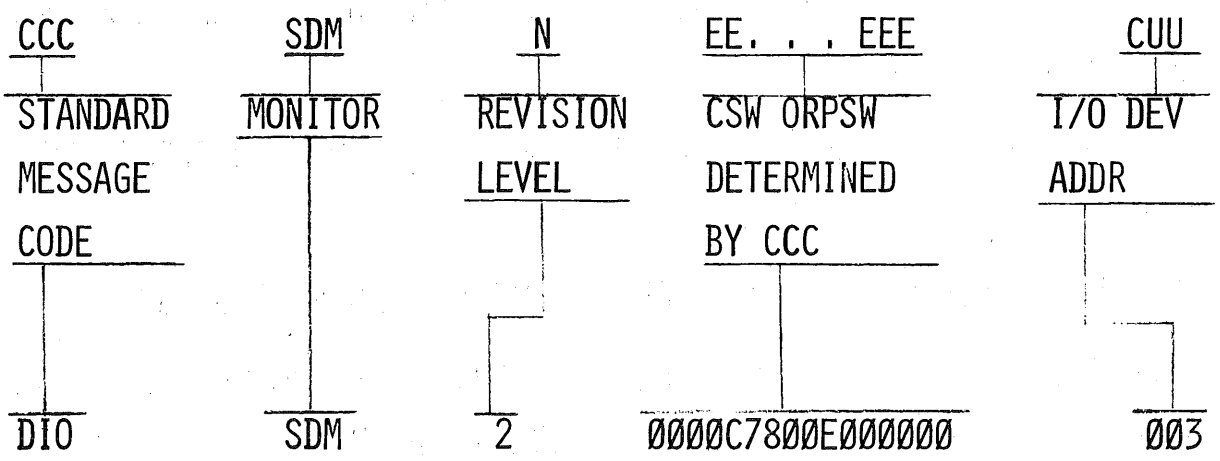
*Indicates true error condition. These messages are subject to stop on error options. All others are control messages and not subject to the error options.

Symbol	Meaning
AAAAAA	Address in MDM where error was detected.
CCC	Standard message code. An asterisk is printed when a machine error is identified.

•	CCC	EEEEEEEEEEEEEEEE	SDM	MDM
	DIO	CSW	X	
•	EIE	External old PSW	X	X
	HLT	Sv call old PSW	X	X
	ILR		X	
	INV		X	
•	IOE	CSW	X	X
•	IOH	CUU		X
	IRQ		X	
•	ISC	Sv call old PSW	X	X
•	MCK	Mach chk old PSW	X	X
	OIR		X	X
•	PGM	Program old PSW	X	X
	PNF		X	X
	REJ		X	
	RNV		X	X
	RPM	CSW	X	
•	SDO		X	X
	TBF		X	X
•	UEX	External old PSW		X
•	UIO	CSW	X	X

CUU	Address of I/O device. Printed only when applicable.
DDDD(DD)	Cycle count (hex in SDM, decimal in MDM).
E...E	CSW or old PSW as shown above for CCC.
LLLLLL	Address in section where error was detected.
N	Program revision level.
PPPSSS	Program identification.
QQ	Count of routines run (hex in SDM, decimal in MDM).
RR	Routine number as coded, usually hex.
X	CE identity.

SDM OUTPUT MESSAGE FORMAT



MEANING: MONITOR I/O ERROR, RUNNING UNDER SDM,

REVISION 2, UNIT STATUS 0E ON CARD READER 003.

RPM WITHOUT DIO

1. MEANING: REPEAT INPUT MESSAGE. AN ERROR HAS BEEN DETECTED WHILE PROCESSING THE INPUT MESSAGE IDENTIFIED IN THE VARIABLE FIELD OF MESSAGE.

2. THE FOLLOWING ERRORS WILL CREATE THIS CONDITION:

   A. THE FIRST CHARACTER OF THE INPUT MESSAGE IS NOT A VALID MESSAGE VERB.

   B. ONE OF THE FIELDS FOLLOWING THE VERB CONTAINS A NONHEXADECIMAL EBCDIC CHARACTER.

   C. ONE OF THE FIELDS FOLLOWING THE VERB IS NOT WITHIN PRESCRIBED LENGTH DEFINED FOR FIELD.

   D. THE INPUT MESSAGE IS NOT PROPERLY TERMINATED BY A SLASH.

   E. FOR THE E (ENTER) AND T (TYPE-OUT) VERBS, THE RESULTING ADDRESS, OBTAINED BY ADDING THE ADDRESS FIELD WITH THE COUNT FIELD, EXCEEDS THE HIGHEST AVAILABLE ADDRESS ON THE SYSTEM.

   F. FOR THE E (ENTER) AND T (TYPE-OUT) VERBS, THE COUNT FIELD OF THE MESSAGE IS ZERO.

   G. FOR THE E (ENTER) VERB, THE COUNT FIELD OF MESSAGE IS NOT CONSISTENT WITH DATA ENTERED.

   H. FOR THE L (LOAD) VERB, THE FOUR HIGH-ORDER CHARACTERS (STOP SEARCH ARGUMENT) IS NUMERICALLY LESS THAN THE FIRST FOUR CHARACTERS (START SEARCH ARGUMENT).

   I. FOR THE S (ALTER SENSE SWITCH) VERB, A SENSE SWITCH NUMBER HAS BEEN ENTERED THAT EXCEEDS DECIMAL 31.

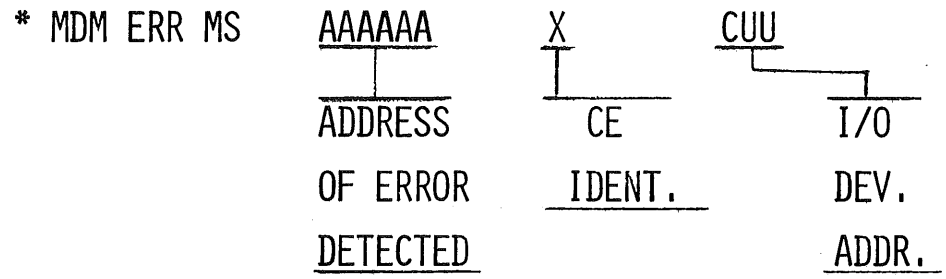
OTHER SDM MESSAGE FORMATS

1. CCC SDM N EEEEEEEEEEEEEEEE CUU
2. S PPPSSS
3. CYC PPPSSS RR DDDD
4. CCC PPPSSS RR EEEEEEEEEEEEEEEE
5. REPRINT*
6. SDM CURRENT JOB REQUEST PASS COMPLETE
7. T PPPSSS QQ ROUTINES RUN
8. EOJ SDM JOB COMPLETED

Message	Comments
	A. MDM
MDM REVISION N READY	Printed during initialization if REQUEST is depressed.
*MDM ERR MSG AAAAAA X CUU PPPSSS RR LLLLLL CCC EEEEEEEEEEEEEEE	Standard message format. These three lines are printed for MDM-generated messages.
*PPPSSS RR LLLLLL X CUU	Section-generated messages.
START PPPSSS	Section started (Sequential mode only).
CYCLE COUNT DDDDDD	Response to entered P-message.
T CE X QQ PPPSSS	Section terminated.
EOJ MDM JOB COMPLETED	Task assignments terminated.
NO UDT ENTRY FOUND FOR THIS DEVICE	Unit CUU not found in GPR 12 of section.
THIS DEVICE IS NOT ASSIGNED TO THIS SECTION	Unit CUU in GPR 12 is not assigned to the section.
PGM INT ON PRIV OP	Program interruption occurred during issuing of privileged operation for section.
PGM FLAGS 11	Section Preface program flags are illegally set to 11.
PGM MASK UNEQUAL	Section Preface condition mask does not equal interruption code for problem state section.
DIAGNOSE INSTRUCTION	MDM does not issue the Diagnose instruction.
SECTION PPSS DID NOT REQUEST D MESSAGE ENTRY	Section Preface, byte 14, bit 6 is not set, and D-message was entered for section.
	B. MDM-D/E ONLY
MCK INT DUE TO STORAGE ERROR-LOSS NOT ISSUED	If 'ILOS' bit is set, MDM cannot log out a storage. However, MDM will print the logout of the CE of IOCE that detected the error.
CE X DIDN'T RESPOND TO WRITE DIRECT FROM CE IN AT LOCATION AAAAAA-MANUAL INTERVENTION REQUIRED-MDM D/E CONTINUING IN SCHEDULER.	A CE has set the 'idle' byte, and one or more other CE's have failed to enter the idle loop at subroutine SRIDLE. Probable reasons are: (1) a CE failed to respond to an external start. (2) a CE is in a continuous loop in MDM or a section and cannot test the 'idle' byte, and (3) a CE is in an FXX wait.

FIGURE 2-6. MDM OUTPUT MESSAGES AND FORMATS

MDM OUTPUT MESSAGE FORMAT
(3 LINES)



EXAMPLE

```
* MDM  ERR  MSG  004F20     2     003

  626100     04              00829C

  PGM    00C4000540000820
```

FEDERAL AVIATION ADMINISTRATION ACADEMY
DATA PROCESSING SECTION
DCP COURSE UNIT

43458 DIAGNOSTIC PROGRAMS

LABORATORY EXPERIMENT 3

PURPOSE

To gain proficiency in the running of specific diagnostic sections under SDM/MDM.

OBJECTIVES

A. Practice loading diagnostic programs.

B. Utilize input messages to load and execute specific diagnostic sections.

C. Perform P. M. task D22AØ on off line SE.

D. Analyze resultant monitor output messages. (Error Analysis)

PROCEDURES

A. Configure the off line system for running diagnostic programs.

   1. Insure available SE is in ATR slot 1.

   2. Insure available SE is in state zero.

B. Mount the diagnostic tape on a tape drive connected to your configured TCU.

C. IPL (subsystem load) from the Compute Element. Bypass bringup sections.

D. Press request key on the 1052 in your system.

   1. Monitor will respond - SDM revision XX Ready Enter System ID. Reply either A D, E.

   2. Enter your response to this message (D/).

   3. Enter the message LMDM/ and observe the following:

      a. Tape drive motion.

      b. Output messages.

E. At this point, MDM is resident within your system and ready for initialization.

F. Add the HSP available to your system and initialize this device as secondary output.

   1. A,CUU/

   2. I,,,CUU/

G. Load and execute 22AØ on all 4 BSM's on the configured SE. (Selected SHMOO routines only.)

   1. Normally, the XY voltages of each BSM would be varied using the voltage values established on the SE 198's. DO NOT make these adjustments. Your instructor will show and explain these adjustments.

   2. Three passes on each BSM, both above and below the operational SHMOO limits are required by 6100.1. Each pass through 22AØ produces an output message on the HSP which will provide a count of passes.

   3. Repeat this process on each of the remaining BSM's.

H. After each BSM is completed, it will be necessary to initialize the system (I/ clears the LMT) and reload 22AØ defining the next segment of storage with the D message.

This concludes the experiment. Return all equipment to normal conditions.

SUMMARY

A. IPL of diagnostic tape causes the stand alone programs to run automatically.

B. If CE IPL, IAR will indicate Address X'ØØØØØA' when SDM is successfully loaded.

C. SDM may be bypassed by the input MSG LMDM/.

D. SE Diagnostic 22AØ can then be loaded and executed under MDM.

E. The absence of output error messages indicates a successful pass on a given BSM. (Only one BSM can be specified in the "D" message, "Define Storage.")

F. Each successful pass will be printed on the secondary output device.

```
  SDM REVISION  8 READY
ENTER SYSTEM ID
REPLY EITHER A,D OR E
d/
lmdm/
  MDM D/E RIVISION 05 READY CD0009 000 OKC D/E
122a0/d.000.020/ss.0/b/
START   D22A04
  TESTING SE  1 LOW  EVEN BSM
  TESTING SE  1 LOW  EVEN BSM
  TESTING SE  1 LOW  EVEN BSM
f/
T CE1  044      D22A04
  EOJ  MDM JOB COMPLETE
122a0/d.020.040/ss.0/b/
START   D22A04
  TESTING SE  1 LOW  ODD  BSM
  TESTING SE  1 LOW  ODD  BSM
  TESTING SE  1 LOW  ODD  BSM
f/
T CE1  045      D22A04
  EOJ  MDM JOB COMPLETE
122a0/d.040.060/ss.0/b/
START   D22A04
  TESTING SE  1 HIGH EVEN BSM
  TESTING SE  1 HIGH EVEN BSM
  TESTING SE  1 HIGH EVEN BSM
f/
T CE1  044      D22A04
  EOJ  MDM JOB COMPLETE
122a0/d.060.080/ss.0/b/
START   D22A04
  TESTING SE  1 HIGH ODD  BSM
  TESTING SE  1 HIGH ODD  BSM
  TESTING SE  1 HIGH ODD  BSM
f/
T CE1  044      D22A04
  EOJ  MDM JOB COMPLETE
```

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DIAGNOSTIC PROGRAM

GO/NO-GO

DAY 1

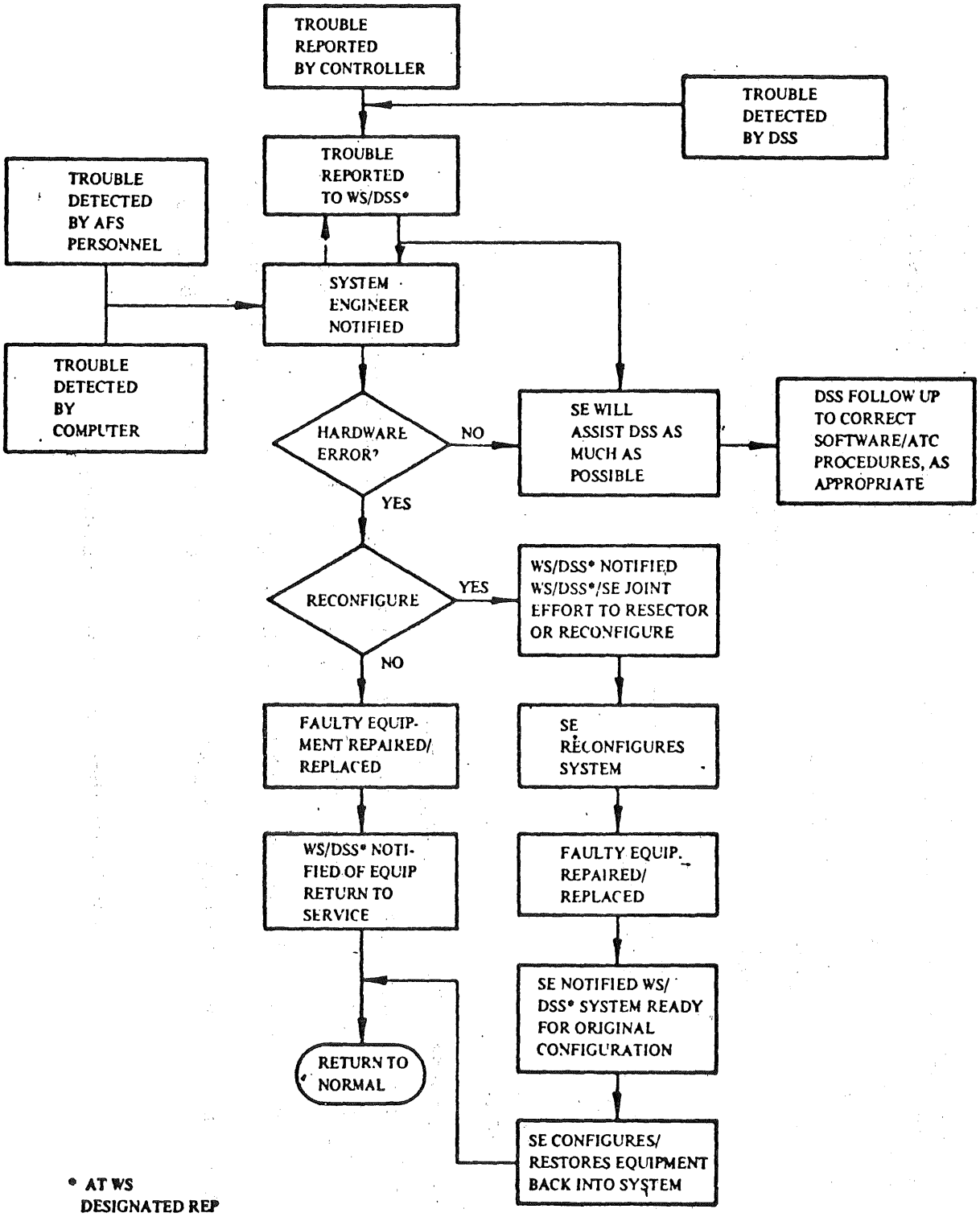


FIGURE 108. System Fault Procedures Flow Diagram.

```
          (A)                                                    (B)                  (C)
LINE 1    dddd/dd    ELEMENT CHECK REPORT          ,DATE  dd/dd/dd          TIME  dd:dd:dd
               (A)                                                (B)                  (C)
LINE 2    INTERMITTENT ERROR     CHARGED TO elmnt       elmnt INTFC        ERR CNTS dd MAX dd
          SOLID ERROR                                                      A NON-OPERATIONAL
          INDETERMINENT ERROR                                              ELEMENT
           (A)      (B)          (C)                                (D)
LINE 3    elmnt                 MC       INTERRUPTION
                   APSA          PROG                          OLD PSW xxxxxxxx xxxxxxxx
                                 EXT                           SEE PREVIOUS I/O CHECK REPORT
                                 SVC
                                 I/O
           (A)      (B)                        (C)
LINE 4    elmnt    SPCI       SEE PREVIOUS I/O CHECK REPORT
                   SIO        FAILED FOR elmnt
                   TIO
                   HIO
                   TCH
                   SCON
                   SATR
          (A)
LINE 5    elmnt    DAR ANALYSIS CHECK CONDITIONS:
  (B)              IOCE1 IOCE2 IOCE3/ 1 2  3 4 5 SE 7 8 9 10 11 12/1 PAM 3/1 TCU 3/CE OWN/*/1 2  CE 4/*
  (C)
 DAR MASK          b b   b b   b b    bbbbbb  bbbb b b  b  b  bb  b  bb    b  b  bbb  bb
  (D)
READING-1          b b   b b   b b    bbbbbb  bbbb b b  b  b  bb  b  bb    b  b  bbb  bb
  (E)
READING-2          b b   b b   b b    bbbbbb  bbbb b b  b  b  bb  b  bb    b  b  bbb  bb
```

FIGURE 109. Element Check Report Format (Sheet 1 of 2)

GO/NO-GO DIAGNOSTIC PROGRAM

OBJECTIVES:

1. ANALYZE AND RELATE THE SEQUENCE OF CHANNEL CONTROL WORDS TO LOAD THE FIRST PROGRAM.

2. STATE THE PROGRAM PHILOSOPHY.

3. LOAD AND INITIATE THE GO/NO-GO PROGRAM BY USING ACCEPTED PROCEEDURES.

4. SYNTHESIZE THE FAILING INSTRUCTION BY MATCHING CERTAIN INDICATIONS WITH INFORMATION CONTAINED IN THE PROGRAM LISTING.

GO/NO-GO DIAGNOSTIC PROGRAM

1. GENERAL:

   A. STAND-ALONE PROGRAM, NOT REQUIRING A MONITOR.

   B. PROVIDES FOR TESTING 14 OR 15 BASIC INSTRUCTIONS REQUIRED BY PROGRAMS THAT FOLLOW:

      (1) BASIC STORE

      (2) HARDCORE OR IDM BASED ON SYSTEM ENVIRONMENT

      (3) SDM/MDM

2. TEST THE ABILITY TO FORM AN EFFECTIVE ADDRESS FROM BASE , INDEX AND DISPLACEMENT COMPONENTS.

3. TEST THE ABILITY TO START INPUT-OUTPUT OPERATIONS BY:

   A. READING A RECORD FORWARDS.

   B. READING A RECORD BACKWARDS.

   C. SKIPPING A RECORD.

4. GO/NO-GO MUST LOAD, AND TRANSFER CONTROL TO THE BASIC STORE DIAGNOSTIC PROGRAM.

GO/NO-GO ASSUMPTIONS

THE LOADING AND EXECUTION OF ANY DIAGNOSTIC PROGRAM WITHIN THE 9020 SYSTEM ASSUMES THAT:

A. THE SYSTEM BEING USED HAS BEEN PREVIOUSLY CONFIGURED:

1. MANUALLY.

2. UNDER NAS OR OTHER SOFTWARE PROGRAM WITH CONFIGURATION CAPABILITY.

B. THE REQUIRED I/O LOADING PATH IS AVAILABLE AND OPERATIONAL.

C. THE BASIC INSTRUCTION LOAD PROGRAM STATUS WORD (LPSW) FUNCTIONS NORMALLY.

D. APPROXIMATELY 1K HEXIDECIMAL BYTES OF STORAGE, EITHER IN MACH (IOCE) OR MAIN (SE) IS FUNCTIONING PROPERLY.

GO/NOGO

LPSW

LPSW BC

BC LA C

BC LA C L ST

BC LA C L S A

LPSW BC LA C LR BCR

LPSW BC LA C L ST SVC SPM

BC LA C L ST IC STC

LPSW BC LA C L IC STC Eff. Addr.

LPSW BC LA L A ST SPM STC SPSB

LPSW BC LA C L A ST IC STC SIO

GO/NO-GO

ERROR INDICATIONS

1. WAIT BIT ON, VIA LPSW, WITH A UNIQUE ADDRESS IN THE INSTRUCTION COUNTER.

2. ONE INSTRUCTION HANG LOOPS, NO WAIT BIT ON, FAILING ADDRESS IN THE INSTRUCTION COUNTER.

3. UNEXPECTED INTERRUPTS PRODUCE A WAIT STATE, WITH A UNIQUE ADDRESS IN THE INSTRUCTION COUNTER.

GO/NO-GO

TROUBLESHOOTING AIDS

1. ADDRESS X'00000008' WILL CONTAIN THE SECTION IDENTIFICATION. WHAT SECTION IN DIAGNOSTICS THE ERROR OCCURED IN.

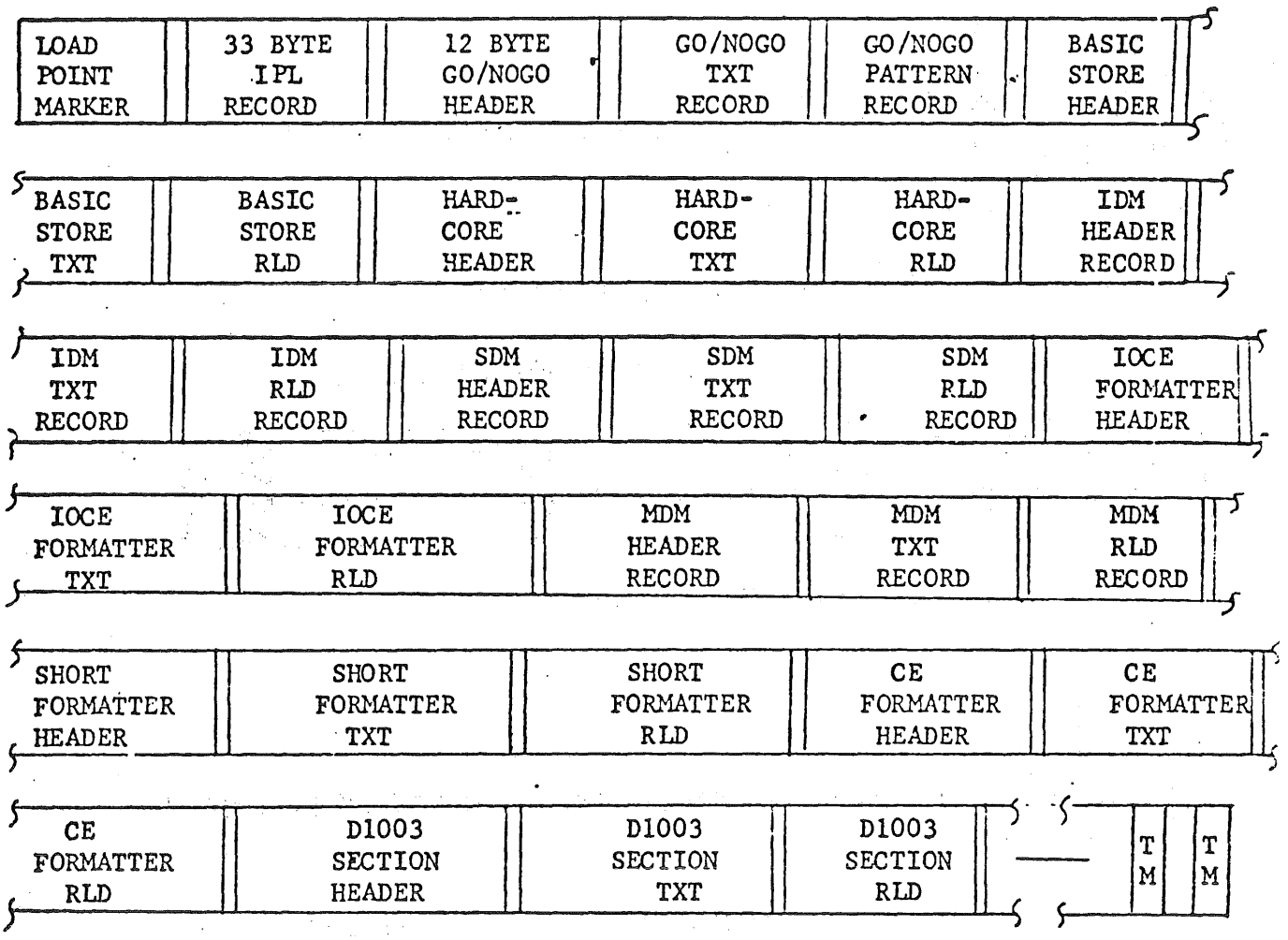
2. CONTENTS OF OLD PSW'S FOR A GIVEN UNEXPECTED INTERRUPT.

3. GENERAL PURPOSE REGISTER 3 WILL CONTAIN THE ADDRESS OF A FAILING ROUTINE WITHIN A DIAGNOSTIC TEST. (CALLED A TRACE REG)

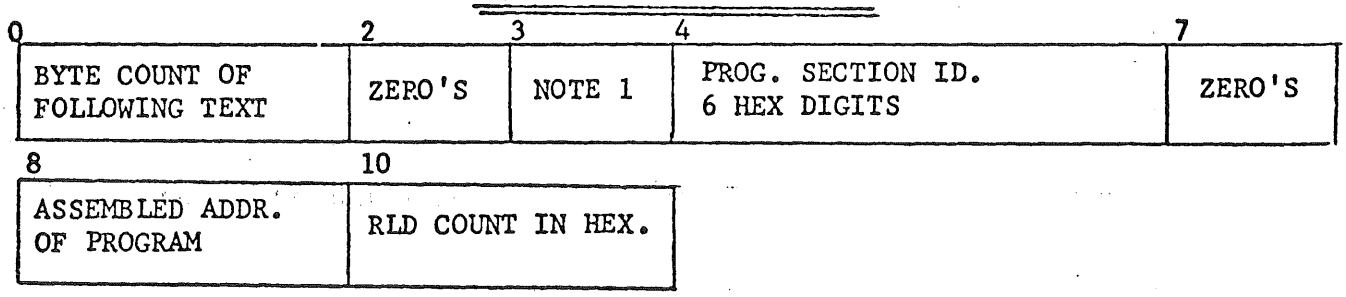
4. DATA CONTENT OF REGISTERS AND STORAGE USED WITH A GIVEN ROUTINE.

5. WAIT LIGHT ON OR OFF IS ALSO USEFUL INFORMATION.

DIAGNOSTIC LIBRARY TAPE FORMAT



HEADER RECORD FORMAT



NOTE 1: BYTE 3 BIT BREAKDOWN

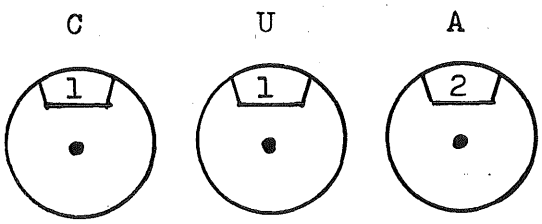
BITS 0-3 NUMBER OF 1K HEX ADDITIONAL BLOCKS OF CORE REQUIRED BY DIAGNOSTIC PROGRAM.

BIT 4 EXCLUSIVE CPU BIT. IF A "1" SECTION CANNOT RUN IN A MULTIPROGRAM SITUATION. (one ce only)

BIT 5 EXCLUSIVE SYSTEM BIT. IF A "1" THE SYSTEM IS NEEDED IN IT'S ENTIRETY BY THE SECTION.

BITS 6 7 RECORD ID

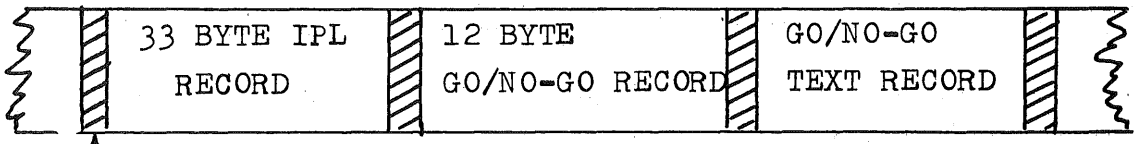
00 = TEXT RECORD
01 = HEADER RECORD
10 = OVERLAY SECTION HEADER
11 = RLD RECORD



CHANNEL AND UNIT ADDRESS

LOAD — LOAD PUSH BUTTON

TAPE MOTION

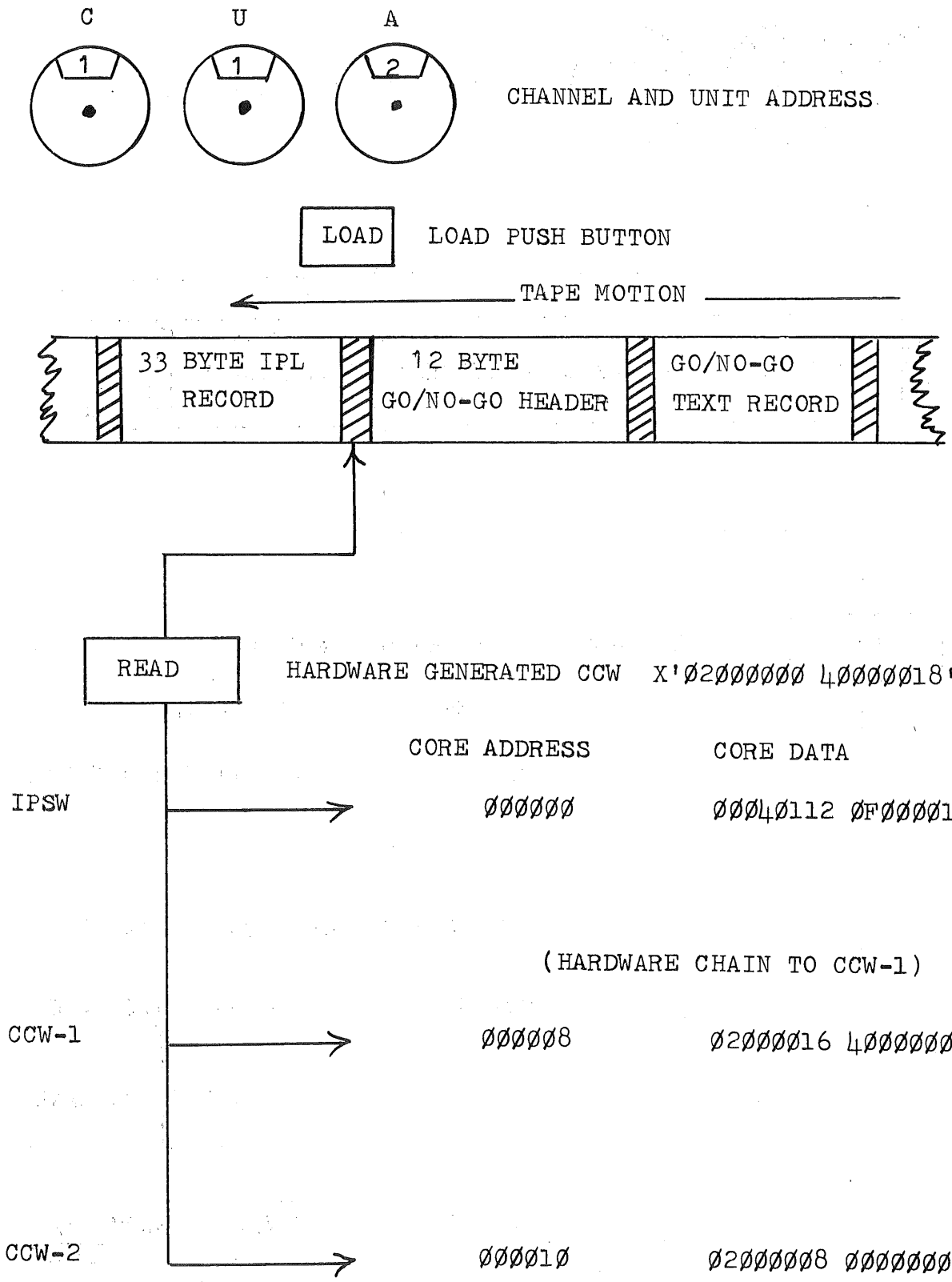


TAPE AT LOAD POINT MARKER

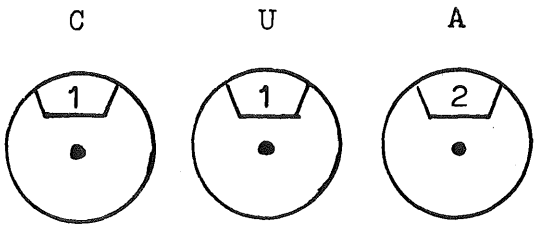
READ — HARDWARE GENERATED CCW X'Ø2ØØØØØØ 4ØØØØØ18'

	CORE ADDRESS	CORE DATA
IPSW	ØØØØØØ	ØØØØØØØØ ØØØØØØØØ
CCW-1	ØØØØØ8	ØØØØØØØØ ØØØØØØØØ
CCW-2	ØØØØ1Ø	ØØØØØØØØ ØØØØØØØØ

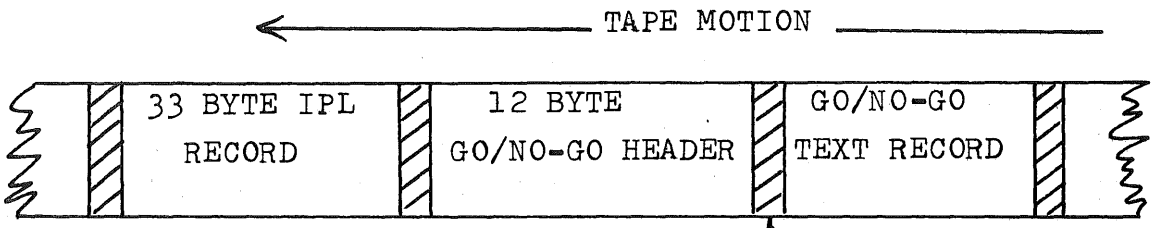
STEP # 1


C
U
A
1
1
2
CHANNEL AND UNIT ADDRESS
LOAD
LOAD PUSH BUTTON
TAPE MOTION
33 BYTE IPL RECORD
12 BYTE GO/NO-GO HEADER
GO/NO-GO TEXT RECORD
READ
HARDWARE GENERATED CCW X'Ø2ØØØØØØ 4ØØØØØ18'
CORE ADDRESS
CORE DATA
IPSW
ØØØØØØ
ØØØ4Ø112 ØFØØØØ1Ø
(HARDWARE CHAIN TO CCW-1)
CCW-1
ØØØØØ8
Ø2ØØØØ16 4ØØØØØØC
CCW-2
ØØØØ1Ø
Ø2ØØØØØ8 ØØØØØØØØ

STEP # 2



CHANNEL AND UNIT ADDRESS



READ — CCW-1 READS 12 BYTE HEADER RECORD

	CORE ADDRESS	CORE DATA
IPSW	ØØØØØØ	ØØØ4Ø112 ØFØØØØ1Ø

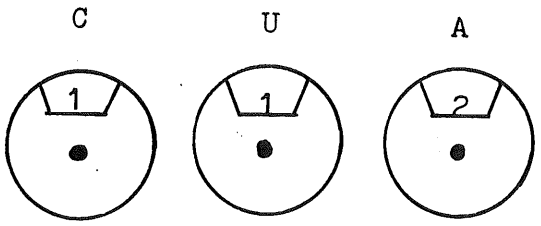
(HARDWARE HAS CHAINED TO CCW-1)

CCW-1	ØØØØØ8	Ø2ØØØØ16 4ØØØØØØC
CCW-2	ØØØØ1Ø	Ø2ØØØØØ8 ØØØØØFAØ

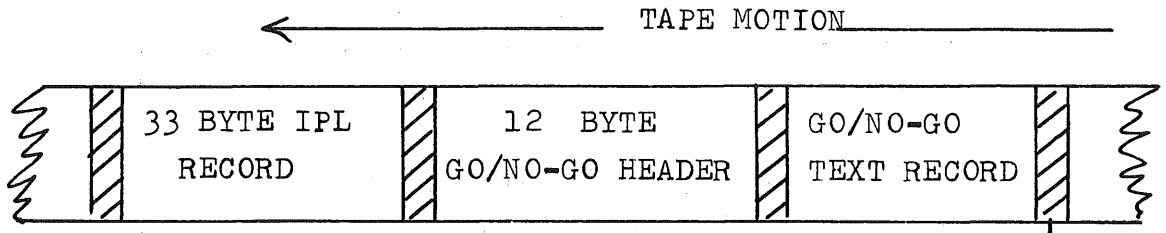
CHAIN COMMAND

OVERLAY BYTE COUNT

STEP # 3



CHANNEL AND UNIT ADDRESS



READ

CCW-2 READS THE GO/NO-GO TEXT RECORD INTO CORE AND STARTS OVERLAYING AT ADDRESS X'ØØØØØ8'

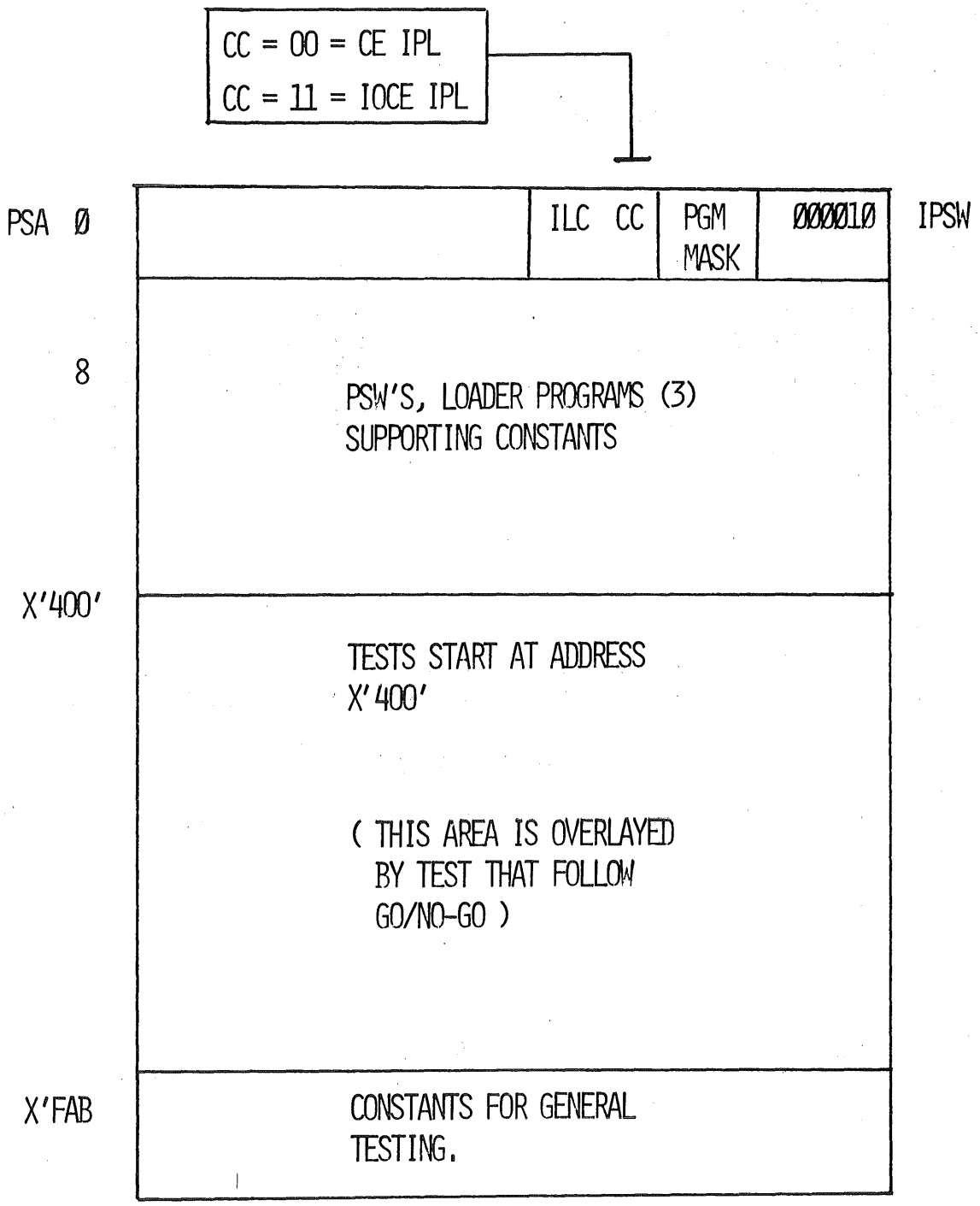
	CORE ADDRESS	CORE DATA
IPSW	ØØØØØØ	ØØØ4Ø112 ØFØØØØ1Ø
CCW-1	ØØØØØ8	DØØ1Ø2ØØ ØØØØØØØØ
CCW-2	ØØØØ1Ø	82ØØØD78 47FØØØ14

SECTION ID

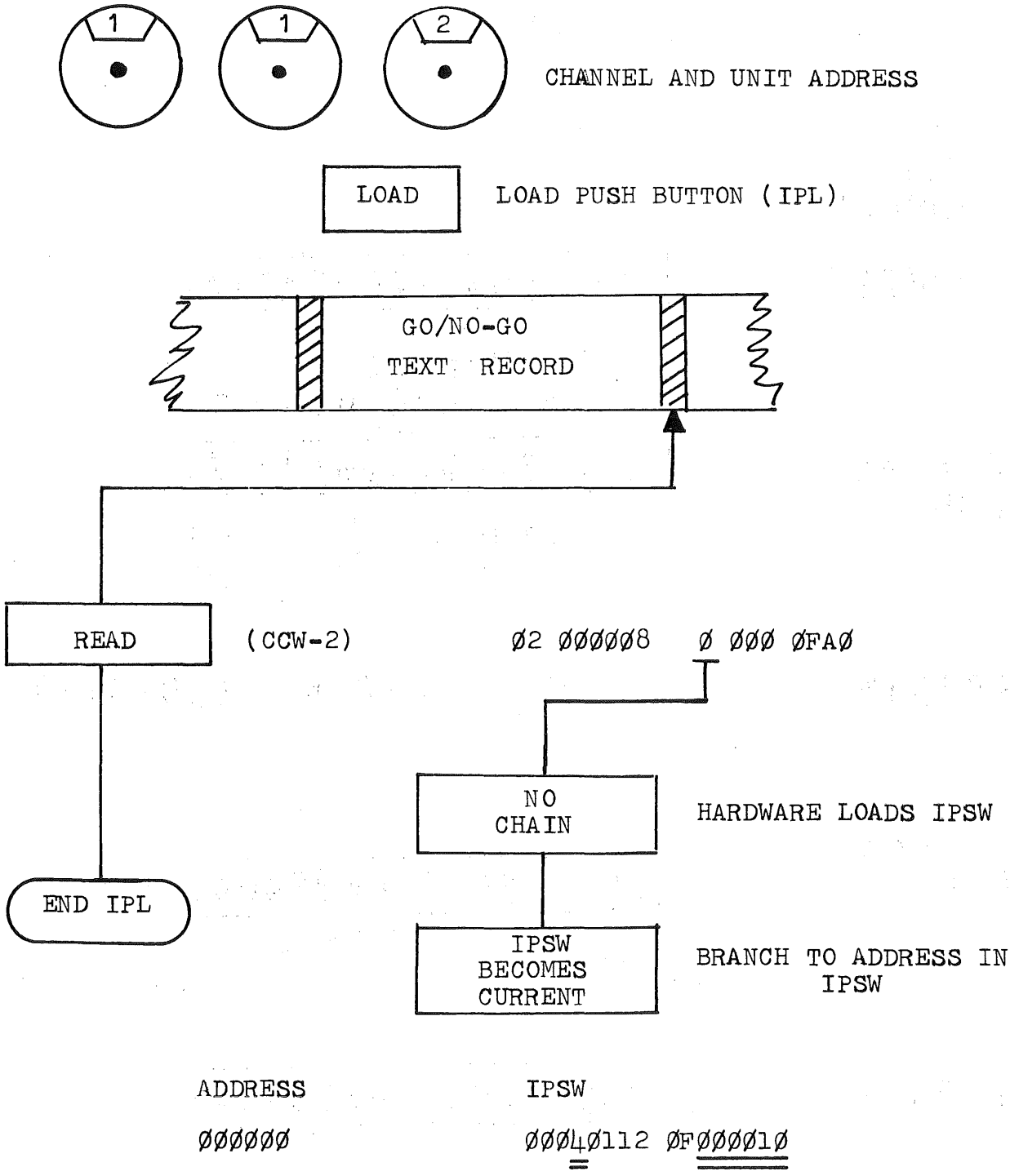
LPSW

FROM THIS ADDRESS

STEP 4 -



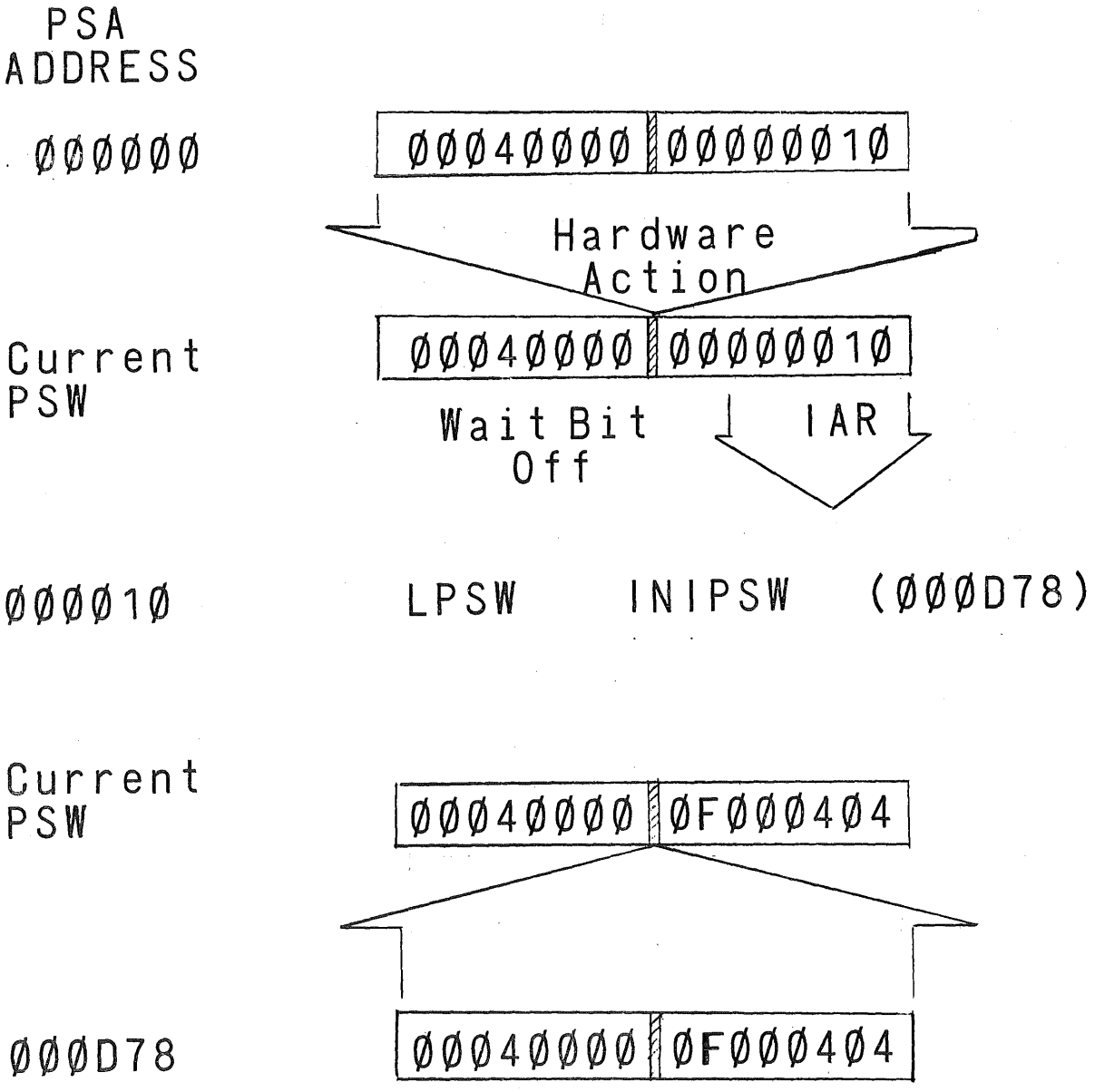
GENERAL CORE LAYOUT

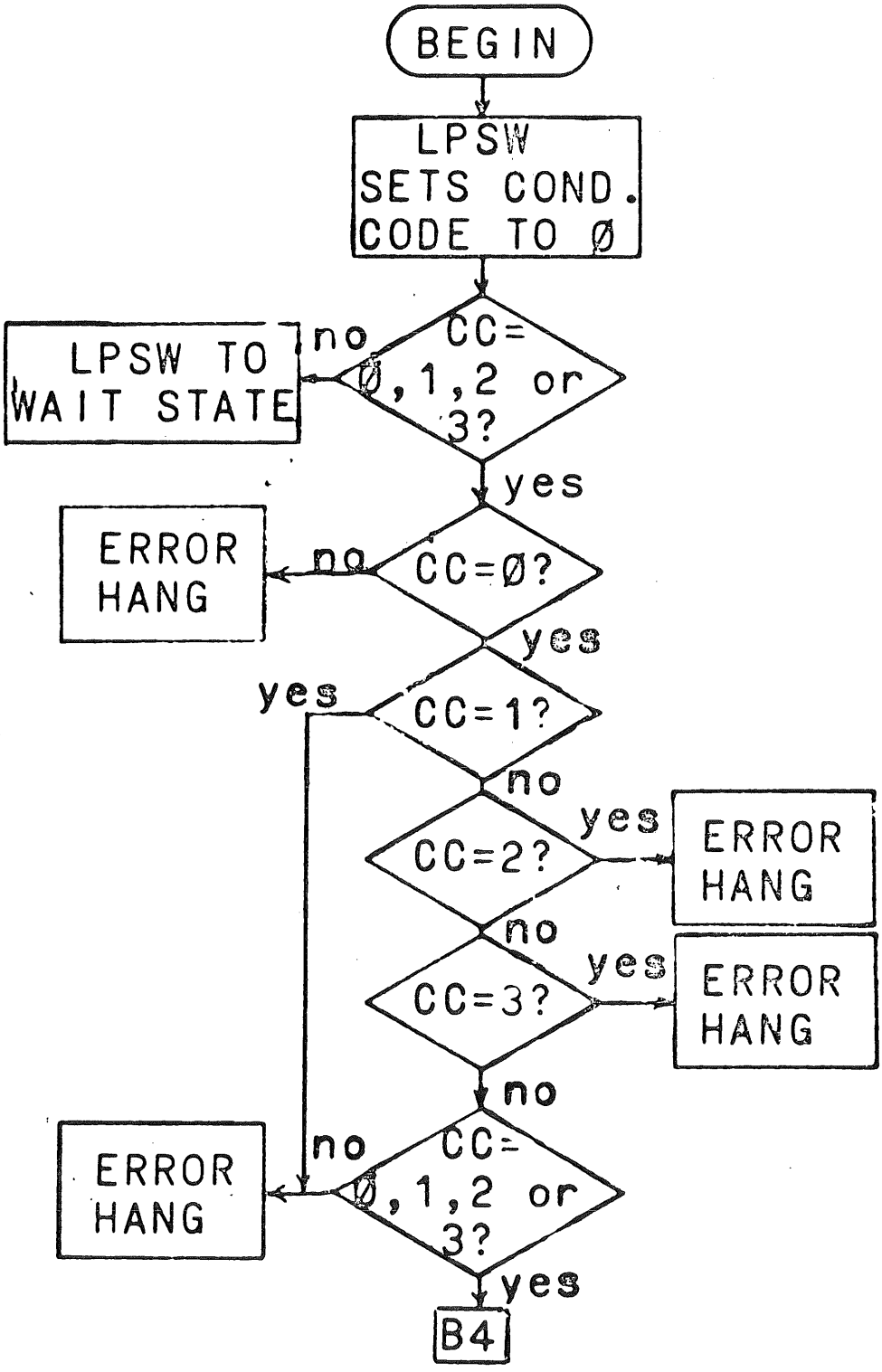


ADDRESS IPSW

ØØØØØØ ØØØ4Ø112 ØFØØØØ1Ø

RESULT OF NO CHAINING IN CCW-2




BEGIN
LPSW SETS COND. CODE TO Ø
CC= Ø,1,2 or 3?
no
LPSW TO WAIT STATE
yes
CC=Ø?
no
ERROR HANG
yes
CC=1?
yes
no
CC=2?
yes
ERROR HANG
no
CC=3?
yes
ERROR HANG
no
CC= Ø,1,2 or 3?
no
ERROR HANG
yes
B4

43458

DIAGNOSTIC PROGRAM

GO/NO-GO

DAY 2

GO/NO-GO REVIEW QUIZ

1. What is the purpose of GNG?

2. List the types of error halts available in the GNG diagnostic program.

3. Why are I/O operations tested in the GNG diagnostic program?

4. List the assumptions that have to be made to run diagnostic GNG.

5. How does the 33 byte IPL Record get into storage?

6. What is the first instruction executed in GO/NO-GO, and what is its core location?

7. What are the contents of address 8 after GO/NO-GO is resident?

8. What is the purpose of CCW1 that originated on the IPL Record?

9. CCW 2 gets modified when CCW 1 reads in the header record. What is the purpose of the modification?

10. At the end of CCW 2, reading of the text record, how does the program GNG get control?

11. What does Routine 1 of the GNG diagnostic program accomplish? Why is this important?

12. Where does the initial CC used in routine 1 originate?

GO/NO-GO DIAGNOSTIC PROGRAM

OBJECTIVES:

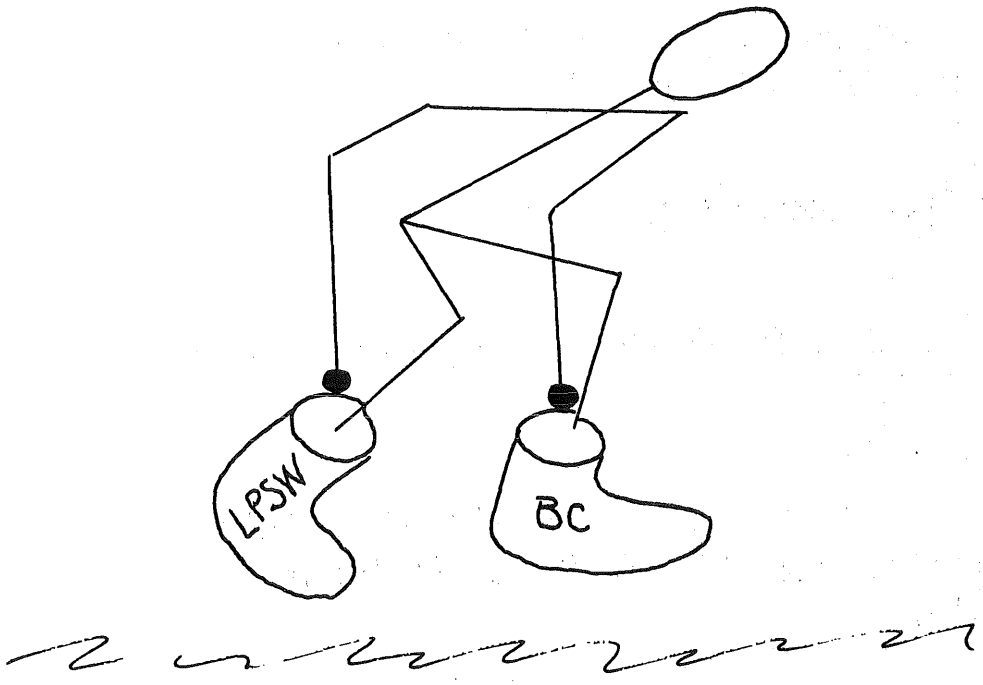
1. ANALYZE AND RELATE THE SEQUENCE OF CHANNEL CONTROL WORDS TO LOAD THE FIRST PROGRAM.

2. STATE THE PROGRAM PHILOSOPHY.

3. LOAD AND INITIATE THE GO/NO-GO PROGRAM BY USING ACCEPTED PROCEEDURES.

4. SYNTHESIZE THE FAILING INSTRUCTION BY MATCHING CERTAIN INDICATIONS WITH INFORMATION CONTAINED IN THE PROGRAM LISTING.

BOOTSTRAP PRINCIPLE



"EACH INSTRUCTION EXCEPT LPSW IS TESTED BEFORE IT IS USED IN MAKING OTHER TESTS. THUS THE PROGRAM BUILDS ITS OWN INSTRUCTION SET."

(BOOTSTRAP)

SUMMARY OF BC

TESTING

USING LOAD PSW

1. LOAD PSW INIPSW TO ESTABLISH A KNOWN CONDITION CODE OF Ø. TEST ALL COMBINATIONS OF BC USING THIS CONDITION.

INIPSW | Ø Ø Ø 4 Ø Ø Ø Ø | Ø F Ø Ø Ø 4 Ø 4 |

ØØØD78

2. LOAD PSW SECPSW TO SET CONDITION CODE 1 AND TEST ALL BRANCHING COMBINATIONS OF BC USING CC=1.

SECPSW | Ø Ø Ø 4 Ø Ø Ø Ø | 1 F Ø Ø Ø 4 3 4 |

ØØØD8Ø

3. LOAD PSW THRPSW TO SET CONDITION CODE 2 AND TEST ALL BC CONDITIONS USING THIS CC.

THRPSW | Ø Ø Ø 4 Ø Ø Ø Ø | 2 F Ø Ø Ø 4 6 4 |

ØØØD88

4. LOAD PSW FORPSW TO SET CONDITION CODE 3 AND TEST ALL BC POSSIBILITIES USING CC3.

FORPSW | Ø Ø Ø 4 Ø Ø Ø Ø | 3 F Ø Ø Ø 4 9 4 |

ØØØD9Ø

ROUTINE 2 LOAD ADDRESS (LA)
AND COMPARE (C)

ADDRESS	LINE		
0004C0	289	LOK20	LA 3,LOK20
			X X | 0 0 | 0 4 | C 0 REG3
0004C4	290		C 3,CONAX1
			0 0 | 0 0 | 0 4 | C 0
			E80 CONAX1 PAGE 13
0004C8	291		BC EQ,LOK21
0004CC	292		BC UNC,*

IF OPERAND COMPARE, SET CC=0 IN CURRENT PSW AND BRANCH TO LOK21.

IF OPERANDS DO NOT COMPARE, FALL THROUGH INTO ONE INSTRUCTION HANG LOOP.

Q. WHICH INSTRUCTION FAILED, LA OR COMPARE?

Q. HOW COULD WE FIND OUT?

LOAD ADDRESS AND COMPARE
CONTINUED

ADDRESS	LINE			
0004D0	299	LOK21	C	3,CONAX2

REG 3 | 00 | 00 | 04 | C0 | | 00 | 00 | 04 | DC |

COMPARE REG 3 TO A HIGHER CONSTANT, AND SHOULD SET CONDITION CODE 1.

0004D4	300		BC	LOW,LOK22
0004D8	301		BC	UNC,*

SHOULD BRANCH TO LOK22 OTHERWISE HANG IN A TIGHT LOOP.

Q. WHAT WOULD YOU SEE IN TERMS OF THE FRONT PANEL?

LA TEST FOR BYTE ZERO

ADDRESS	LINE				
000514	333	LA	3,LOK25	00 00 05 14	REG3
000518	334	L	1,ALLBT	FF FF FF FF	REG1
00051C	335	LA	1,LOK20	00 00 04 C0	

LA INSTRUCTION ZERO's OUT HIGH ORDER BYTE AND LOADS BITS 8-31 WITH ADDRESS SPECIFIED. HAD NOT TESTED THIS FEATURE OF THE LA INSTRUCTION. LA PRIOR TO THIS POINT HAD BEEN INTO A CLEAR REGISTER.

000520	336	C	1,CONAX1	00 00 04 C0	
				CONAX1	
000524	337	BC	EQ,LOK25B		
			CC=0 IF LA ZEROES OUT THE HIGH ORDER BYTE OF GP REG 1.		
000528	338	BC	UNC,*		
			IF HIGH ORDER BYTE DOES NOT GET ZEROED OUT, HANG IN A TIGHT LOOP		

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DIAGNOSTIC PROGRAM

GO/NO-GO

DAY 3

GO/NO-GO DIAGNOSTIC PROGRAM

OBJECTIVES

1. ANALYZE AND RELATE THE SEQUENCE OF CHANNEL CONTROL WORDS TO LOAD THE FIRST PGM.

2. STATE THE PROGRAM PHILOSOPHY.

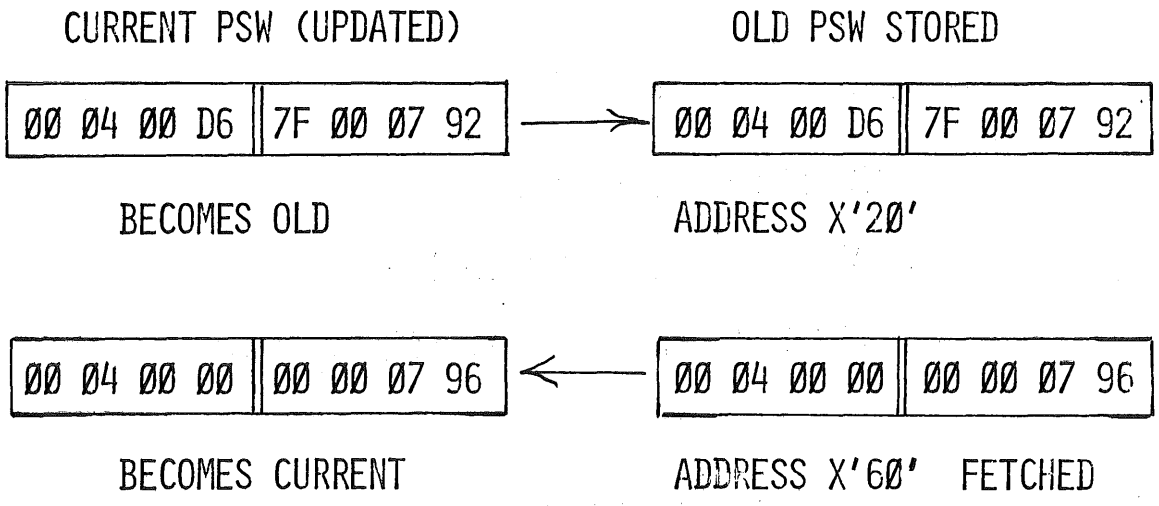
3. LOAD AND INITIATE THE GNG PROGRAM BY USING ACCEPTED PROCEDURES.

4. SYNTHESIZE THE FAILING INSTRUCTION BY MATCHING CERTAIN INDICATIONS WITH INFORMATION CONTAINED IN THE PROGRAM LISTING.

ISSUE SVC INSTRUCTION WITH X'D6'
INTERRUPT CODE

MACHINE LANGUAGE X'ØAD6"

FORCE PSW SWAP



GO/NO-GO STRUCTURE
ASSUME LPSW
WORKS

LPSW

LPSW BC

LPSW BC LA C

LPSW BC LA C L ST

LPSW BC LA C L ST A S

LPSW BC LA C L ST A S LR BCR

LPSW BC LA C L ST A S LR BCR SVC SPM

"BOOTSTRAP CONCEPT CONTINUES. TEST AN INSTRUCTION AND THEN USE THIS INSTRUCTION TO TEST THE NEXT INSTRUCTION."

SUMMARY OF GNG TESTING
TO THIS POINT

1. INSTRUCTIONS TESTED (13)
   BC, LA, C, L, ST, A, S, LR, BCR
   SVC, SPM, IC AND STC.

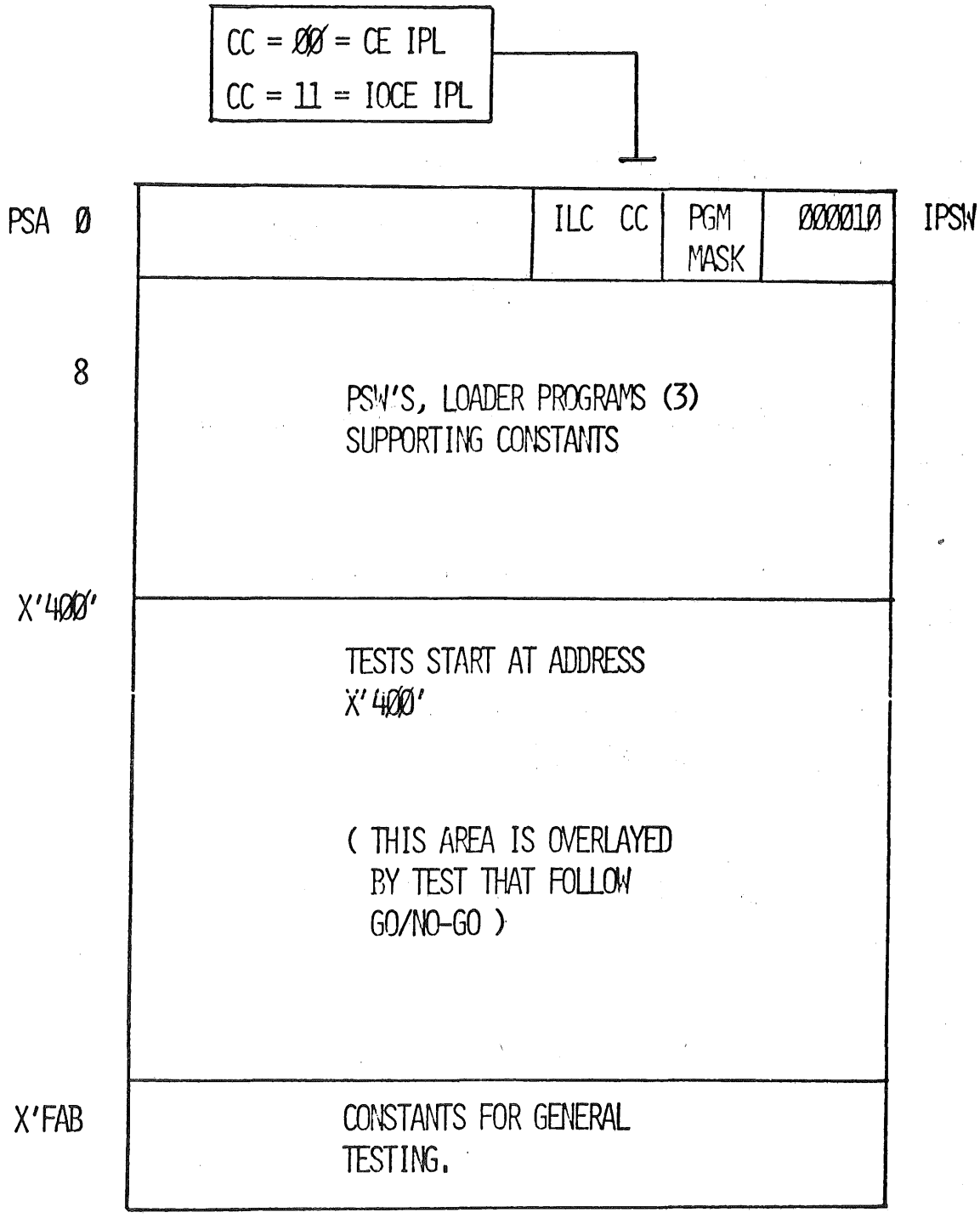
2. REGISTER 2 HAS BEEN SUCCESSFULLY USED.

3. REGISTER 1 HAS BEEN USED MANY TIMES.

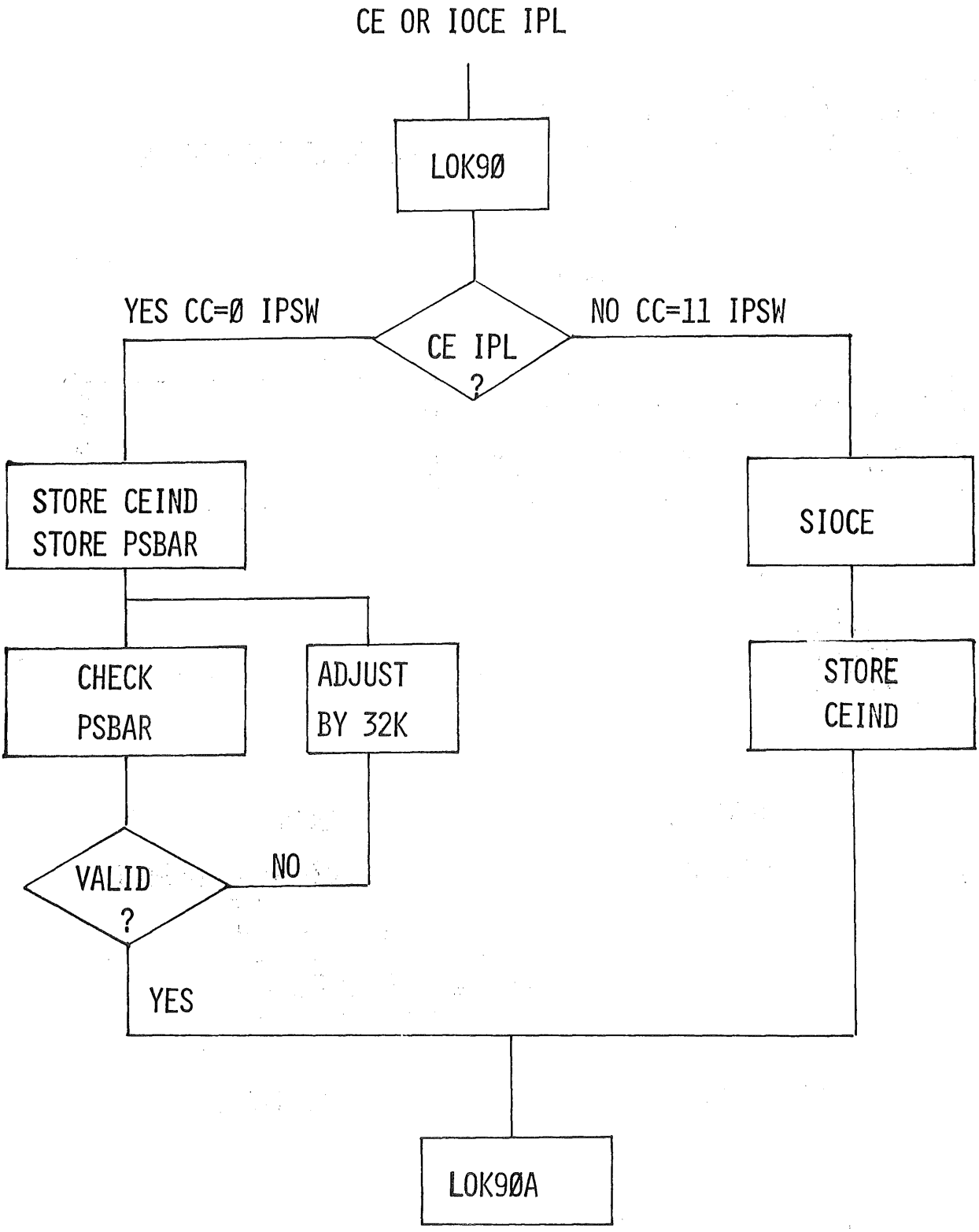
4. REGISTER 3 HAS BEEN USED AS
   A TRACE REGISTER.

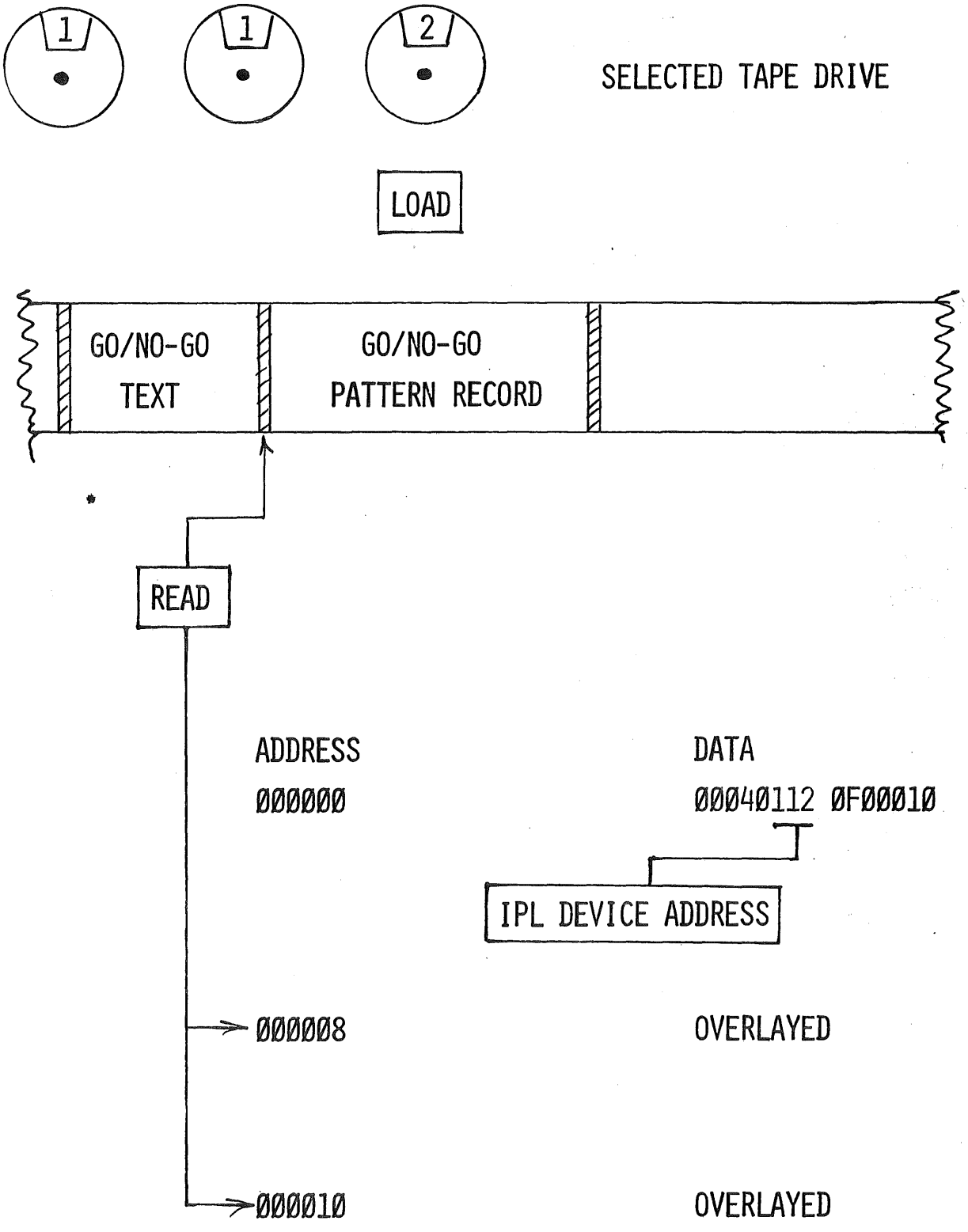
5. PSW SWAPS (SVC) HAVE BEEN SUCCESSFUL.

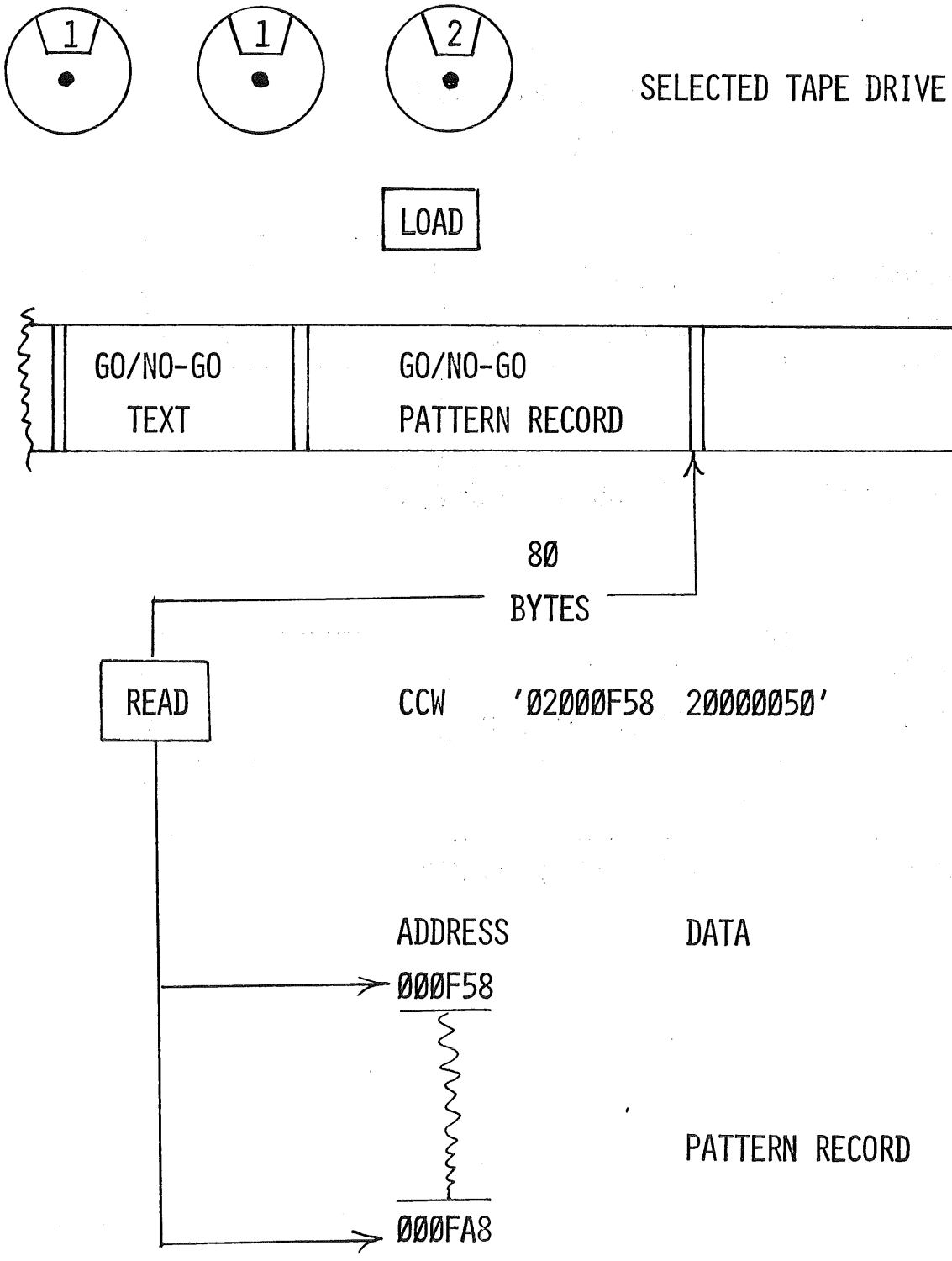
"WHAT COMES NEXT?"



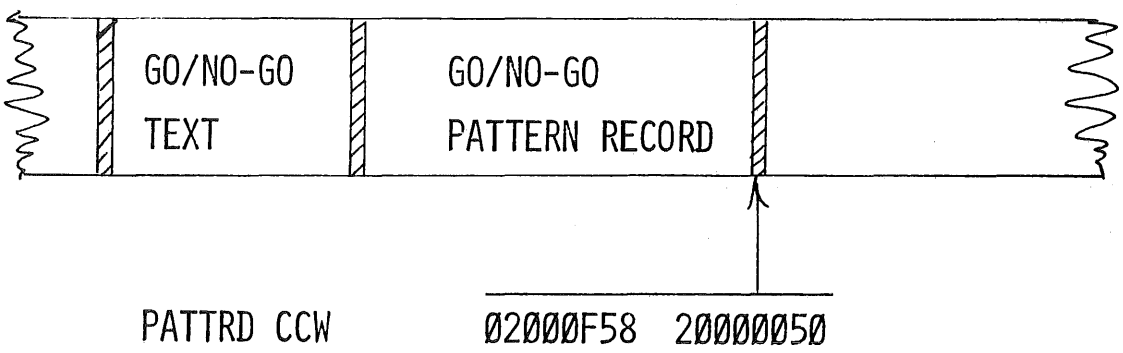
GENERAL CORE LAYOUT

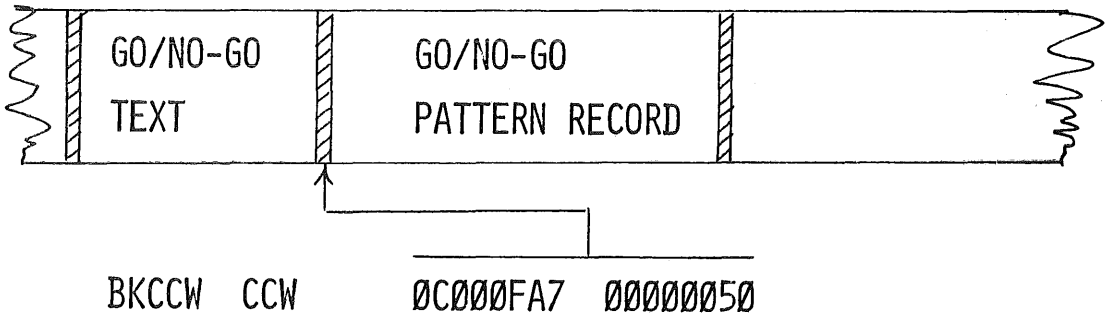

CE OR IOCE IPL
LOK9Ø
YES CC=Ø IPSW
CE IPL ?
NO CC=11 IPSW
STORE CEIND
STORE PSBAR
SIOCE
CHECK PSBAR
ADJUST BY 32K
STORE CEIND
VALID ?
NO
YES
LOK9ØA


1
1
2
SELECTED TAPE DRIVE
LOAD
GO/NO-GO
TEXT
GO/NO-GO
PATTERN RECORD
READ
ADDRESS
000000
DATA
00040112 0F00010
IPL DEVICE ADDRESS
000008
OVERLAYED
000010
OVERLAYED

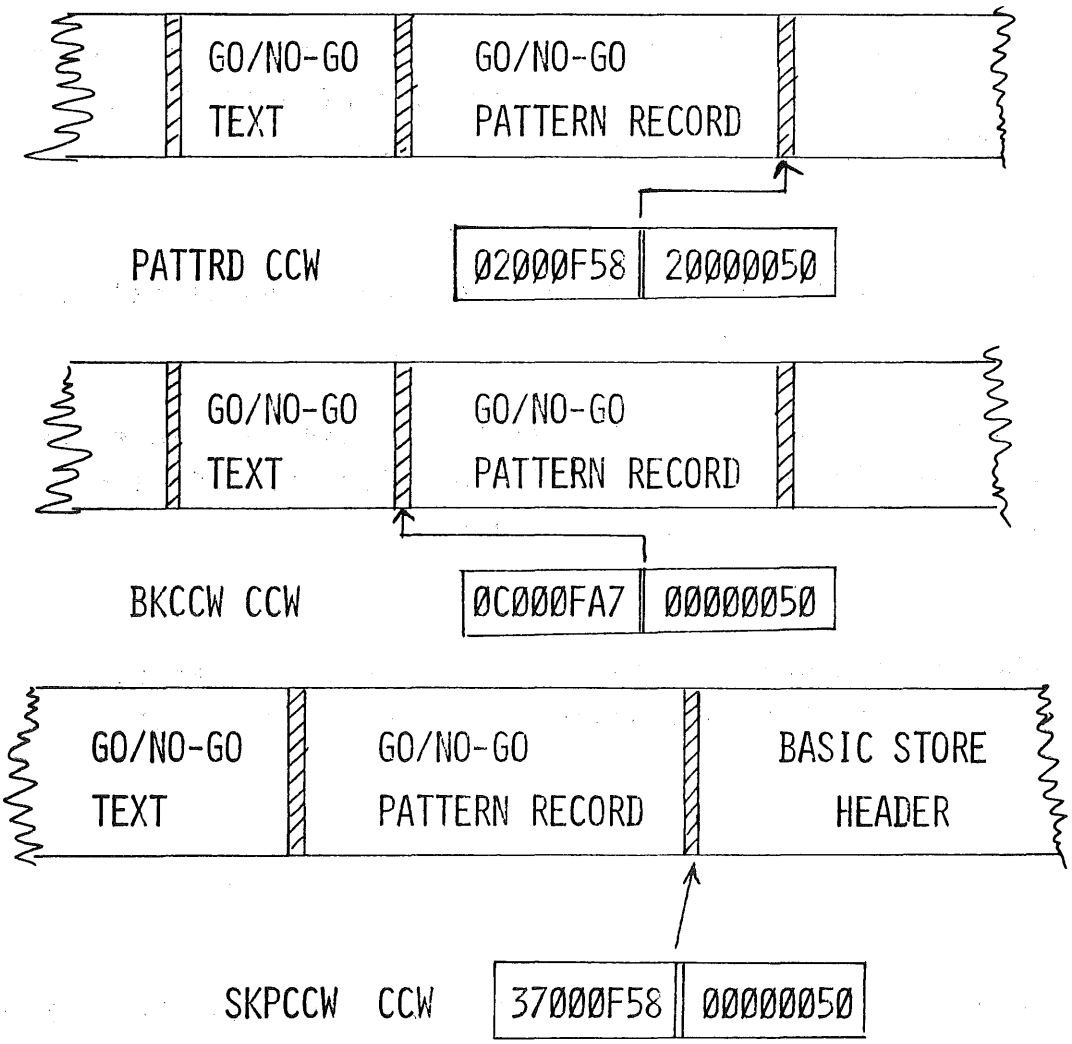

1
1
2
SELECTED TAPE DRIVE
LOAD
GO/NO-GO
TEXT
GO/NO-GO
PATTERN RECORD
80
BYTES
READ
CCW '02000F58 20000050'
ADDRESS
DATA
000F58
PATTERN RECORD
000FA8

START READ BACKWARDS
OPERATION





I/O OPERATIONS IN SUMMARY



CRITERION TEST (GO-NO-GO)

1. What will be the error indications if the instruction at line #12 does not work?

2. You are running GO-NO-GO and you notice that the wait light is on with and IAR indication of X '438'. What caused this error indication to occur?

3. Register 3 is used throughout GO-NO-GO and is called a _____ Register.

4. You have loaded the diagnostic tape and the CPU stops with an IAR indication of X'550' with the wait light on. What is the cause of the error?

5. What is the next address to be executed if the base register in the instruction at lines #862 fails?
   A. X'F48'
   B. X'F50'
   C. X'A12'
   D. X'008'

6. Register 3 contains X'000007BE'. What is the LOK number of this routine?

7. The storage location CEIND contains a one. What IPL source does this represent?

8. What is the routine number (LOK) that first uses an index and base register with zero displacement for effective address generation?

9. What is the routine number used for GO-NO-GO housekeeping?

10. What user intervention is required to loop GO-NO-GO?

FEDERAL AVIATION ADMINISTRATION ACADEMY
AUTOMATION SECTION
SYSTEMS COURSE UNIT

43458 Diagnostic Programs

Laboratory Experiment 4

PURPOSE

To gain proficiency in GO-NO-GO failure analysis.

OBJECTIVES

A. Practice loading diagnostic tape.

B. Interpretation of front panel indications relative to failure detection.

C. Utilization of GO-NO-GO BAL listing to determine probable cause of failure.

PROCEDURE

A. Configure the off-line system for running diagnostic programs.

   1. Insure available SE is in ATR slot 1.

   2. Insure that the off-line system is in state zero.

B. Mount the diagnostic tape on a tape drive connected in your configured system.

C. Inform your instructor that you are ready to IPL.

   NOTE

   Your instructor will DORK the CE causing a hardware error detectable by GO-NO-GO.

D. IPL (subsystem load) from the CE.

E. Two problems will be generated by your instructor for your analysis. Provide the requested information in the following table and individually state the probable cause of the error.

	PROBLEM 1	PROBLEM 2
WAIT LIGHT		
IAR/D REG CONTENTS		
GP REG-3 CONTENTS		
X'ØØØØØB' CONTENTS		
X'ØØØ4ØØ' CONTENTS		
GP REG 9 CONTENTS		

PROBLEM 1 CONCLUSION:

PROBLEM 2 CONCLUSION:

This concludes the laboratory exercise. Return all equipment to normal conditions.

SUMMARY

A. IPL of the DIAGNOSTIC tape causes the stand alone program GO-NO-GO to run automatically.

B. The state of the WAIT light will indicate if an UNEXPECTED INTERRUPT has occurred (wait light on) or if the program is in a TIGHT ERROR LOOP (wait light off).

C. WAIT LIGHT ON:

1. Inspect contents of IAR and relate to a NEW PSW unique address in GO-NO-GO listing.

2. Inspect address X'ØØØØØ8' where you should find:

X'DØØ1Ø2ØØ'	GNG SECTION LABEL
X'ØØØ4ØØØØ'	AS CHANGED BY LOK-87

3. Inspect address X'ØØØ4ØØ where you may find:

X'82ØØØD78'	LPSW instruction in GNG
X'DØØ2Ø1ØØ'	BASIC STORE section label

If the BASIC STORE section label resides at address X'ØØØ4ØØ' then the failure does not relate to GO-NO-GO but to BASIC STORE.

4. The address of the routine being executed at time of failure will be in GP REG-3 (trace register). This address will be valid following the execution of LOK-2Ø.

D. WAIT LIGHT OFF

1. Inspect contents of IAR/D-REG and relate to tight error loop address in GO-NO-GO listing.

2. To verify that the failure occurred in GO-NO-GO, inspect address X'ØØØØØ8' and X'ØØØ4ØØ' as in C.2 and C.3 above.

3. Inspection of GP REG-3 (trace register) will provide the starting address of the routine being executed when the failure occurred.

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DIAGNOSTIC PROGRAM

BASIC STORE

OBJECTIVES

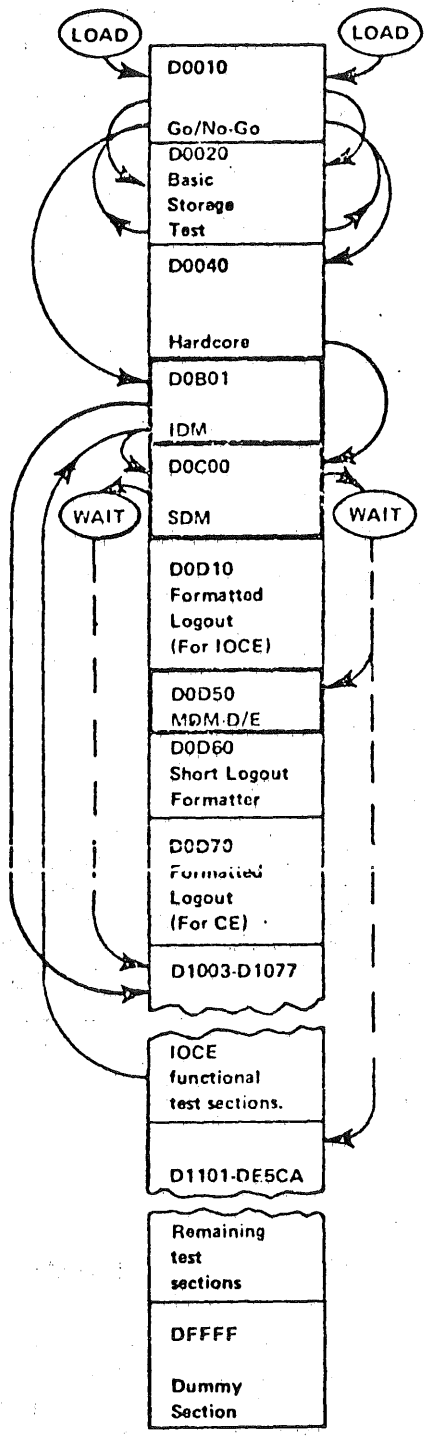
UTILIZE THE BASIC STORE DIAGNOSTIC LISTING TO BECOME PROFICIENT IN COMPUTER TROUBLE-SHOOTING TO INCLUDE:

1. LISTING ANALYSIS.
2. TESTING PHILOSOPHIES.
3. LABORATORY APPLICATION.

B. 9020D and 9020E System Maintenance Tape

When loading via IOCE:

1. IPL loads Go/No-Go.
2. Go/No-Go tests IOCE and then loads Basic Storage Test.
3. Basic Storage Test tests MACH storage and then returns to Go/No-Go for loading of IDM.
4. IDM tests IOCE by sequentially loading and running sections D1003-D1077 and then loads SDM.
5. SDM waits for entry of input messages. Additional sections that can be run, depending on availability of units, are:
   - D1401 IOCE Internal Timer
   - D1403 IOCE Delay Instruction
   - D1501 IOCE Diagnose Kernel, Part 3
   - D2101 IOCE Local Storage
   - D2308 MACH to Main Storage
   - D2740 MACH Storage
   - D3051-D3155 Channel Tests
   - D4050-D4060 Tape Tests
   - D6251-D6262 2540 Reader Punch
   - D6351-D6356 1403 Printer
   - D6651-D6653 1052 Printer Keyboard
   - D6A51-D6A58 2821 Control Unit
   - D8051-D806A DASF
   - D9051 Reconfiguration Unit
   - DA051 Channel-to-Channel Adapter
   - DB051, DB052 2701 Data Adapter Unit
   - DCC51 PAM and Adapters
   - DCC61 Flight Strip Printer

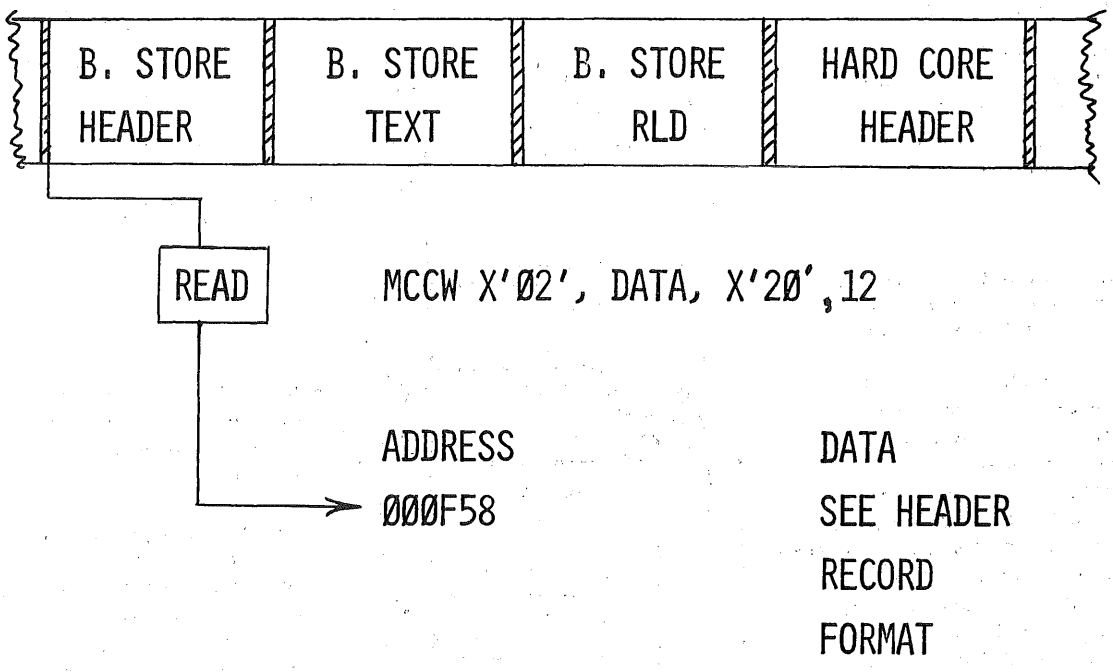


When loading via CE:

1. IPL loads Go/No-Go.
2. Go/No-Go tests CE and then loads Basic Storage Test.
3. Basic Storage Test tests first 128K (decimal) of SE and then returns to Go/No-Go for loading of Hardcore.
4. Hardcore tests CE and then loads SDM.
5. SDM waits for entry of input messages. Sections that can be run, depending on availability of units are:
   - D1101-D1103 Basic CE Test
   - D1108 Basic Diag and Logout
   - D1111-D1115 CEDA
   - D1151-D13C8 CE Function Tests
   - D13CD CE Random
   - D1DA3 Direct Control
   - D22A0-D22AA SE and DE Storage
   - D3051-DCC61 Same as left but also including
   - D6CA6 7265-03 Config Console
6. Enter LMDM/ message to SDM at any time to load MDM-D/E. All the above listed sections plus the following run under MDM-D/E:
   - D24A0 DE/DG Interface
   - D46A0 TCU Dual Interface
   - D6AA0 2821 Dual Interface
   - D6CA4 7265-02 System Console
   - D80A0 DASF Two Channel Sw
   - DB0A1 DAU Two-Processor Sw
   - DCCA0 PAM Dual Interface
   - DD6A2 DAR/DAR Mask
   - DD8A0 Configuration Control
   - DD9A0 ATR Controls
   - DDAA0 SSU Multi-Element
   - DDDA1 IOCE Processor
   - DE0A3-DE5CA SEVA Program Acceptance Test Sections

FIGURE 1-1. OPERATION OF SYSTEM MAINTENANCE TAPE (PART 2 OF 2)

BASIC STORE LOADING



HEADER RECORD FORMAT

0	2	3	4	7
BYTE COUNT OF FOLLOWING TEXT	ZERO'S	NOTE 1	PROG. SECTION ID. 6 HEX DIGITS	ZERO'S

8	10
ASSEMBLED ADDR. OF PROGRAM	RLD COUNT IN HEX.

NOTE 1: BYTE 3 BIT BREAKDOWN

BITS 0-3 NUMBER OF 1K HEX ADDITIONAL BLOCKS OF CORE REQUIRED BY DIAGNOSTIC PROGRAM.

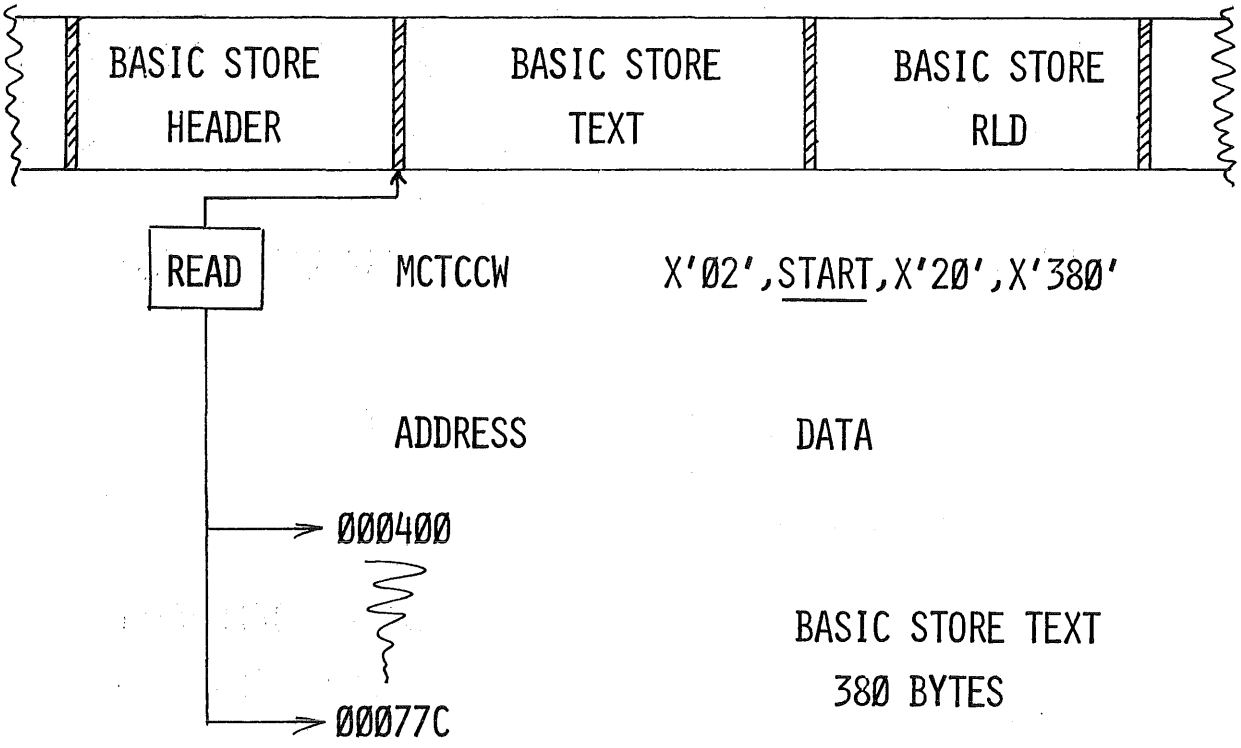
BIT 4 EXCLUSIVE CPU BIT. IF A "1" SECTION CANNOT RUN IN A MULTIPROGRAM SITUATION. (one ce only)

BIT 5 EXCLUSIVE SYSTEM BIT. IF A "1" THE SYSTEM IS NEEDED IN IT'S ENTIRETY BY THE SECTION.

BITS 6 7 RECORD ID
00 = TEXT RECORD
01 = HEADER RECORD
10 = OVERLAY SECTION HEADER
11 = RLD RECORD

LOADING BASIC STORE

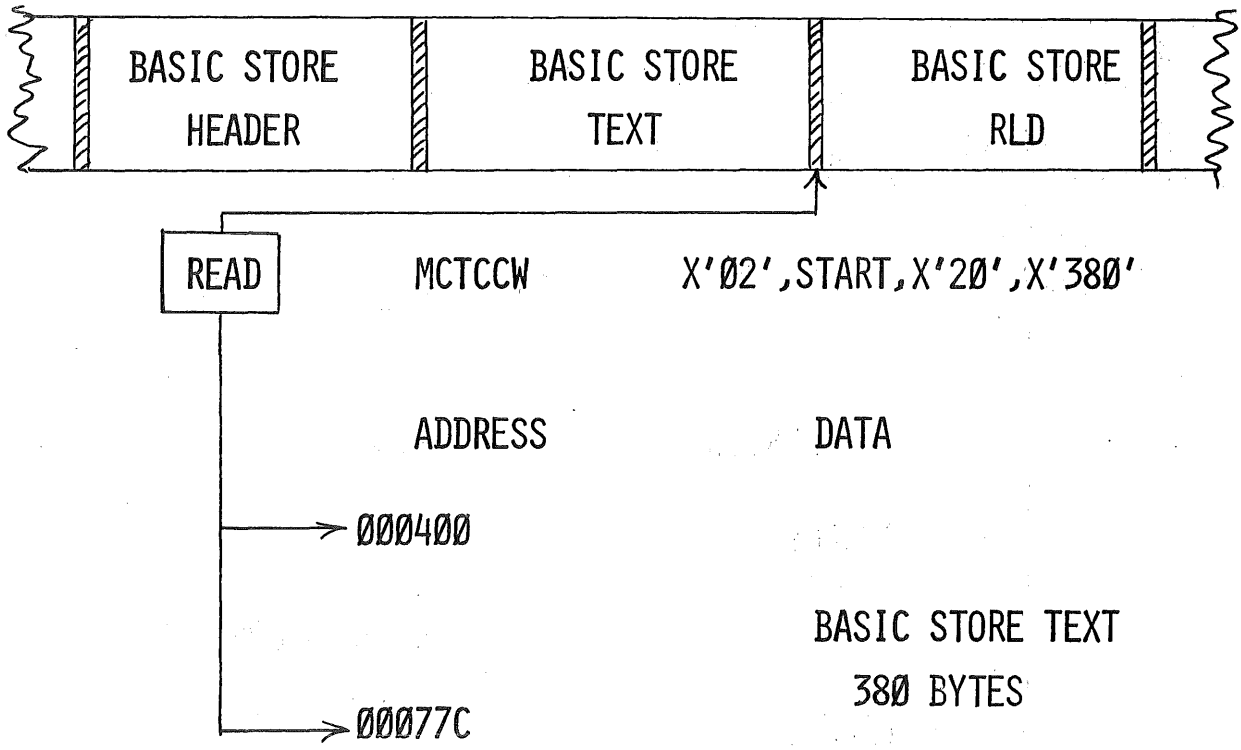
STEP 1



AT THE BEGINNING OF THIS OPERATION, TAPE IS AT THE IRG BETWEEN B.S. HEADER AND B.S. TEXT AND GO/NO-GO IS RESIDENT. ONLY THE BYTE COUNT OF THE TEXT RECORD AND THE BASIC STORE I.D. HAVE BEEN READ INTO CORE AT ADDRESS X'000F58'.

LOADING BASIC STORE

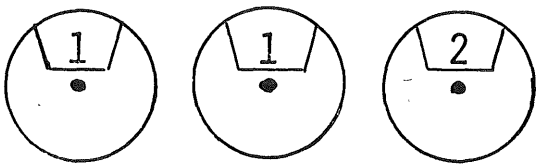
STEP 2



AT THE END OF THIS I/O OPERATION BASIC STORE HAS OVERLAYED PART OF THE GO/NO-GO PROGRAM STARTING AT ADDRESS X'000400' AND CONTINUING FOR 380 HEXIDECIMAL BYTES. TAPE STOPS AT THE IRG BETWEEN BASIC STORE TEXT AND RLD RECORDS.

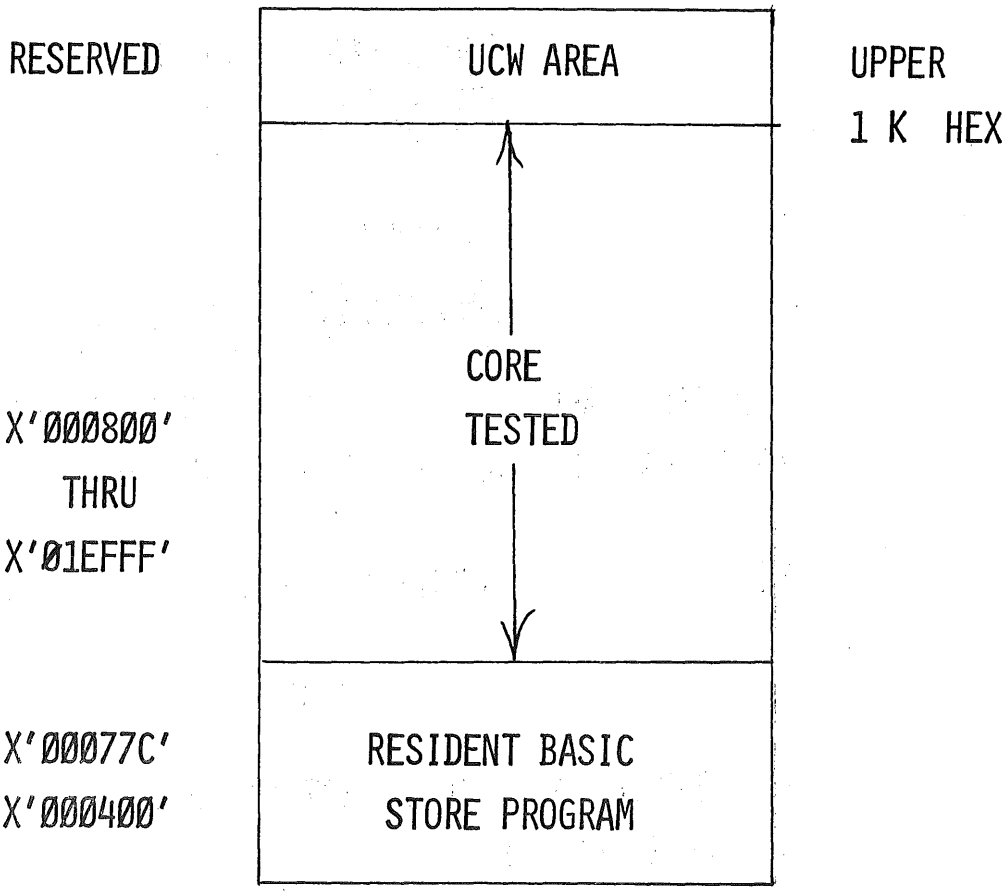
GO/NO-GO HOUSEKEEPING

LINE	SYMBOL	OPERATION	
85	LA	9,LOK1ØØ	
		ØØØØØ25C	GP REG 9
	GO/NO-GO RETURN ADDRESS		
86	L	5,CEIND	
		ØØØØØØØØ	GP REG 5 CE IPL
		ØØØØØØØ1	GP REG 5 IOCE IPL
87	L	6,PSVAL	
		ØØØØØØØØ	GP REG 6
	ADD THIS VALUE TO THE ADDRESS IN BASIC STORE TO ADJUST ALL ADDRESS TYPE CONSTANTS.		
88	BC	UNC,START+12	
		X'ØØØ4OC'	
	GO EXECUTE MACH STORE TEST AT THIS STARTING ADDRESS.		

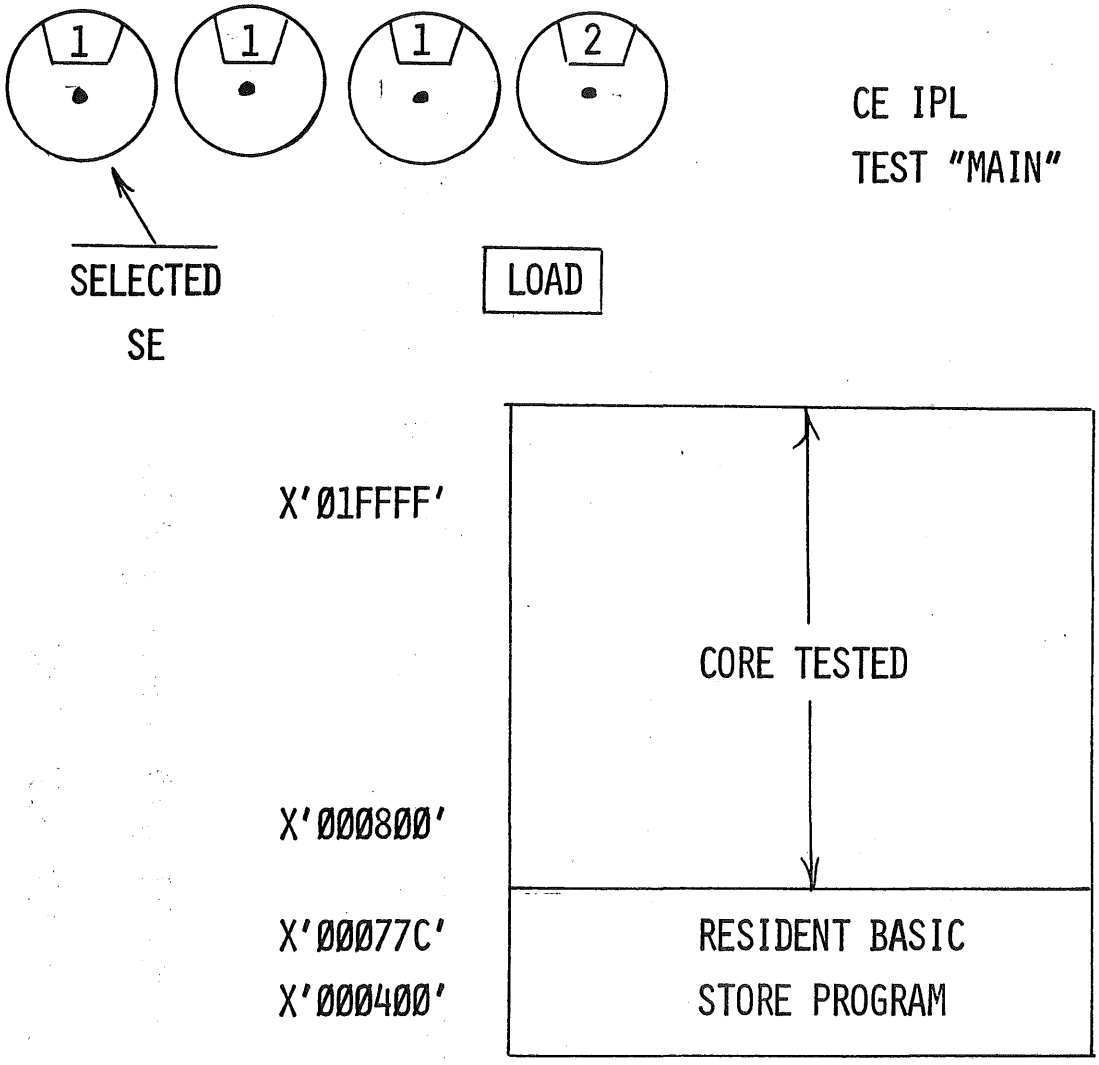


IOCE LOAD
TEST "MACH"

LOAD

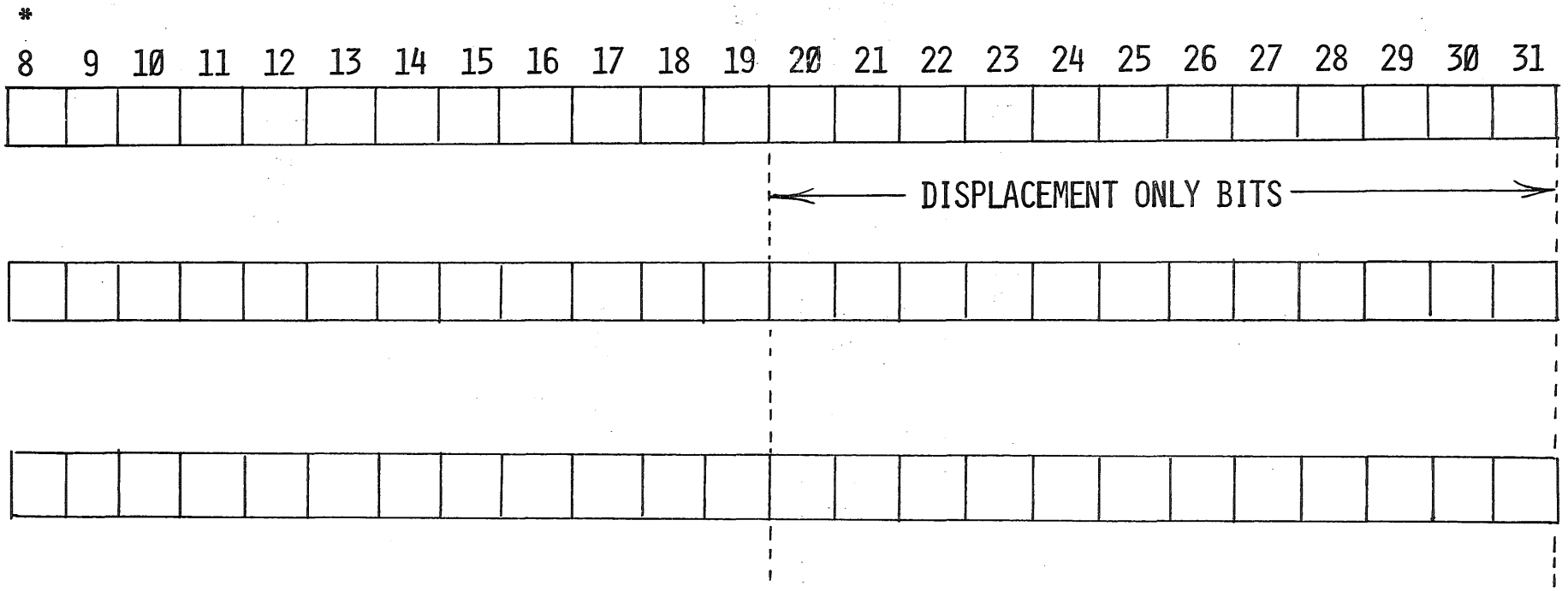


MACH STORE IOCE


1
1
1
2
CE IPL
TEST "MAIN"
SELECTED
SE
LOAD
X'01FFFF'
CORE TESTED
X'000800'
X'00077C'
X'000400'
RESIDENT BASIC
STORE PROGRAM
"MAIN STORAGE"

BASIC STORE ADDRESSING

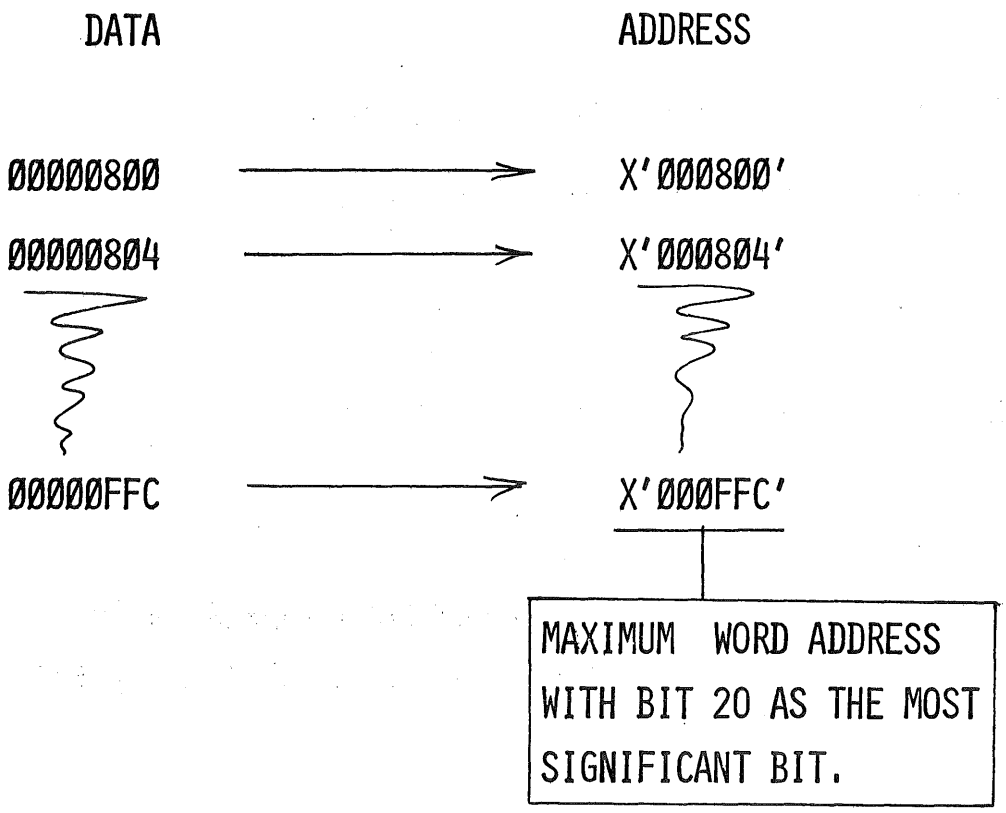
STORAGE ADDRESS REGISTER (SAR) WORKSHEET



ROUTINE 1

STEP "A"

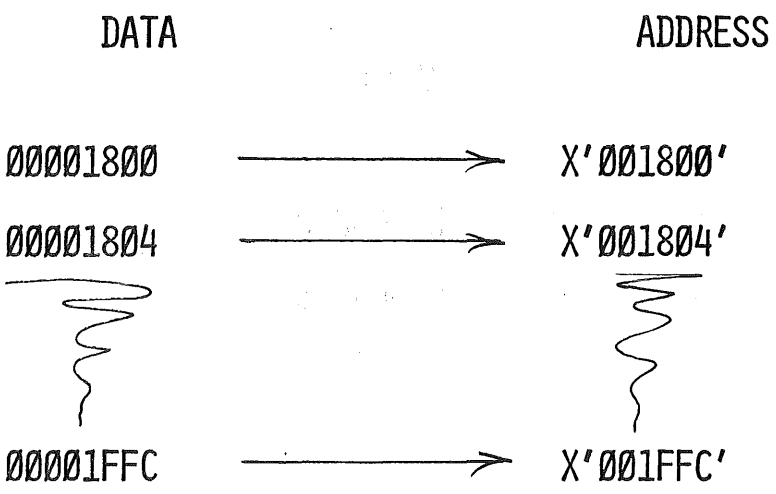
PREPERATION STEP - LOADS THE FOLLOWING DATA INTO STORAGE AT THE INDICATED ADDRESSES:



ROUTINE 1

STEP "B"

TEST STEP - MOVE LEFT, TURN ON STORAGE ADDRESS REG- (SAR) BIT 19. TRY TO STORE THE FOLLOWING DATA AT THE INDICATED ADDRESSES.



MAXIMUM WORD ADDRESS WITH BIT 19 AS MOST SIGNIFICANT.

BASIC STORE

ROUTINE 1

STEP C

RECHECK - TEST BIT 19 FOR DATA OVERLAY. TEST ORIGINAL ADDRESSES FOR DATA CONTENT. IF ADDRESS X'000800' CONTAINS DATA 00001800 SUSPECT BIT 19 FAILED TO TURN ON.

ADDRESS	DATA CONTENT	
000800 }	00000800	NORMAL
	00001800/	FAILURE

BIT 19

ADDRESS X'000800' SHOULD CONTAIN DATA WORD 00000800, WHEN EXAMINED. FAILURE OF BIT 19 TO BE TURNED ON WOULD RESULT IN THE NEW INFORMATION (00001800) TO BE STORED IN THE LOWER ADDRESSES.

CRITERION TEST (BASIC STORE)

1. What is the error indication if while executing the Basic Store program an unexpected program interrupt occurs?

   A. IAR = X'44Ø', Hang Loop
   B. IAR = X'33Ø', Hang Loop
   C. IAR = X'33Ø', Wait light on
   D. IAR = X'6DØ', Wait light on

2. What will be the error indication if while executing RTN-4 of Basic Store (test for SAR Bit 16 dropping) the comparison instruction at line 115 does not set a conditions code of Ø?

   A. IAR = X'69Ø', Hang loop
   B. IAR = X'6DØ', Hang loop
   C. IAR = X'69Ø', Wait light on
   D. IAR = X'6DØ', Wait light on

3. You have IPL'ED the diagnostic tape and after a short period you note that there is no address change indicated in the IAR. Investigation reveals the following information:

   1. Wait light is on
   2. IAR = X'ØØØ44Ø'
   3. REG 1 = X'FFFFFFFF'
   4. REG 2 = X'ØØØØØØØØ'
   5. REG 3 = X'0000025C'

The cause of error is:

A. An unexpected machine check interrupt occurred while the Basic Store program was returning control to GNG.

B. An unexpected machine check interrupt occurred while checking for bit drops (RTN-6) during Basic Store execution.

C. The branch low instruction in LOK-6 of GNG failed to execute properly.

D. An unexpected I/O interrupt occurred while executing LOK-93F of GNG.

4. Is it true that the Basic Store program uses the new PSW's that were used in GNG?

What is the housekeeping data that GNG passes to Basic Store?

REG. 5 _____

REG. 6 _____

REG. 9 _____

6. In what core location is the Basic Store section lable located? _____

7. A BC Ø, Ø instruction is used in the Basic Store program on line 19. What is the purpose of this instruction?

43458

DIAGNOSTIC PROGRAM

HARDCORE

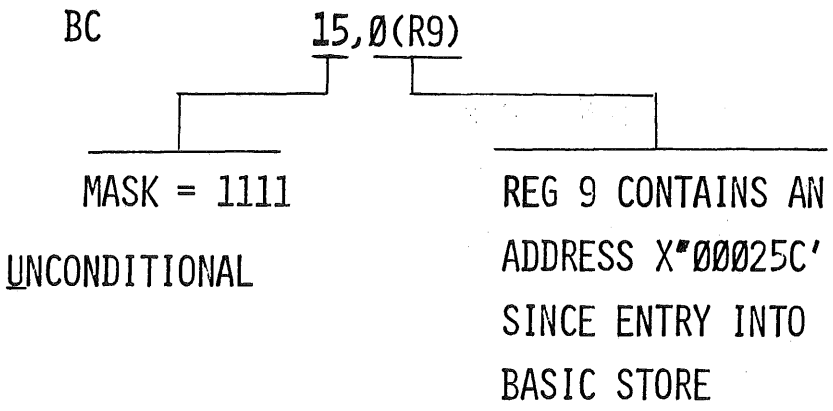
BASIC STORE ENDING CONDITIONS

1. COMPLETE TESTING OF CORE:
   A. ZERO OUT CORE TO UPPER LIMIT.
   B. COMPARE CORE FOR ZERO'S TO UPPER LIMIT.

2. LOAD GENERAL PURPOSE REGISTER 1 WITH ONE'S.

11	11	11	11	GPR1

3. UNCONDITIONAL BRANCH BACK TO GO/NO-GO VIA THE ADDRESS IN GENERAL PURPOSE REGISTER 9.



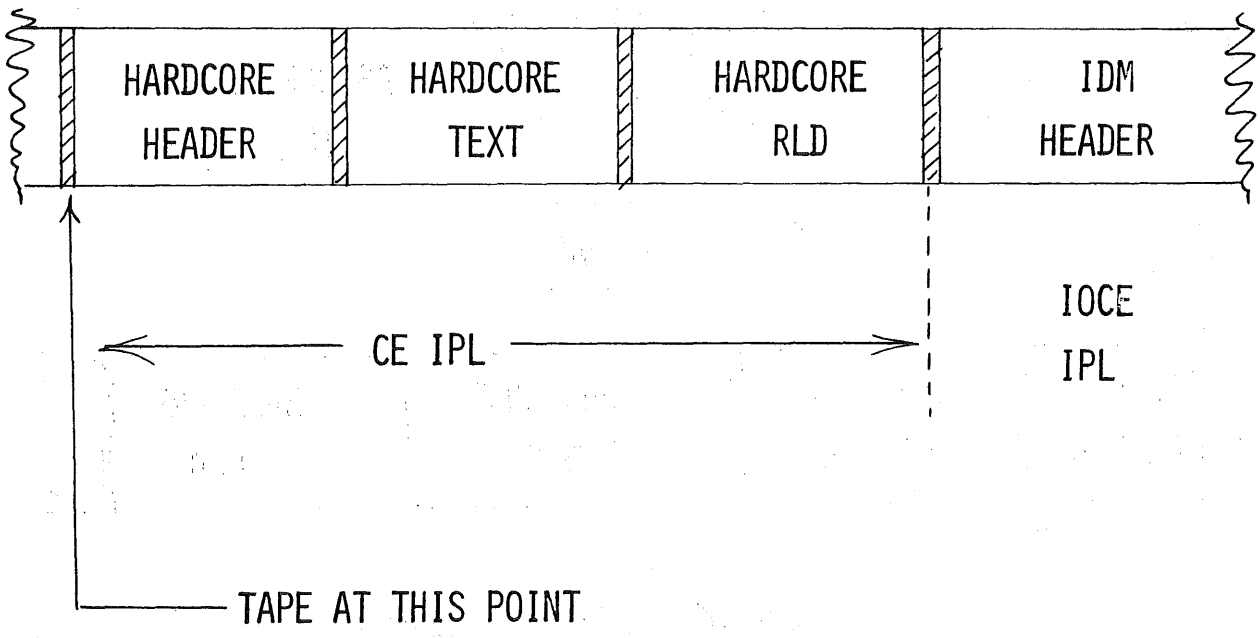
HARDCORE DIAGNOSTIC PROGRAM

OBJECTIVES:

ANALYZE THE HARDCORE DIAGNOSTIC PROGRAM RELATIVE TO:

1. LOADING.
2. ERROR INDICATIONS.
3. OPERATOR CONTROLS.
4. PHYSICAL LAYOUT.

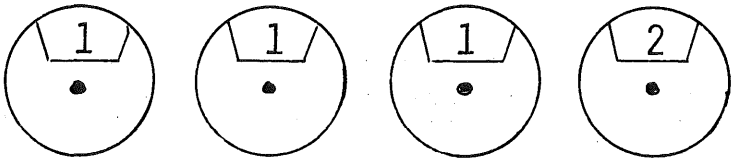
GO/NO-GO RESPONSIBILITY



1. CE IPL - READ HARDCORE HEADER, TEXT AND RLD.

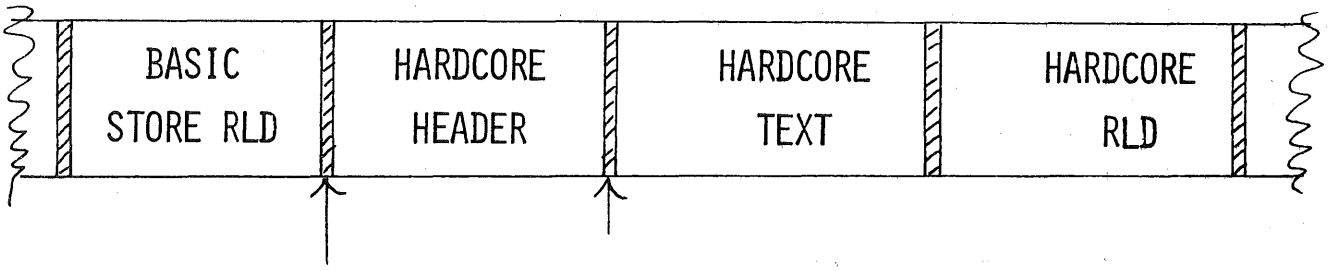
2. IOCE IPL- READ IDM HEADER, TEXT AND RLD.

READ HARDCORE HEADER



ASSUME CE
IPL

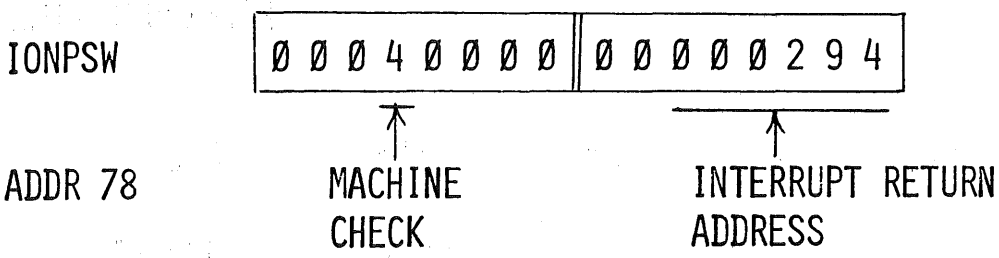
LOAD

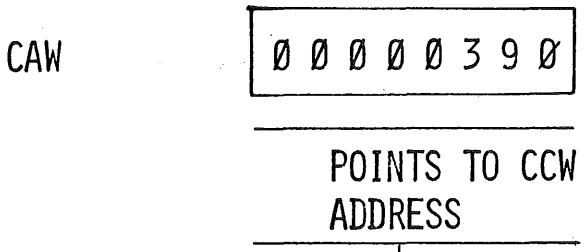


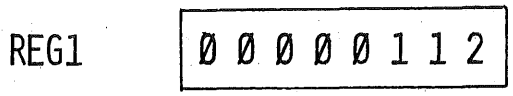
LOK100 ADDRESS X'00025C'

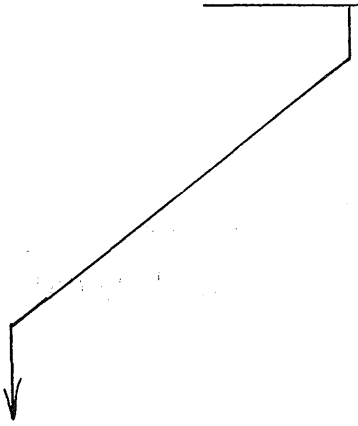
LA	3,LOK100	00 00 02 5C	REG 3
LA	2,4	00 00 00 04	REG 2
L	1,NOWAIT	00 04 00 00	REG 1
ST	1,IONPSW	00 04 00 00	ADDR 78
L	1,MCHCAW	00 00 03 90	REG 1
A	1,PSVAL	00 00 03 90	REG 1
ST	1,CAW	00 00 03 90	ADDR 72
LA	1,LOK101	00 00 02 94	REG 1
ST	1,IONPSW+4	00 00 02 94	ADDR 7C
L	1,0	00 00 01 12	IPL DEV

SUMMARY OF LOK100 OPERATION



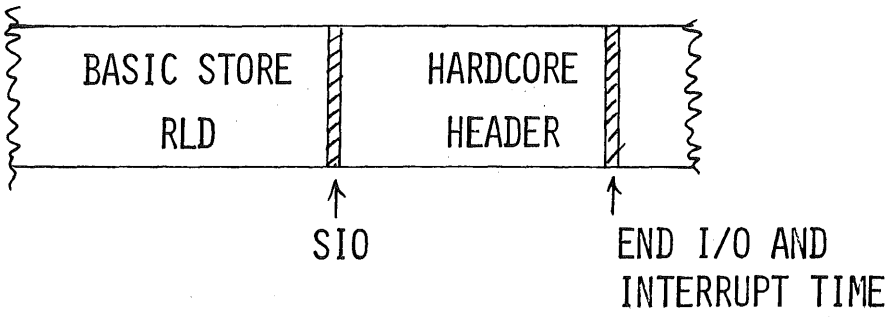






```
ØØØ39Ø     MCCW
           X'Ø2',DATA,X'2Ø',12
```

SIO Ø(1) STARTS TAPE DRIVE 112 UNDER CONTROL OF THE CCW SPECIFIED IN CAW (ADDRESS 390)

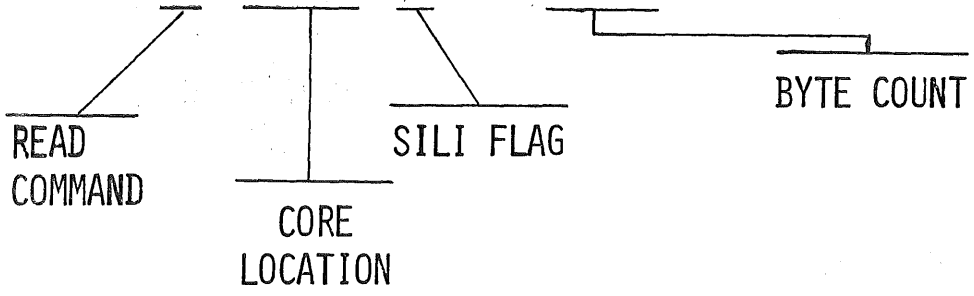


X'000390' MCCW CCW

- X'02' = READ
- DATA = ADDRESS
- X'20' = FLAGS
- 12 = BYTES

MACHINE LANGUAGE

X'02 000F58 20 00 00000C'

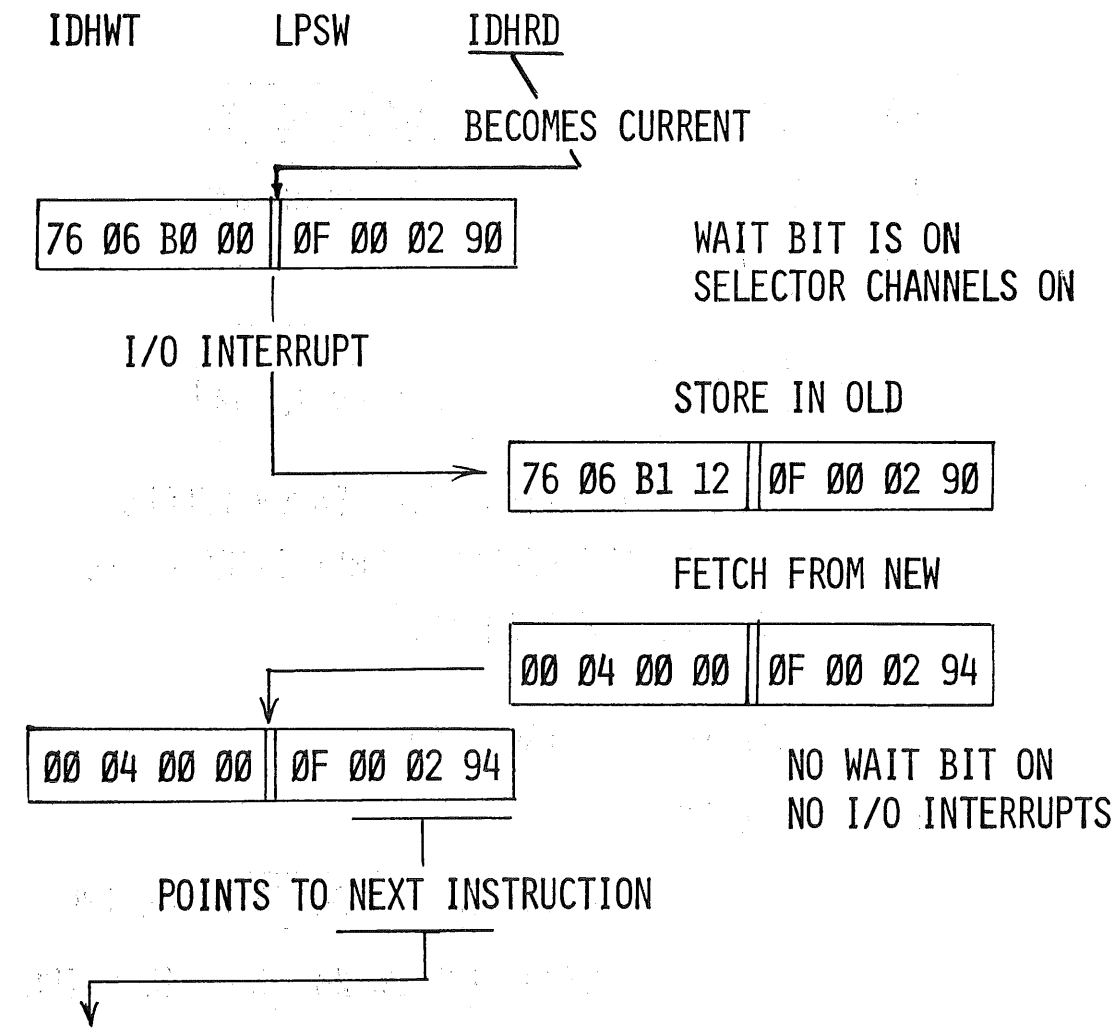


RESULT: READ THE HARDCORE HEADER RECORD, 12 BYTES INTO CORE STARTING AT ADDRESS F58.

```
        BC    EQ,IDHWT      (CC=0  I/O STARTED)

IDHWT   LPSW IDHRD          (MASKED TO ALLOW I/O)
```

HARDCORE LOADING CONTINUED




```
LOK101    LA    3,LOK101        ØØ ØØ Ø2 94
          L     1,CSW+4         ØC ØØ ØØ ØØ
          C     1,EXPCSW        ØC ØØ ØØ ØØ
          BC    EQ,LOK102       NORMAL CC=Ø
```

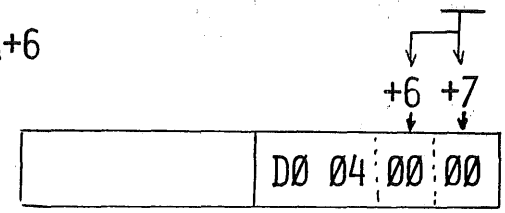
C.E. VS IOCE IPL

LOK102

```
LOK102      LA    3,LOK102
            LA    1,Ø
            STC   1,DATA+6
```

ØØ ØØ Ø2 A8

ØØ ØØ ØØ ØØ



DATA = 12 BYTES FROM HEADER RECORD
SEE HEADER RECORD FORMAT BYTES 4-5-6
CONTAIN SECTION ID.

```
            STC   1,DATA+7      (SEE ABOVE)
            C     1,CEIND
```

CEIND ØØ ØØ ØØ ØØ CE IPL

CEIND ØØ ØØ ØØ Ø1 IOCE IPL

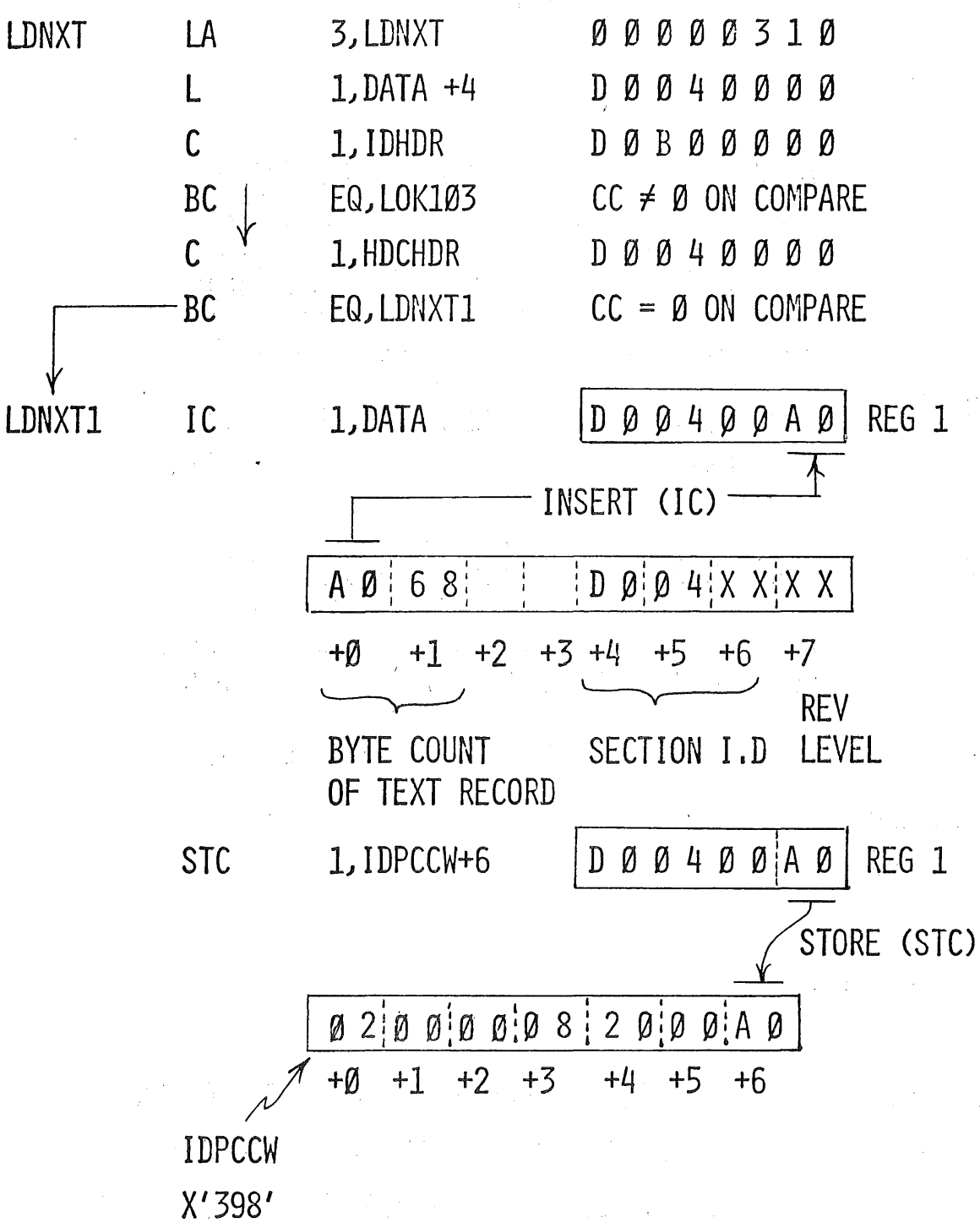
```
            BC    EQ,LDNXT
```

CC=Ø ON COMPARE FOR CE IPL

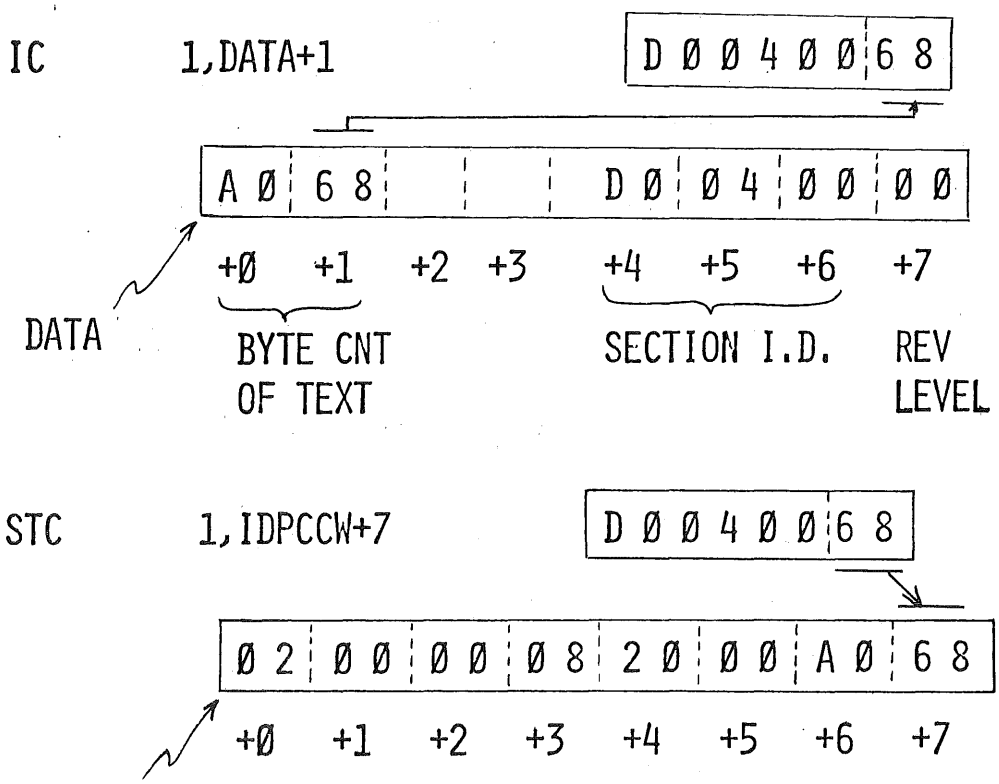
IOCE

LDNXT — NEXT ROUTINE FOR CE IPL

PREPARATIONS FOR READING HARD CORE TEXT



PREPARATIONS FOR READING H.C. TEXT (CONT)



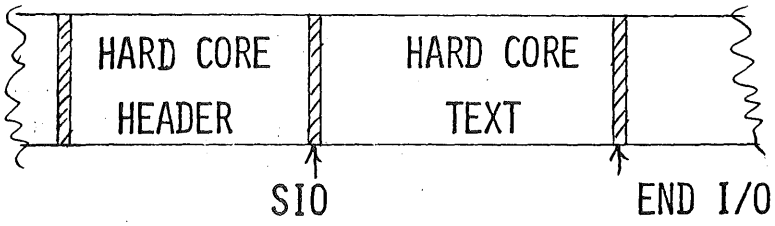

```
BC   UNC,LOK1Ø3
```

THIS ROUTINE HAS TESTED FOR AND FOUND THE H.C. HEADER RECORD, HAS TAKEN THE BYTE COUNT FROM BYTES Ø AND 1 AND MODIFIED THE CCW TO BE USED FOR READING THE TEXT RECORD INTO CORE.

READ H.C. TEXT RECORD

LOK13

```
LOK1Ø3    LA      LOK1Ø3          Ø Ø Ø Ø Ø 2 E Ø    REG 3
          L       1,IDPCAW        Ø Ø Ø Ø Ø 3 9 8    REG 1
          A       1,PSVAL         Ø Ø Ø Ø Ø 3 9 8    REG 1
          ST      1,CAW           Ø Ø Ø Ø Ø 3 9 8    ADDR'48'
          L       1,IDPCCW        Ø 2 Ø Ø Ø Ø Ø 8    REG 1
          A       1,PSVAL         Ø 2 Ø Ø Ø Ø Ø 8    REG 1
          ST      1,IDPCCW        Ø 2 Ø Ø Ø Ø Ø 8    IDPCCW
          L       1,Ø             Ø Ø Ø Ø Ø 1 1 2    REG 1
          SIO     Ø(1)          START IPL DEVICE
          BC      EQ,IDPWT        CC = Ø ON SIO
          BC      UNC,*           FAIL
IDPWT     LPSW    IDSIT           (X'7806BØØØØFØØØ3ØC')
```



IDPCCW = X'Ø2ØØØØØ82ØØØA Ø68'

CMD ADDR BYTES

TRANSFER TO HARD CORE PROGRAM

IDPWT LPSW IDSIT

7 6	Ø 6	B Ø	Ø Ø	Ø F	Ø Ø	Ø 3	Ø C

WAIT BIT IS ON
SELECTOR CHANS
TAPE IS MOVING

H.C. TEXT IS GOING INTO CORE STARTING AT X'ØØØØØØØ8' AND OVERLAYS GO/NO-GO AND BASIC STORE UP TO 'AØ68' BYTES. TAPE REACHES IRG AT END OF H.C. TEXT AND CAUSES I/O INTERRUPT.

7 6	Ø 6	B 1	1 2	Ø F	Ø Ø	Ø 3	Ø C

STORE

(OLD I/O PSW)

7 6	Ø 6	B 1	1 2	Ø F	Ø Ø	Ø 3	Ø C

PSW SWAP

(NEW I/O PSW)

FETCH

Ø 1	Ø 4	Ø Ø	Ø Ø	Ø Ø	Ø Ø	Ø 1	F 8

*

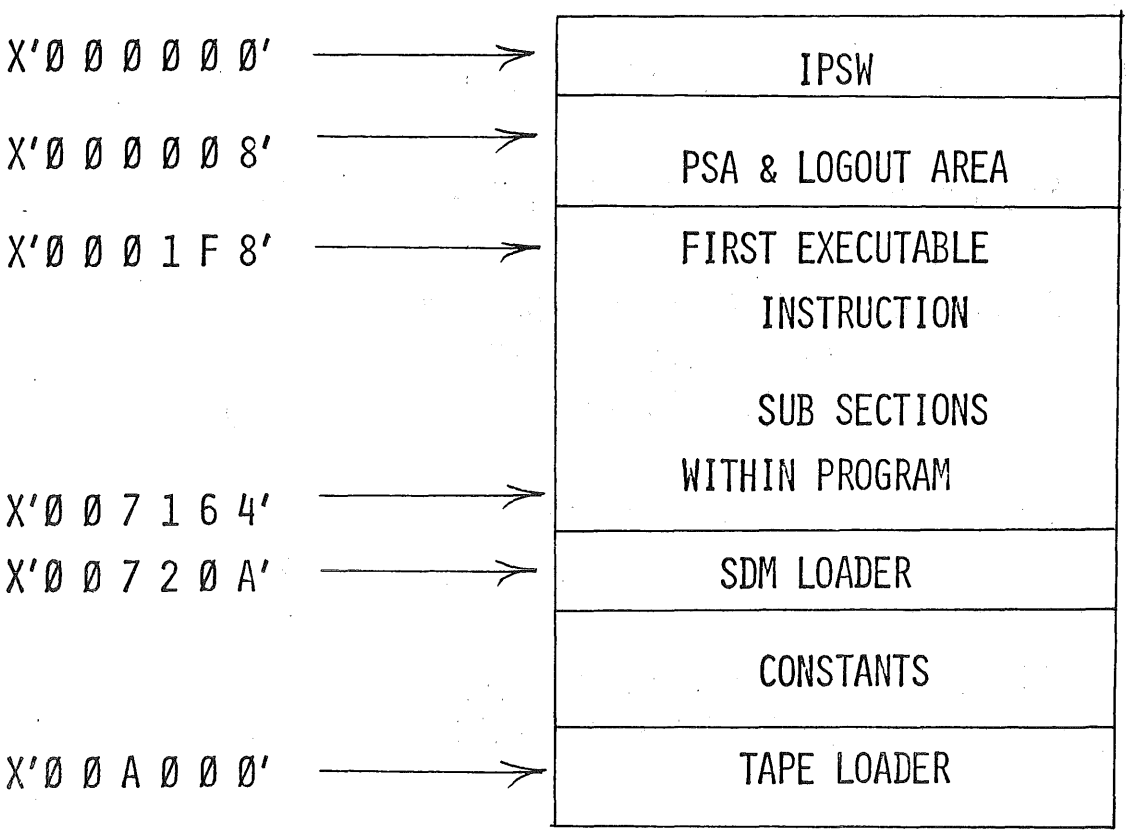
Ø 1	Ø 4	Ø Ø	Ø Ø	Ø Ø	Ø Ø	Ø 1	F 8

FIRST EXECUTABLE INSTRUCTION IN HARDCORE

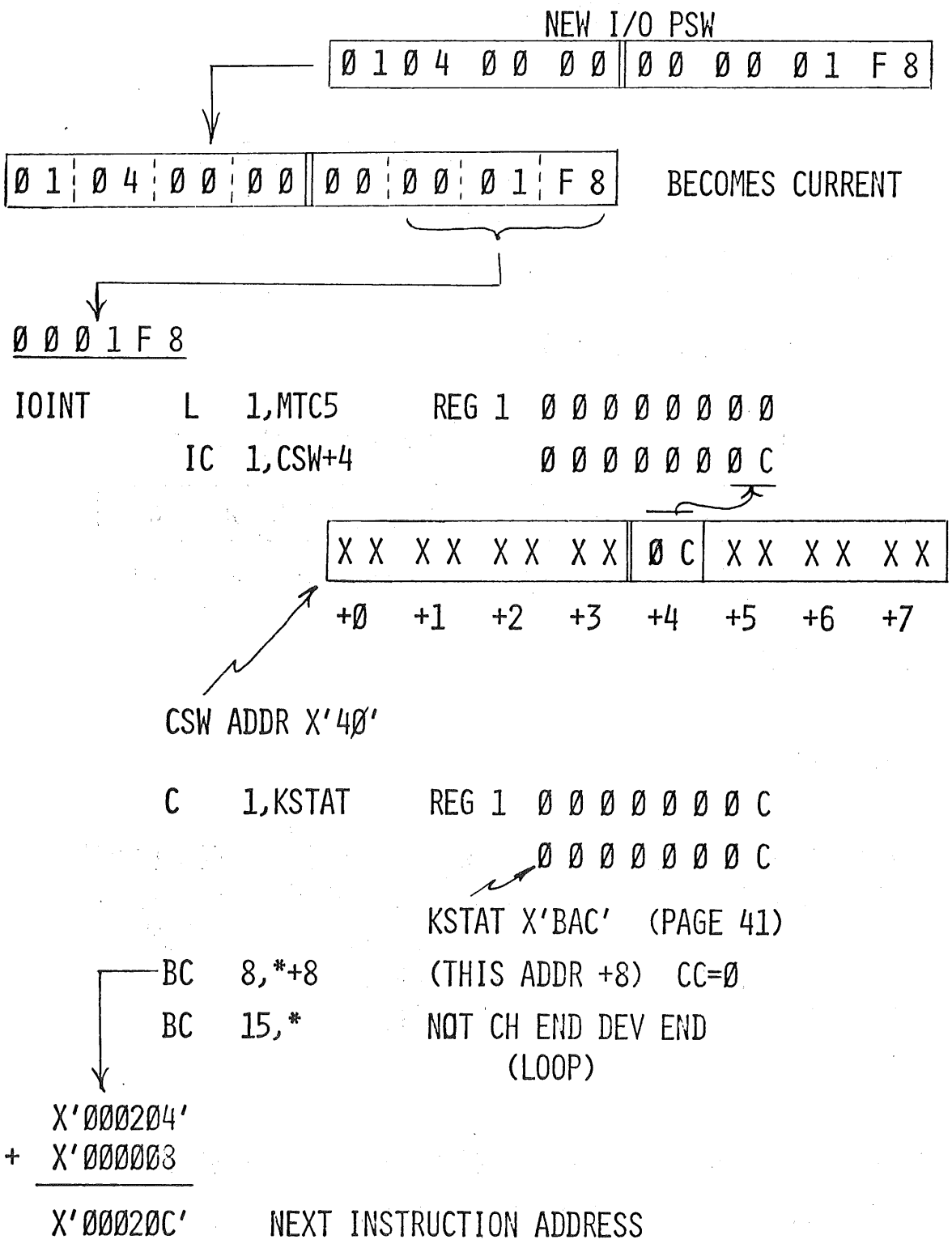
*THIS ONE COMES FROM HARDCORE TEXT RECORD JUST READ INTO CORE, AND IS HOW CONTROL IS TRANSFERRED TO H.C. FROM GNG.

HARDCORE PHYSICAL LAYOUT
AND INDEX TO
SECTIONS

HARDCORE LAYOUT
(GENERAL)

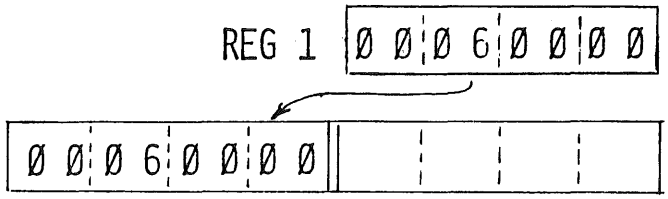


I/O INTERRUPT FROM GNG



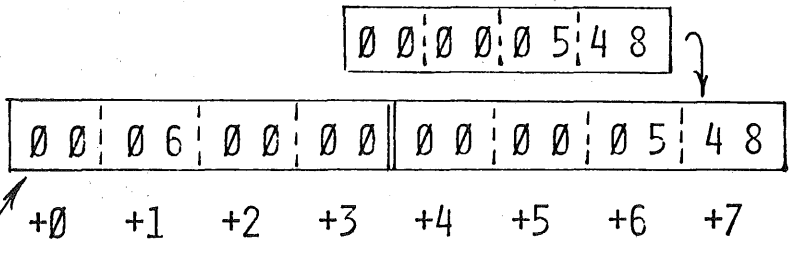
BUILD NEW I/O PSW FOR
HARDCORE

```
L     1,SETION
ST    1,IONEW
```

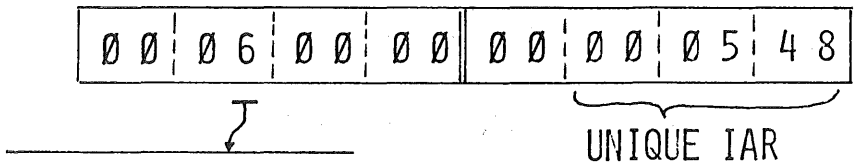


IONEW (ADDR X'78')

```
L     1,SETION+4
```




```
ST    1,IONEW+4
```



RESULTANT NEW I/O PSW

MACH CHECK ALLOWED
WAIT BIT ON
NO I/O INTERRUPTS

UNIQUE IAR
INDICATOR
FOR FAILURES

UNTIL MODIFIED LATER, THIS PSW WILL BE USED FOR ERROR HALT CONDITIONS FOR UNEXPECTED I/O INTERRUPTS . . . .

SAVE INITIAL PSW

```
L    1,Ø                                  REG 1 Ø Ø Ø Ø Ø 1 1 2
ST   1,MTPID   | Ø Ø | Ø Ø | Ø 1 | 1 2 |  |  |  |  |
```

MTPID (ADDRESS AØ8)

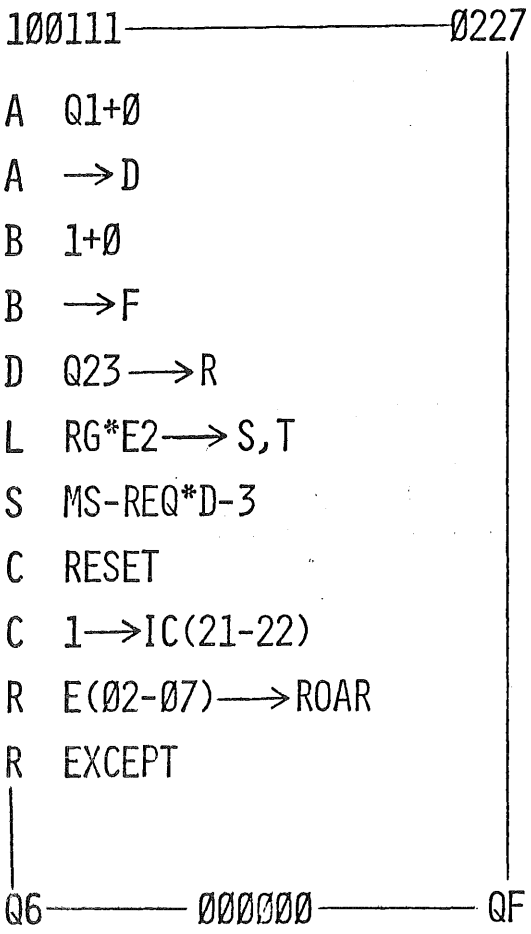
```
L    1,4                                              ØF ØØØØ1Ø ↓
ST   1,DSAV    | Ø Ø | Ø 4 | Ø 1 | 1 2 | Ø F | Ø Ø | Ø Ø | 1 Ø |
```

MTPID(BBØ) DSAV(BB4)

```
BC   15,MT1      BEGIN TESTS
```

RESULT: DOUBLEWORD IPSW @ LOCATION
Ø IS SAVED FOR FUTURE USE. ADDRESS
Ø CAN NOW BE MODIFIED FOR PSW RESTARTS.
CUU OF IPL DEVICE AND ORIGINAL PSW
ADDRESS CAN BE RECALLED FROM MTPID AND DSAV.

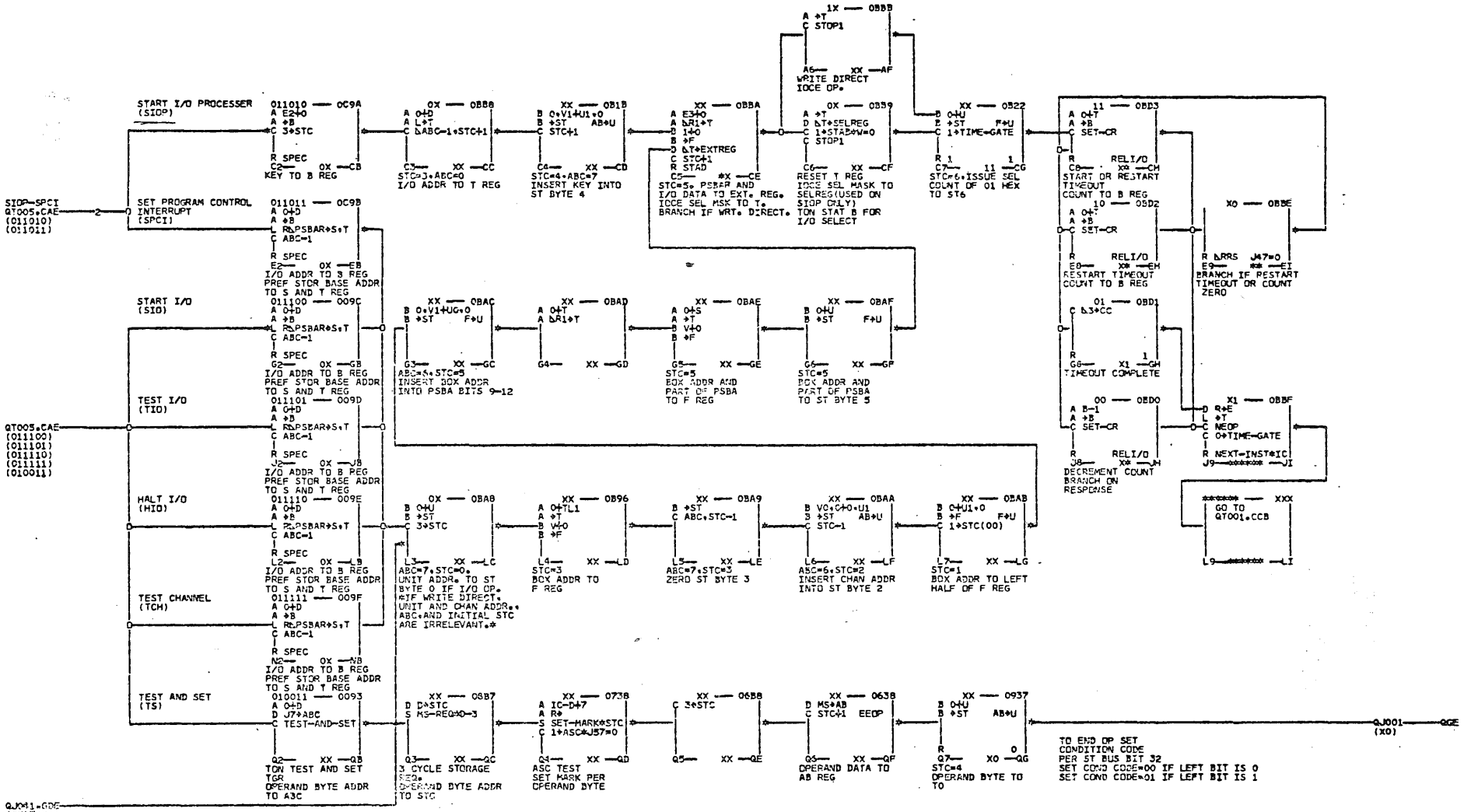
CAS BLOCK



CAS = COMPUTER
AUTOMATED
SYMBOLOGY

USE OF CAS: SHORT-HAND METHOD OF TELLING THE TECHNICIAN WHAT THE COMPUTER IS DOING FOR EACH MACHINE CYCLE.

MANY CAS BLOCKS ARE CONNECTED TOGETHER TO FORM A CAS PAGE. CAS PAGES BECOME THE ROAD MAP TO FOLLOW IN THE OVERALL COMPUTER OPERATION IN TERMS OF MICRO PROGRAM.



713671	04/20/70	MACH NAME MODE P.N. IBM CORP.	C7201-02 MANUAL 2383830 SDD	DATE 05/21/70 LOG 048	SHEET 1 VERSION	QK021	IO OPERATIONS AND TEST AND SET

43458

DIAGNOSTIC PROGRAM

I.D.M.

DAY 1

I.D.M. OBJECTIVES

RECOGNIZE THE FUNDAMENTAL CONSTRUCTION OF I.D.M. RELATIVE TO:

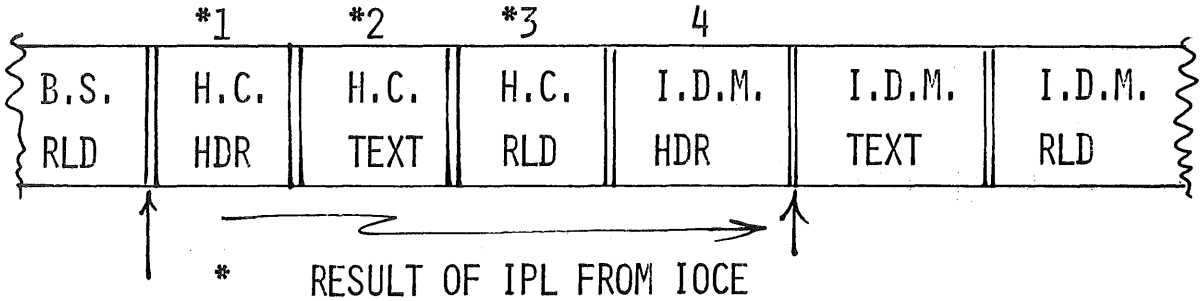
A. LOADING.

B. ERROR HALTS.

C. PURPOSE OF PROGRAM.

GO/NO-GO I.D.M.

D/E I.O.C.E. IPL (ASSUMED)



* RESULT OF IPL FROM IOCE

1. GO/NO-GO . . .

2. BASIC STORE (TEST MACH) . . .

3. BASIC STORE RETURNS CONTROL TO GNG TO LOAD IDM.

4. GO/NO-GO MUST SKIP RECORDS

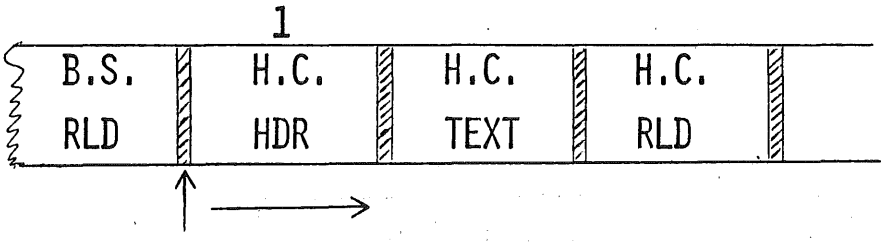
* 1, 2 AND 3 (HARDCORE) TO GET TO IDM HEADER.

BASIC STORE (PAGE 23)

BC 15,Ø(R9) ØØØØØ25C

GNG
PAGE 2

I.D.M. LOADING
(CONT)



LOK100 — LA 2,4 — 0 0 0 0 0 0 0 4 — REG 2

READ H.C. HDR RECORD, TAPE MOVES TO IRG AND INTERRUPTS

LOK 101 — YES — MY TAPE DRIVE?

LOK102

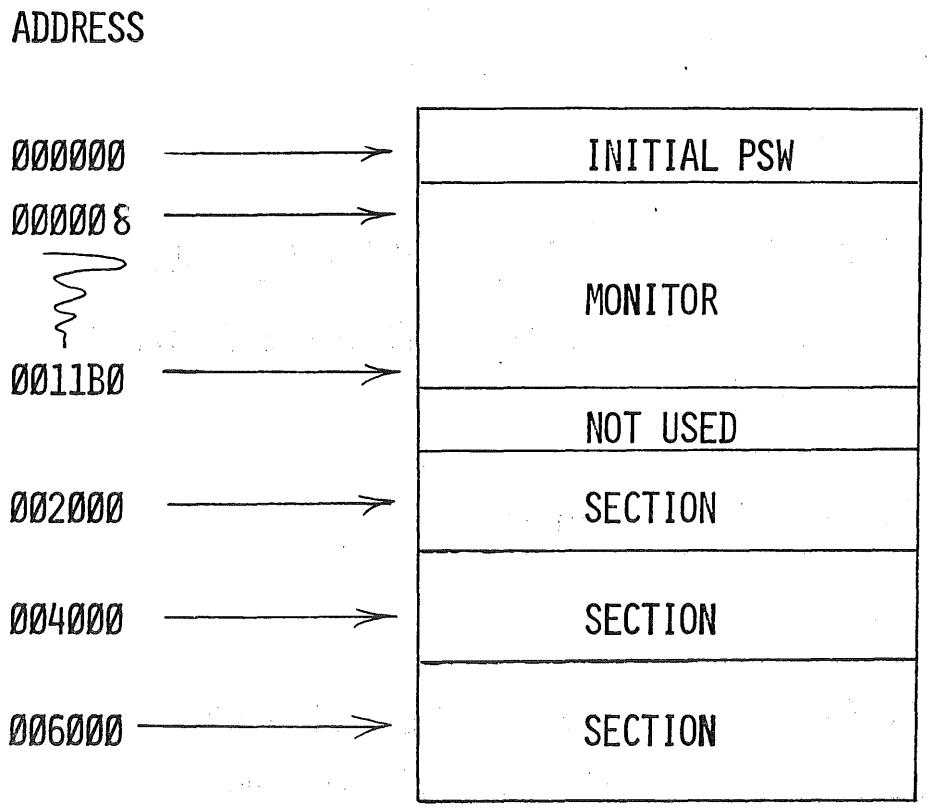
LOOK FOR C.E. IPL - NO
LOOK FOR IDM HDR - NO
DECREMENT REG 2

R2 = 0 — NO

LOK100 +8

GO BACK, KEEP READING RECORDS UNTIL COUNT = 0 OR IDM HRD COMPARES

I.D.M. ORGANIZATION



IOCE IPL - PROGRAM IN MACH STORAGE
IOCE IS IN DIAGNOSE MODE AND IS A
STAND ALONE COMPUTER. NO COMMUNI-
CATIONS BIT ON TO THE CE IN IOCE CCR.

SECTION REFERENCE
(SECREF) "A" CE IPL

A

LINE					
309	CELOAD	L	1,ZERO	00 00 00 00	
		ST	1,CEIND	00 00 00 00	CEIND
		IC	1,CEREF	7C 50 00 50	CEREF
				7C	REG 1
		STC	1,SECREF	7C	REG 1
				7C	SECREF
		IC	1,CEREF+1	50	CEREF
				50	REG 1
		STC	1,SECREF+1	7C 50	SECREF

+1

FOR CE IPL FINAL SECREF = 7C 50 01 00

CPU OPTIONS
0111 1100 = 7C
BIT

7
- Ø = EXPANSION
- 1 = FLOATING POINT
- 1 = DECIMAL
- 1 = STORAGE PROTECTION

C
- 1 = DIRECT CONTROL
- 1 = FETCH PROTECT
- Ø = EXPANSION
- Ø = EXPANSION

MODEL BYTE

INITIAL DIAGNOSTIC MONITOR

NO CHANGE

SECTION REFERENCE

IOCE IPL

LINE					
305		BC	EQ,CELOAD		
		L	1,ONE	ØØ ØØ ØØ Ø1	REG 1
		ST	1,CEIND	ØØ ØØ ØØ Ø1	CEIND
		BC	UNC,SETPS		
	SETPS	L	1,ZERO	ØØ ØØ ØØ ØØ	REG 1
		ST	1,PSVAL	NO PSBAR VALUE	
		ST	14,IDMBAS	STORE BASE REG	
		C	1,SWITCH	FIRST TIME THROUGH?	
		BC	UNE,SETPS1		
	SETPS1	IC	1,ICREF	ØØ 5Ø Ø1 ØØ	ICREF
		STC	1,SECREF	OVERLAY 7C	
		IC	1,ICREF+1	ØØ 5Ø Ø1 ØØ	ICREF
		STC	1,SECREF+1		

FINAL SECREF FOR IOCE IPL = ØØ 5Ø Ø1 ØØ

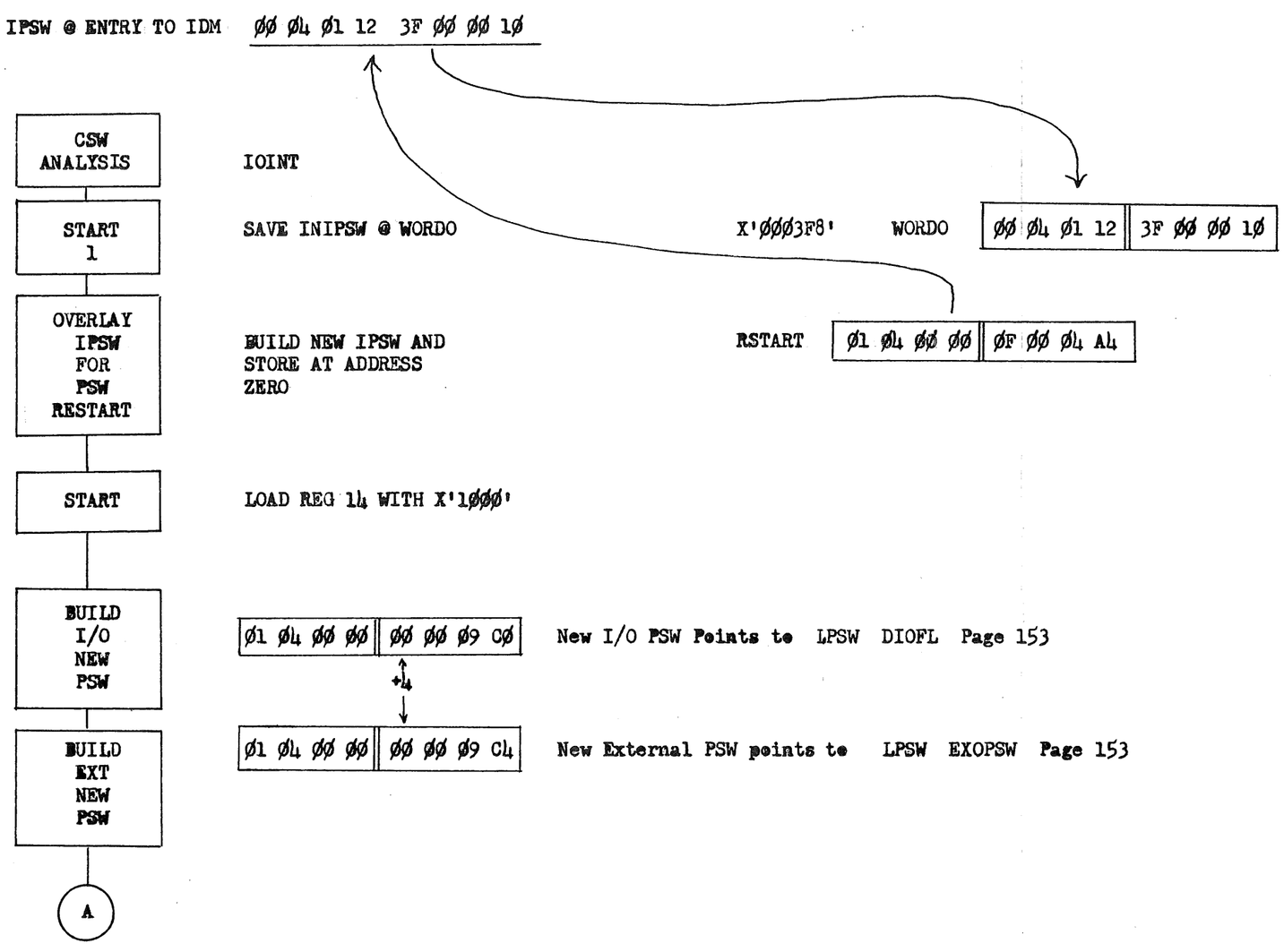
NO CPU OPTIONS	MODEL	INITIAL
	5Ø	DIAGNOSTIC MONITOR

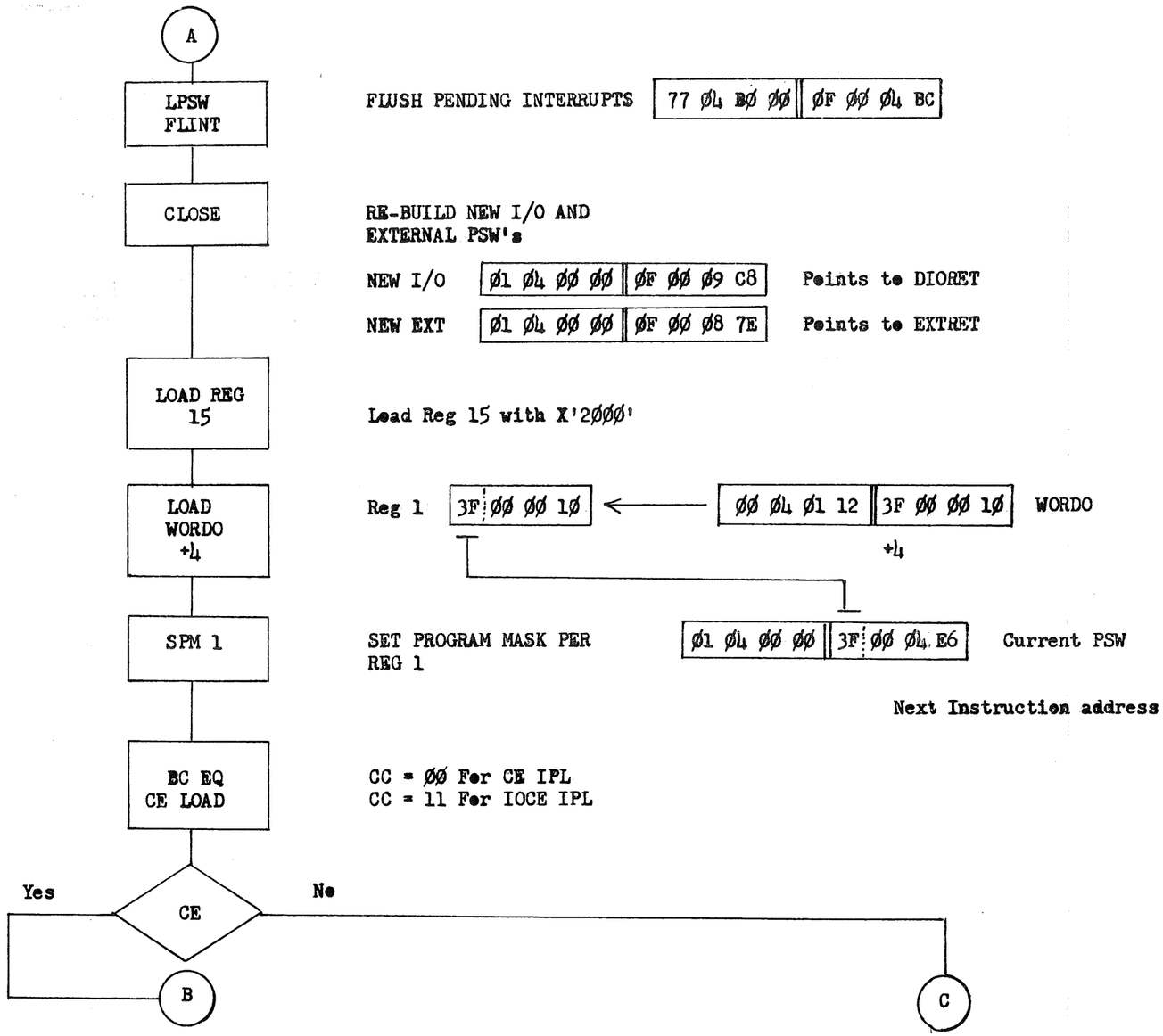
43458

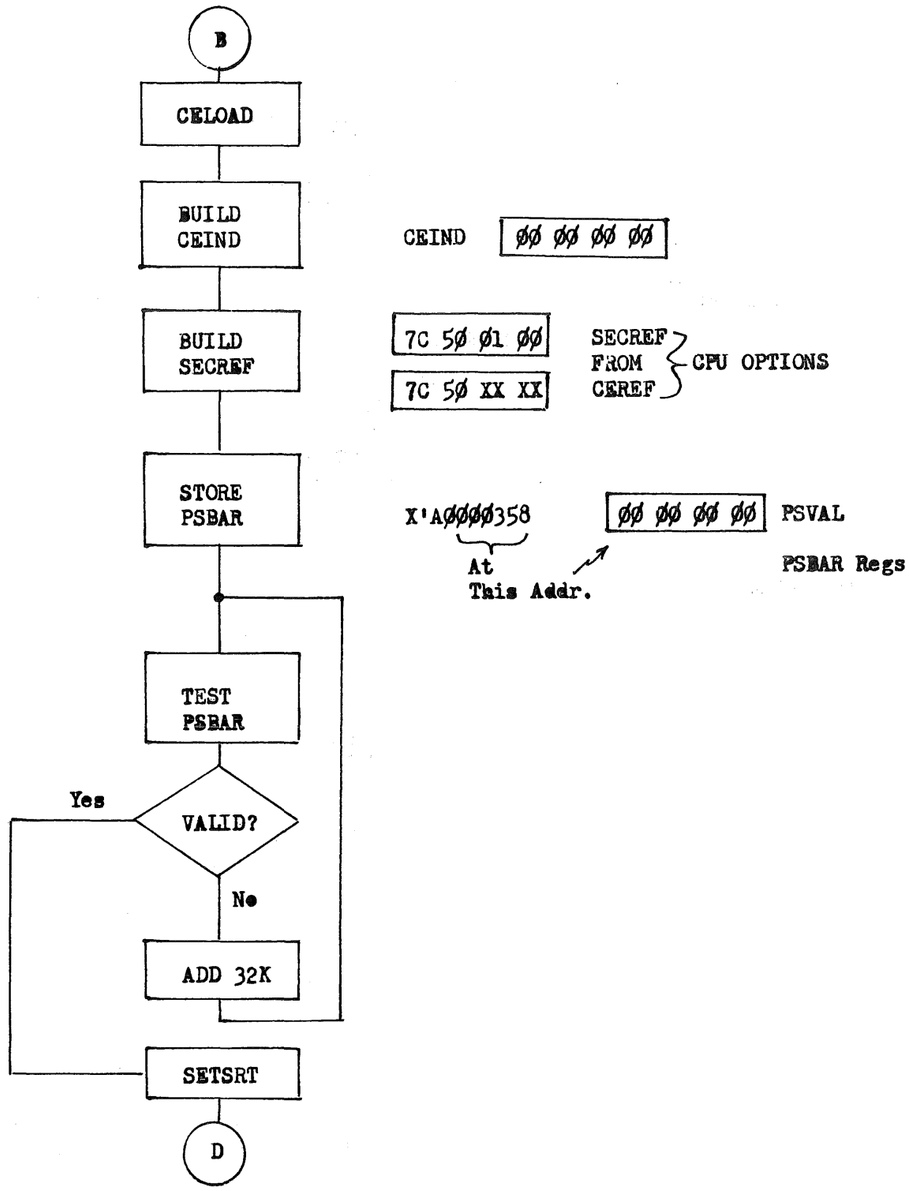
INITIAL DIAGNOSTIC MONITOR

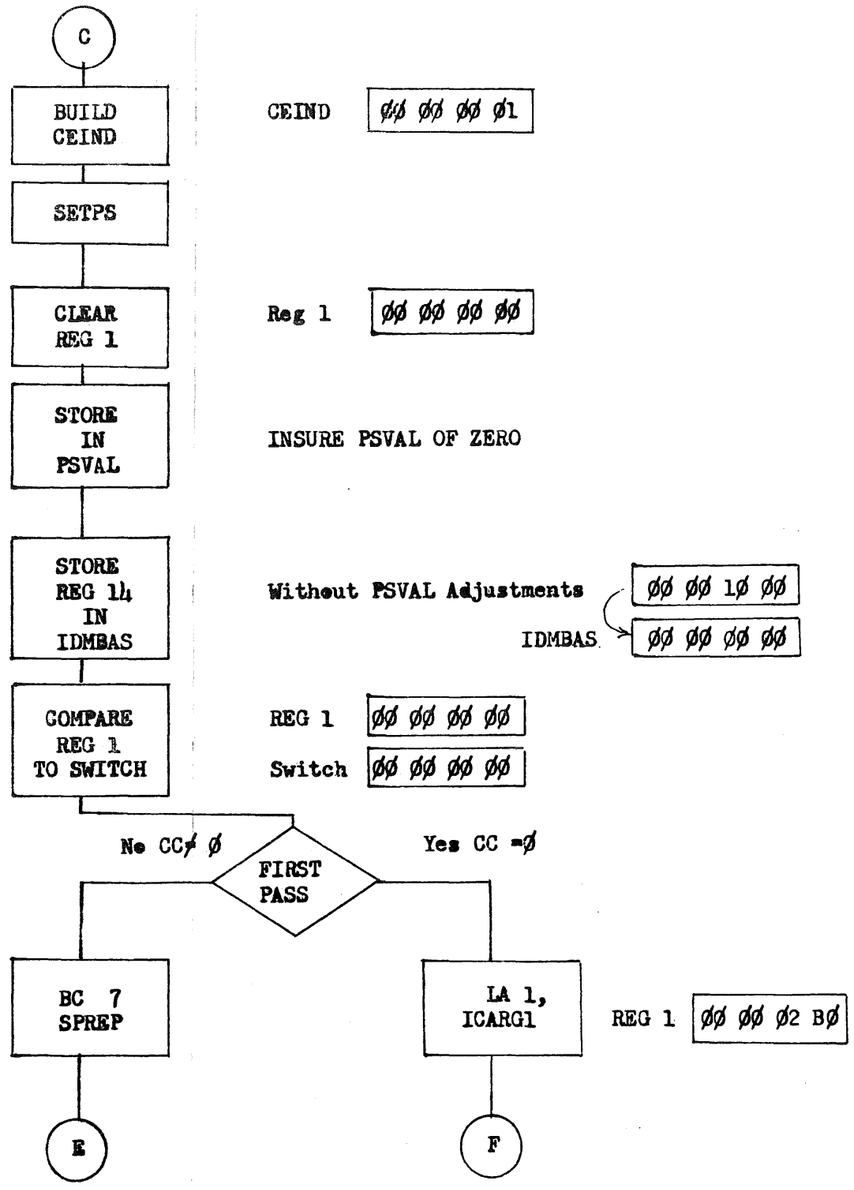
FLOWCHARTS

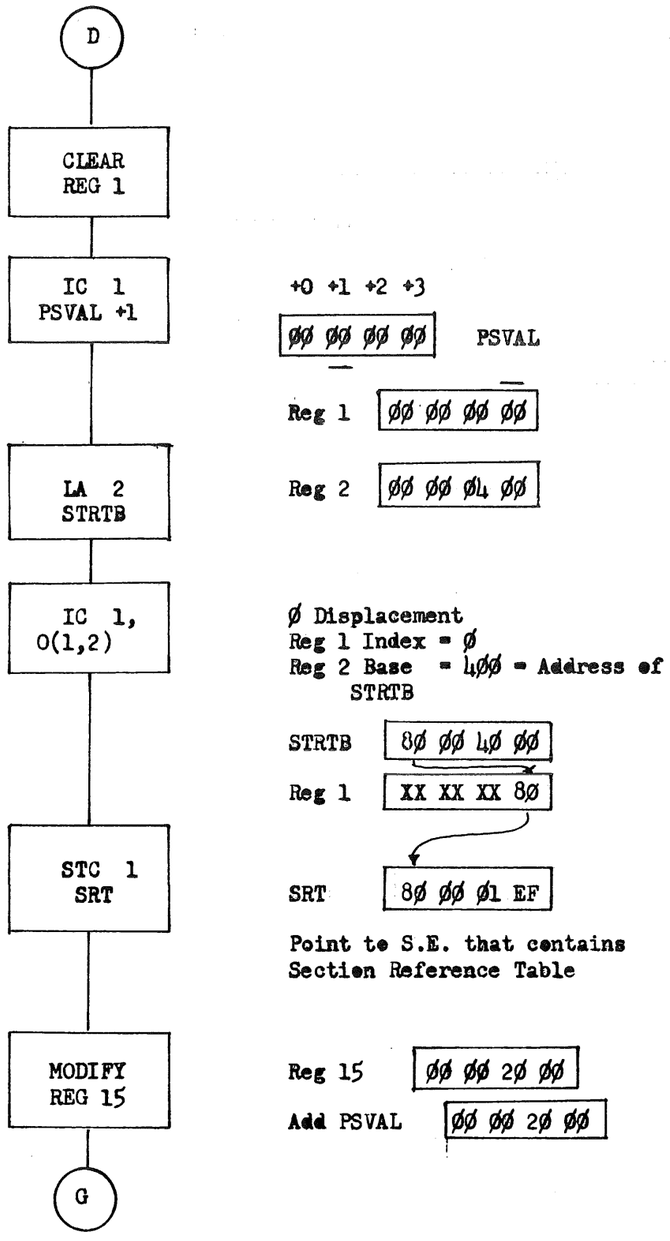
FLOWCHART

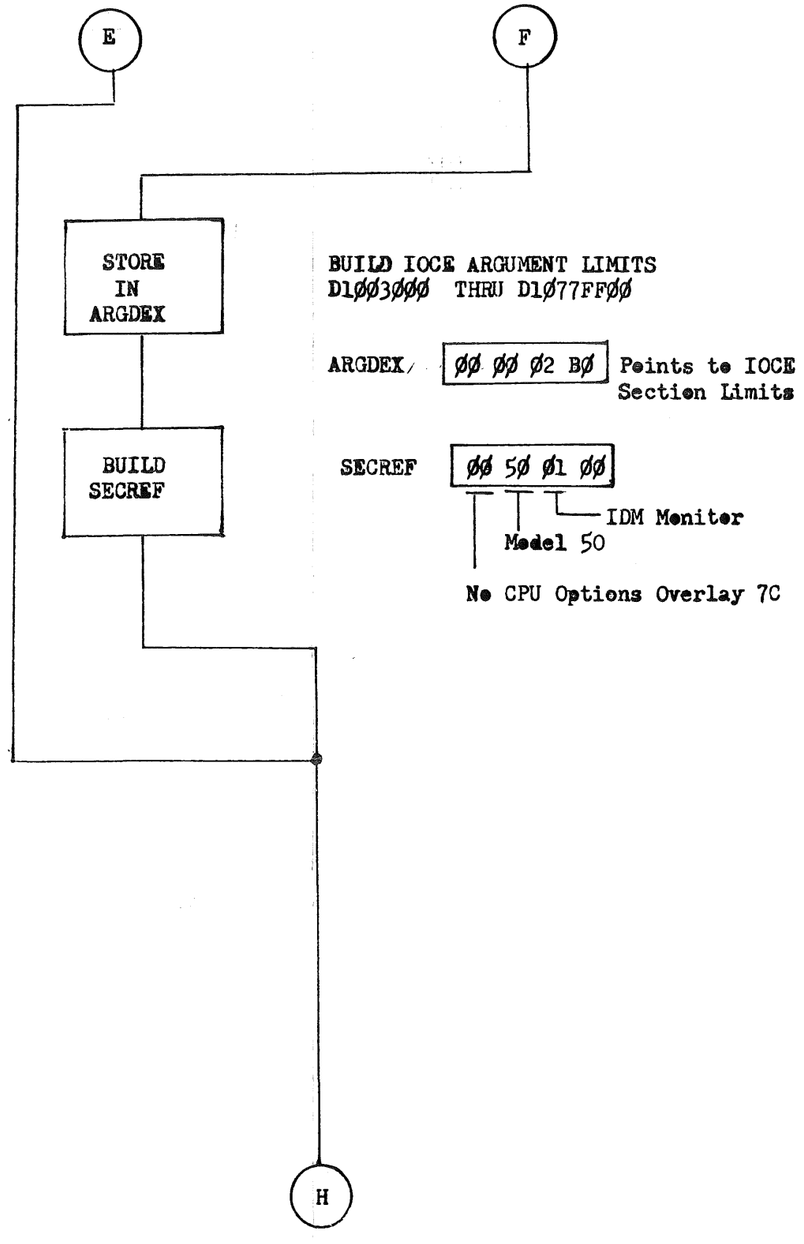

IPSW @ ENTRY TO IDM ØØ Ø4 Ø1 12 3F ØØ ØØ 1Ø
CSW ANALYSIS
IOINT
START 1
SAVE INIPSW @ WORDO
X'ØØØ3F8'
WORDO
ØØ Ø4 Ø1 12
3F ØØ ØØ 1Ø
OVERLAY IPSW FOR PSW RESTART
BUILD NEW IPSW AND STORE AT ADDRESS ZERO
RSTART
Ø1 Ø4 ØØ ØØ
ØF ØØ Ø4 A4
START
LOAD REG 14 WITH X'1ØØØ'
BUILD I/O NEW PSW
Ø1 Ø4 ØØ ØØ
ØØ ØØ Ø9 CØ
New I/O PSW Points to LPSW DIOFL Page 153
+4
BUILD EXT NEW PSW
Ø1 Ø4 ØØ ØØ
ØØ ØØ Ø9 C4
New External PSW points to LPSW EXOPSW Page 153
A

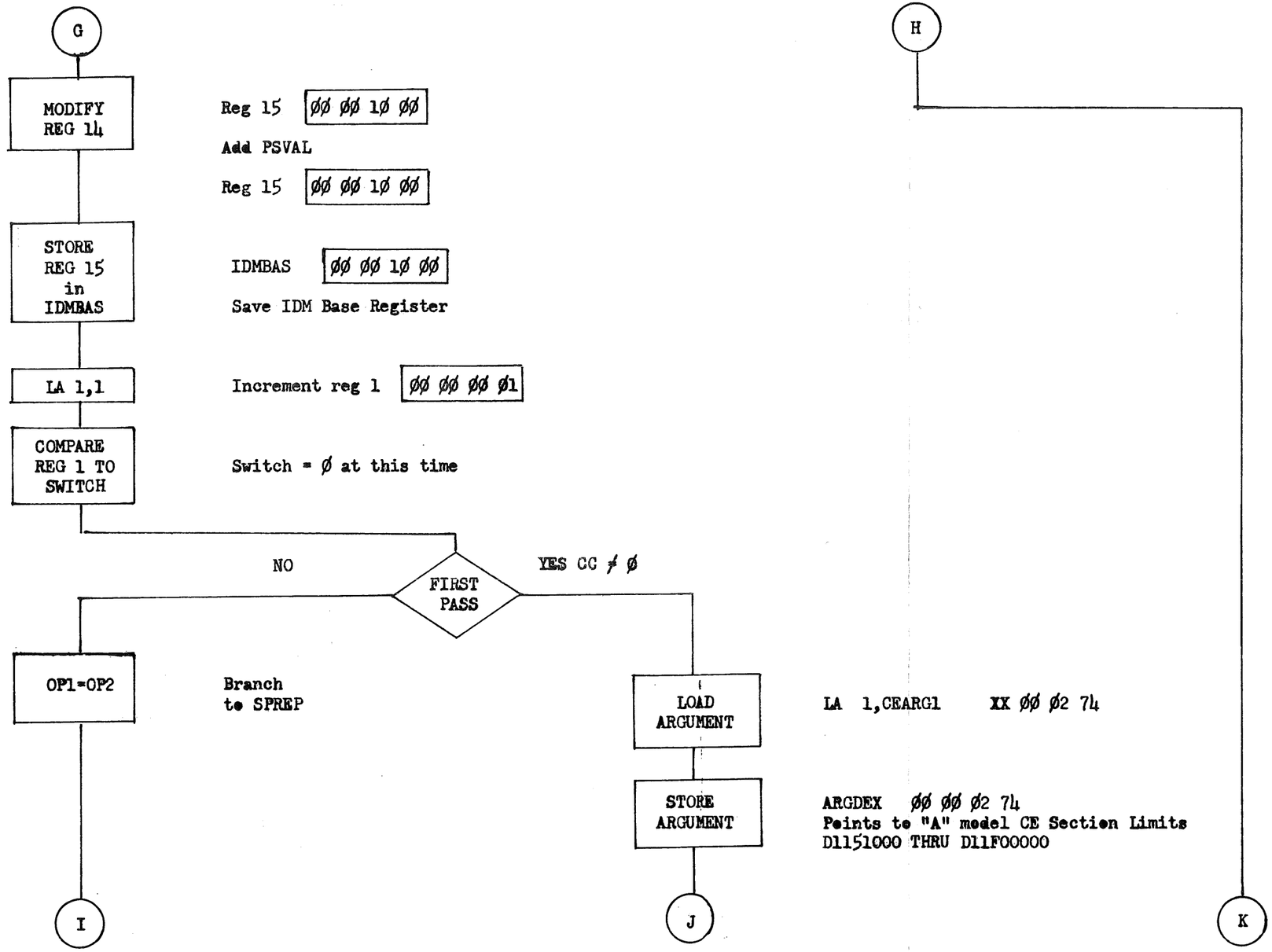

A
LPSW FLINT
FLUSH PENDING INTERRUPTS
77 Ø4 BØ ØØ
ØF ØØ Ø4 BC
CLOSE
RE-BUILD NEW I/O AND EXTERNAL PSW's
NEW I/O
Ø1 Ø4 ØØ ØØ
ØF ØØ Ø9 C8
Points to DIORET
NEW EXT
Ø1 Ø4 ØØ ØØ
ØF ØØ Ø8 7E
Points to EXTRET
LOAD REG 15
Load Reg 15 with X'2ØØØ'
LOAD WORDO +4
Reg 1
3F ØØ ØØ 1Ø
ØØ Ø4 Ø1 12
3F ØØ ØØ 1Ø
WORDO
+4
SPM 1
SET PROGRAM MASK PER REG 1
Ø1 Ø4 ØØ ØØ
3F ØØ Ø4 E6
Current PSW
Next Instruction address
BC EQ CE LOAD
CC = ØØ For CE IPL
CC = 11 For IOCE IPL
Yes
CE
No
B
C

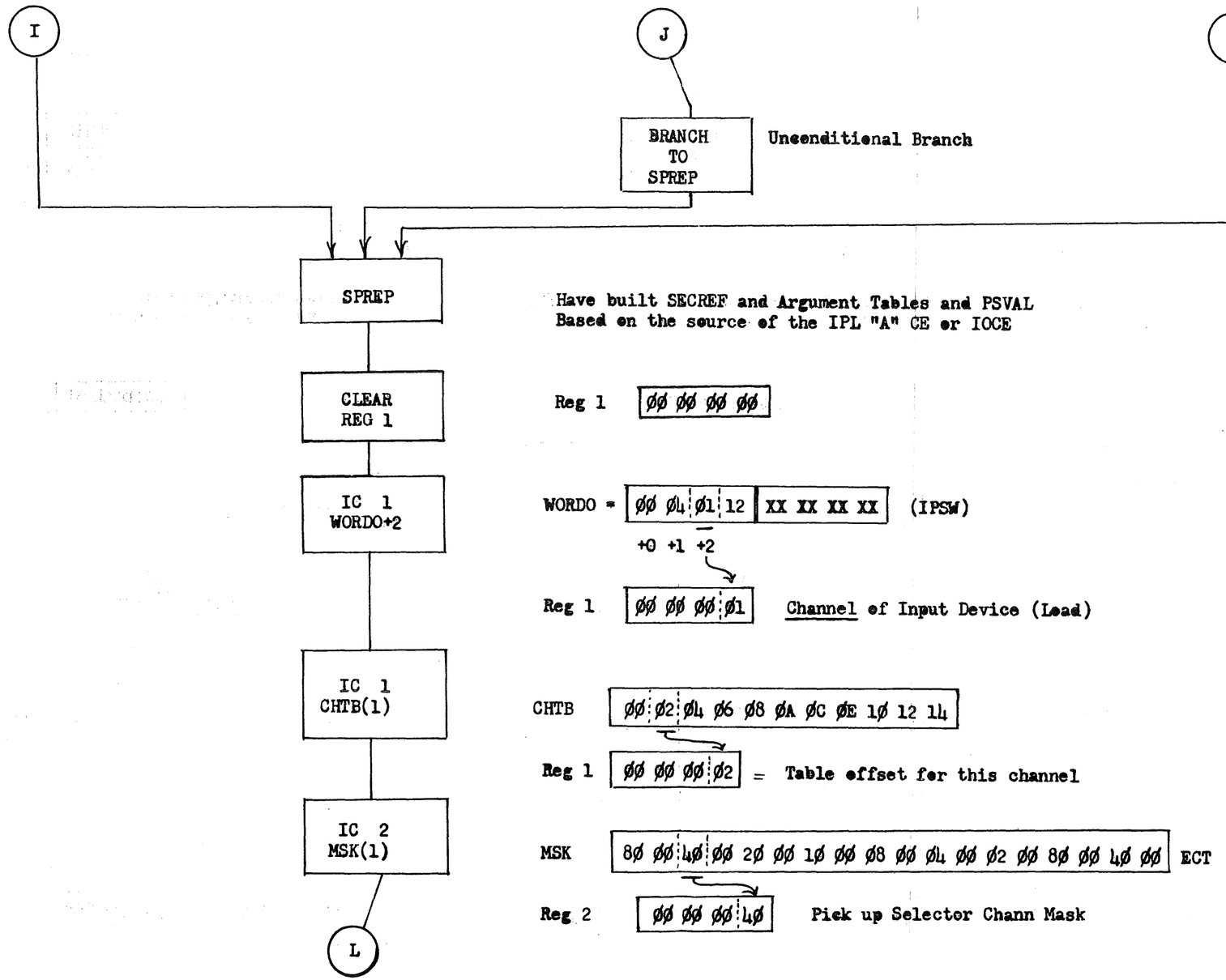

B
CELOAD
BUILD CEIND
BUILD SECREF
STORE PSBAR
TEST PSBAR
Yes
VALID?
No
ADD 32K
SETSRT
D
CEIND ØØ ØØ ØØ ØØ
7C 5Ø Ø1 ØØ
7C 5Ø XX XX
SECREF FROM CEREF
CPU OPTIONS
X'AØØØØ358
At This Addr.
ØØ ØØ ØØ ØØ
PSVAL
PSBAR Regs

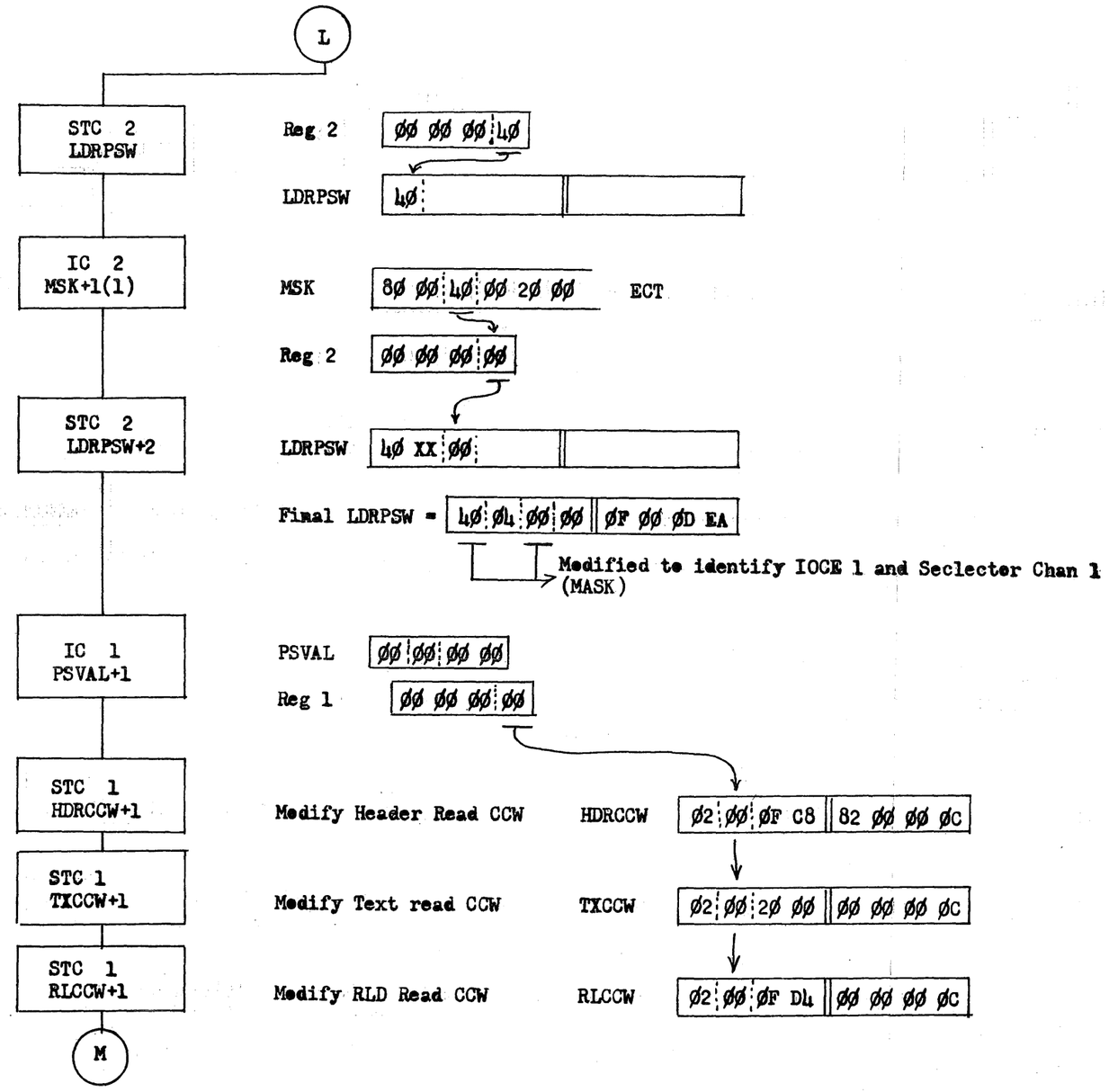

C
BUILD CEIND
SETPS
CLEAR REG 1
STORE IN PSVAL
STORE REG 14 IN IDMBAS
COMPARE REG 1 TO SWITCH
FIRST PASS
No CC≠ Ø
Yes CC =Ø
BC 7 SPREP
LA 1, ICARG1
E
F
CEIND ØØ ØØ ØØ Ø1
Reg 1 ØØ ØØ ØØ ØØ
INSURE PSVAL OF ZERO
Without PSVAL Adjustments
ØØ ØØ 1Ø ØØ
IDMBAS
ØØ ØØ ØØ ØØ
REG 1 ØØ ØØ ØØ ØØ
Switch ØØ ØØ ØØ ØØ
REG 1 ØØ ØØ Ø2 BØ

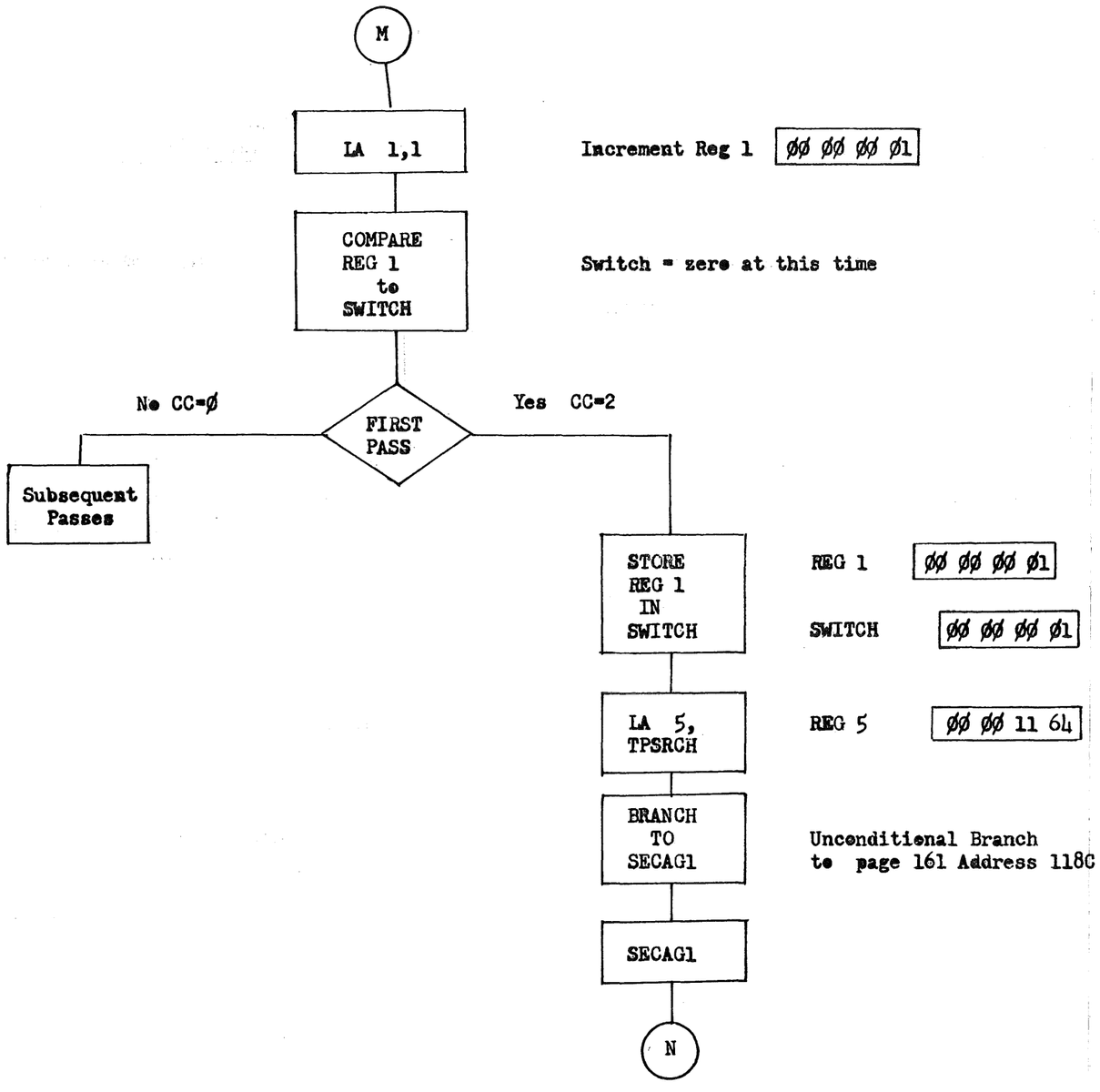

D
CLEAR REG 1
IC 1 PSVAL +1
LA 2 STRTB
IC 1, O(1,2)
STC 1 SRT
MODIFY REG 15
G
+0 +1 +2 +3
ØØ ØØ ØØ ØØ
PSVAL
Reg 1
ØØ ØØ ØØ ØØ
Reg 2
ØØ ØØ Ø4 ØØ
Ø Displacement
Reg 1 Index = Ø
Reg 2 Base = 4ØØ = Address of STRTB
STRTB
8Ø ØØ 4Ø ØØ
Reg 1
XX XX XX 8Ø
SRT
8Ø ØØ Ø1 EF
Point to S.E. that contains Section Reference Table
Reg 15
ØØ ØØ 2Ø ØØ
Add PSVAL
ØØ ØØ 2Ø ØØ

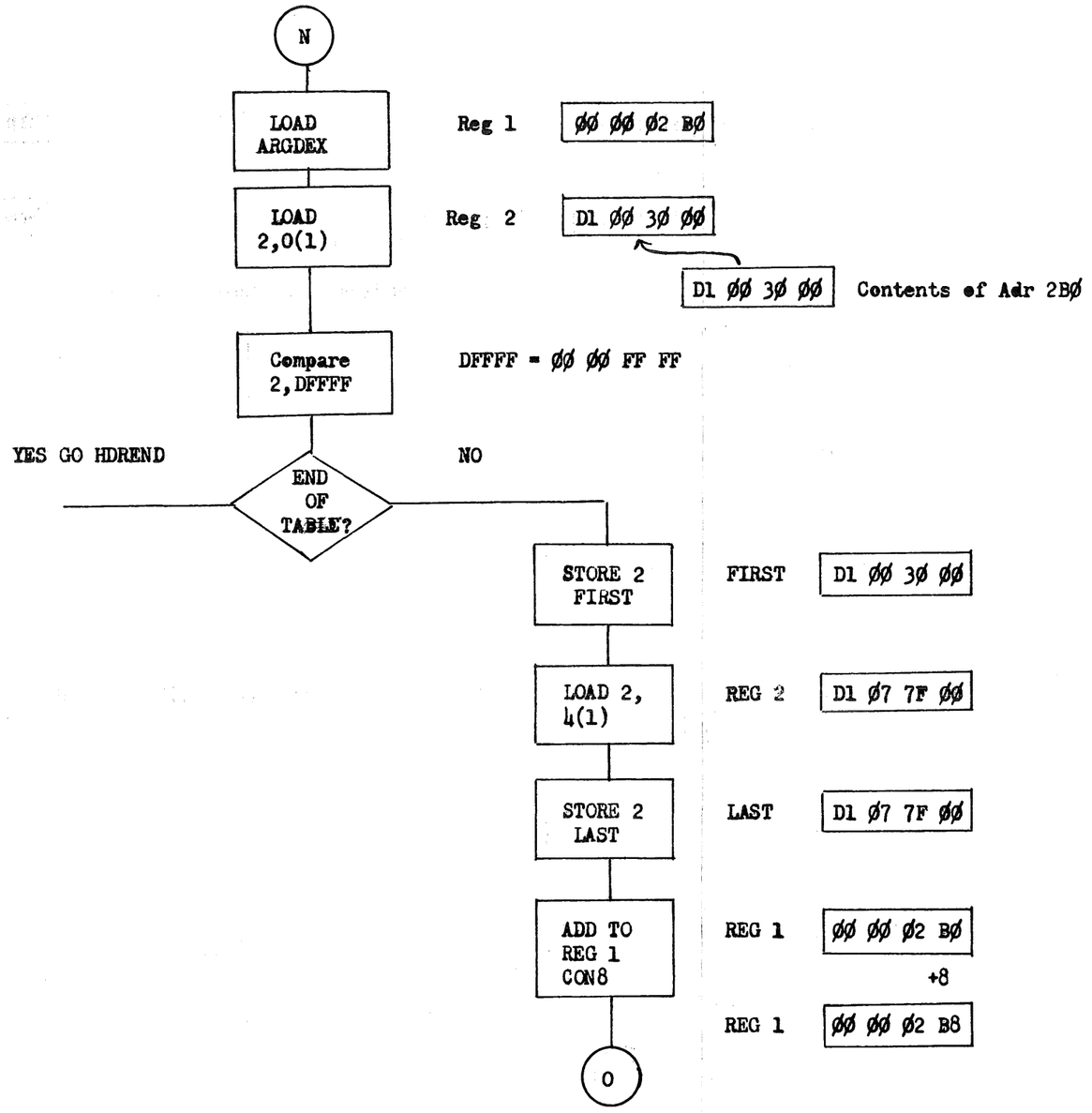

E
F
STORE IN ARGDEX
BUILD SECREF
BUILD IOCE ARGUMENT LIMITS
D1ØØ3ØØØ THRU D1Ø77FFØØ
ARGDEX
ØØ ØØ Ø2 BØ
Points to IOCE Section Limits
SECREF
ØØ 5Ø Ø1 ØØ
IDM Moniter
Model 50
No CPU Options Overlay 7C
H

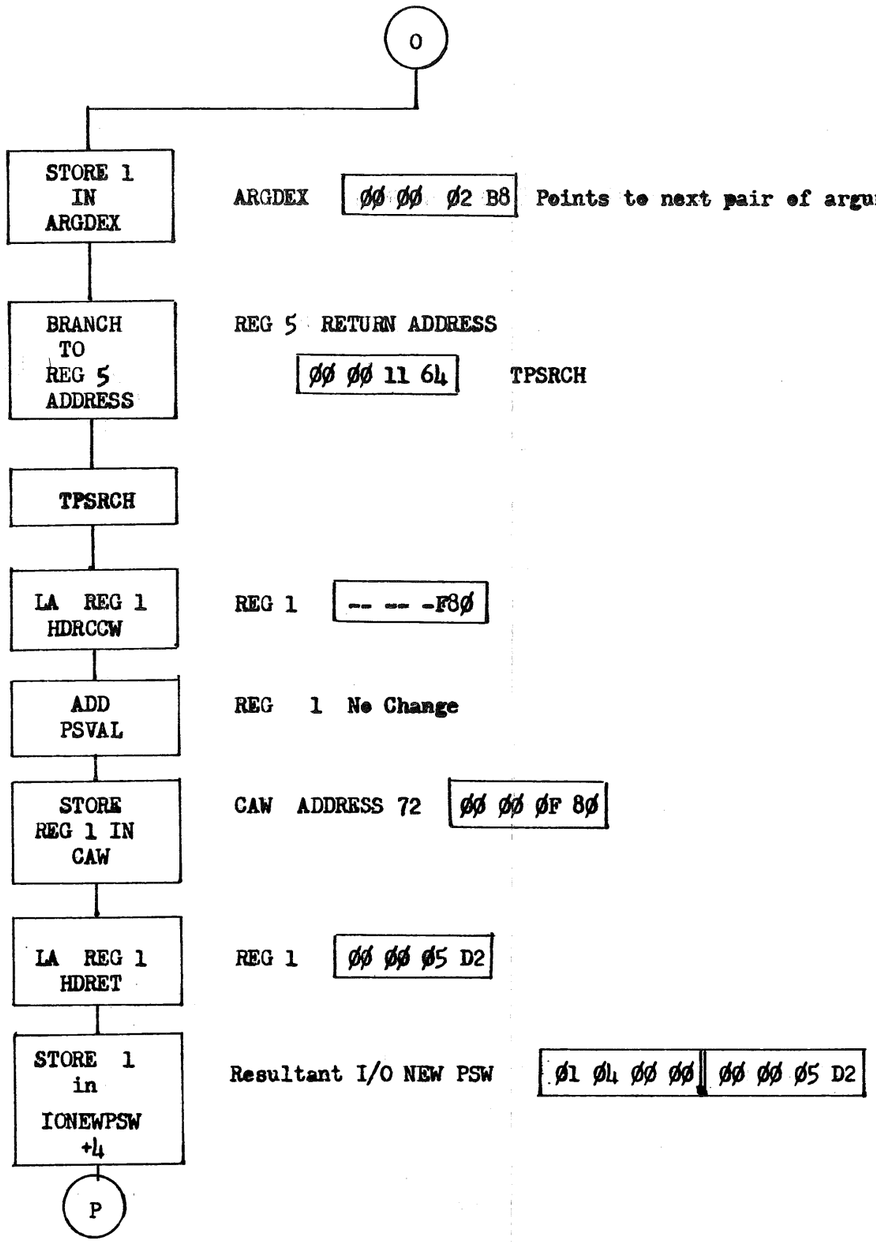

G
MODIFY REG 14
Reg 15 ØØ ØØ 1Ø ØØ
Add PSVAL
Reg 15 ØØ ØØ 1Ø ØØ
STORE REG 15 in IDMBAS
IDMBAS ØØ ØØ 1Ø ØØ
Save IDM Base Register
LA 1,1
Increment reg 1 ØØ ØØ ØØ Ø1
COMPARE REG 1 TO SWITCH
Switch = Ø at this time
FIRST PASS
NO
YES CC ≠ Ø
OP1=OP2
Branch to SPREP
LOAD ARGUMENT
LA 1,CEARG1 XX ØØ Ø2 74
STORE ARGUMENT
ARGDEX ØØ ØØ Ø2 74
Points to "A" model CE Section Limits
D1151000 THRU D11F00000
I
J
H
K

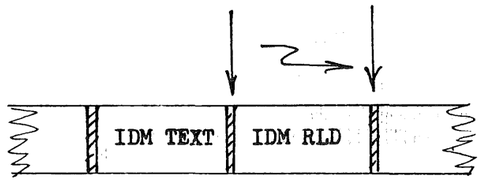

I
J
K
BRANCH TO SPREP
Unconditional Branch
SPREP
Have built SECREF and Argument Tables and PSVAL
Based on the source of the IPL "A" CE or IOCE
CLEAR REG 1
Reg 1 ØØ ØØ ØØ ØØ
IC 1 WORDO+2
WORDO = ØØ Ø4 Ø1 12 XX XX XX XX (IPSW)
+0 +1 +2
Reg 1 ØØ ØØ ØØ Ø1 Channel of Input Device (Lead)
IC 1 CHTB(1)
CHTB ØØ Ø2 Ø4 Ø6 Ø8 ØA ØC ØE 1Ø 12 14
Reg 1 ØØ ØØ ØØ Ø2 = Table offset for this channel
IC 2 MSK(1)
MSK 8Ø ØØ 4Ø ØØ 2Ø ØØ 1Ø ØØ Ø8 ØØ Ø4 ØØ Ø2 ØØ 8Ø ØØ 4Ø ØØ ECT
Reg 2 ØØ ØØ ØØ 4Ø Pick up Selector Chann Mask
L


L
STC 2
LDRPSW
Reg 2
ØØ ØØ ØØ 4Ø
LDRPSW
4Ø
IC 2
MSK+1(1)
MSK
8Ø ØØ 4Ø ØØ 2Ø ØØ
ECT
Reg 2
ØØ ØØ ØØ ØØ
STC 2
LDRPSW+2
LDRPSW
4Ø XX ØØ
Final LDRPSW =
4Ø Ø4 ØØ ØØ
ØF ØØ ØD EA
Modified to identify IOCE 1 and Seclecter Chan 1
(MASK)
IC 1
PSVAL+1
PSVAL
ØØ ØØ ØØ ØØ
Reg 1
ØØ ØØ ØØ ØØ
STC 1
HDRCCW+1
Modify Header Read CCW
HDRCCW
Ø2 ØØ ØF C8
82 ØØ ØØ ØC
STC 1
TXCCW+1
Modify Text read CCW
TXCCW
Ø2 ØØ 2Ø ØØ
ØØ ØØ ØØ ØC
STC 1
RLCCW+1
Modify RLD Read CCW
RLCCW
Ø2 ØØ ØF D4
ØØ ØØ ØØ ØC
M

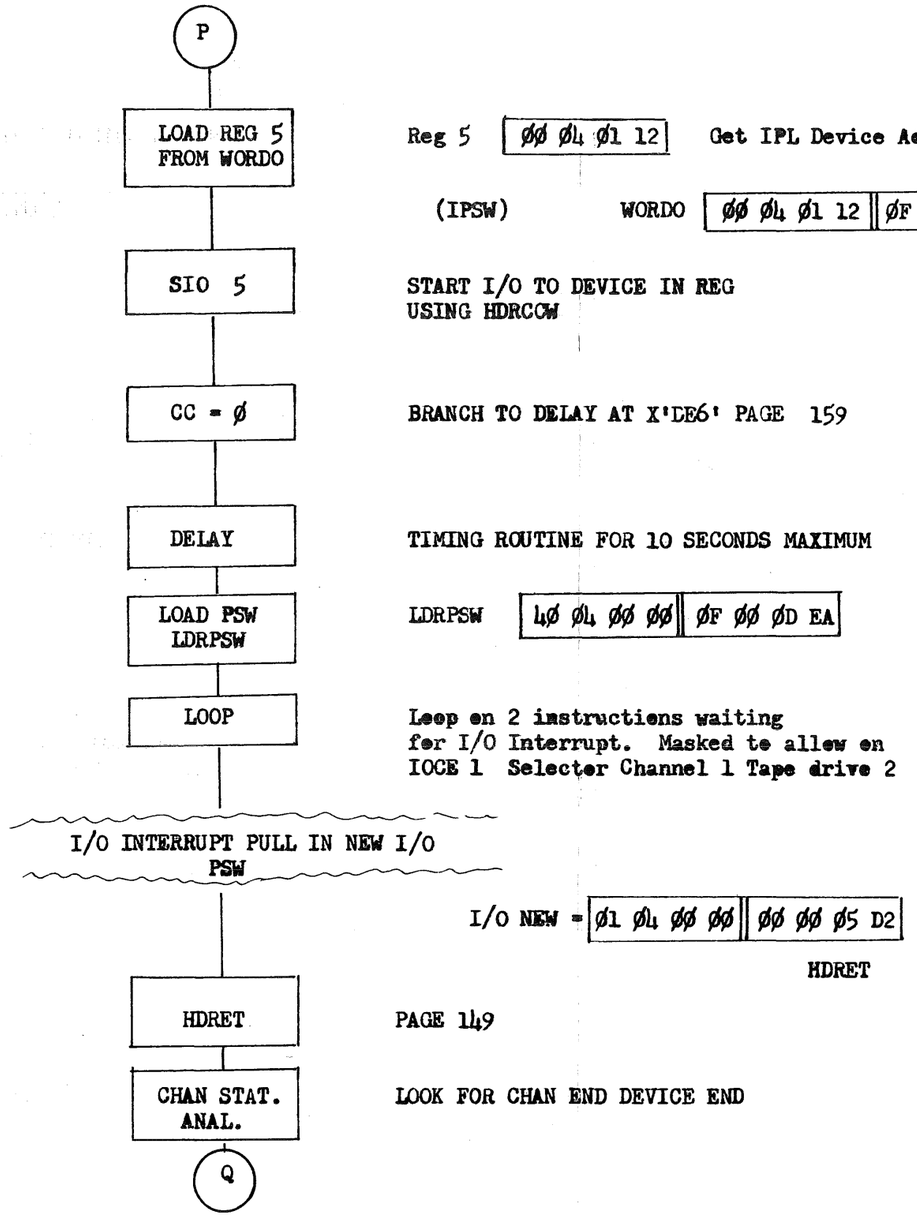

M
LA 1,1
Increment Reg 1
ØØ ØØ ØØ Ø1
COMPARE REG 1 to SWITCH
Switch = zero at this time
No CC=Ø
FIRST PASS
Yes CC=2
Subsequent Passes
STORE REG 1 IN SWITCH
REG 1
ØØ ØØ ØØ Ø1
SWITCH
ØØ ØØ ØØ Ø1
LA 5, TPSRCH
REG 5
ØØ ØØ 11 64
Return address
BRANCH TO SECAG1
Unconditional Branch to page 161 Address 118C
SECAG1
N

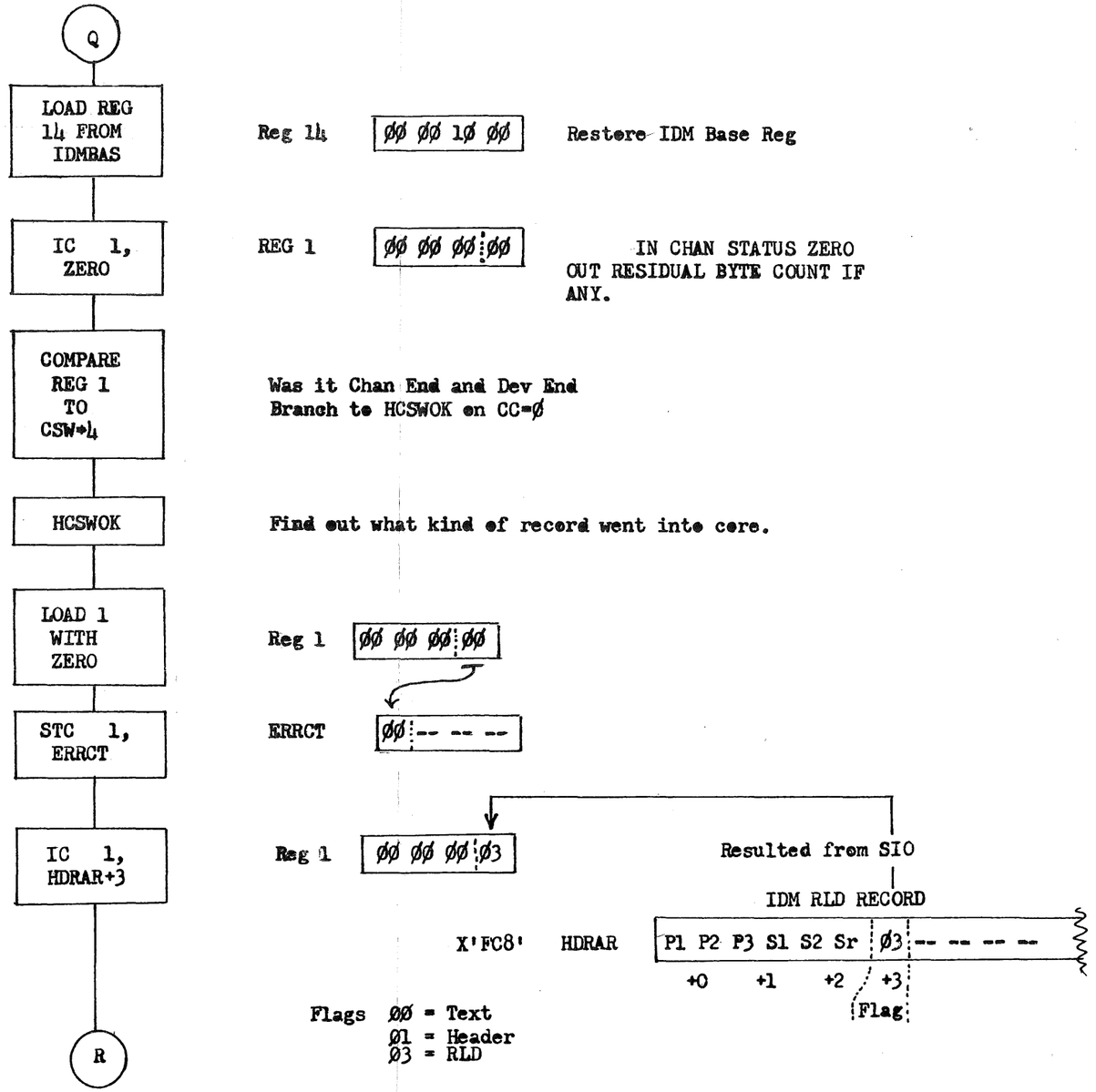

N
LOAD ARGDEX
Reg 1
ØØ ØØ Ø2 BØ
LOAD 2,0(1)
Reg 2
D1 ØØ 3Ø ØØ
D1 ØØ 3Ø ØØ
Contents of Adr 2BØ
Compare 2,DFFFF
DFFFF = ØØ ØØ FF FF
YES GO HDREND
END OF TABLE?
NO
STORE 2 FIRST
FIRST
D1 ØØ 3Ø ØØ
LOAD 2, 4(1)
REG 2
D1 Ø7 7F ØØ
STORE 2 LAST
LAST
D1 Ø7 7F ØØ
ADD TO REG 1 CON8
REG 1
ØØ ØØ Ø2 BØ
+8
REG 1
ØØ ØØ Ø2 B8
O

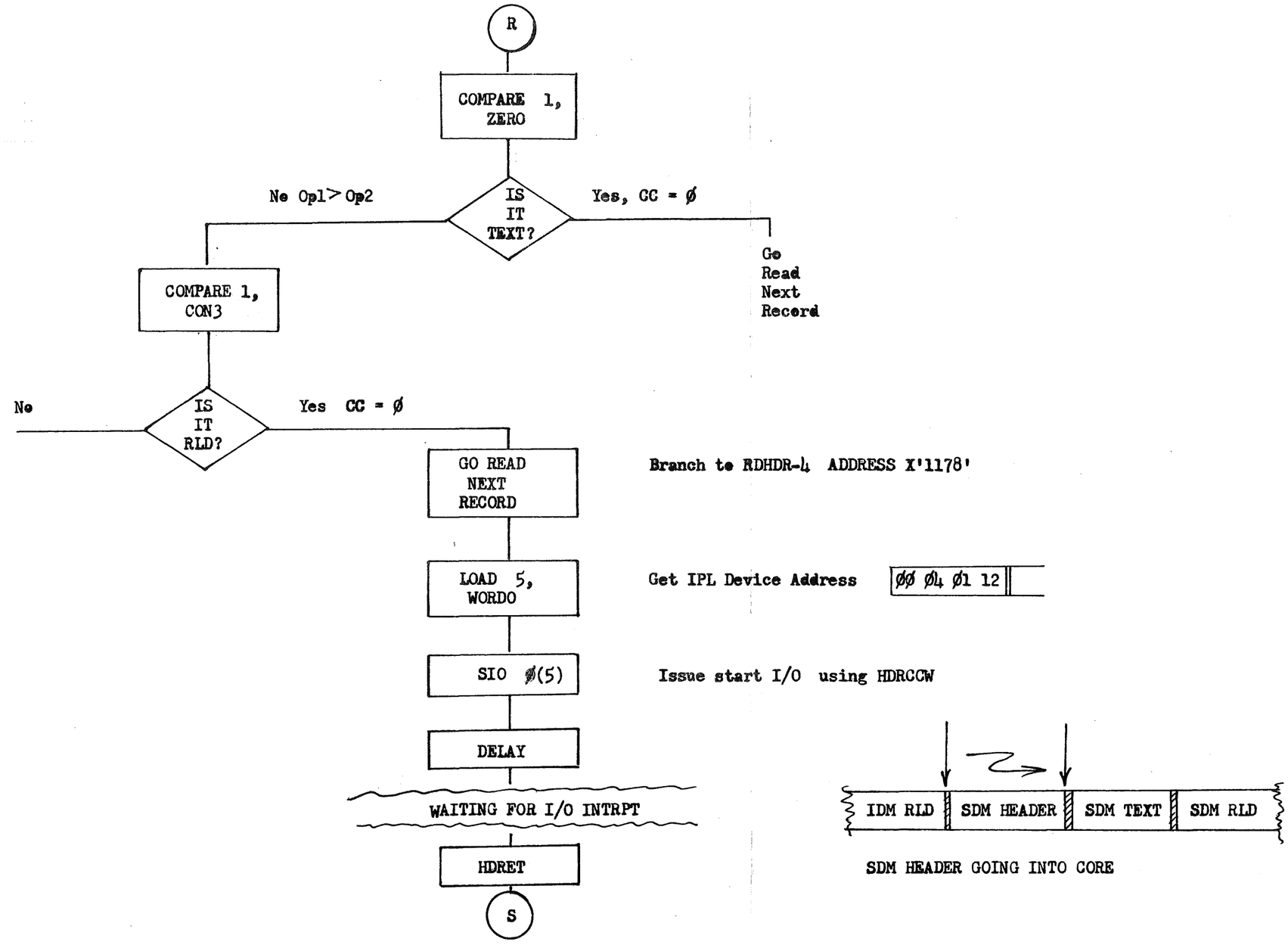

0
STORE 1 IN ARGDEX
ARGDEX
ØØ ØØ Ø2 B8
Points to next pair of arguments
BRANCH TO REG 5 ADDRESS
REG 5 RETURN ADDRESS
ØØ ØØ 11 64
TPSRCH
TPSRCH
LA REG 1 HDRCCW
REG 1
-- -- -F8Ø
ADD PSVAL
REG 1 No Change
STORE REG 1 IN CAW
CAW ADDRESS 72
ØØ ØØ ØF 8Ø
LA REG 1 HDRET
REG 1
ØØ ØØ Ø5 D2
STORE 1 in IONEWPSW +4
Resultant I/O NEW PSW
Ø1 Ø4 ØØ ØØ
ØØ ØØ Ø5 D2
P

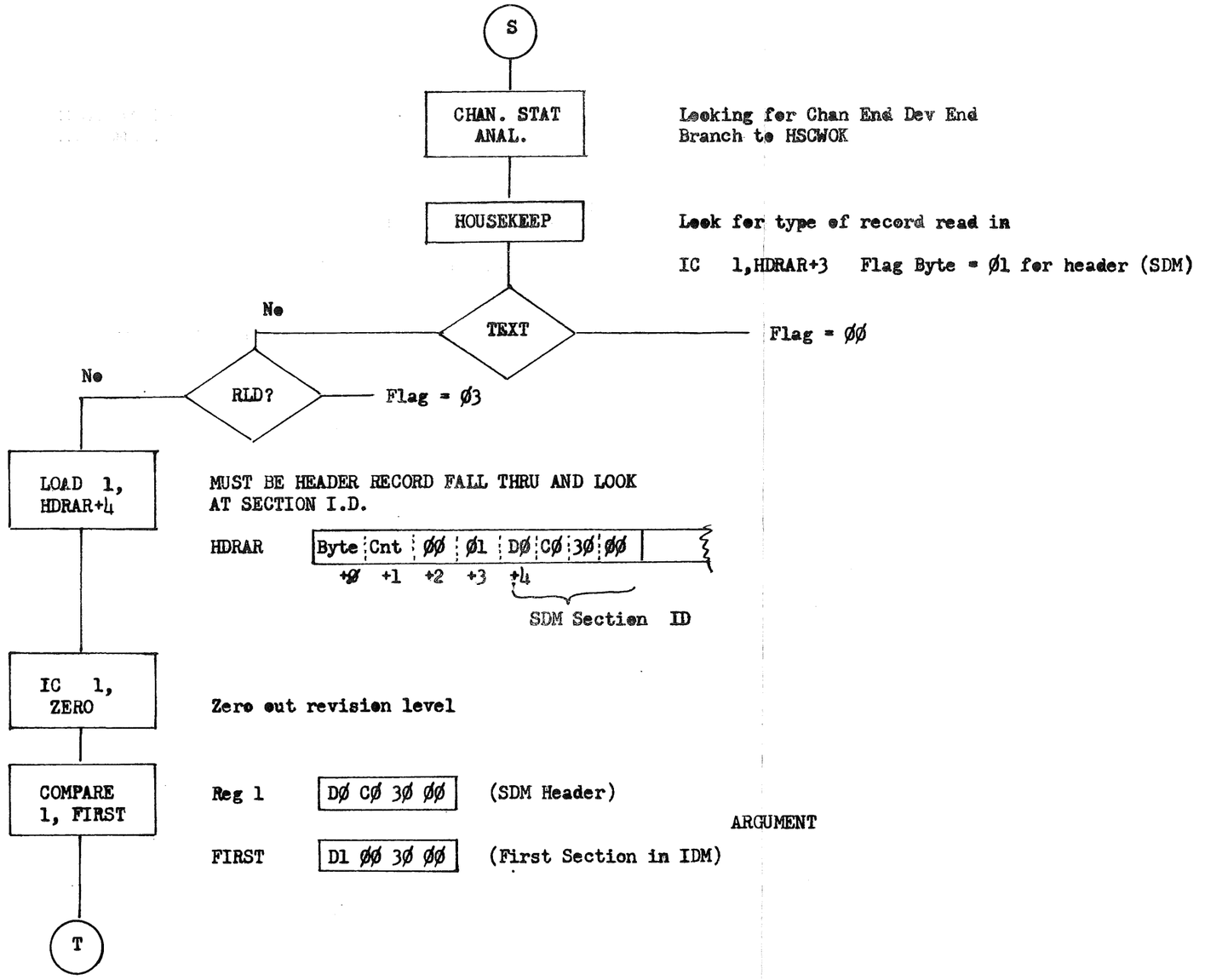


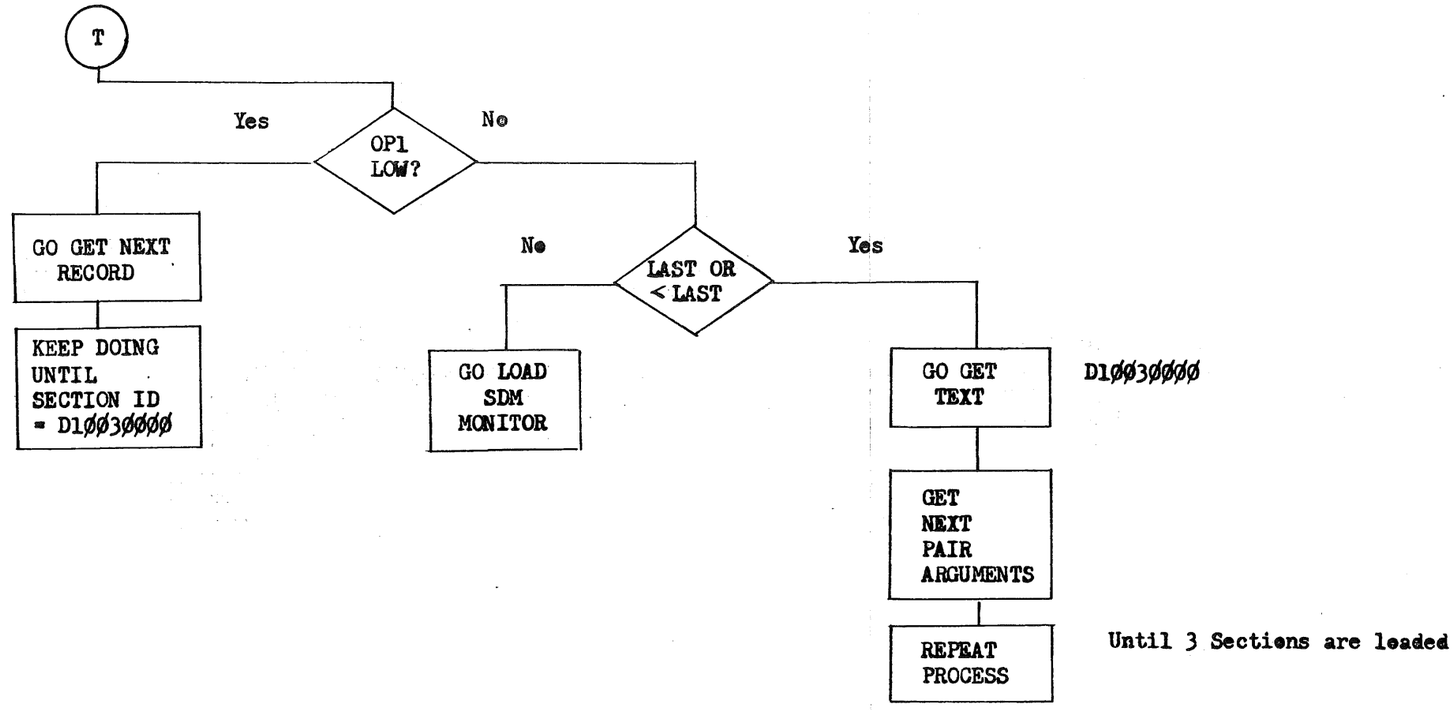
LOOKING FOR CHAN END
AND DEVICE END
12 BYTES GOING INTO
CORE AT ADDRESS X'FC8'




Q
LOAD REG 14 FROM IDMBAS
Reg 14
ØØ ØØ 1Ø ØØ
Restore IDM Base Reg
IC 1, ZERO
REG 1
ØØ ØØ ØØ ØØ
IN CHAN STATUS ZERO OUT RESIDUAL BYTE COUNT IF ANY.
COMPARE REG 1 TO CSW+4
Was it Chan End and Dev End Branch to HCSWOK on CC=Ø
HCSWOK
Find out what kind of record went into core.
LOAD 1 WITH ZERO
Reg 1
ØØ ØØ ØØ ØØ
STC 1, ERRCT
ERRCT
ØØ -- -- --
IC 1, HDRAR+3
Reg 1
ØØ ØØ ØØ Ø3
Resulted from SIO
IDM RLD RECORD
X'FC8'
HDRAR
P1 P2 P3 S1 S2 Sr Ø3 -- -- -- --
+0
+1
+2
+3
Flag
Flags ØØ = Text
Ø1 = Header
Ø3 = RLD
R


R
COMPARE 1, ZERO
IS IT TEXT?
No Op1 > Op2
Yes, CC = ø
Go Read Next Record
COMPARE 1, CON3
IS IT RLD?
No
Yes CC = ø
GO READ NEXT RECORD
Branch to RDHDR-4 ADDRESS X'1178'
LOAD 5, WORDO
Get IPL Device Address
øø ø4 ø1 12
SIO ø(5)
Issue start I/O using HDRCCW
DELAY
WAITING FOR I/O INTRPT
HDRET
S
IDM RLD
SDM HEADER
SDM TEXT
SDM RLD
SDM HEADER GOING INTO CORE


S
CHAN. STAT ANAL.
Looking for Chan End Dev End
Branch to HSCWOK
HOUSEKEEP
Look for type of record read in
IC 1,HDRAR+3 Flag Byte = Ø1 for header (SDM)
No
TEXT
Flag = ØØ
No
RLD?
Flag = Ø3
LOAD 1, HDRAR+4
MUST BE HEADER RECORD FALL THRU AND LOOK AT SECTION I.D.
HDRAR
Byte Cnt ØØ Ø1 DØ CØ 3Ø ØØ
+Ø +1 +2 +3 +4
SDM Section ID
IC 1, ZERO
Zero out revision level
COMPARE 1, FIRST
Reg 1 DØ CØ 3Ø ØØ (SDM Header)
ARGUMENT
FIRST D1 ØØ 3Ø ØØ (First Section in IDM)
T


T
Yes
OP1 LOW?
No
GO GET NEXT RECORD
KEEP DOING UNTIL SECTION ID = D1ØØ3ØØØØ
No
LAST OR < LAST
Yes
GO LOAD SDM MONITOR
GO GET TEXT
D1ØØ3ØØØØ
GET NEXT PAIR ARGUMENTS
REPEAT PROCESS
Until 3 Sections are loaded