HEWLETT PACKARD

# DIAGNOSTIC CONFIGURATOR

## reference manual

For HP 2114, 2115, 2116, 2100, and HP 1000 M-, E-, and F-Series Computer Systems using the HP 24396A through HP 24396F Diagnostics on Multimedia or the HP 24998-14002 Diagnostic Library for the HP 1000 Computer Systems.

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Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

To determine what manual edition and update is compatible with your current software revision code, refer to the appropriate Software Numbering Catalog, Software Product Catalog, or Diagnostic Configurator Manual.

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# INTRODUCTION

SECTION I

## 1-1. GENERAL

This manual describes the operation and use of the Diagnostic Configurator (hereafter called the Configurator), a standalone program loaded into an HP 1000 M-Series, E-Series, F-Series, 2100A/S, 2116A/B/C, 2115A, or 2114A/B Computer System* before other diagnostics. The program loads and controls the sequential execution of most of the HP 2100 Series Computer, interface, and peripheral equipment diagnostics, and they in turn reference the Configurator for certain parameters required by the diagnostics.

The Configurator is available on all diagnostic media which include paper tape, HP 7900/7905/7906 Disc, HP 7970B/E Magnetic Tape, and HP 2644/2645/48 Cartridge Tape.

The six media which carry the diagnostic library are employed to give the user a choice of several input devices. Any one of the diagnostic media listed below carries a special product number which includes the diagnostic library on the specified medium and all associated manuals:

| PRODUCT NO. | MEDIUM | COMMENT |
|---|---|---|
| 24396A | Paper Tape | All Configurator-compatible diagnostics on any medium. |
| 24396B | 7900 Disc | |
| 24396C | 7905 Disc | |
| 24396D | 7970B Magnetic Tape | |
| 24396E | 7970E Magnetic Tape | |
| 24396F | 2644/45 Cartridge Tape | All Configurator-compatible diagnostics on 7 cartridge tapes. |

In addition to the 6 products mentioned above which provide all configurator compatible diagnostics on different media a special selection of diagnostics has been created. This selection (part no. 24998-14002) carries only the diagnostics which are compatible with the HP 1000 System. It consists of 6 HP 2645 cartridge tapes, and the appropriate manuals and is supplied with an HP 1000 System.

Two Diagnostic Reference Tables, which are provided in appendix A, list the Diagnostic Serial Numbers (DSN), diagnostic designations, and the associated part numbers for the HP 2100 Series diagnostics and the appropriate manuals used with the Configurator.

Table A-1 lists all the diagnostics available on the 6 media, table A-2 lists the selected diagnostics for the HP 1000 System.

The Configurator furnishes drivers (console, line printer, and diagnostic input) and commonly used utility routines for the diagnostic program. It also sets parameters related to the computer which can be referenced by the executing diagnostic. This allows a diagnostic, in conjunction with the Configurator, to test an HP 2100 Series Computer, an interface board, or a peripheral subsystem connected to the computer.

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*Throughout the rest of this manual, the term "2100 Series Computer" will be used as a general reference to any one of the above-mentioned computer systems. When specifically required, the term "21MX" will be used to specify a 21MX M-Series, E-Series, or 21MX F-Series Computer.

The Configurator can be executed in three basic modes: Conversational, Automatic, and Manual. Other features in the Configurator include a Pretest (for the CPU, memory, and basic I/O), Binary Loaders, Paper Tape Dump routine, and the ability to sequentially execute diagnostics (Long Diagnostic). The Pretest is used when the CPU is in question and a check is desired prior to configurations. The Binary Loaders allow the operator to load diagnostics from any standard input device. (See paragraph 1-2d.) The Paper Tape Dump routine is used to dump (to paper tape) an absolute binary copy of the object code currently in memory. Sequential diagnostic execution capabilities are included to allow the operator to execute diagnostics in the Long Diagnostic mode from any one of the specified input devices.

It should be noted that previous diagnostics were coded for a particular computer system such as the diagnostics designed exclusively for the HP 2116 Computers. The Diagnostic Configurator is not compatible with these single computer diagnostics. However, it is possible to use the Teleprinter Driver portion of the Configurator in conjunction with previous diagnostics. Since, during the loading process, such a previous diagnostic will overlay portions of the Configurator, it is necessary to reload the Configurator when it is desired to run a newer type of diagnostic listed in appendix A. Any programs loaded with the Configurator shall not overlay the linkage area except locations 100, 105, 116, and 126 (octal). (See figure 3-2.)

Also included in this manual are the descriptions and procedures for storing the Configurator, diagnostics, and control programs on disc (Disc Initialization) and interconnecting two CPU's (Cross Link). The binary object programs are separated from the Configurator and have their own DSN's. They must be loaded prior to execution. Disc initialization is covered in appendix C, paragraph C-3 and cross link in appendix C, paragraph C-10.

## 1-2. REQUIRED HARDWARE

The following hardware is required:

a. An HP 2100 Series Computer with at least 4K of memory. When a computer has more than 4K of memory, the Configurator utility routines and device drivers are relocated to the last page of memory. See paragraphs 1-5 and 2-10c for memory size restrictions. The computer must have the configured basic binary loader (BBL), for the medium on which the Configurator is stored, in the last 64 (decimal) locations in memory. (Refer to appendix E.)

b. A loading device for the medium on which the Configurator is stored. (Normally this is the same as the diagnostic input device.)

c. A console device, for operator communication, is optional. If a console is used, the interface must be an HP 12531B/C/D, HP 12880A, HP 12587B, HP 12966A or HP 12968A.

d. A diagnostic input device. (The device for loading depends upon the medium on which the Configurator/diagnostic(s) are distributed or available.)

| | |
|---|---|
| (1) Paper tape reader: | HP 2737A/B, HP 2748A/B, HP 2758A (or teleprinter with paper tape reader). |
| (2) Magnetic tape unit: | HP 7970B/E (9-track only, unit 0 only); requires DMA (DCPC). |
| (3) Cartridge disc: | HP 7900A or HP 7901A (unit 0, removable platter only); requires DMA (DCPC). |

(4) Cartridge disc: HP 7905A (unit 0, removable platter and upper surface only) or 7920A (unit 0, upper surface only); requires DMA (DCPC). The disc can only be interconnected to those computers specified in the appropriate hardware manuals.

(5) Cartridge tape: HP 2644A or 2645A Terminal; requires HP 12966A interface (strapped for external baud rate). (Operator must preselect left/right CTU. Refer to Owner's Manual, part no. 02644-90001 or 02645-90001.)

e. A line printer (optional, only if the diagnostic requires one): HP 2767A, HP 2610A, HP 2614A, HP 2613A, HP 2617, HP 2618A, HP 2607A, HP 2778A, HP 9866A.

f. A punch device (required for paper tape dump routine only): HP 2753A or HP 2895A.

Note: Throughout the rest of this manual, model numbers may be abbreviated for simplicity (e.g., HP 2737A/B will be simply 2737).

## 1-3. REQUIRED SOFTWARE

Additional software beyond the diagnostic(s) or control program(s) to be executed is not required by the Configurator. However, the operator should make sure that the diagnostic(s)/control program(s) to be run have been designed to be used with the Configurator. These programs are listed in appendix A.

## 1-4. TEXT CONVENTIONS USED

All halt codes, select codes, and addresses used in this manual are in octal unless specifically shown otherwise. Whenever the term "Press PRESET" is used in this manual it applies, in case of an HP 2100A/S, that "INTERNAL PRESET" as well as "EXTERNAL PRESET" has to be pressed. Throughout the flowcharts, notes, and text that follow, abbreviations may be used where necessary to conserve space and reduce confusion. The abbreviations used are listed below. (Such abbreviations as BBL, IBL, I/O, etc., are commonplace in HP 2100 Series Computer manuals and are not listed here.)

| ABBREVIATION | MEANING |
|---|---|
| ADDR | Address |
| A-REG | A-Register |
| BMDL | Binary Moving Head Disc Loader |
| B-REG | B-Register |
| CART. DISC | Cartridge Disc |
| CR | Carriage Return |
| CTU | Cartridge Tape Unit |
| DC | Date Code |
| DCPC | Dual Channel Port Controller |
| DIAG | Diagnostic |
| DMA | Direct Memory Access |
| DRT | Diagnostic Reference Table |
| DSN | Diagnostic Serial Number |

| | |
|---|---|
| ENBL | Enable |
| EOF | End-of-File |
| EOM | End-of-Message |
| E-REG | E-Register |
| FWA | First Word of Available Memory |
| HLT(S) | Halt or halts |
| LF | Line Feed |
| LWA | Last Word of Available Memory |
| MAG TAPE | Magnetic Tape |
| MPRT | Memory Protect |
| M-REG | M-Register |
| P-REG | P-Register |
| REV. | Revision |
| RTE | Real-Time Executive |
| SC | Select Code |
| S-REG | Switch Register (or Display Register) |
| T-REG | T-Register (or Memory Data Register) |
| WCS | Writable Control Store |

## 1-5. CONFIGURATOR LIMITATIONS

If a diagnostic, which relocates the Configurator to a different area in memory, is executed and then aborted, the restart procedures as outlined in paragraph 2-10 and figure 2-7 cannot be employed. The Configurator has to be reloaded with the binary loader and configured to continue with the execution of other diagnostics.

It is not advisable to utilize a diagnostic input device which has write capabilities (disc, magnetic tape, cartridge tape) if the functional integrity of the hardware is in question.

Due to the fact that the A-, B- and P-Register on the HP 2114A/B computer can only be accessed via the Switch Register, it is mandatory that the A-, B-, P- and S-Registers be addressed in this sequence whenever the Configurator procedure calls for updating or modifying a register. Whenever the A- and/or B-Register are modified, the P- and S-Register contents have to be restored.

On an HP 2115A/B or HP 2116A/B/C Computer, the A-, B- and P-Registers can be modified in any sequence; however, the S-Register must be the last one set.

The FPP/SIS/FFP Diagnostic (DSN 101121) cannot be executed in the automatic sequential load manner. The DSN must be specified in the A-register, and the diagnostic selection in the B-register with bit 15 of the S-register set.

The minimum memory size required is 4K. If the diagnostic to be executed or dumped on paper tape requires more than 4K, the minimum memory size is determined by the diagnostic and listed in the appropriate Diagnostic Reference Manual and in appendix A of this manual. Table A-1 lists software and manual part numbers of all diagnostics that run under control of the Configurator. If a diagnostic occupies any memory locations in the area N6300 through N6500 and the diagnostic is loaded from a disc, the available memory size is insufficient. (N= 0 for 4K, N= 1 for 8K, N= 2 for 12K, and N= 3 for 16K. If more than 16K are available, this limitation cannot be reached with any diagnostics). See also paragraph 2-10c.

If the Writable Control Store (WCS) accessory is installed, it must be disconnected to run the pretest because it issues an STF instruction to all SC's. The same applies for all I/O related diagnostics which employ a basic I/O test.

If the 12979B Dual-Port I/O Extender is installed and pretest or any I/O related diagnostic is to be run, the extender should be "locked" to the port (either A or B) that the computer running the diagnostic is connected to.

Full system dedications is required during loading and configuring the Configurator. This also applies to all associated components of the diagnostic input device.

# OPERATING PROCEDURE

SECTION II

## 2-1. OPERATIONAL OVERVIEW

This section describes the procedures for loading the Configurator, executing the Pretest, configuring the Configurator, and loading the diagnostics. The operating procedures are shown in flowcharts with notes where necessary for clarification.

There are three procedures for configuring the program: Conversational, Automatic, and Manual. The Conversational method provides a means of configuring the program from the console with one input from the S-Register and utilizing the parameters calculated by the program. This method is recommended for the user who is not familiar with the Configurator. The Automatic method provides a means of configuring the program with one input from the S-Register (A- and B-Registers) and utilizing the parameters calculated by the program. The Manual method provides a means of configuring the program using the S-Register exclusively and allows modification of the parameters calculated by the program.

The Conversational or Manual methods of configuration must be used when a line printer is required by a diagnostic.

Prior to configuration, the operator may execute the Pretest to ensure that the basic instructions of the CPU can be executed and the drivers will be configured correctly.

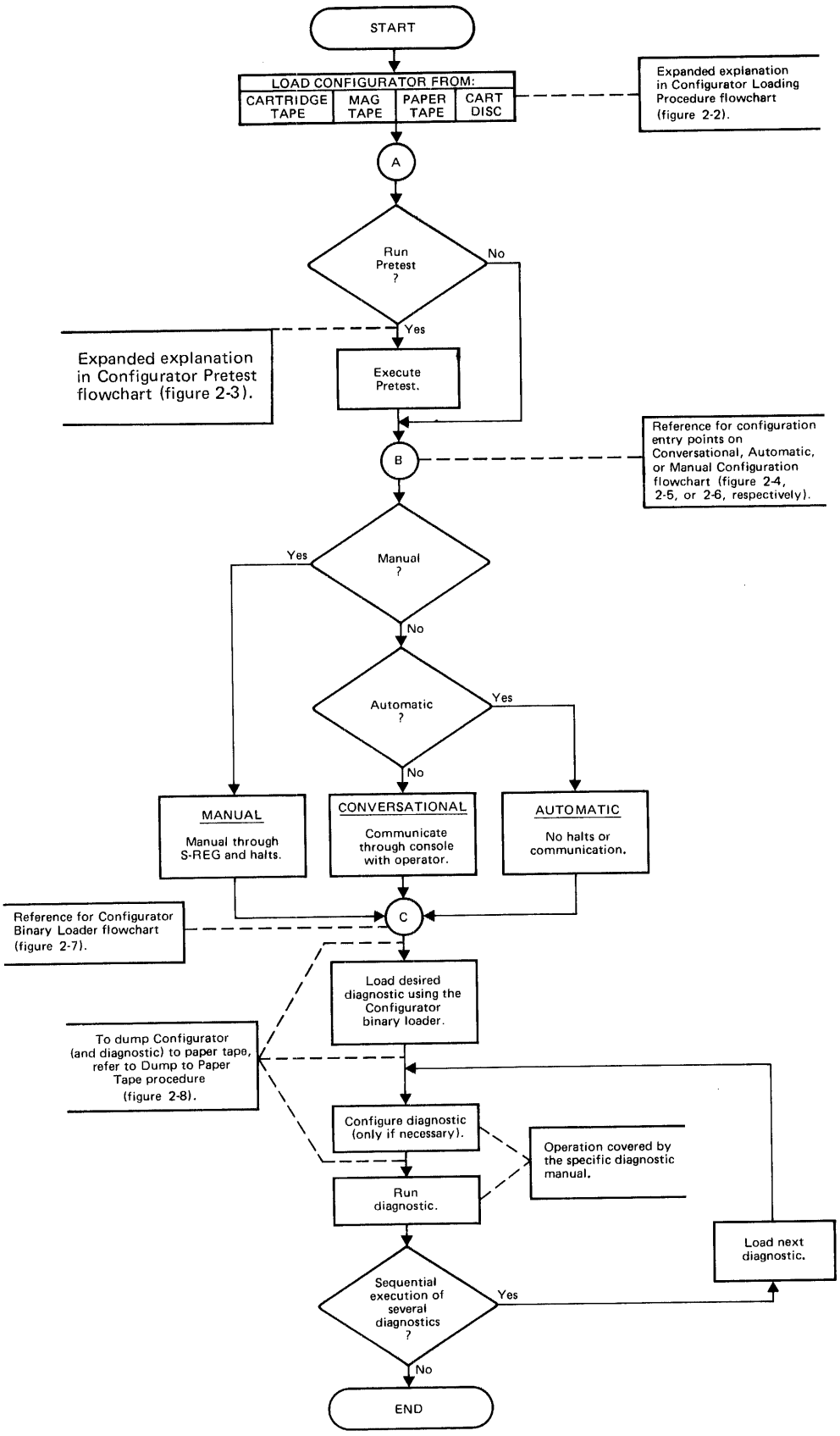
A general loading procedure flowchart for the various devices and computers is furnished as a quick reference in figure 2-1.

The basic configuration procedure is:

1. LOAD THE CONFIGURATOR PROGRAM (figure 2-2).

   Note: Immediately after loading the Configurator (a diagnostic or a control program), the Diagnostic Serial Number (DSN) which resides in memory location 126 (octal) may be checked for a match with the information shown in the left-hand column of table A-1 in appendix A of this manual.

2. SET P-REG TO:
   (a) 2 → to execute the Pretest prior to configuration (figure 2-3).
   (b) 100 → to start configuration directly.




7132-1

Figure 2-1. Operational Overview Flowchart

3. SET S-REG TO: (a) The console select code (Conversational, figure 2-4).

-or-

(b) The console select code, diagnostic input device select code, and diagnostic input device type. Set bit 15 if the A-Register specifies a DSN and the B-Register the diagnostic to be loaded and executed following the specified DSN (Automatic, figure 2-5).

-or-

(c) Clear (Manual, figure 2-6).

4. PRESS PRESET, RUN.

Note: Running time for the Configurator is entirely dependent upon the selection or deletion of the Pretest, the mode selected, and operator response time. (The Pretest requires approximately 10 seconds for a CPU with 32K of base memory.)

## 2-2. CONFIGURATOR LOADING PROCEDURE

Figure 2-2 is the flowchart for loading the Configurator. Paragraph 2-10 provides information for loading diagnostics after the Configurator is loaded and configured.

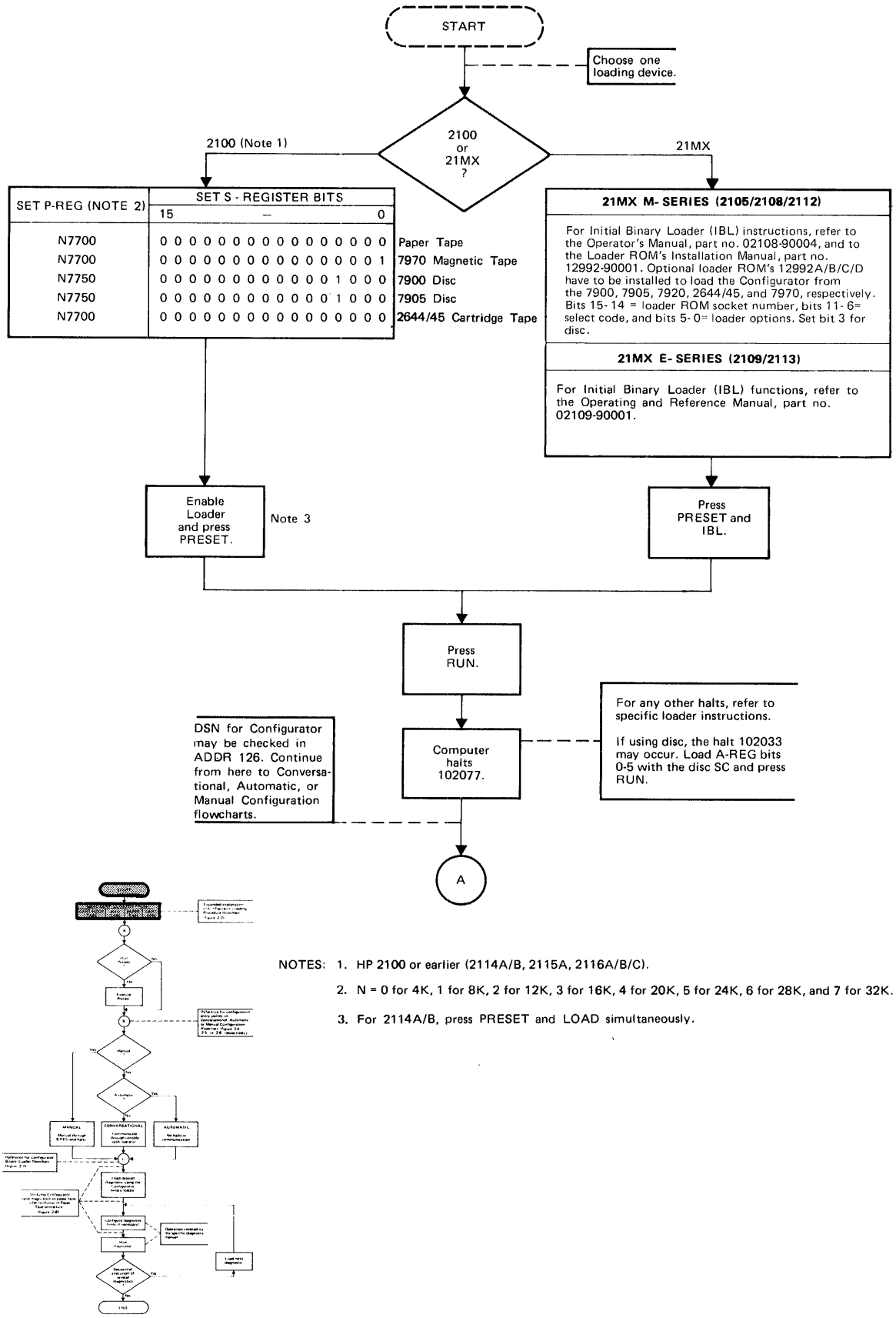
## 2-3. REGISTER USAGE

The following describes the use of the four registers (P, S, A and B) during configuration and the loading of diagnostics. The P-Register, as shown in the table below, shows the starting address of the various programs and the required registers.

| P-REGISTER | PROGRAM SELECTION | REQUIRED REGISTERS |
|---|---|---|
| 2 | Execute Pretest | S-A-B |
| 100 | Configure Diagnostic Configurator | S-A-B |
| 120 | Load Diagnostics | A-B |
| N7677 | Dump to Paper Tape | S |

## 2-4. S-REGISTER

As shown in the table below, the S-Register is used to indicate which configuration mode (Automatic, Conversational, or Manual) shall be used. If only the console is specified, then Conversational is used. If the console and the input device are specified, then Automatic is used. If the S-Register is left clear, then Manual is used. If a legal but incorrect SC is given for an I/O device, the result is unpredictable.




NOTES: 1. HP 2100 or earlier (2114A/B, 2115A, 2116A/B/C).

2. N = 0 for 4K, 1 for 8K, 2 for 12K, 3 for 16K, 4 for 20K, 5 for 24K, 6 for 28K, and 7 for 32K.

3. For 2114A/B, press PRESET and LOAD simultaneously.

7132-2

Figure 2-2. Configurator Loading Procedure Flowchart

During the Paper Tape Dump routine, the SC of the punch is specified in the S-Register. (Refer to Dump routine in paragraph 2-11.)

| S-REGISTER | INTERFACE TYPES & SELECT CODES | |
|---|---|---|
| | CONFIGURE (PRETEST) | DUMP ROUTINE |
| 5-0 | Console Select Code | Punch Select Code |
| 11-6 | Input Device Select Code | |
| 14-12 | Input Device Type | |
| 15 | Additional Parameters (in A- and B-Registers) | |

## 2-5. A- AND B-REGISTERS

The two working registers have a special meaning when employed in conjunction with the Configurator Binary Loader. (See table 2-1.)

The A-Register has to be either loaded with the DSN of the diagnostic to be read into memory (and executed) or be cleared, in which case the next sequentially stored file in the input device will be loaded (and executed).

The B-Register has to be loaded with the bit pattern representing the appropriate diagnostic files to be loaded (and executed) following the diagnostic specified by the A-Register. B-Register bit 0 set will call for the execution of the diagnostic specified by the A-Register, bit 1 set will call for the execution of the next sequential diagnostic (file), etc. If the B-Register is cleared, the diagnostic specified in the A-Register will be loaded but not automatically executed. If any bit or bits are set in the B-Register, it will load and start execution of the selected diagnostic.

If both the A- and B-Register are not clear the Configurator will, after the specified diagnostics have been executed, return (rewind) to the first diagnostic specified and repeat the execution; i.e., loop on selected diagnostics.

Table 2-1. Summary of A- and B-Register Concept

| B-REGISTER | A-REGISTER | |
|---|---|---|
| | CLEARED | SET TO DSN |
| Cleared | Load next file (diagnostic) and halt before execution. | Load specified diagnostic and halt before execution. |
| Set to bit pattern | Load next file and execute from there on each diagnostic specified in the B-Register one time. | Load specified diagnostic, execute from there on each specified diagnostic, and loop on all selected diagnostics. |

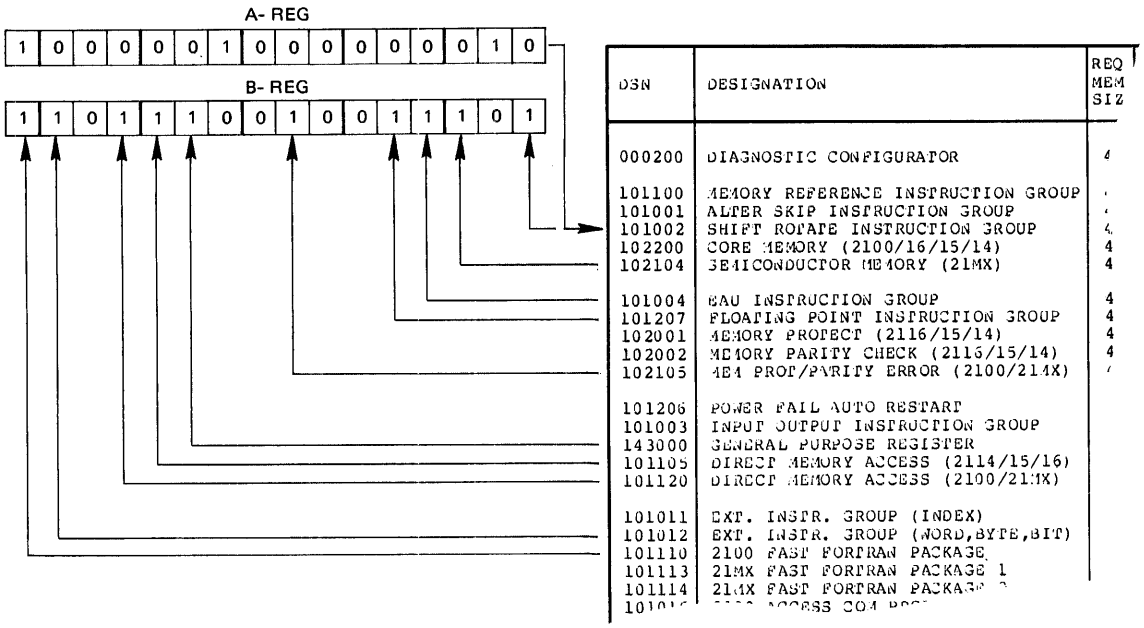
This concept enables the user to concatenate his own Long Diagnostic with the desired diagnostics. The A- and B-Registers are set prior to Automatic configuration (see paragraph

2-8) and at the end of Manual configuration (halt 102077; see paragraph 2-9). In the Conversational mode, the user inputs the information via the terminal in response to the message: DSN (,SEQ.DIAG.EXECUT.) . . .

Example: A-REG → 101002: B-REG → 156235

A-REG → 101002: Load Shift-Rotate Instruction Group Diagnostic.

B-REG → 156235: Execute Shift-Rotate Instruction Group diagnostic, then load and execute sequentially the specified diagnostics.




| DSN | DESIGNATION | REQ MEM SIZ |
|---|---|---|
| 000200 | DIAGNOSTIC CONFIGURATOR | 4 |
| 101100 | MEMORY REFERENCE INSTRUCTION GROUP | |
| 101001 | ALTER SKIP INSTRUCTION GROUP | |
| 101002 | SHIFT ROTATE INSTRUCTION GROUP | 4 |
| 102200 | CORE MEMORY (2100/16/15/14) | 4 |
| 102104 | SEMICONDUCTOR MEMORY (21MX) | 4 |
| 101004 | EAU INSTRUCTION GROUP | 4 |
| 101207 | FLOATING POINT INSTRUCTION GROUP | 4 |
| 102001 | MEMORY PROTECT (2116/15/14) | 4 |
| 102002 | MEMORY PARITY CHECK (2116/15/14) | 4 |
| 102105 | MEM PROT/PARITY ERROR (2100/21MX) | |
| 101206 | POWER FAIL AUTO RESTART | |
| 101003 | INPUT OUTPUT INSTRUCTION GROUP | |
| 143000 | GENERAL PURPOSE REGISTER | |
| 101105 | DIRECT MEMORY ACCESS (2114/15/16) | |
| 101120 | DIRECT MEMORY ACCESS (2100/21MX) | |
| 101011 | EXT. INSTR. GROUP (INDEX) | |
| 101012 | EXT. INSTR. GROUP (WORD,BYTE,BIT) | |
| 101110 | 2100 FAST FORTRAN PACKAGE | |
| 101113 | 21MX FAST FORTRAN PACKAGE 1 | |
| 101114 | 21MX FAST FORTRAN PACKAGE 2 | |
| 101015 | ACCESS COM PROG | |

If in the above example the B-Register carries the value 156234, the Shift-Rotate Instruction Group diagnostic will not be executed.

After the 2100 Fast FORTRAN Package diagnostic has been executed and the diagnostic media is disc or magnetic tape, the diagnostic execution will restart. In case of cartridge tape or paper tape, an end-of-tape halt 106070 will be reached at an earlier point. This is because the cartridge tape number 1, with 17 files stored, reaches an EOF after the DMA/DCPC (2100/21MX) diagnostic. In case of paper tape, the first EOF will be reached after the semiconductor memory diagnostic.

## 2-6. CONFIGURATOR PRETEST

This procedure provides a means to execute the Pretest (which is loaded as part of the Configurator) prior to any configuration. It should be used whenever the CPU, memory, or

basic I/O is in question. When it is executed and an error halt 102066 is encountered, the operator should refer to the listing in appendix D. An error-reporting method via a console is not employed for the Pretest because it verifies the basic integrity of the CPU, base memory, and basic I/O, which is a prerequisite for transferring data to a console. The approximate run time for the Pretest is 10 seconds for 32K of memory.

The memory section of the Pretest checks only the base memory. The basic I/O section of the Pretest requires a standard* I/O interface board with its SC specified. If installed, disconnect WCS accessory. The Configurator Pretest flowchart is shown in figure 2-3.

## 2-7. CONVERSATIONAL CONFIGURATION

This procedure, which provides a fully conversational configuration from the console, must be used when a line printer is required**. It should also be used (if possible) when the operator is not familiar with the program operation. This procedure requires a console with one of the console interfaces listed in paragraph 1-2c. The Conversational Configuration flowchart is shown in figure 2-4.

All inputs are terminated by a CR (carriage return). If an entry is found incorrect prior to entering a CR, the input can be erased by entering a RUBOUT/DELETE. In reply, the program will issue a CR/LF (line feed).

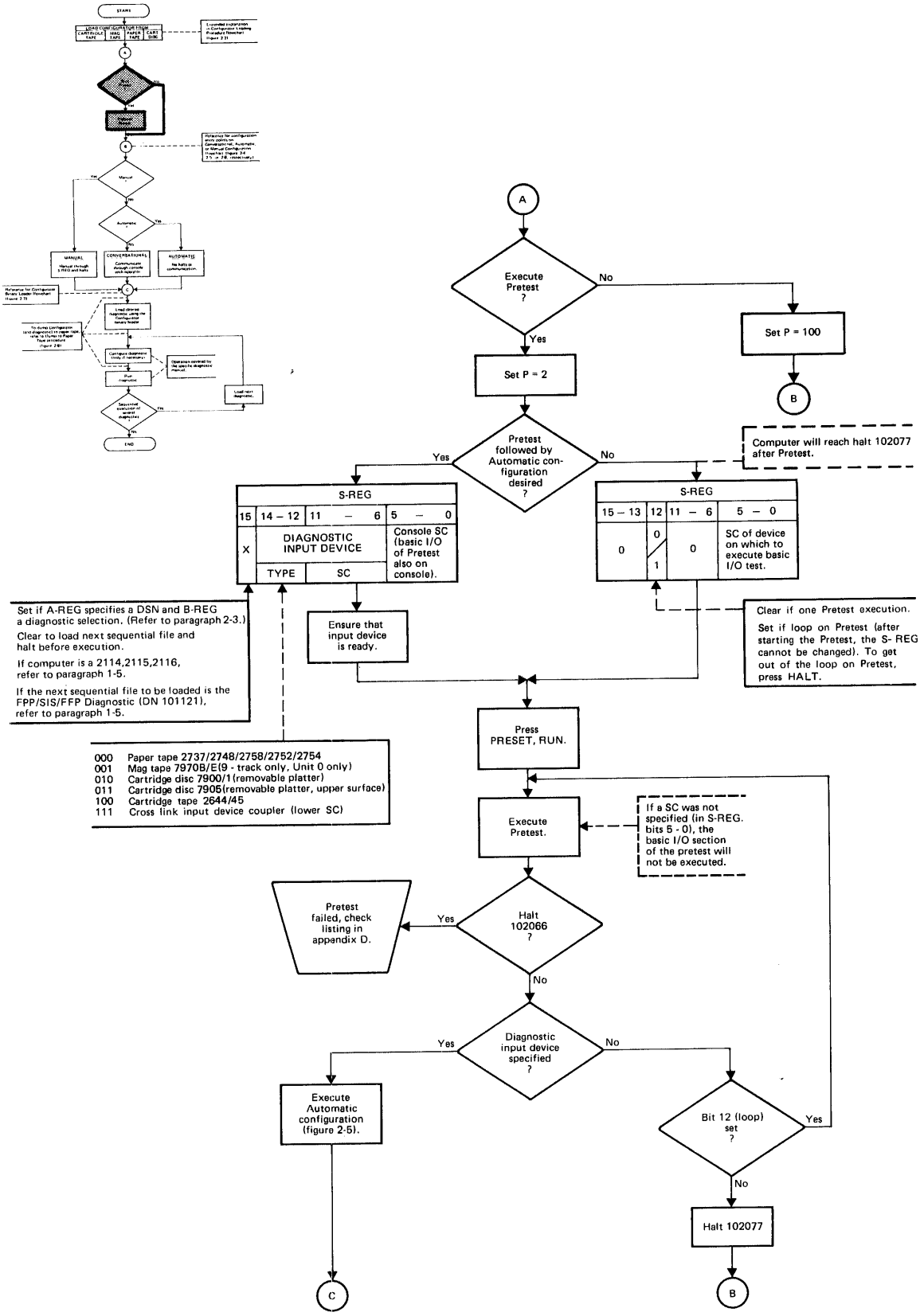
## 2-8. AUTOMATIC CONFIGURATION

This procedure provides a means to configure the program and load a diagnostic with one input from the S-Register. There are no messages on the console. The program configures the appropriate drivers and then loads a diagnostic. Because there is no report of what is calculated by the program, the operator must assume that the calculations were made correctly. For Automatic Configuration, figure 2-5 shows the expansion of point B to point C from the Operational Overview flowchart.

---

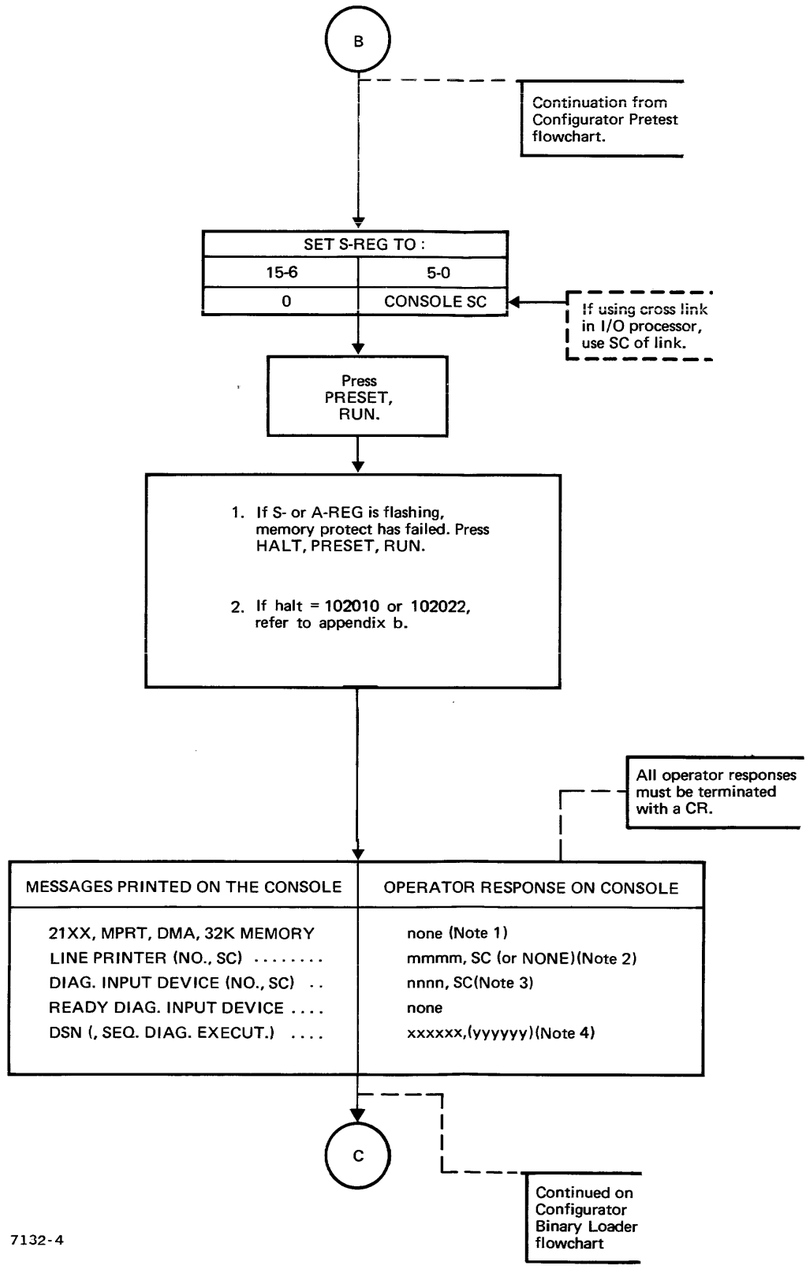
*Standard I/O implies that the interface will respond to the assigned meaning of the I/O instructions and will also interrupt when control and flag are set and the interrupt system is enabled, (e.g., the 12665-60001, 59310-60101, 13175A, and 13178B interfaces cannot be used).

**Manual method may also be used to specify (configure) a line printer driver.




7132-3

Figure 2-3. Configurator Pretest Flowchart




Console Configuration Notes:

1. No response to this message is required. The printout shows the parameters calculated by the program. They are listed for operator reference only. The actual printout will depend on the computer and its options:

| | |
|---|---|
| 21MX M, 21MX E, 2114, 2115, 2116, 2100 | Computer type (21MX E refers to the E-Series and F-Series computer) |
| NO MPRT or MPRT | Memory protect |
| NO DMA or DMA | Direct Memory Access/Dual Channel Port Controller |
| 32K MEMORY | Calculated base memory size, this does not include Memory Expansion Unit. |

2. Respond with the appropriate line printer model number and select code.

| | | |
|---|---|---|
| mmmm | = | 2767, 2610, 2614, 2613, 2617, 2618, 2778, 2607 or 9866<br>NONE (if not available)<br>LINK (if cross link is used) |
| SC | = | Line printer select code. |

3. Respond with the appropriate device number (or LINK) and select code.

| | | | |
|---|---|---|---|
| nnnn | = | 2737, 2748 or 2758 | Paper tape devices |
| | = | 7970 | Mag tape (9 - track only, Unit 0 only) |
| | = | 7900 or 7901 | Cartridge disc (removable platter only) |
| | = | 7905/20 | Cartridge disc (removable platter, upper surface) |
| | = | 2644 or 2645 | Cartridge tape (input 2645 if using 2648) |
| | = | LINK | (if cross link input device coupler is used) |
| SC | = | select code of device | (Lower SC in case of 2 SC) |

4. Respond with the desired Diagnostic Serial Number for the indicated value of xxxxxx. Refer to appendix A for a list of available diagnostics and their DSN's. If 0 is entered, the next consecutive binary file will be loaded from the input device.

   The value yyyyyy may be entered for the octal equivalent of the binary bits selecting the desired diagnostic. (The program will load the values xxxxxx into the A- REG and yyyyyy into the B- REG and interpret as explained in paragraph 2- 3.) If yyyyyy is not entered, the program sets the B- REG to 000000.

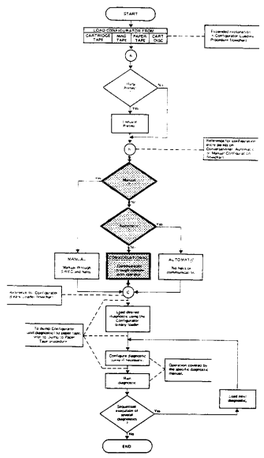
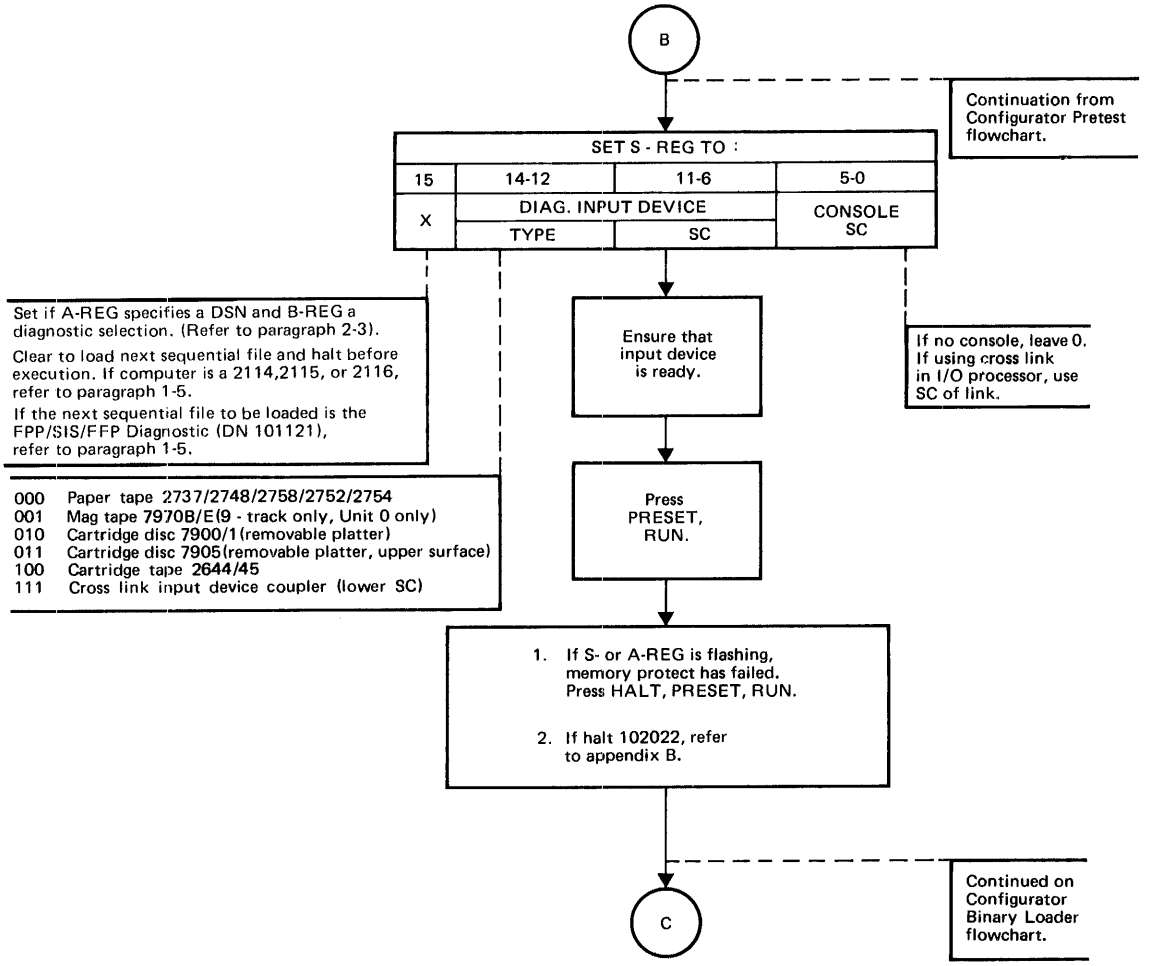
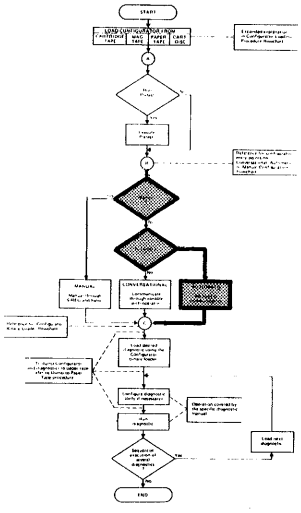


Figure 2-4. Conversational Configuration Flowchart



7132-5

Figure 2-5. Automatic Configuration Flowchart

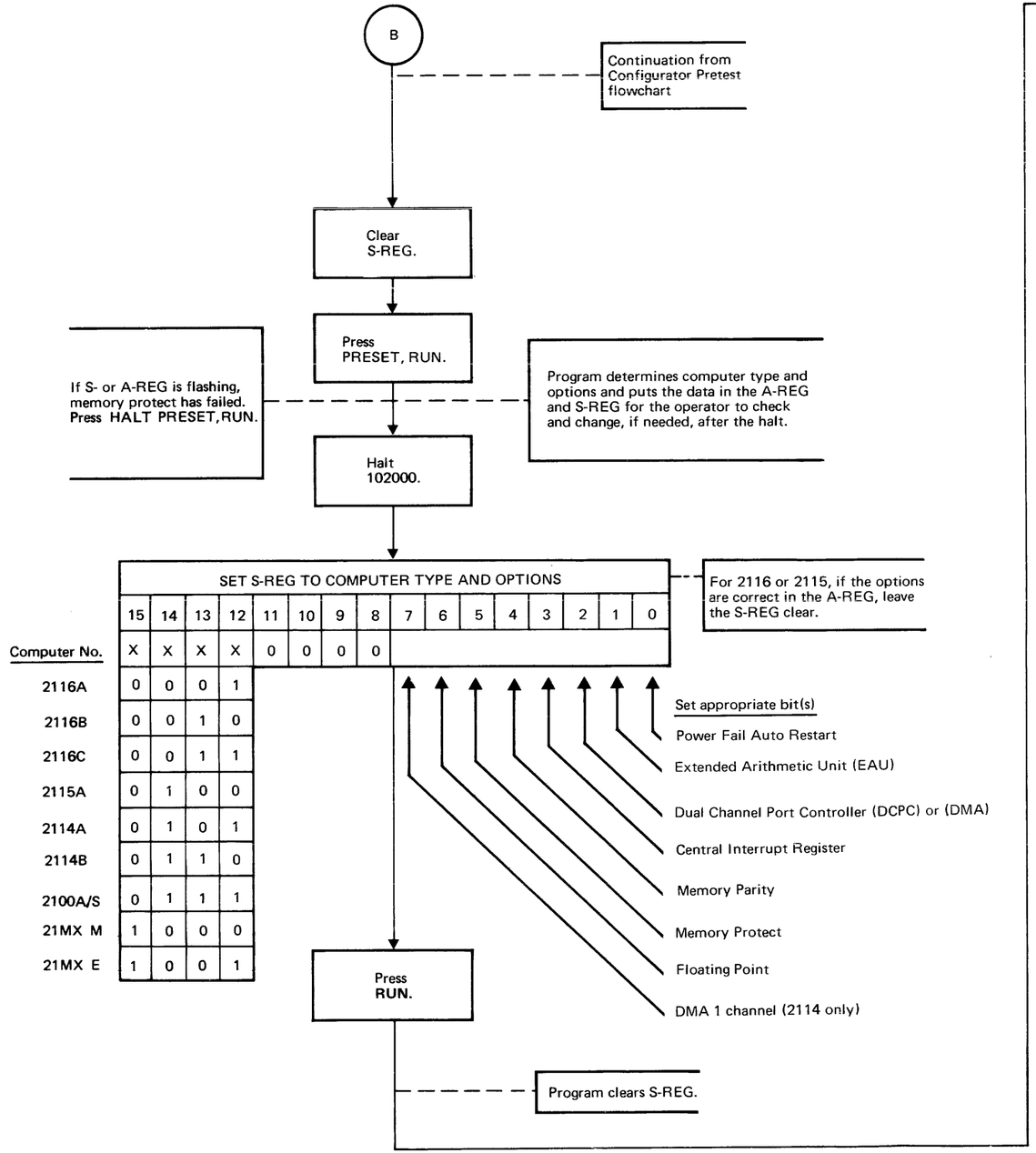
## 2-9. MANUAL CONFIGURATION

This procedure allows complete configuration through the S-Register via five halts. The program calculated parameters are displayed in the A- and S-Registers at the appropriate halts (0 and 3). When the operator presses RUN, the S-Register is read and the information supersedes the calculated value.* The basic halts and required inputs are:

| HALTS | INPUT |
|---|---|
| 102000 | Computer type and options. |
| 102001 | Console interface type and select code. |
| 102002 | Line printer type and select code. |
| 102003 | Memory size. |
| 102004 | Diagnostic input device type and select code. |
| 102077 | Configuration complete. |

After halt 102077, the program exits to the Configurator Binary Loader routine to accept a DSN in the A-Register and a sequential execution bit pattern in the B-Register. (Refer to paragraph 2-3b.) The Manual Configuration flowchart is shown in figure 2-6.

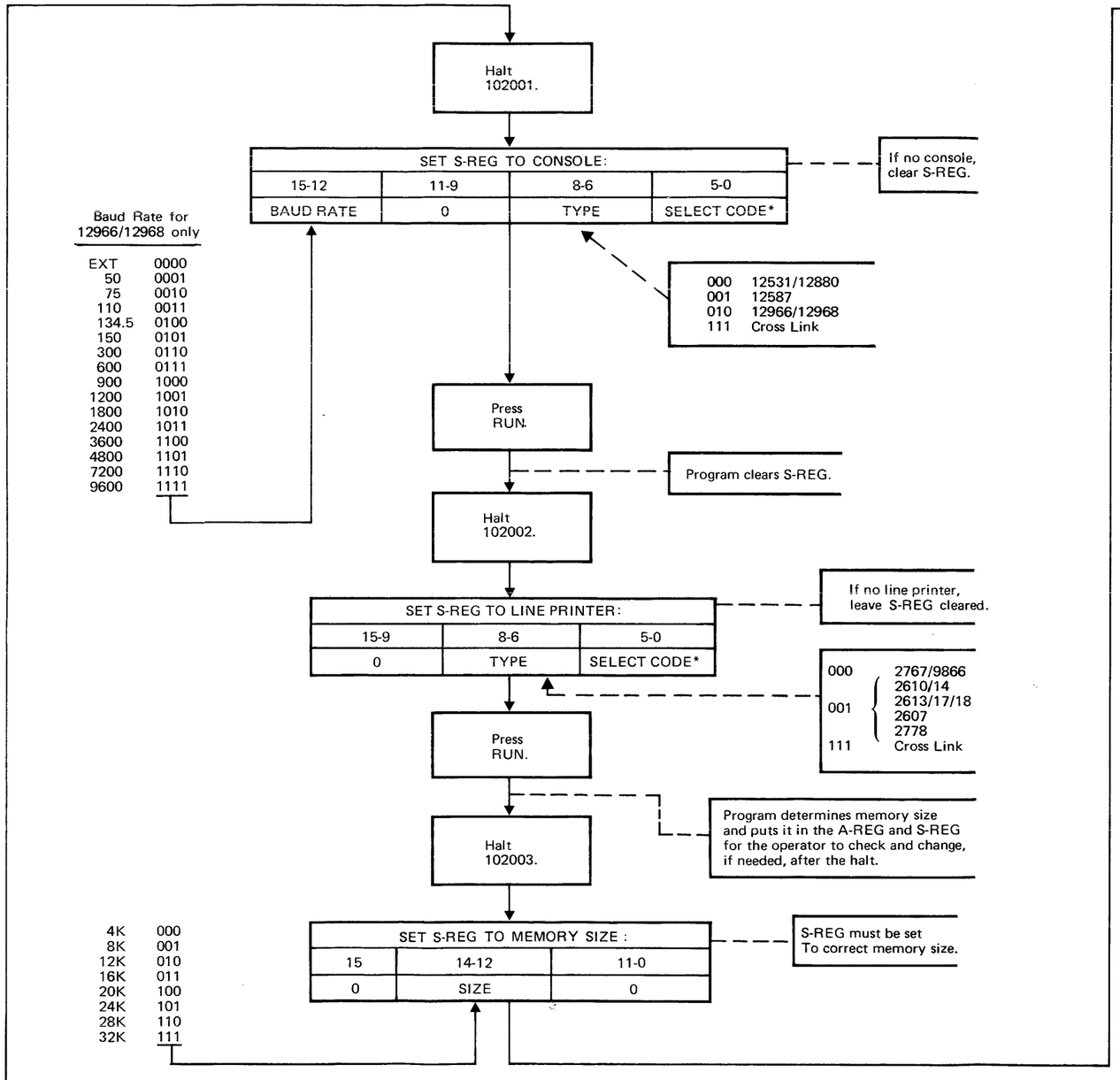
*If the S-Register is cleared at halt 102000, the program calculated parameters are used for configuration. This is ordinarily useful on the 2116 and 2115 where the S-Register is already cleared and the A-Register contains the correct parameters.

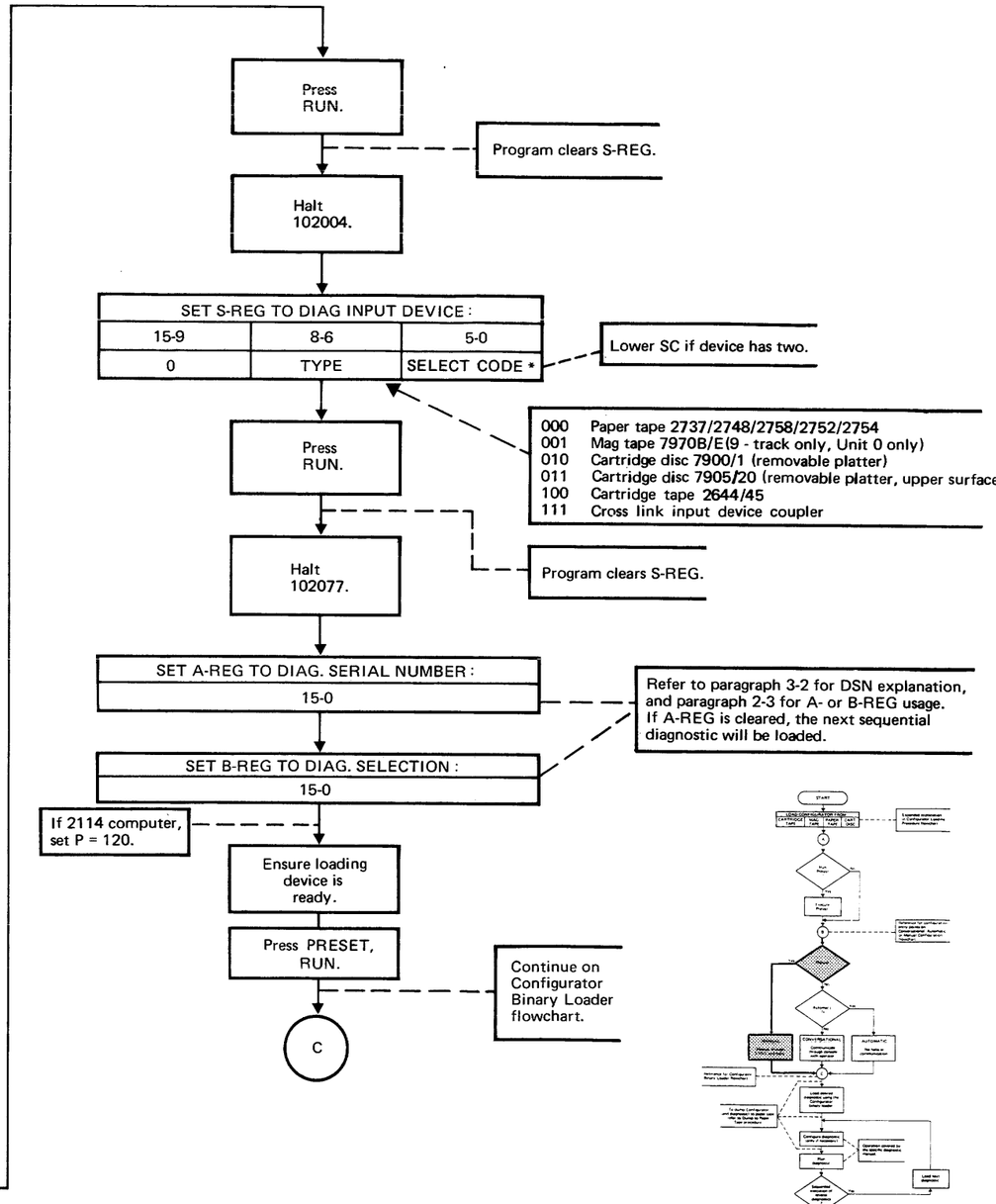

B
Continuation from Configurator Pretest flowchart
Clear S-REG.
Press PRESET, RUN.
If S- or A-REG is flashing, memory protect has failed. Press HALT PRESET,RUN.
Program determines computer type and options and puts the data in the A-REG and S-REG for the operator to check and change, if needed, after the halt.
Halt 102000.
SET S-REG TO COMPUTER TYPE AND OPTIONS
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Computer No.
X X X X 0 0 0 0
2116A 0 0 0 1
2116B 0 0 1 0
2116C 0 0 1 1
2115A 0 1 0 0
2114A 0 1 0 1
2114B 0 1 1 0
2100A/S 0 1 1 1
21MX M 1 0 0 0
21MX E 1 0 0 1
For 2116 or 2115, if the options are correct in the A-REG, leave the S-REG clear.
Set appropriate bit(s)
Power Fail Auto Restart
Extended Arithmetic Unit (EAU)
Dual Channel Port Controller (DCPC) or (DMA)
Central Interrupt Register
Memory Parity
Memory Protect
Floating Point
DMA 1 channel (2114 only)
Press RUN.
Program clears S-REG.
S
15-12
BAUD RATE
Baud Rate for 12966/12968 only
EXT 0000
50 0001
75 0010
110 0011
134.5 0100
150 0101
300 0110
600 0111
900 1000
1200 1001
1800 1010
2400 1011
3600 1100
4800 1101
7200 1110
9600 1111
SE
15-9
0
4K 000
8K 001
12K 010
16K 011
20K 100
24K 101
28K 110
32K 111
SET
15
0

ptions
leave

J)

)CPC) or (DMA)




* If using cross link in I/O processor, use SC of link.



Figure 2-6. Manual Configuration Flowchart.

## 2-10. CONFIGURATOR BINARY LOADER

The Configurator Binary Loader is used to load diagnostic programs from the following devices:

a. Paper Tape Readers; (Type 0)*: HP 2737, 2748, 2758, or teleprinter with paper tape reader.

b. Magnetic Tape; (Type 1)* (requires DMA/DCPC), (Unit 0 only): HP 7970B/E 9-track only, interfaces = 13181, 13183, 18184.

c. Cartridge Disc; (Types 2 and 3)* (requires DMA/DCPC), (Unit 0 only): HP 7900/1 Removable platter or HP 7905 Removable platter, upper surface.

   The loader utilizes memory addresses N6300 through N6500 as a sector buffer for the disc loader. Diagnostics are loaded starting at address 130 and they may extend into the sector buffer area. Therefore, prior to loading the diagnostic, the upper memory boundry required to load the diagnostic is tested. If it reaches beyond N6300, the loader program will halt with 106073 displayed. Three possible routes can then be chosen by the operator as follows:

   (1) Load the desired diagnostic from a different device.

   (2) Restart the loader and specify another DSN.

   (3) Continue loading the diagnostic from disc but be aware that the overlayed buffer may cause unpredictable results.

d. Cartridge Tape; (Type 4)*: HP 2644 or 2645 Terminal with 12966 interface.

e. Cross Loader Coupler; (Type 7)*: This is not a true loader but it allows the program to cross link to a loader driver in the central processor. The data checking (checksum and address violation) is done in the I/O processor (or slave) and only the device driver is used in the central processor. (See paragraphs C-10 through C-14.)

When using the loader, the files are searched until the specified Diagnostic Serial Number is found. If the specified DSN is not found, the program will halt 106070. When the Configurator Binary Loader has loaded the desired diagnostic and the B-Register was cleared, the program halts 102077 with the A-Register carrying the DSN contained in address 126.

To load the next consecutive binary file, clear the A- and B-Registers, set P=120, press PRESET and RUN.

All files are assumed to be absolute and the record length is not longer than 60 words including the count, address, and checksum. The flowchart for the Configurator Binary Loader is in figure 2-7.

---

*Type numbers refer to S-Register bits 14 through 12 in Automatic Configuration and S-Register bits 8 through 6 after halt 102004 is reached in Manual Configuration. They are also placed in memory location 111 with the select code.

## 2-11. DUMP TO PAPER TAPE

The Paper Tape Dump Routine can be employed to dump (a) the configured Configurator, (b) the configured Configurator and an unconfigured diagnostic, or (c) the configured Configurator and a configured diagnostic. The requirements are as follows:

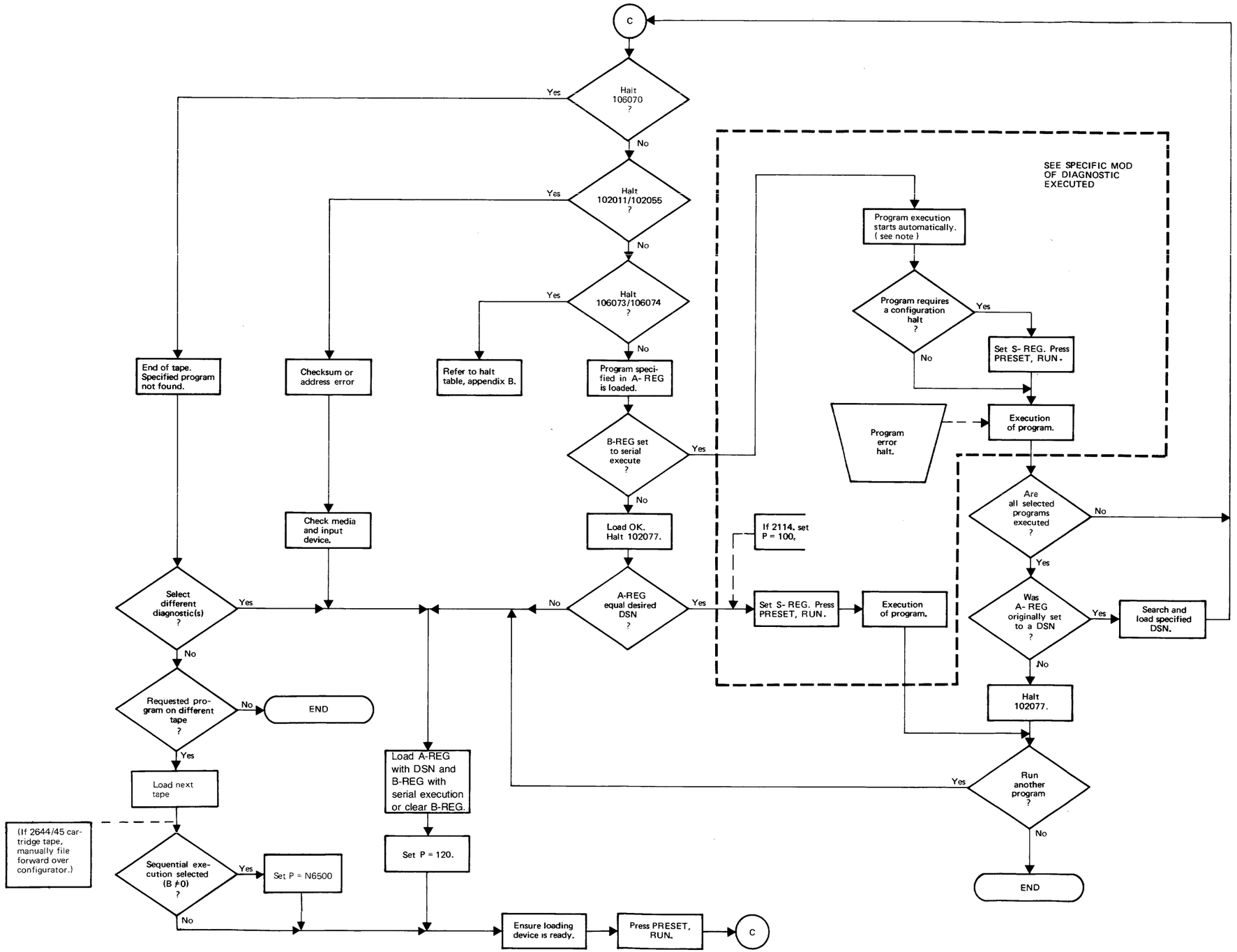
a. The paper tape loader must be specified during configuration as the diagnostic input device. The Configurator can therefore be loaded from any one of the specified input devices; the diagnostic, however, must be loaded from the paper tape reader. The Configurator must be configured manually.

b. The dump device must be one of the following:

   HP 2895, 2753 (punches)
   HP 2752, 2754 (teleprinter tape punch device)

c. The desired diagnostic should be loaded. It can also be configured. If a diagnostic is not loaded, only a copy of the Configurator Linkage Area, Utility Routines, and Drivers will be dumped to tape.

The Paper Tape Dump Routine flowchart is shown in figure 2-8.




NOTE:
If sequential execution of diagnostics has been selected and the diagnostic just loaded requires a configuration input an error halt (normally 102073) will be reached. Refer to the appropriate manual of diagnostics.

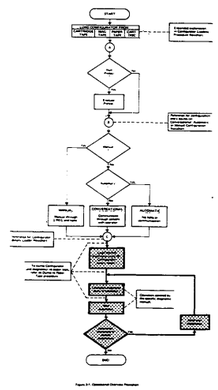
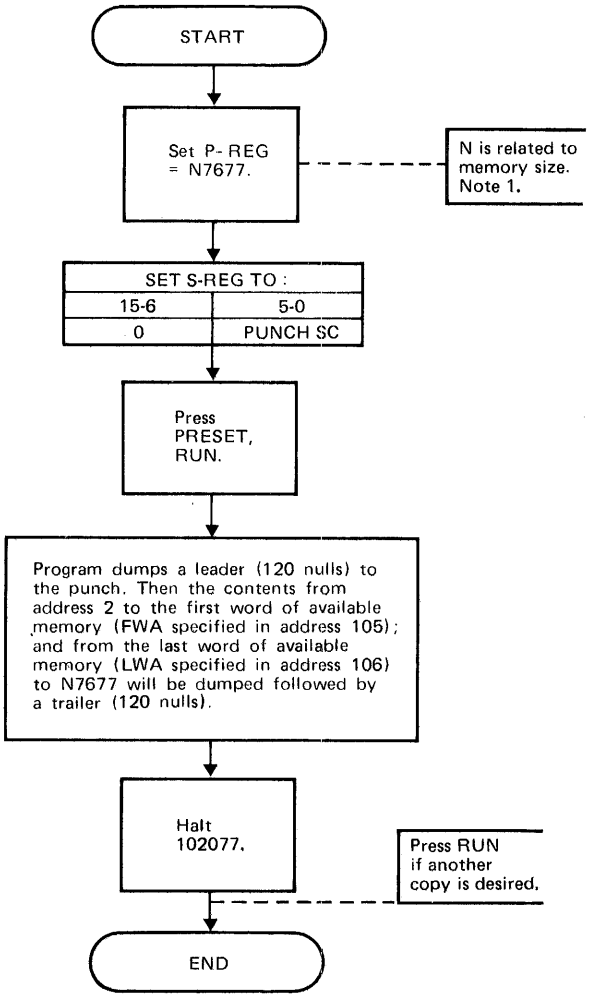


Figure 2-7. Configurator Binary Loader Flowchart




1. N=0 for 4K, 1 for 8K, 2 for 12K, 3 for 16K, 4 for 20K, 5 for 24K, 6 for 28K, and 7 for 32K.

7132-8

Figure 2-8. Paper Tape Dump Routine Flowchart

# PROGRAM DESCRIPTION

SECTION III

## 3-1. GENERAL ORGANIZATION

The program is organized according to the memory map shown in figure 3-1. The map also includes the paragraph number that describes that area or function. The addresses shown in figure 3-1 are effective prior to configuration. Utility Routines and Configured Drivers are moved during configuration to the corresponding addresses in the last page of memory.

The area from 130 to N6477* may be overlayed when a diagnostic is loaded.

## 3-2. CONFIGURATOR LINKAGE AREA

This area, starting at address 100, is reserved by the Configurator for address links to utility routines and drivers. It also has data referenced by the diagnostic for computer parameters such as DMA/DCPC available, Memory Protect, memory size, etc. Refer to figure 3-2 for details of the linkage area.

When a diagnostic is loaded, it will overlay the JMP START (address 100), FWA (address 105), and DSN (address 126). The configurator loader does not protect the linkage area when a binary file is loaded.

The JMP START from address 100 establishes a common starting point for all diagnostics.

The FWA is the first unused memory location after the area occupied by the diagnostic. The area between the FWA and LWA is essentially unused memory. The LWA is established by the Configurator utility routines and is set to N6477 which is the last unused memory location before the routines. Some diagnostics use the area (FWA to LWA) as a buffer area. When dumping to paper tape, this area is not dumped; only locations 2 to FWA− 1 and LWA+ 1 to N7677.

The DSN (Diagnostic Serial Number) is used to identify any diagnostic in memory. (See figure 3-3.) Each diagnostic is assigned a DSN when it is originally written and the revision number in the DSN is incremented each time the diagnostic is updated. The DSN allows the operator to check exactly what diagnostic and which revision of the diagnostic is loaded.

Any prereleased diagnostics or control programs will carry a pseudo-DSN of 177777. Figure 3-3 describes the DSN in detail. A diagnostic control program loads individual diagnostics, supplies parameters necessary for diagnostic execution, and/or monitors the sequential execution of discrete diagnostics.

---

*N is related to memory size. Also see figure 2-2, note 2.

## 3-3. PRETEST

The Pretest consists of a check to ensure that all major base set instructions work correctly. This is a cursory check and is not meant to replace any CPU Diagnostics. Each instruction is checked in a general manner and the entire base memory is checked with several patterns. When the Pretest passes, configuration can be performed with relative assurance that the basic computer is functional.

Four possible halts that can be encountered during the Pretest are as follows:

a. When an error occurs (halt 102066) the operator must refer to the Pretest listing in appendix D. Any malfunctions must be corrected before continuing.

| DESCRIPTION PARAGRAPH | STARTING MEMORY ADDRESS | FUNCTION |
|---|---|---|
| — | 10 | Trap cells for I/O select codes. |
| 3-2 | 100 | Configurator linkage area (figure 3-2). |
| 3-3 | 130 | Pretest part A. |
| | 1400 | Storage. |
| 3-3 | 2000 | Pretest part B. |
| 3-4 | 3000 | Establish computer parameters (memory size, DMA, MPRT, and computer type). |
| 3-5 | | Configuration of drivers<br>a. Console<br>b. Line printer<br>c. Diagnostic input device. |
| 2-9 | | Manual configuration. |
| 3-6 | 4000 | Table of drivers<br>a. Consoles<br>b. Line printers<br>c. Diagnostic input devices. |
| 3-7 | N6500 | Utility routines |
| 3-14 | N7000 | Configured drivers<br>a. Console driver<br>b. Line printer driver<br>c. Diagnostic input device driver. |
| | N7700 | Basic Binary Loader (protected area or IBL). |

Note: The shaded area represents an area protected by the Configurator or an area within the BBL. An attempt to write into location N6500-N7777, when using the Configurator Binary Loader, will result in a halt 102055. Any programs loaded shall not overwrite the configurator linkage area (location 100-127), except locations, 100, 105, 116 and 126.

Figure 3-1. Memory Map

| OCTAL ADDRESS | | CONTENTS | MEANING |
|---|---|---|---|
| 100 | | JMP START | GO TO START OF USER PROGRAM |
| 101 | | NOP | RESERVED |
| 102 | | DEF CNSLO | CONSOLE OUTPUT DRIVER |
| 103 | | DEF LNPTR | LINE PRINTER DRIVER |
| 104 | | DEF CNSLI | CONSOLE INPUT DRIVER |
| 105 | FWA | OCT 130 | FIRST WORD OF AVAILABLE MEMORY |
| 106 | LWA | OCT 6477 | LAST WORD OF AVAILABLE MEMORY |
| 107 | | DEF LOADR | LOADER PROGRAM |
| 110 | TMC | DEC −200 | 1 MILLISEC. TIME COUNT |
| 111 | | OCT 0 | LOADER SELECT CODE |
| 112 | | OCT 0 | CONSOLE SELECT CODE (0=NOT AVAILABLE) |
| 113 | | OCT 0 | LINE PRINTER SELECT CODE (0=NOT AVAILABLE) |
| 114 | | OCT 0 | CONSOLE SELECT CODE (0=NOT AVAILABLE) |
| 115 | | OCT 0 | COMPUTER TYPE/OPTIONS |
| 116 | | OCT 0 | USER CARD TYPE AND SC |
| 117 | | OCT 0 | MEMORY SIZE |
| 120 | | JSB 107B,1 | GO TO LOADER PROGRAM |
| 121 | | DEF TMR | 1 MILLISEC. TIMER ROUTINE |
| 122 | | DEF SWR | CHECK S-REG |
| 123 | | DEF D2ASC | DECIMAL TO ASCII CONVERSION |
| 124 | | DEF O2ASC | OCTAL TO ASCII CONVERSION |
| 125 | | DEF ASC2N | ASCII TO NUMBER CONVERSION |
| 126 | DSN | OCT 000200 | DIAGNOSTIC SERIAL NUMBER (CONF./REV. 1) |
| 127 | | DEF FMTR | FORMATTER ROUTINE |

REV B

Figure 3-2. Linkage Area

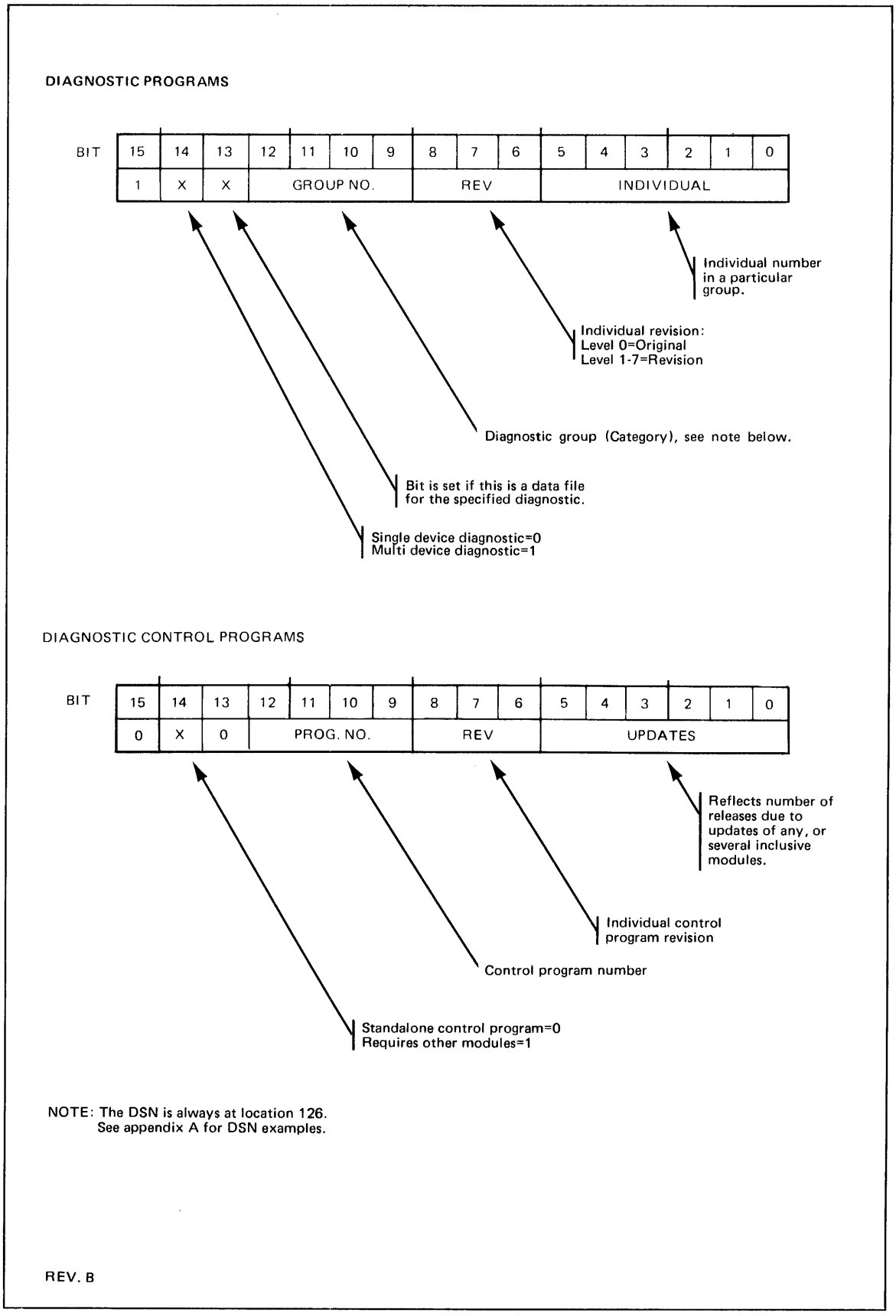



Figure 3-3. Diagnostic Serial Number (DSN)

b. Halts 102020 and 102021 can occur only when testing a 2115 or 2116 computer where the S-Register cannot be modified under program control.

c. Halt 102077 indicates successful Pretest execution.

## 3-4. COMPUTER PARAMETERS

The parameters calculated by the program are: computer type, DMA/DCPC, Memory Protect, and memory size. After being calculated, the computer type is used to look up the standard features, and the 1-millisecond timing constant. See figure 3-4 for computer type and options parameter details and figure 3-5 for memory size parameter details.

The calculated parameters are printed on the console device when Conversational Configuration is used. They are displayed in the A- and S-Registers when Manual Configuration is used. The display of parameters is for operator reference. If the parameters are wrong, it is a direct indication that the appropriate hardware has failed. The operator can correct the parameters by using Manual Configuration.

| BIT | SET IF AVAILABLE | 21MX E | 21MX M | 2100 A/S | 2116 A/B/C | 2115 A | 2114 A/B |
|---|---|---|---|---|---|---|---|
| 0 | POWER FAIL AUTO RESTART | 1 | 1 | 1 1 | X X X | X | X X |
| 1 | EXTENDED ARITHMETIC UNIT | 1 | 1 | 1 1 | X X X | X | 0 0 |
| 2 | DMA/DCPC | X | X | X 1 | X X X | X | 0 X |
| 3 | CENTRAL INTERRUPT REG. | 1 | 1 | 1 1 | X* 1 1 | X* | 0 1 |
| 4 | MEMORY PARITY CHECK | 1 | 1 | 1 1 | X X X | X | X X |
| 5 | MEMORY PROTECT | X | X | 1 1 | X X X | 0 | 0 0 |
| 6 | FLOATING POINT | 1 | 1 | X 1 | 0 0 0 | 0 | 0 0 |
| 7 | DMA (1 CHANNEL ONLY) | 0 | 0 | 0 0 | 0 0 0 | 0 | 0 1 |
| 8 | RESERVED | 0 | 0 | 0 0 | 0 0 0 | 0 | 0 0 |
| 9 | RESERVED | 0 | 0 | 0 0 | 0 0 0 | 0 | 0 0 |
| 10 | RESERVED | 0 | 0 | 0 0 | 0 0 0 | 0 | 0 0 |
| 11 | RESERVED | 0 | 0 | 0 0 | 0 0 0 | 0 | 0 0 |
| 12 | COMPUTER TYPE CODE | 1 | 0 | 1 1 | 1 0 1 | 0 | 1 0 |
| 13 | COMPUTER TYPE CODE | 0 | 0 | 1 1 | 0 1 1 | 0 | 0 1 |
| 14 | COMPUTER TYPE CODE | 0 | 0 | 1 1 | 0 0 0 | 1 | 1 1 |
| 15 | COMPUTER TYPE CODE | 1 | 1 | 0 0 | 0 0 0 | 0 | 0 0 |

NOTES: * = ON EARLIER MODELS THIS WAS AN OPTION
X = OPTIONAL FEATURE AVAILABLE ON INDICATED COMPUTER.
0 = FEATURE NOT AVAILABLE ON INDICATED COMPUTER.
1 = STANDARD FEATURE ON INDICATED COMPUTER.

LINKAGE AREA , ADDRESS 115.

Figure 3-4. Computer Type and Options

In determining the computer type, it should be noted that the Configurator cannot distinguish between a 2115 and 2116 computer. The program will default to a 2115 calculation if the calculated memory size is 8K or less.

The S-Register will flash to indicate a hardware problem if one exists when checking for MPRT. The operator must press HALT, PRESET, RUN.

## 3-5. CONFIGURATION OF DRIVERS

The device drivers are written in such a way that only the basic hardware differences (in programming for each device and interface) are kept in a table. One table is used for each driver (console line printer and diagnostic input device). When a device is specified, the appropriate driver is moved from the table to the driver area of the Configurator. During the move the select code is set to the one specified by the operator. If a cross link is specified, the program will only configure the driver that has been loaded into the driver area. Refer to paragraph C-10. If no device is specified, a pseudo-driver is used so that if the diagnostic calls that driver no action is taken. The select code in the base page is also cleared to indicate that there is no device for that driver. When using Conversational or Automatic Configuration, the Configurator program determines the console interface type installed in the select code specified by the operator. If the Configurator is unsuccessful in determining the interface type, the program will halt 102022. The operator must enter a new select code or use Manual Configuration.

If a line printer was not specified during configuration, a pseudo-driver is used to call the console output driver, Therefore, in the event the diagnostic calls the line printer driver, the message will appear on the console.

The Configurator program asks for the device model number of the diagnostic input device and the select code during configuration. This data is used to look up the Binary Loader driver.

| MEMORY SIZE | 15 | 14 13 12 | 11-0 |
|---|---|---|---|
| 4K | 0 | 0 0 0 | 0 |
| 8K | 0 | 0 0 1 | 0 |
| 12K | 0 | 0 1 0 | 0 |
| 16K | 0 | 0 1 1 | 0 |
| 20K | 0 | 1 0 0 | 0 |
| 24K | 0 | 1 0 1 | 0 |
| 28K | 0 | 1 1 0 | 0 |
| 32K | 0 | 1 1 1 | 0 |
| LINKAGE AREA, ADDRESS 117 | | | |

Figure 3-5. Memory Size

If the diagnostic input device model number cannot be found during input, the request line will be output repeatedly until a valid device number is entered. The same situation applies to the select code if the entry is greater than 77 or less than 10.

## 3-6. TABLE OF DRIVERS

The tables consist of console, line printer, and diagnostic input device drivers. The drivers in each table are written in a format that can be relocated to the driver routine area of memory during configuration. Primarily, the tables represent hardware differences (in programming) that must be known in order to interface with the driver routines.

The tables contain the following device drivers:

a. Console:
   12531/12880
   12587
   12966

b. Line printer:
   2767/9866
   2607/2610/2613/2614/2617/2618/2778

c. Diagnostic Input Device:
   Paper tape: 2737, 2748, 2758 (or teleprinter)
   Magnetic tape: 7970B/E (9-track unit 0)
   Cartridge disc: 7900/1 (unit 0, removable platter only)
   Cartridge disc: 7905/20 (unit 0, removable platter, upper surface only)
   Cartridge tape: 2644/2645 terminal

## 3-7. UTILITY ROUTINES

The following six paragraphs, listed below, describe the calling sequence for each of the Utility routines. The routines are generally required by diagnostics and are therefore incorporated in the configurator and are not overlayed by the diagnostic. These routines do not change the interrupt system and are interruptable at any point if the interrupt system is enabled.

a. Timer or Wait Loop.
b. S-REG Check.
c. Decimal (Integer) to ASCII Conversion.
d. Octal to ASCII Conversion.
e. ASCII to Number (Binary) Conversion.
f. Formatted Output.

The routines will not be directly used by the operator and are described here only to provide a broader scope of understanding the Configurator. The information can be used as a basis for creating individual diagnostics to run under the Configurator.

## 3-8. TIMER OR WAIT LOOP (ONE MILLISECOND)

CALLING SEQUENCE:

```
        LDA   TIME     NUMBER OF MILLISEC.
P       JSB   121B,I   GO TO TIMER
P+1     . . .          NORMAL RETURN

TIME    DEC   100      100 MILLISEC.
```

From P to P+1 = Time × 1 millisecond.

## 3-9. S-REGISTER CHECK

CALLING SEQUENCE:

```
        LDB   SW10     SWITCH NUMBER
P       JSB   122B,I   CHECK IT
P+1     . . .          RETURN IF SWITCH(ES) IS ON
P+2     . . .          RETURN IF SWITCH IS OFF

SW10    OCT   002000   S-REG BIT 10
```

Upon entry the B-register contains the mask for the switch(es) of interest. The return is P+2 if the switch is off (or all off) or P+1 if any switches in question are on.

## 3-10. DECIMAL TO ASCII CONVERSION

CALLING SEQUENCE:

```
        CLE            START WITH UPPER HALF (CCE=LOWER*)
        LDA   DECNO    GET NUMBER FOR CONVERSION
        LDB   BFPTR    GET LOCATION IN BUFFER TO STORE THE
                         CONVERTED NUMBER
        JSB   123B,I   MAKE CONVERSION
        . . .          NORMAL RETURN
DECNO   DEC   -32000   DECIMAL VALUE
BFPTR   DEF   ***      POINTER TO BUFFER
```

The above call will result in the following:

```
BFPTR   —     3
        2     0        ASCII characters in memory.
        0     0
```

Note: The routine does a right justify. The contents of the A- and B-Registers are lost.

## 3-11. OCTAL TO ASCII CONVERSION

CALLING SEQUENCE:

```
        CLE             START WITH UPPER HALF (CCE=LOWER*)
        LDA   OCTN      GET OCTAL NUMBER TO BE CONVERTED TO ASCII
        LDB   BFPTR     GET LOCATION IN BUFFER TO STORE THE
                          CONVERTED NUMBER
        JSB   124B,I    MAKE CONVERSION
        ...             NORMAL RETURN

OCTN    OCT   034567
```

The above call will result in the following:

```
BFPTR   0     3
        4     5     ASCII characters in memory.
        6     7
```

Note: The routine does a right justify. The contents of the A- and B-Registers are lost.

## 3-12. ASCII TO BINARY CONVERSION

Converts a decimal or octal ASCII coded number in memory to a binary number and puts it in the A-Register. This routine will accept ASCII numbers only, 60 to 70 (octal). Any other characters will terminate the conversion or the routine will terminate after converting the sixth character.

CALLING SEQUENCE:

```
        CLA             DECIMAL CONVERSION (CCA=OCTAL)
        LDB   BFPTR     GET LOCATION IN BUFFER TO STORE THE
                          CONVERTED NUMBER
        CLE             START WITH UPPER HALF (CCE=LOWER*)
        JSB   125B,I    MAKE CONVERSION
        ...             NORMAL RETURN
                        A-REG = CONVERTED NUMBER
                        B-REG = BUFFER ADDRESS OF NEXT CHARACTER
                        E-REG = UPPER/LOWER CHARACTER*
```

## 3-13. FORMATTED OUTPUT

To make it easier for programming, a simple format output call is available. This allows more room for the diagnostic.

---

*A four word buffer is required in this mode.

CALLING SEQUENCE:

```
CLA,   CLE (see note 1)  FORMAT STARTING
LDB    FMTA              POINTER TO FORMAT STRING
JSB    127B,I            CALL FOR OUTPUT
. . .                    NORMAL RETURN
                         A = 0 (OUTPUT COMPLETE)
                         B = 0
                         or
                         A = 43 (# WAS REQUESTED)
                         B = N.A.
```

```
FMTA   DEF   *+1
       ASC   7,FORMAT OUTPUT/
```

FORMAT CONTROL CHARACTERS

\# = NUMBER OUTPUT (See explanation — next page.)

/ = OUTPUT BUFFER WITH A CR-LF (OR PRINT IF OUTPUTTING TO LINE PRINTER)

← = OUTPUT BUFFER WITHOUT A CR-LF (OR SUPPRESS PRINT OF PENDING BUFFER, IF OUTPUTTING TO LINE PRINTER, UNTIL A /CONTROL CHARACTER IS ENCOUNTERED)

/ = or ← will cause a return with the original A- and B-REGS.

Note 1: CLA, CLE = OUTPUT TO CONSOLE
CLA, CCE = OUTPUT TO LINE PRINTER

CALLING SEQUENCE: (number output)

This call can be used *only* in conjunction with the calling sequence above.

```
CCA    (see note 2)   OUTPUT NUMBER (OCTAL)
LDB    NMBR           GET NUMBER FOR OUTPUT
JSB    127B,I         CONTINUE FORMAT OUTPUT WITH NUMBER
. . .                 RETURN
```

Note 2: CCA = OUTPUT NUMBER IN OCTAL
CLA, INA = OUTPUT NUMER IN DECIMAL

If a call is made for a number output but a format has not been established, no action is taken and control is returned to P+1.

When the Format routine is started (A=0), the formatter moves each character in the string to a buffer. Each character is examined for the three control characters. If the character is #, a jump back to the caller is made. The program then indicates the type of conversion and passes the number back. The number is then converted and added to the buffer. The formatter will then continue to move each character until another control character is found. If the output string is larger than the format buffer, the buffer is output but no CR-LF or PRINT command is given. This process continues until a terminating control character is found (/ or ←).

---

*A four word buffer is required in this mode.

# 3-14. CONFIGURED DRIVERS

The followng paragraphs (listed below) describe the calling sequence for each of the drivers (console, line printer, and diagnostic input device) available to the diagnostic program.

a. Console Output.

b. Console Input.

c. Line Printer Output.

d. Binary Loader.

## 3-15. CONSOLE OUTPUT

a. Calling Sequence:

```
LDA   CNT     BUFFER COUNT
LDB   BUFA    BUFFER ADDRESS
JSB   102B,I  CALL CONSOLE OUTPUT DRIVER
 .            RETURN WHEN COMPLETE
 .            A + B MEANINGLESS
```

b. Count and Address:

The count is the positive number of 8-bit characters in the buffer. The address is the absolute memory location of the first byte in the buffer.

Note: The count cannot be negative, the results are unpredictable. A buffer count of zero will issue a CR-LF to the console.

c. Call Console Output Driver:

This call will initialize an output of the specified buffer. The buffer is unpacked 8 bits (1 byte) at a time and transferred to the console. When the transfer has reached the count, a carriage return (CR) line feed (LF) is issued and the driver returns to the caller. If, during a transfer, a RUBOUT character is found, the driver will return to the caller at that point regardless of the remaining count, and no carriage return or line feed is issued.

## 3-16. CONSOLE INPUT

a. Calling Sequence:

```
LDA   CNTMX   MAXIMUM INPUT COUNT
LDB   BUFA    BUFFER ADDRESS
JSB   104B,I  CALL CONSOLE INPUT DRIVER
              RETURN WHEN COMPLETE
              A = NUMBER OF CHARACTERS INPUT BY THE
                  OPERATOR
              B = MEANINGLESS
```

b. Count and Address:

The count is the positive maximum number of 8-bit characters to be input and loaded into the buffer. The address is the absolute memory location of the buffer.

Note: The count cannot be negative or zero, the results are unpredictable.

c. Call Console Input Driver:

This call will initialize an input from the console device. The characters will be put in the buffer in packed format (8-bit bytes) until the operator enters a CR (carriage return), or the buffer is filled.

Note: The driver automatically takes care of a RUBOUT (or delete) by the operator, issues a CR/LF, and resets the pointers to the start of the buffer. The driver requires only a CR to terminate an input.

d. Return:

When the operator enters a line feed, or the buffer is filled, the driver will return to the caller with the A-REG set to the input count.

## 3-17. LINE PRINTER OUTPUT

The same rules apply as for the Console Output driver except:

a. The JSB is JSB 103B,I.

b. A halt 106076 will occur if the line printer is not ready.

# DIAGNOSTIC SERIAL NUMBERS

APPENDIX A

Major groups are listed first (these are the prefixes for the DSN's). Specific DSN's follow this listing.

| DSN | DIAGNOSTIC GROUP |
|---|---|
| 000RXX | Control Programs |
| 100RXX | Reserved |
| 101RXX | CPU |
| 102RXX | Memory |
| 103RXX | Interface Cards |
| 104RXX | Consoles |
| 105RXX | Line Printers |
| 106RXX | Tape Readers/Punches |
| 107RXX | Plotters |
| 110RXX | Reserved |
| 111RXX | Discs |
| 112RXX | Mag Tapes |
| 113RXX | Card Readers |
| 114RXX | Reserved |
| 116RXX | Reserved |
| 117RXX | Special Peripherals |
| 177777 | Prereleased program |

Notes: See figure 3-3 in paragraph 3-2 for explanations.
R = revision.

All one's in the DSN represents a prereleased diagnostic or control program.

A diagnostic reference table is presented in table A-1, which lists the DSN's, diagnostic designations, part numbers, and date codes for the HP 2100 Series diagnostic media and the appropriate diagnostic reference manuals used with this Configurator.

## 24396A-F Products Cross Reference List

| PRODUCT NO. | NAME | PARTS SUPPLIED WITH PRODUCT | |
|---|---|---|---|
| | | SOFTWARE | MANUALS |
| 24396A | DIAGNOSTIC LIBRARY ON PAPER TAPES | 24296-60001<br>24396-12001<br>24396-12002<br>24396-12003<br>12943-16002<br>12943-16001<br>12907-16003<br>12977-16004<br>12977-16005<br>12740-16001<br>12929-16001<br>24395-16002<br>12539-16001<br>12936-16001<br>12908-16001<br>13197-16002<br>24335-16001<br>59310-16001<br>12587-16001<br>12920-16001<br>12920-16002<br>12621-16001<br>12622-16001<br>12967-16001<br>12966-16001<br>12968-16001<br>24340-16001<br>02618-16001<br>02631-16001<br>02635-16001<br>02608-16001<br>12996-16001<br>12732-16003<br>12960-16001<br>12962-16001<br>92900-16001<br>13181-16001<br>13184-16001<br>24296-16003<br>24296-16002<br>12597-16001<br>12560-16001<br>12924-16001<br>12989-16001<br>12531-16001<br>24351-16001<br>24360-16001 | 24396-14001<br>24396-14002<br>24396-14003<br>24396-14004 |
| 24396B | DIAGNOSTIC LIBRARY ON 7900/01 CARTRIDGE DISC | 24396-13001 | |
| 24396C | DIAGNOSTIC LIBRARY ON 7905 CARTRIDGE DISC | 24396-13101 | |
| 24396D | DIAGNOSTIC LIBRARY ON 7970B MAGNETIC TAPE (800 BPI) | 24396-13501 | |
| 24396E | DIAGNOSTIC LIBRARY ON 7970E MAGNETIC TAPE (1600 BPI) | 24396-13601 | |
| 24396F | DIAGNOSTIC LIBRARY ON 2644/45 MINICARTRIDGES | 24396-13301<br>24396-13302<br>24396-13303<br>24396-13304<br>24396-13305<br>24396-13306<br>24396-13307 | |

*The diagnostics and control programs listed in this reference table are stored on the appropriate media in the sequence specified by the table. This does not imply that a specific system delivered to a user is compatible with all the hardware listed in this table.

## Table A-1. Diagnostic Reference Table for HP 24396A-F Products

| DSN | DESIGNATION | REQ MEM SIZ | SINGLE FILE PAPER TAPE | | | MULTIPLE FILES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | BINARY | D.C. | MANUAL | PAPER TAPE BINARIES | D.C. | 2644/45 CARTRIDGE BINARIES | D.C. | DISC/MAG TAPE BINARIES | D.C. | MANUAL VOL. |
| 000200 | DIAGNOSTIC CONFIGURATOR | 4K | 24296-60001 | 1627 | 02100-90157 | 24296-60001 | 1627 | THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE, DISC AND MAG TAPE. | | | | |
| 101100 | MEMORY REFERENCE INSTRUCTION GROUP | 4K | 24315-16001 | 1624 | 02100-90218 | | | | | | | |
| 101001 | ALTER SKIP INSTRUCTION GROUP | 4K | 24316-16001 | 1431 | 02100-90211 | | | | | | | |
| 101002 | SHIFT ROTATE INSTRUCTION GROUP | 4K | 24317-16001 | 1431 | 02100-90212 | 24396-12001 | 1644 | | | | | |
| 102200 | CORE MEMORY (2100/16/15/14) | 4K | 24323-16001 | 1624 | 02100-90219 | | | | | | | |
| 102104 | SEMICONDUCTOR MEMORY (21MX) | 4K | 24395-16001 | 1644 | 24395-90001 | | | | | | | 24396-14001 |
| 101004 | EAU INSTRUCTION GROUP | 4K | 24319-16001 | 1431 | 02100-90214 | | | | | | | |
| 101207 | FLOATING POINT INSTRUCTION GROUP | 4K | 24320-16001 | 1551 | 24320-90001 | 24396-12002 | 1901 | 24396-13301 | 1901 | | | |
| 102305 | MEM PROT/PARITY ERROR (2100/21MX) | 4K | 12892-16001 | 1705 | 12892-90005 | | | | | | | |
| 101206 | POWER FAIL AUTO RESTART | 4K | 24321-16001 | 1635 | 02100-90216 | | | | | | | |
| 141103 | I/O INSTR-GROUP I/O CHANNEL EXTENDER | 8K | 24318-16001 | 1810 | 02100-90213 | | | | | | | |
| 143300 | GENERAL PURPOSE REGISTER | 4K | 24391-16001 | 1813 | 24391-90001 | 24396-12003 | 1901 | | | | | |
| 101220 | DIRECT MEMORY ACCESS (2100/21MX) | 4K | 24322-16002 | 1705 | 24322-90002 | | | | | | | |
| 101011 | EXT. INSTR. GROUP (INDEX) | 4K | 12943-16002 | 1432 | 12943-90004 | | | | | | | |
| 101112 | EXT. INSTR. GROUP (WORD,BYTE,BIT) | 4K | 12943-16001 | 1728 | 12943-90004 | | | | | | | |
| 101110 | 2100 FAST FORTRAN PACKAGE | 4K | 12907-16003 | 1632 | 12907-90003 | | | | | | | |
| 101213 | M/E-Series FAST FORTRAN PACKAGE 1 | 4K | 12977-16004 | 1822 | 12977-90002 | | | 24396-13302 | 1926 | | | |
| 101114 | M/E-Series FAST FORTRAN PACKAGE 2 | 4K | 12977-16005 | 1632 | 12977-90002 | | | | | | | |
| 101121 | F-Series FPP/SIS/FFP | 16K | 12740-16001 | 1926 | 12740-90004 | | | | | | | |
| 102103 | MEMORY EXPANSION UNIT | 16K | 12929-16001 | 1830 | 12929-90003 | | | | | | | |
| 102006 | SEMICOND MEMORY, MICROCODED F.21MX | 4K | 24395-16002 | 1644 | 24395-90003 | | | | | | | |
| 103301 | TIME BASE GENERATOR | 4K | 12539-16001 | 1830 | 12539-90011 | | | | | 7900 DISC: | | |
| 103115 | 12936 PRIVILEGED INTERRUPT | 4K | 12936-16001 | 1643 | 12936-90003 | | | | | 24396-13001 | 2040 | |
| 103105 | 12908/12978 WCS 256 W. | 4K | 12908-16001 | 1502 | 12908-90013 | | | 24396-13303 | 1830 | | | |
| 103023 | 13197 WCS 1024 W. | 4K | 13197-16002 | 1640 | 13197-90002 | | | | | 7905 DISC: | | |
| 103207 | 12889 HARDWIRED SERIAL INTERFACE | 4K | 24335-16001 | 1717 | 02100-90169 | | | | | 24396-13101 | 2040 | |
| 103122 | 59310 INTERF. BUS INTERFACE | 4K | 59310-16001 | 1728 | 59310-90061 | | | | | | | |
| 103003 | 12587 ASYN. DATA SET INTERF. | 8K | 12587-16001 | 1552 | 12587-90013 | | | | | 7970B MAG TAPE: | | |
| 103110 | 12920 ASYN. MULTIPLEXER (DATA) | 4K | 12920-16001 | 1805 | 12920-90009 | | | | | 24396-13501 | 2040 | |
| 103011 | 12920 ASYN. MULTIPLEXER (CNTL) | 4K | 12920-16002 | 1444 | 12920-90009 | | | | | | | |
| 103012 | 12621 SYNC. DATA SET (RECEIVE) | 4K | 12621-16001 | 1532 | 12621-90008 | | | | | 7970E MAG TAPE: | | |
| 103013 | 12622 SYNC. DATA SET (SEND) | 4K | 12622-16001 | 1532 | 12622-90008 | | | 24396-13304 | 1928 | 24396-13601 | 2040 | |
| 103116 | 12967 SYNC. INTERFACE | 4K | 12967-16001 | 1438 | 12967-90001 | | | | | | | |
| 103017 | 12966 ASYN. DATA SET | 8K | 12966-16001 | 1519 | 12966-90004 | | | | | | | 24396-14003 |
| 103121 | 12968 ASYN. COMM. INTERFACE | 4K | 12968-16001 | 1602 | 12968-90003 | | | | | | | |
| 103024 | 12821 ICD DISC INTERFACE | 8K | 12821-16001 | 1928 | 12821-90002 | | | | | | | |
| 105102 | 2607 LINE PRINTER | 4K | 24340-16001 | 1446 | 12987-90004 | | | | | | | |
| 145103 | 2613/17/18 LINE PRINTER | 4K | 02618-16001 | 1633 | 02618-90006 | | | | | | | |
| 105106 | 2631 PRINTER | 8K | 02631-16001 | 1913 | 02631-90906 | | | | | | | |
| 105107 | 2635 PRINTING TERMINAL | 8K | 02635-16001 | 1913 | 02635-90906 | | | 24396-13305 | 2026 | | | |
| 105105 | 2608 LINE PRINTER | 8K | 02608-16001 | 2026 | 02608-90906 | | | | | | | |
| 105104 | 9866 LINE PRINTER | 4K | 12996-16001 | 1541 | 12996-90001 | | | | | | | |
| 111104 | 12732 FLEXIBLE DISC SUBSYSTEM | 8K | 12732-16003 | 1708 | 12732-90003 | | | | | | | |
| 151302 | 7900/01 CARTRIDGE DISC | 8K | 12960-16001 | 1805 | 12960-90003 | | | | | | | |
| 151403 | 7905/06/20/25 DISC | 16K | 12962-16001 | 1805 | 12962-90001 | | | 24396-13306 | 1901 | | | |
| 104117 | 92900 TERMINAL SUBSYS (3070,40280) | 8K | 92900-16001 | 1814 | 92900-90003 | | | | | | | |
| 112200 | 9-TRACK MAG TAPE (7970, 13181/3) | 8K | 13181-16001 | 2040 | 13181-90095 | | | | | | | |
| 112102 | 7/9 TRACK MAG TAPE (13184 INTF) | 8K | 13184-16001 | 1629 | 13184-90008 | | | | | | | |
| 010000 | DIAGNOSTIC CROSS LINK | 4K | 24296-16003 | 1627 | 02100-90157 | | | | | | | |
| 011000 | 7900/05/20 DISC INITIALIZATION | 4K | 24296-16002 | 1627 | 02100-90157 | | | | | | | |
| 146200 | PAPER TAPE READER-PUNCH | 4K | 12597-16001 | 1725 | 12597-90031 | | | | | | | |
| 107000 | DIG. PLOTTER INTERFACE (CALCOMP) | 4K | 12560-16001 | 1540 | 12560-90029 | | | 24396-13307 | 2040 | | | |
| 113100 | 2892 CARD READER | 4K | 12924-16001 | 1537 | 12924-90006 | | | | | | | |
| 113001 | 2894 CARD READER PUNCH | 8K | 12989-16001 | 1728 | 12989-90001 | | | | | | | |
| 104003 | TELEPRINTER | 4K | 12531-16001 | 1509 | 12531-90042 | | | | | | | |
| 104007 | 2615 VIDEO TERMINAL | 4K | 24351-16001 | 1347 | 02615-90002 | | | | | | | |
| 103006 | 12909B PROM WRITER | 4K | 24360-16001 | 1420 | 24360-90001 | | | | | | | 24396-14004 |

Table A-2. Diagnostic Reference Table for Part no. 24998-14002

| DSN | DESIGNATION* | REQ MEM SIZ | SINGLE FILE PAPER TAPE | | | MULTIPLE FILES | |
|---|---|---|---|---|---|---|---|
| | | | BINARY | D.C. | MANUAL | 2645 CARTRIDGE BINARIES | 2645 CARTRIDGE D.C. |
| 000200 | DIAGNOSTIC CONFIGURATOR | 4K | 24296-60001 | 1627 | 02100-90157 | THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE. | |
| 101100 | MEMORY REFERENCE INSTRUCTION GROUP | 4K | 24315-16001 | 1624 | 02100-90218 | | |
| 101001 | ALTER SKIP INSTRUCTION GROUP | 4K | 24316-16001 | 1431 | 02100-90211 | | |
| 101002 | SHIFT ROTATE INSTRUCTION GROUP | 4K | 24317-16001 | 1431 | 02100-90212 | | |
| 102104 | SEMICONDUCTOR MEMORY (21MX) | 4K | 24395-16001 | 1644 | 24395-90001 | | |
| 101004 | EAU INSTRUCTION GROUP | 4K | 24319-16001 | 1431 | 02100-90214 | | |
| 101207 | FLOATING POINT INSTRUCTION GROUP | 4K | 24320-16001 | 1551 | 24320-90001 | | |
| 102305 | MEM PROT/PARITY ERROR (2100/21MX) | 4K | 12892-16001 | 1705 | 12892-90005 | 24998-13301 | 1926 |
| 101206 | POWER FAIL AUTO RESTART | 4K | 24321-16001 | 1635 | 02100-90216 | | |
| 141103 | I/O INSTR GROUP I/O CHANNEL/EXTENDER | 8K | 24318-16001 | 1610 | 02100-90213 | | |
| 143300 | GENERAL PURPOSE REGISTER | 4K | 24391-16001 | 1813 | 24391-90001 | | |
| 101220 | DIRECT MEMORY ACCESS (2100/21MX) | 4K | 24322-16002 | 1705 | 24322-90002 | | |
| 101011 | EXT. INSTR. GROUP (INDEX) | 4K | 12943-16002 | 1432 | 12943-90004 | | |
| 101112 | EXT. INSTR. GROUP (WORD,BYTE,BIT) | 4K | 12943-16001 | 1728 | 12943-90004 | | |
| 101213 | M/E-Series FAST FORTRAN PACKAGE 1 | 4K | 12977-16004 | 1822 | 12977-90002 | | |
| 101114 | M/E-Series FAST FORTRAN PACKAGE 2 | 4K | 12977-16005 | 1632 | 12977-90002 | | |
| 101121 | F-Series FPP/SIS/FFP | 16K | 12740-16001 | 1926 | 12740-90004 | | |
| 102103 | MEMORY EXPANSION UNIT | 16K | 12929-16001 | 1830 | 12929-90003 | | |
| 102006 | SEMICOND MEMORY, MICROCODED F.21MX | 4K | 24395-16002 | 1644 | 24395-90003 | 24998-13302 | 1926 |
| 103301 | TIME BASE GENERATOR | 4K | 12539-16001 | 1830 | 12539-90011 | | |
| 103023 | 13197 WCS 1024 W. | 4K | 13197-16002 | 1640 | 13197-90002 | | |
| 103110 | 12920 ASYN. MULTIPLEXER (DATA) | 4K | 12920-16001 | 1805 | 12920-90009 | | |
| 103011 | 12920 ASYN. MULTIPLEXER (CNTL) | 4K | 12920-16002 | 1444 | 12920-90009 | | |
| 103012 | 12621 SYNC. DATA SET (RECEIVE) | 4K | 12621-16001 | 1532 | 12621-90008 | | |
| 103013 | 12622 SYNC. DATA SET (SEND) | 4K | 12622-16001 | 1532 | 12622-90008 | | |
| 103116 | 12967 SYNC. INTERFACE | 4K | 12967-16001 | 1438 | 12967-90001 | 24998-13303 | 1928 |
| 103017 | 12966 ASYN. DATA SET | 8K | 12966-16001 | 1519 | 12966-90004 | | |
| 104003 | TELEPRINTER | 4K | 12531-16001 | 1509 | 12531-90042 | | |
| 103207 | 12889 HARDWIRED SERIAL INTERFACE | 4K | 24335-16001 | 1717 | 02100-90169 | | |
| 103122 | 59310 INTERF. BUS INTERFACE | 4K | 59310-16001 | 1728 | 59310-90061 | | |
| 103024 | 12821 ICD DISC INTERFACE | 8K | 12821-16001 | 1928 | 12821-90002 | | |
| 105102 | 2607 LINE PRINTER | 4K | 24340-16001 | 1446 | 12987-90004 | | |
| 145103 | 2613/17/18 LINE PRINTER | 4K | 02618-16001 | 1633 | 02618-90006 | | |
| 105106 | 2631 PRINTER | 8K | 02631-16001 | 1913 | 02631-90906 | 24998-13304 | 2026 |
| 105107 | 2635 PRINTING TERMINAL | 8K | 02635-16001 | 1913 | 02631-90906 | | |
| 105105 | 2608 LINE PRINTER | 8K | 02608-16001 | 2026 | 02608-90906 | | |
| 105104 | 9866 LINE PRINTER | 4K | 12996-16001 | 1541 | 12996-90001 | | |
| 111104 | 12732 FLEXIBLE DISC SUBSYSTEM | 8K | 12732-16003 | 1708 | 12732-90003 | | |
| 151302 | 7900/01 CARTRIDGE DISC | 8K | 12960-16001 | 1805 | 12960-90003 | 24998-13305 | 1822 |
| 151403 | 7905/06/20/25 DISC | 16K | 12962-16001 | 1805 | 12962-90001 | | |
| 104117 | 92900 TERMINAL SUBSYS (3070,40280) | 8K | 92900-16001 | 1814 | 92900-90003 | | |
| 112200 | 9-TRACK MAG TAPE (7970, 13181/3) | 8K | 13181-16001 | 2040 | 13181-90095 | | |
| 146200 | PAPER TAPE READER-PUNCH | 4K | 12597-16001 | 1725 | 12597-90031 | | |
| 113100 | 2892 CARD READER | 4K | 12924-16001 | 1537 | 12924-90006 | 24998-13306 | 2040 |
| 010000 | DIAGNOSTIC CROSS LINK | 4K | 24296-16003 | 1627 | 02100-90157 | | |
| 011000 | 7900/05/20 DISC INITIALIZATION | 4K | 24296-16002 | 1627 | 02100-90157 | | |

Note: Part no. 24998-14002 consists of the 6 cartridge tapes 24998-13301, 24998-13302, 24998-13303, 24998-13304, 24998-13305 and 24998-13306 plus all manuals listed in the table.

*The diagnostics and control programs listed in this reference table are stored on the appropriate media in the sequence specified by the table. This does not imply that a specific system delivered to a user is compatible with all the hardware listed in this table.

# CONFIGURATOR HALT CODE SUMMARY

APPENDIX B

| HALT CODE | REASON/RESPONSE |
|---|---|
| 102000 | Manual Configuration was selected (S-REG originally cleared). The program is requesting the computer type and options. The program calculated type and options are stored in the A-REG and S-REG (S-REG only if the computer being used is a HP 21MX, 2100A/S or 2114A/B).<br><br>Refer to figure 3-4 and paragraph 3-4 and if necessary, change the S-REG to the correct, or desired value and press RUN. |
| 102001 | Manual Configuration was selected (S-REG originally cleared). The program is requesting the console interface type and select code. The A-REG and S-REG are cleared by the program prior to the halt.<br><br>Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly and press RUN. If no console device is available ensure that the S-REG is cleared and then press RUN. |
| 102002 | Manual Configuration was selected (S-REG originally cleared). The program is requesting the line printer type and select code. The A-REG and S-REG are cleared prior to the halt.<br><br>Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly and press RUN. If no line printer is available ensure that the S-REG is cleared then press RUN. |
| 102003 | Manual Configuration was selected (S-REG originally cleared). The program is requesting the memory size. The program calculated size is stored in the A-REG and S-REG (S-REG only if the computer being used is a 21MX, 2100A/S or 2114A/B).<br><br>Refer to figure 3-5 and paragraph 3-4 and if necessary, change the S-REG to correct, or desired value then press RUN. |
| 102004 | Manual Configuration was selected (S-REG originally cleared). The program is requesting the diagnostic input device type and select code. The A-REG and S-REG are cleared by the program prior to the halt.<br><br>Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly then press RUN. |
| 102010 | Illegal select code (<10) for diagnostic input device or console was chosen. Restart at P = 100 for configuration or P = 2 for Pretest.<br><br>(If halt occurs during disc initialization, there was no console specified and program cannot be run.) |

| HALT CODE | REASON/RESPONSE |
|---|---|
| 102011 | Checksum error during the loading of a binary file. |
| 102020 | Pretest halt for 2115 or 2116 computer. Set S-REG to 177777 and press RUN. |
| 102021 | Pretest halt for 2115 or 2116 computer. Clear S-REG and press RUN. |
| 102022 | Conversational or Automatic Configuration was selected and the console interface type could not be determined by the configurator from the select code input to the S-REG.<br><br>Check the S-REG for the correct select code:<br>a. Change it if incorrect, then press RUN.<br>b. If the select code is correct check the interface type. If it is not a 12531, 12880, 12587, 12966 or 12968, no driver is available and no console can be specified.<br>c. If the select code and type are correct there is a possible problem on the interface board and the Manual Configuration must be used. The diagnostic for the console or interface should be run. |
| 102033 | The disc boot has been loaded and executed. During execution the boot could not find the DMA/DCPC control word in upper memory (for the select code).<br><br>Load A-REG bits 5-0 with the disc select code and press RUN. |
| 102044 | Disc did not respond with a flag. Restart program. |
| 102045 | Disc not ready or a hardware failure has occurred. Press RUN to try operation again. |
| 102055 | Address violation during the loading of a binary file. |
| 102066 | Pretest failed. Refer to M-REG for memory location in Pretest and appendix D for program listing. |
| 102071 | Manual Configuration was selected (S-REG originally cleared) and the console type input by the operator was not valid.<br>a. To leave a pseudo-driver in place, press RUN or<br>b. Restart configuration. |
| 102072 | An invalid loader type has been specified during configuration.<br>a. Press RUN to leave a pseudo-loader in the driver area or<br>b. Restart configuration. |

| HALT CODE | REASON/RESPONSE |
|---|---|
| 102077 | End-of-operation.<br>a. Disc Boot.<br>b. Disc Initialization.<br>c. Paper Tape Dump.<br>d. Load Complete.<br>e. Configuration Complete (Manual).<br>f. Pretest Complete. |
| 106070 | "End-of-Files" was reached during a diagnostic load operation. The specified DSN was not found.<br><br>If a different diagnostic(s) selection on the current tape is desired:<br><br>a. Load the A-REG with a new DSN.<br><br>b. Clear the B-REG if sequential execution is not desired, otherwise set B-REG to appropriate sequential selection.<br><br>c. Ready input device, set P-REG = 120, press PRESET and RUN.<br><br>If the diagnostic(s) originally selected is on a different tape:<br><br>a. Load the new tape. (If a 2644/45 cartridge tape, manually file forward over the configurator.)<br><br>b. If sequential execution was selected (B $\neq$ 0) set P-REG = N6500.<br><br>c. Ready input device, press PRESET and RUN. |
| 106071* | No console was specified during configuration. A pseudo-driver was configured in place of the console driver and a request for input from the console was generated by the diagnostic.<br><br>Press RUN to return to the program — but it should be noted that the request is in error. The program should check for the presence of a console (address 114 = SC of the console) before making a request. |
| 106072* | No diagnostic input device was specified during Manual or Automatic configuration. A pseudo-driver was configured in place of the diagnostic input device driver and a request for input was generated by the diagnostic or the operator.<br><br>No loading is possible. |

| HALT CODE | REASON/RESPONSE |
|---|---|
| 106073* | This halt has two meanings as follows:<br>a. During a transfer using the I/O processor loader link, an error was encountered. Restart the loader program in the I/O processor.<br>b. The diagnostic memory size exceeded the available space. (Refer to paragraph 2-10c.) |
| 106074* | Error on diagnostic input device (paper tape, magnetic tape, cartridge tape, or disc):<br>a. Device not ready; ready device: Press RUN.<br>b. Time-out on long paper tape leader: Press RUN.<br>c. Incorrect SC or device type specified: Reconfigure Configurator.<br>d. Data error on device: Restart loader in Configurator by setting P = 120, A-REG to DSN, and B-REG to serial execution. |
| 106075* | All unused memory locations in the first 4K are loaded with halts 106075. |
| 106076* | An output request to the line printer has been generated and the line printer was not ready. Ready the line printer and press RUN. |
| 106077* | Trap cell halt. M-REG = trap cell address. |

*These halts can occur during diagnostic execution.

# OPERATOR'S NOTES

APPENDIX C

## C-1. GENERAL

Appendix C is divided into four basic sections:

1. Figure C-1 gives the operator the basic instructions to transfer the Configurator and diagnostic(s) and/or control programs from one medium to another. It is a general guide to lead the user to the appropriate area in this manual (in case of paper tape dump or disc initialization), or to an operating system.

2. Magnetic tape and cartridge tape format required by basic loader and loader in Configurator.

3. Cartridge Disc Initialization for HP 7900/7901, HP 7905 and HP 7920.

4. Cross Link for program down-loading from a second computer in a multicomputer system.

| LOAD CONFIGURATOR, DIAGNOSTIC(S), AND/OR CONTROL PROGRAM(S) FROM: | IF IT IS DESIRED TO TRANSFER THE CONFIGURATOR, DIAGNOSTIC(S), AND/OR CONTROL PROGRAMS TO: | | |
|---|---|---|---|
| | PAPER TAPE | 7970 MAG TAPE (9-TRACK) OR 2644/45 CARTRIDGE TAPE | 7900/01 DISC 7905 DISC |
| Paper tape | Use Paper Tape Dump routine in Configurator; load Configurator and diagnostic from paper tape and create a memory dump of:<br>a. Configured Configurator.<br>— or —<br>b. Configured Configurator and unconfigured diagnostic.<br>— or —<br>c. Configured Configurator and configured diagnostic. | Not possible with Configurator. Use DOS or RTE to transfer the absolute binary diagnostics onto magnetic tape or RTE to transfer the binary onto cartridge tape. | Use Disc Initialization Program to create a diagnostic disc with Configurator, desired diagnostic(s), and/or control program(s). |
| 7970 Magnetic Tape (9-track) or 2644/45 Cartridge Tape. | Not possible with Configurator. Use DOS or RTE System for magnetic tape; use RTE System for cartridge tape. | | |
| 7900/01 Disc<br>7905 Disc<br>7920 Disc | Not possible due to special disc format. | | |

Figure C-1. Program Transfer Guide

# C-2. MAGNETIC TAPE AND CARTRIDGE TAPE FORMAT

To facilitate the use of magnetic tape and cartridge tape, input drivers were added to the Configurator. This allows the operator to boot-in the Configurator, then load diagnostics using the Configurator driver. The Configurator, diagnostics, and control programs are in absolute binary format and the last file is followed by a second EOF record. To create a magnetic tape, the operator must use RTE or DOS to write the absolute binary programs onto magnetic tape. To create a cartridge tape, the operator must use RTE. Refer to figure C-2 for the format used on magnetic tape and cartridge tape.

# C-3. CARTRIDGE DISC INITIALIZATION

## C-4. GENERAL

The Cartridge Disc Initialization program is used to write first the Configurator, then Diagnostics and/or Control Programs on an HP 7900/1, HP 7905, or HP 7920 Cartridge Disc. After the Cartridge Disc has been initialized, the operator uses the Disc Loader (IBL or BMDL) to load the Configurator, then the Configurator is configured and used to load programs specified by a DSN from the disc.

The Disc Initialization program allows either the Configurator, diagnostics, and control programs to be coresident on a disc with an RTE or DOS operating system or have a disc entirely dedicated to diagnostic programs. When using the Disc Loader, the operator can specify via S-Register bit 3 to load either the Configurator (bit 3 set) or the system boot (bit 3 cleared), provided a system was on the disc prior to initialization. Disc Initialization requires continuous tracks on the disc. Track sparing is not employed by Disc Initialization. If diagnostics are coresident with a system, the system cannot do track sparing in the area where the diagnostic will be stored.

## C-5. REQUIRED HARDWARE

The following hardware is required:

a. An HP 2100 series computer with at least 4K of memory.

b. An HP 7900/1, HP 7905, or HP 7920 Cartridge Disc. (Only computer type and cartridge disc type combinations specified by the appropriate hardware manuals are allowed to run Disc Initialization. The disc platter must be formatted and track sparing cannot be used. It cannot be the same physical disc as specified in paragraph C-5d.)

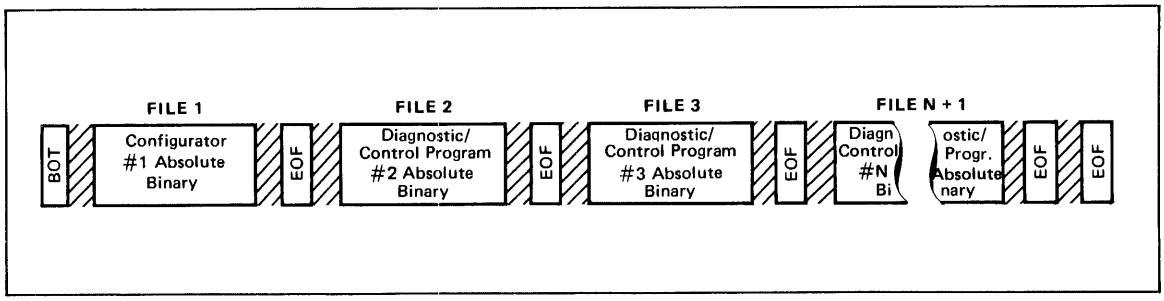



Figure C-2. Magnetic Tape and Cartridge Tape Format

c. A console device for operator communication is required. The interface must be an HP 12531B/C/D, 12880A, 12587B, 12966A, or 12968A.

d. A program input device as specified in paragraph 1-2d.

## C-6. REQUIRED SOFTWARE

In addition to the Configurator and the programs to be loaded onto the disc, the Disc Initialization, part no. 24296-16002 is required.

## C-7. OPERATING PROCEDURE

The operating procedures for Disc Initialization are outlined in figure C-3.

When the Disc Initialization program is executed it reads into memory cylinder 0, head 0, sector 0 where the system boot is located if the disc carries an operating system. It then copies data necessary for DOS IIIB, only that it saves the data so that the boot will operate with DOS IIIB.

After the Configurator has been loaded and configured, and the Disc Initialization has been loaded with the help of the Configurator, the program (when executed) writes a title message and asks the operator to input the disc device type and SC followed by the first and last cylinder number. The numbers entered are first checked to ensure that the first cylinder number is smaller than the second and that the second cylinder number is not greater than 202 for 7900/1 or 410 for 7905/20. If either of the above conditions exists, the question is repeated. The Configurator loader routine is then written on the disc in the first cylinder specified by the operator. If the boot on the disc is not the original system boot but a previous Configurator boot, the program reads the original system boot from its previous location. The system boot is then written on the disc in the same cylinder as the loading routine.

The operator is then asked for the input device to be used. When the device is ready, the routine copies all files from the input device to the disc. The files must contain records of 60 words or less and be in absolute binary format. The files are stored consecutively until all files have been copied from the input device. At this point the operator is asked "END OF FILES?". If more files are to be loaded from the same input device, the operator answers "NO". If the entire file loading process is completed, the disc is ready to be employed as a diagnostic input device and the operator answers "YES" to terminate the disc initialization. If "RUN" is pressed after halt 102077, the program will restart.

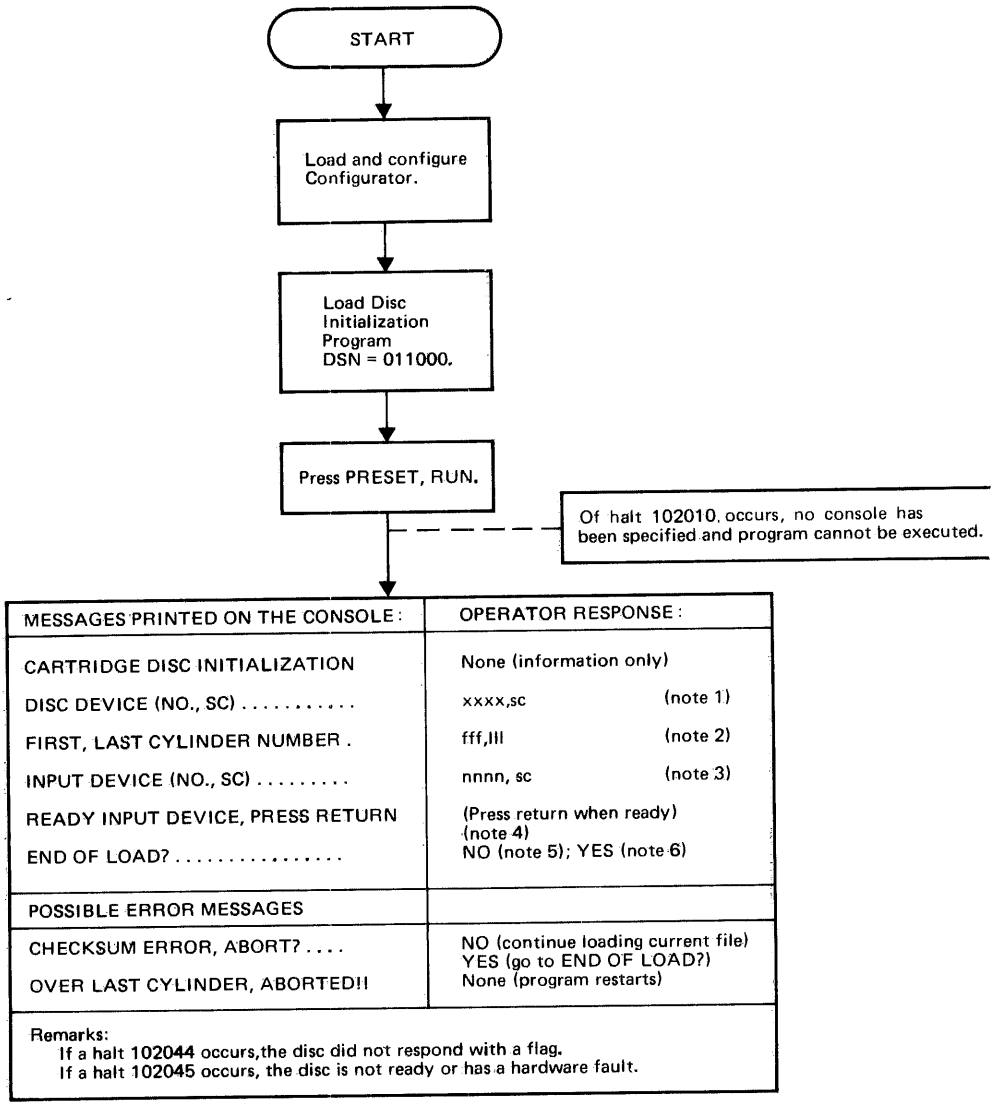
## C-8. CARTRIDGE DISC FORMAT

The first cylinder specified by the operator contains the original system boot and the Configurator loading routine. These are memory image formats. The Configurator (which must be loaded first), diagnostics, and/or control programs start on the next sequential cylinder and are in absolute binary format with the exception of the first three words. Each file starts on a sector boundary and the first three words contain the following:

a. Word 1 = the cylinder number of the next consecutive file.

b. Word 2 = the head and the sector of the next consecutive file.

c. Word 3 = the highest memory address location used by the file.




| MESSAGES PRINTED ON THE CONSOLE: | OPERATOR RESPONSE: |
|---|---|
| CARTRIDGE DISC INITIALIZATION | None (information only) |
| DISC DEVICE (NO., SC) . . . . . | xxxx,sc (note 1) |
| FIRST, LAST CYLINDER NUMBER . | fff,lll (note 2) |
| INPUT DEVICE (NO., SC) . . . . . | nnnn, sc (note 3) |
| READY INPUT DEVICE, PRESS RETURN | (Press return when ready) (note 4) |
| END OF LOAD? . . . . . | NO (note 5); YES (note 6) |
| POSSIBLE ERROR MESSAGES | |
| CHECKSUM ERROR, ABORT? . . . . | NO (continue loading current file) YES (go to END OF LOAD?) |
| OVER LAST CYLINDER, ABORTED!! | None (program restarts) |

Remarks:
If a halt 102044 occurs, the disc did not respond with a flag.
If a halt 102045 occurs, the disc is not ready or has a hardware fault.

NOTES:
1. Respond with appropriate disc model number and lower SC (higher priority). XXXX = 7900, 7901, or 7905.
2. Respond with cylinder number on disc to be used for program storage.
3. Respond with the appropriate device number (or two letters) and select code.

| | | | |
|---|---|---|---|
| nnn | = | 2737, 2748 or 2758 | Paper tape devices |
| | = | 7970 | Mag tape (9 - track only, Unit 0 only) |
| | = | 7900 or 7901 | Cartridge disc (removable platter only) |
| | = | 7905 | Cartridge disc (removable platter, upper surface) |
| | = | 7920 | Cartridge disc (upper surface) |
| | = | 2644 or 2645 | Cartridge tape |
| SC | = | select code of device | (Lower SC in case of 2 SC) |

4. All binary files will be transfered from specified input device to disc until double end of files or end of tape is reached. The Configurator must be first file loaded.
5. Respond with "NO" to continue loading more files from specified input device after input device has been readied.
6. Respond with "YES" if end of load operation.

Figure C-3. Disc Initialization Flowchart

The last file is an end of files mark where:

a. Word 1 = all one's.
b. Word 2 = all zero's.
c. Word 3 = all zero's.

## C-9. DISC INITIALIZATION EXAMPLE

The system configuration is used for the following Disc Initialization example:

a. HP 21MX Computer with DMA, MPRT, and 32K memory.
b. Console in select code 12.
c. Paper tape reader in select code 13.
d. HP 7900A Disc in select code 15.
e. HP 7970B Magnetic Tape Unit in select code 21.

Initialize a cartridge disc using magnetic tape as a source for the binary files. The cartridge disc can:

a. Be blank (but must be formatted),
b. Have a system on it with a reserved area set aside when the system was generated, or
c. Have a system on it with an area set aside in the file area on disc. This area, once initialized, cannot be moved (example PK command). Therefore, it should be the first area in the directory. The area can be set aside by the ST,B command for DOS or the CR command for RTE. (A directory list will give the starting cylinder of the file.)

After the Disc Initialization program has been loaded by the Configurator and started at location 100, the following messages appear on the terminal:

```
CARTRIDGE DISC INITIALIZATION
DISC DEVICE (NO.,SC) . . . . . 7900,15
FIRST, LAST CYLINDER NUMBERS.0,40     (blank disc or the area set aside)
INPUT DEVICE (NO.,SC) . . 7970,21
READY INPUT DEVICE, PRESS RETURN
```

At this point the program loads the binary files sequentially from magnetic tape. When the transfer is complete, the program will output the message "END OF LOAD?". If more files are to be loaded from the same device, answer "NO". If all files are loaded and the cartridge is ready, answer "YES".

# C-10. CROSS LINK

## C-11. GENERAL

Cross Link is used in a multicomputer environment where one computer is designated as a central processor and all others are I/O (slave) processors. It is used to load the Configurator,

diagnostics, and control programs from the central processor to an I/O processor through one of three possible links:

a. HP 12875 Processor Interconnect. (Four 12566 interfaces; Cross Link utilizes one 12566 processor interconnect pair.)

b. HP 12665 Computer Serial Interface Kit.

c. HP 12773 Computer Modem Interface Kit.

The two interface kits have the same program control. The differences are that the 12665 is hardwired and the 12773 is modem connected.

The program is useful when the I/O processor has one of the two links to the central processor but no input device and/or no console and/or no line printer attached, and a diagnostic has to be loaded and executed in the I/O processor. This does not imply that all three peripheral devices have to be attached to the central processor. However, when any one of the three devices are attached to the central processor, Cross Link must be loaded and execution started in the central processor so that the linkage for that device can be established to the I/O processor.

All drivers (input device, console, and line printer) which have been loaded as part of the Configurator will be configured to the peripherals in the central processor. The Cross Link program, which then is loaded, will link the drivers via link routines from the central processor to the I/O processor. This feature gives the user the capability to load a program (diagnostic) from the input device via the input device link in the main processor through the input device coupler driver in the I/O processor into the I/O processor memory. Then he starts program execution in the I/O processor. Message reporting to the console is done via the console coupler driver in the I/O processor, the console link and console driver in the central processor, and to the attached console. See figure C-4.

The Cross Link program does require the full dedication of the central processor because it is a standalone program. It is not possible to initialize a disc through Cross Link.

## C-12. REQUIRED HARDWARE

The following hardware is required:

a. Two or more 2100 series computers, each with at least 4K of memory.

b. HP 12875 Processor Interconnect or HP 12665/12773 Computer Serial Interface. (Only computer type and Processor Interconnect combinations or computer type and Serial Interface combinations specified by the appropriate hardware manuals are allowed.)

c. A console device for operator communication is optional. See paragraph 1-2c.

d. A program input device as specified in paragraph 1-2d.

## C-13. REQUIRED SOFTWARE

In addition to the Configurator and the programs to be cross-loaded to the I/O processor, the Diagnostic Cross Link, part no. 24296-16003, is required.

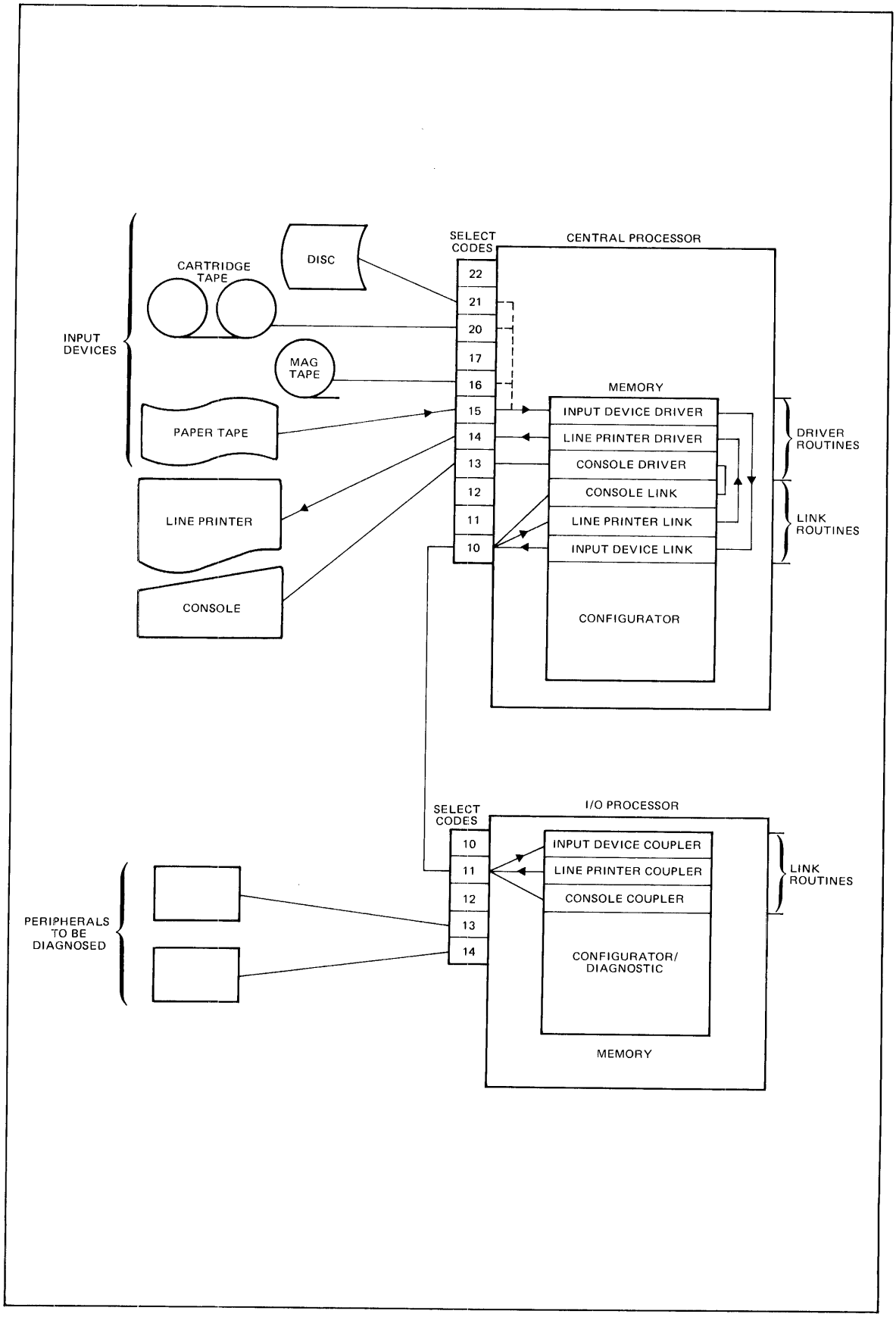


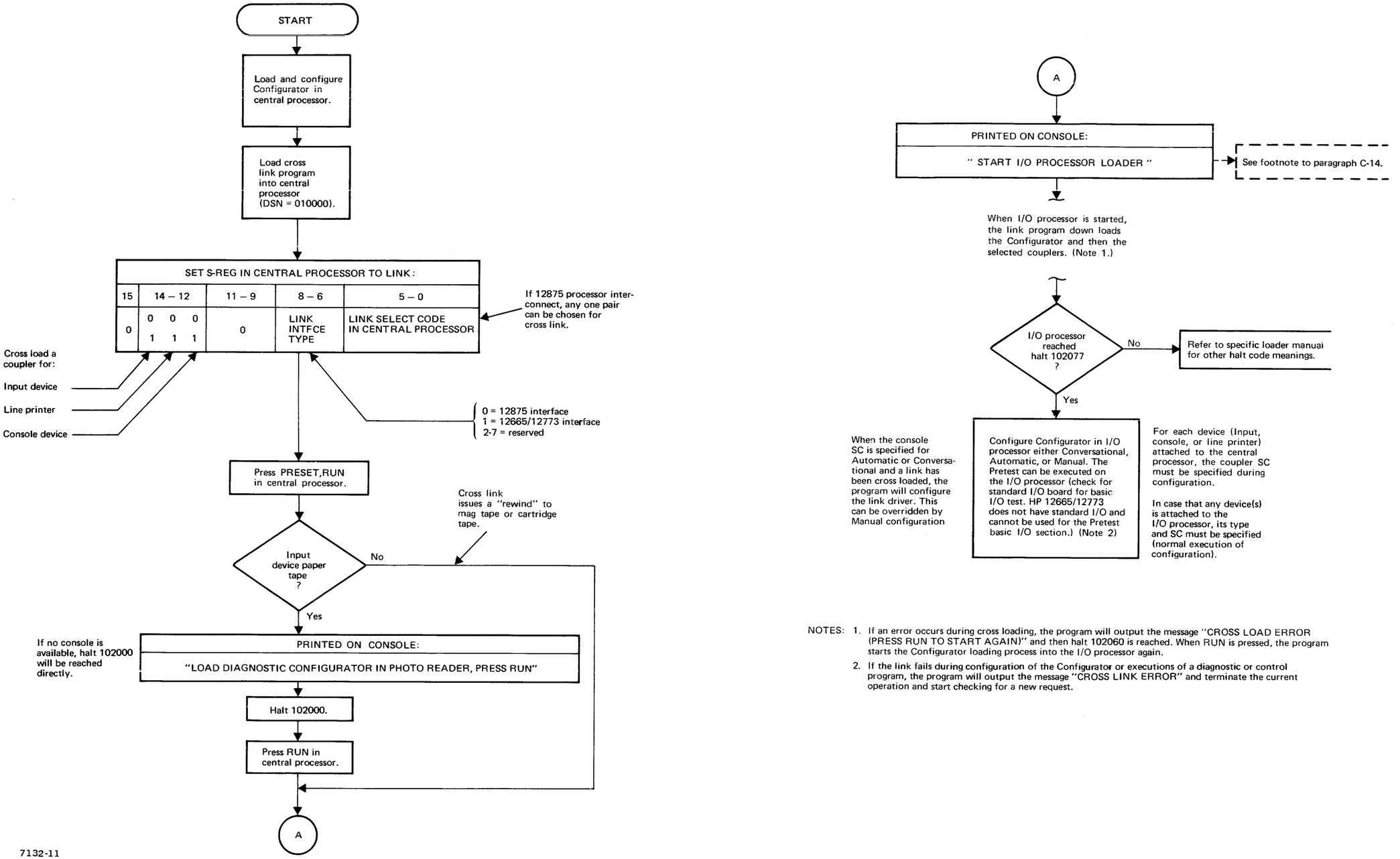

Figure C-4. Dual Computer Link

## C-14. OPERATING PROCEDURES

The operating procedures for Cross Link are outlined in figure C-5. To execute the Cross Link program, the operator must first load and configure the Configurator in the central processor to the input device and/or console and/or line printer type and SC's, then load the Cross Link program with the Configurator. In S-Register bits 0-8, specify the link interface type and select codes and with S-Register bits 12-14, specify which drivers (input device, line printer, console) are to be used in the I/O processor. After pressing RUN on the central processor, the program instructs the operator to start the special binary loader* in the I/O processor to load the Configurator from the input device via the central processor to the I/O processor. When the Configurator is loaded, the Cross Link loads the couplers which were specified by the operator. It should be noted that the Cross Link program sets a flag in the I/O processor memory so that, when the Configurator in the I/O processor is configured, the program will use the console coupler (unless overridden by Manual Configuration). The input device coupler SC must be specified as the diagnostic input device during configuration of the Configurator. In case of a line printer, the first coupler SC must be specified.

---

*Special binary loader: for 12875 Processor Interconnect, standard Paper Tape Loader is employed to cross link.
for 12665/12773 Computer Interface Kit, SCE1 Loader Program, part no. 91700-16160 Rev. 1621, or equivalent ROM.







NOTES:
1. If an error occurs during cross loading, the program will output the message "CROSS LOAD ERROR (PRESS RUN TO START AGAIN)" and then halt 102060 is reached. When RUN is pressed, the program starts the Configurator loading process into the I/O processor again.
2. If the link fails during configuration of the Configurator or executions of a diagnostic or control program, the program will output the message "CROSS LINK ERROR" and terminate the current operation and start checking for a new request.

Figure C-5. Cross Link Flowchart

# PRETEST SOURCE LISTING

APPENDIX D

```
PAGE 0002 #01  DIAGNOSTIC CONFIGURATOR  (CSN 000200)

0001                    ASMB,A,B,L,C
0003  00002                     ORG 2
0004                            SUP
0005  00000               A     EQU 0
0006  00001               B     EQU 1
0007  00000               SC    EQU 0
0008  00000               INTP  EQU 0
0009  00001               SWREG EQU 1
0010  00002               DMA2  EQU 2
0011  00006               DMA6  EQU 6
0012  00005               MPRT  EQU 5
0013  00002 024130               JMP 130B      GO TO START OF PRETEST
0014  00003 106077               OCT 106077
0015                            REP 15
0016  00004 106077               OCT 106077,106077,106077,106077
0016  00010 106077               OCT 106077,106077,106077,106077
0016  00014 106077               OCT 106077,106077,106077,106077
0016  00020 106077               OCT 106077,106077,106077,106077
0016  00024 106077               OCT 106077,106077,106077,106077
0016  00030 106077               OCT 106077,106077,106077,106077
0016  00034 106077               OCT 106077,106077,106077,106077
0016  00040 106077               OCT 106077,106077,106077,106077
0016  00044 106077               OCT 106077,106077,106077,106077
0016  00050 106077               OCT 106077,106077,106077,106077
0016  00054 106077               OCT 106077,106077,106077,106077
0016  00060 106077               OCT 106077,106077,106077,106077
0016  00064 106077               OCT 106077,106077,106077,106077
0016  00070 106077               OCT 106077,106077,106077,106077
0016  00074 106077               OCT 106077,106077,106077,106077
0017*
0018*          LINK TABLE
0019*
0020  00100 125417  START JMP CFIG,I     GO DIRECT TO CONFIGURATION
0021  00101 007431  CRI   DEF LCVR       DATA RECORD INPUT
0022  00102 007327  COD   DEF CNSLO      CONSOLE OUTPUT DRIVER
0023  00103 007404  LPD   DEF LNPTR      LINE PRINTER DRIVER
0024  00104 007354  CID   DEF CNSLI      CONSOLE INPUT DRIVER
0025  00105 000130  FWA   OCT 130        FIRST WORD OF AVBL. MEMORY
0026  00106 006477  LWA   DEF LWAA       LAST WORD OF AVBL. MEMORY
0027  00107 007167  DLP   DEF LOAD       DIAG. LOADER PROGRAM
0028  00110 177404        DEC -252       1 MILSEC. TIME COUNT
0029  00111 000000  CRISC OCT 0          DATA RECORD INPUT SELECT CODE
0030  00112 000000  CODSC OCT 0          CONSOLE OUTPUT SELECT CODE
0031  00113 000000  LPDSC OCT 0          LINE PRINTER SELECT CODE
0032  00114 000000  CIDSC OCT 0          CONSOLE INPUT SELECT CODE
0033  00115 000000  CTO   NOP            COMPUTER TYPE/OPTIONS
0034  00116 000000        NOP            USER CARD TYPE AND SELECT CODE
0035  00117 000000  MEM   NOP            MEMORY SIZE
0036  00120 114107        JSB DLP,I      GO TO DIAG. LOADER PROGRAM
0037  00121 006730  WAIT  DEF TMR        1 MILL SEC TIMER ROUTINE
0038  00122 006722  SWRC  DEF SWR        CHECK SWITCH REG
0039  00123 006610  D2AS  DEF D2ASC      DECIMAL TO ASCII CONVERSION
0040  00124 006566  O2AS  DEF O2ASC      OCTAL TO ASCII CONVERSION
0041  00125 006653  AS2N  DEF ASC2N      ASCII TO BINARY CONVERSION
0042  00126 000200  CSN   OCT 000200     CONF. SERIAL NUMBER
0043  00127 006502  FMTO  DEF FMTR       FORMATTED OUTPUT
```

```
PAGE 0003 #01  DIAGNOSTIC CONFIGURATOR  (CSN 000200)


0045*      ONLY SINGLE OPERATION INSTRUCTIONS ARE TESTED.
0046*      IT IS ASSUMED THAT COMBINATIONS AFTER INITIAL
0047*      TEST WILL WORK(NOT NECESSARILY TRUE BUT NECESSARY).
0048*
0049*      INSTRUCTIONS ARE TESTED IN THE FOLLOWING SEQUENCE:
0050*
0051*      RSS  SOS  SOC  STC  CLO  CLE  SEZ  CCE  CME
0052*
0053*      CLA  CCA  CPA  SZA  STA  LDA  INA  CMA  SSA  SLA (B-REG INCLUSIVE)
0054*
0055*      STA B,I  STB A,I  LDA B,I  LDB A,I  CPA B,I  CPB A,I
0056*
0057*      JMP (BP)  JSB (BP)  JSB (BP),I  TC (BP)
0058*
0059*      GENERAL MEMORY TEST (FIRST 4K ONLY)
0060*
0061*      AND  XOR  ICR  ISZ  ADA  ADB
0062*
0063*      MEMORY ADDRESS, PATTERN & WORST CASE TEST (ABOVE 4K ONLY)
0064*
0065*      CURRENT PAGE / BASE PAGE  JMP  LDA  STA  CPA  JSB
0066*
0067*      ALS  ARS  RAL  RAR  ALR  ALF  (BITS 8-6)
0068*
0069*      ALS  ARS  RAL  RAR  ALR  ALF  (BITS 2-0)
0070*
0071*      ELA  ERA  (BITS 8-6)  ELA  ERA  (BITS 2-0)
0072*
0073*
0074*      ANY ERROR ENCOUNTERED WILL BE INDICATED BY
0075*      A HALT 66B  (102066)
0076  00066          ERH   EQU 66B
0077*      REFER TO LISTING AT THE M-REG. ADDRESS FOR DETAILS IF
0078*      A HALT OCCURS.
0079*      FOR REFERENCES (BP) = BASE PAGE  AND (CP) = CURRENT PAGE




0081*      ARITHMETIC SETTING OF E & C REGISTERS (INA ADA  INB ADB)
0082*
0083*      EXTEND & OVERFLOW REGISTER RESULTS
0084*
0085*
0086*     AD* MEM  TO REG.   =     REG.   OVF  EXT
0087*          +        +           +      0    0
0088*          +        +           -      1    0
0089*          +        -           +      0    1
0090*          -        +           +      0    1
0091*          -        +           -      0    0
0092*          +        -           -      0    0
0093*          -        -           -      0    1
0094*          -        -           +      1    1
```

PAGE 0004 #01  DIAGNOSTIC CONFIGURATOR  (CSN 000200)

```
0096*                       PRE-TEST PART A (BP)
0097*
0098   00130 107700           CLC INTP,C     GENERATE CRS
0099   00131 002001           RSS
0100   00132 102066  HLT0     HLT ERH        RSS FAILED OR I/O CAUSED SKIP
0101*
0102   00133 071404           STA DISN       SAVE A-REG. FOR LATER
0103   00134 075405           STB DIBP       SAVE B-REG FOR LATER ALSO
0104   00135 002400           CLA
0105   00136 071406           STA SWRX       CLEAR S-REG. FLAG IF RESTART.
0106   00137 071407           STA BIOSC      CLEAR BASIC I/O SELECT CODE
0107*
0108   00140 102101  PTLP     STC            START HERE IF PRE TEST LOOP
0109   00141 102201           SOC
0110   00142 102301           SOS
0111   00143 102066           HLT ERH        STC / SOC / SOS
0112   00144 103101           CLC
0113   00145 102301           SOS
0114   00146 102201           SOC
0115   00147 102066           HLT ERH        CLC / SOS / SOC
0116   00150 000040           CLE
0117   00151 002041           SEZ,RSS
0118   00152 002040           SEZ
0119   00153 102066           HLT ERH        CLE / SEZ,RSS / SEZ
0120   00154 002300           CCE
0121   00155 002040           SEZ
0122   00156 002041           SEZ,RSS
0123   00157 102066           HLT ERH        CCE / SEZ / SEZ,RSS
0124   00160 002200           CME
0125   00161 002041           SEZ,RSS
0126   00162 002040           SEZ
0127   00163 102066           HLT ERH        CME / SEZ / SEZ,RSS
```

```
0129*                          PRE-TEST PART A (BP)
0130*
0131   00164 002400            CLA
0132   00165 007400            CCB
0133   00166 071376            STA TMPA
0134   00167 075377            STB TMPB
0135   00170 051335            CPA B0
0136   00171 002002            SZA
0137   00172 102066            HLT ERH          CLA/CPA/SZA
0138   00173 006002            SZB
0139   00174 055335            CPB B0
0140   00175 102066            HLT ERH          CCB/CPB/SZB
0141   00176 051366            CPA M1
0142   00177 102066            HLT ERH          CPA
0143   00200 055335            CPB B0
0144   00201 102066            HLT ERH          CPB
0145   00202 061377            LDA TMPB
0146   00203 065376            LDB TMPA
0147   00204 002002            SZA
0148   00205 051335            CPA B0
0149   00206 102066            HLT ERH          STB/LDA
0150   00207 055335            CPB B0
0151   00210 006002            SZB
0152   00211 102066            HLT ERH          STA/LDB
0153   00212 102301            SOS
0154   00213 002040            SEZ
0155   00214 102066            HLT ERH          E / O  SET
0156   00215 006004            INB
0157   00216 102301            SOS
0158   00217 002040            SEZ
0159   00220 102066            HLT ERH          E / O  SET
0160   00221 002004            INA
0161   00222 002040            SEZ
0162   00223 102201            SOC
0163   00224 102066            HLT ERH          E NOT SET / O SET
0164   00225 000040            CLE
0165   00226 006002            SZB
0166   00227 002002            SZA
0167   00230 102066            HLT ERH          INA/INB
0168   00231 055336            CPB B1
0169   00232 002001            RSS
0170   00233 102066            HLT ERH          INB
```

```
 PAGE 0006 #01  DIAGNOSTIC CONFIGURATOR  (DSN 002200)


0172*                    PRE-TEST PART A (BP)
0173*
0174   00234 003400         CCA
0175   00235 006400         CLB
0176   00236 071376         STA TMPA
0177   00237 075377         STB TMPB
0178   00240 051366         CPA M1
0179   00241 002003         SZA,RSS
0180   00242 102066         HLT ERH        CCA/CPA/SZA,RSS
0181   00243 006003         SZB,RSS
0182   00244 055366         CPB M1
0183   00245 102066         HLT ERH        CLB/CPB/SZB,RSS
0184   00246 051335         CPA B0
0185   00247 102066         HLT ERH        CPA
0186   00250 055366         CPB M1
0187   00251 102066         HLT ERH        CPB
0188   00252 061377         LDA TMPB
0189   00253 065376         LDB TMPA
0190   00254 002003         SZA,RSS
0191   00255 051366         CPA M1
0192   00256 102066         HLT ERH        STB/LDA
0193   00257 055366         CPB M1
0194   00260 006003         SZB,RSS
0195   00261 102066         HLT ERH        STA/LDB
0196   00262 102301         SCS
0197   00263 002040         SEZ
0198   00264 102066         HLT ERH        E / C  SET
0199   00265 002004         INA
0200   00266 102301         SCS
0201   00267 002040         SEZ
0202   00270 102066         HLT ERH        E / C  SET
0203   00271 006004         INB
0204   00272 002040         SEZ
0205   00273 102201         SCC
0206   00274 102066         HLT ERH        E NOT SET / C SET
0207   00275 000040         CLE
0208   00276 006003         SZB,RSS
0209   00277 002003         SZA,RSS
0210   00300 102066         HLT ERH        INA/INB
0211   00301 051336         CPA B1
0212   00302 002001         RSS
0213   00303 102066         HLT ERH        INA
```

PAGE 0007 #01 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```
0215*                          PRE-TEST PART A (BP)
0216*
0217   00304 061413              LDA ALT0
0218   00305 065415              LDB ALT1
0219   00306 071376              STA TMPA
0220   00307 075377              STB TMPB
0221   00310 051413              CPA ALT0
0222   00311 002001              RSS
0223   00312 102066              HLT ERH          LDA/CPA
0224   00313 055415              CPB ALT1
0225   00314 002001              RSS
0226   00315 102066              HLT ERH          LDB/CPB
0227   00316 061377              LDA TMPB
0228   00317 065376              LDB TMPA
0229   00320 051415              CPA ALT1
0230   00321 002001              RSS
0231   00322 102066              HLT ERH          LDA/STB
0232   00323 055413              CPB ALT0
0233   00324 002001              RSS
0234   00325 102066              HLT ERH          LDB/STA
0235   00326 002004              INA
0236   00327 006004              INB
0237   00330 051416              CPA ALT1A
0238   00331 002001              RSS
0239   00332 102066              HLT ERH          INA
0240   00333 055414              CPB ALT0A
0241   00334 002001              RSS
0242   00335 102066              HLT ERH          INB
```

PAGE 0008 #01  DIAGNOSTIC CONFIGURATOR  (DSN 002200)

```
0244*                          PRE-TEST PART A (BP)
0245*
0246   00336 002400              CLA
0247   00337 007400              CCB
0248   00340 003000              CMA
0249   00341 007000              CMB
0250   00342 051366              CPA M1
0251   00343 006002              SZB
0252   00344 102066              HLT ERH          CMA / CMB
0253   00345 002020              SSA
0254   00346 006020              SSB
0255   00347 102066              HLT ERH          SSA / SSB
0256   00350 000010              SLA
0257   00351 004010              SLB
0258   00352 102066              HLT ERH          SLA / SLB
0259   00353 003000              CMA
0260   00354 007000              CMB
0261   00355 055366              CPB M1
0262   00356 002002              SZA
0263   00357 102066              HLT ERH          CMA / CMB
0264   00360 006020              SSB
0265   00361 002020              SSA
0266   00362 102066              HLT ERH          SSA / SSB
0267   00363 004010              SLB
0268   00364 000010              SLA
0269   00365 102066              HLT ERH          SLA / SLB
0270   00366 061413              LDA ALT0
0271   00367 065415              LDB ALT1
0272   00370 003000              CMA
0273   00371 007000              CMB
0274   00372 051415              CPA ALT1
0275   00373 002001              RSS
0276   00374 102066              HLT ERH          CMA
0277   00375 055413              CPB ALT0
0278   00376 002001              RSS
0279   00377 102066              HLT ERH          CMB
```

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PAGE 0009 #01  DIAGNOSTIC CONFIGURATOR  (DSN 000200)


0281*                    PRE-TEST PART A (BF)
0282*
0283*     CHECK SWITCH REGISTER I/O
0284*
0285  00400 061406         LDA SWRX       CHECK IF SWREG HAS
0286  00401 002002         SZA              BEEN CHECK BEFORE
0287  00402 024452         JMP NXT00      YES SKIP CHECK
0288  00403 102501         LIA SWREG      GET AND
0289  00404 071406         STA SWRX          SAVE S-REG.
0290  00405 061413         LDA ALT0       TRY ALTERNATING PATTERNS
0291  00406 102601         OTA SWREG
0292  00407 102501         LIA SWREG
0293  00410 051406         CPA SWRX       STILL ORIGINAL?
0294  00411 061413         LDA ALT0       YES 2116/5 FORCE SKIP
0295  00412 051413         CPA ALT0
0296  00413 002001         RSS
0297  00414 102066         HLT ERH
0298  00415 061415         LDA ALT1       OTHER PATTERN
0299  00416 102601         OTA SWREG
0300  00417 102501         LIA SWREG
0301  00420 051406         CPA SWRX       STILL ORIGINAL?
0302  00421 061415         LDA ALT1       YES 2116/5 FORCE SKIP
0303  00422 051415         CPA ALT1
0304  00423 002001         RSS
0305  00424 102066         HLT ERH
0306  00425 003400         CCA            TRY OUTPUTING
0307  00426 102601         OTA SWREG      ALL ONE'S
0308  00427 102501         LIA SWREG      NOW GET IT BACK
0309  00430 051406         CPA SWRX       2115/2116?
0310  00431 024444         JMP *+11       OPERATOR MUST SET S-REG.
0311  00432 102501         LIA SWREG      GET IT AGAIN
0312  00433 051366         CPA M1         DID IT ECHO THE 1'S?
0313  00434 002001         RSS
0314  00435 102066         HLT ERH        NO
0315  00436 002400         CLA            TRY OUTPUTING
0316  00437 102601         OTA SWREG      B0  'S
0317  00440 102501         LIA SWREG      GET IT BACK
0318  00441 002002         SZA            OK
0319  00442 102066         HLT ERH        NO
0320  00443 024452         JMP NXT00      YES
0321  00444 102020         HLT 20B        2115/2116 OPERATOR MUST SET S-REG.
0322  00445 102501         LIA SWREG      GET IT
0323  00446 051366         CPA M1         IS IT ALL ONES
0324  00447 002001         RSS
0325  00450 102066         HLT ERH        NO INFORM OPERATOR
0326  00451 102021         HLT 21B        OPERATOR MUST CLEAR S-REG.
0327  00452           NXT00 EQU *
0328  00452 102501         LIA SWREG      GET IT AGAIN
0329  00453 002002         SZA            DID IT ECHO THE 0'S
0330  00454 102066         HLT ERH        NO
0331  00455 102301         SCS
0332  00456 002040         SEZ
0333  00457 102066         HLT ERH        E   O SET
```

```
0335*                        PRE-TEST PART A (BP)
0336*
0337   00460 061431            LDA DTMPB
0338   00461 065430            LDB DTMPA
0339   00462 170001            STA B,I
0340   00463 174000            STB A,I
0341   00464 051376            CPA TMPA
0342   00465 002001            RSS
0343   00466 102066            HLT ERH          STA B,I/STB A,I
0344   00467 055377            CPB TMPB
0345   00470 002001            RSS
0346   00471 102066            HLT ERH          STA B,I/STB A,I
0347   00472 160001            LDA B,I
0348   00473 164000            LDB A,I
0349   00474 051376            CPA TMPA
0350   00475 002001            RSS
0351   00476 102066            HLT ERH          LDA B,I
0352   00477 055377            CPB TMPB
0353   00500 002001            RSS
0354   00501 102066            HLT ERH          LDB A,I
0355   00502 160000            LDA A,I
0356   00503 164001            LDB B,I
0357   00504 150001            CPA B,I
0358   00505 002001            RSS
0359   00506 102066            HLT ERH          CPA B,I/LDA A,I
0360   00507 154000            CPB A,I
0361   00510 002001            RSS
0362   00511 102066            HLT ERH          CPB A,I/LDB B,I
```

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PAGE 0011 #01  DIAGNOSTIC CONFIGURATOR  (DSN 000200)


0364*                    PRE-TEST PART A (BP)
0365*
0366   00512 024514          JMP *+2
0367   00513 102066          HLT ERH         JMP (BP)
0368   00514 024520          JMP *+4
0369   00515 102066          HLT ERH         JMP (BP)
0370   00516 024522          JMP *+4
0371   00517 102066          HLT ERH         JMP (BP)
0372   00520 024516          JMP *-2
0373   00521 102066          HLT ERH         JMP (BP)
0374*
0375   00522 002400          CLA
0376   00523 070531          STA JB0
0377   00524 070544          STA JB1
0378   00525 060132          LDA HLT0
0379   00526 064132          LDB HLT0
0380   00527 014531          JSB *+2
0381   00530 102066  JBR0    HLT ERH         JSB (BP)
0382   00531 000000  JB0     NOP
0383   00532 060531          LDA *-1
0384   00533 051434          CPA DJBR0
0385   00534 002001          RSS
0386   00535 102066          HLT ERH         JSB (BP)  RETURN ADDRESS
0387   00536 060132          LDA HLT0
0388   00537 114541          JSB *+2,I
0389   00540 102066  JBR1    HLT ERH         JSB (BP),I
0390   00541 000544          DEF *+3
0391   00542 102066          HLT ERH         JSB (BP),I
0392   00543 102066          HLT ERH         JSB (BP),I
0393   00544 000000  JB1     NOP
0394   00545 060544          LDA *-1
0395   00546 051435          CPA DJBR1
0396   00547 002001          RSS
0397   00550 102066          HLT ERH         JSB (BP),I  RETURN ADDRESS
```

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PAGE 0012 #01  DIAGNOSTIC CONFIGURATOR  (CSN 000200)


0399*                    PRE-TEST PART A (BF)
0400*
0401*      GENERAL MEMORY TEST
0402*      COVERS 4K MEMORY (2 TO 77777)
0403*      EXCEPT THIS ROUTINE
0404*
0405  00551           GMTS  EQL *
0406  00551 006400          CLB             START WITH ADDRESS
0407  00552 006004          INB
0408  00553 006004          INB             TWO
0409  00554 160001  L00     LDA B,I         GET CURRENT CONTENTS
0410  00555 150001          CPA B,I         DID IT LOAD OK?
0411  00556 002001          RSS
0412  00557 102066          HLT ERH         NO FAILED ON LOAD
0413  00560 071376          STA TMPA        OK SAVE ORIGINAL CONTENTS
0414  00561 003400          CCA
0415  00562 170001          STA B,I         PUT ALL M1   IN LOCATION
0416  00563 150001          CPA B,I         DID IT STORE?
0417  00564 002001          RSS
0418  00565 102066          HLT ERH         NO FAILED ON STORE
0419  00566 002400          CLA             PUT  0   IN LOCATION
0420  00567 170001          STA B,I
0421  00570 150001          CPA B,I         DID IT STORE?
0422  00571 002001          RSS
0423  00572 102066          HLT ERH         NO FAILED ON STORE
0424  00573 061413          LDA ALT0        PUT ALTERNATING PATTERN IN LOACTION
0425  00574 170001          STA B,I
0426  00575 150001          CPA B,I         DID IT STORE?
0427  00576 002001          RSS
0428  00577 102066          HLT ERH         NO
0429  00600 061415          LDA ALT1        TRY OPPSITE PATTERN
0430  00601 170001          STA B,I
0431  00602 150001          CPA B,I         DID IT STORE?
0432  00603 002001          RSS
0433  00604 102066          HLT ERH         NO
0434  00605 061376          LDA TMPA        RESTORE ORIGINAL CONTENTS
0435  00606 170001          STA B,I
0436  00607 150001          CPA B,I         DID IT GO BACK?
0437  00610 002001          RSS
0438  00611 102066          HLT ERH         NO
0439  00612 006004          INB             MOVE TO NEXT LOCATION
0440  00613 055432          CPB GMTSA       GOT TO THIS PROGRAM
0441  00614 065433          LDB GMTEA       YES SKIP OVER THIS SECTION
0442  00615 055361          CPB B7700       DONE THIS 4K?
0443  00616 002001          RSS
0444  00617 024554          JMP L00         NO DO NEXT LOCATION
0445  00620           GMTE  EQL *
```

```
PAGE 0013 #01  DIAGNOSTIC CONFIGURATOR  (CSN 000200)

0447*                        PRE-TEST PART A (BP)
0448*
0449   00620 003400            CCA
0450   00621 011335            AND B0
0451   00622 002002            SZA
0452   00623 102066            HLT ERH          AND
0453   00624 061413            LDA ALT0
0454   00625 011415            AND ALT1
0455   00626 002002            SZA
0456   00627 102066            HLT ERH          AND
0457   00630 061415            LDA ALT1
0458   00631 011413            AND ALT0
0459   00632 002002            SZA
0460   00633 102066            HLT ERH          AND
0461   00634 003400            CCA
0462   00635 011413            AND ALT0
0463   00636 051413            CPA ALT0
0464   00637 002001            RSS
0465   00640 102066            HLT ERH          AND
0466   00641 003400            CCA
0467   00642 011415            AND ALT1
0468   00643 051415            CPA ALT1
0469   00644 002001            RSS
0470   00645 102066            HLT ERH          AND
0471*
0472   00646 002400            CLA
0473   00647 021335            XOR B0
0474   00650 002002            SZA
0475   00651 102066            HLT ERH          XOR
0476   00652 021413            XOR ALT0
0477   00653 051413            CPA ALT0
0478   00654 002001            RSS
0479   00655 102066            HLT ERH          XOR
0480   00656 021415            XOR ALT1
0481   00657 051366            CPA M1
0482   00660 002001            RSS
0483   00661 102066            HLT ERH          XOR
0484   00662 021413            XOR ALT0
0485   00663 051415            CPA ALT1
0486   00664 002001            RSS
0487   00665 102066            HLT ERH          XOR
0488   00666 021415            XOR ALT1
0489   00667 002002            SZA
0490   00670 102066            HLT ERH          XOR
0491   00671 003400            CCA
0492   00672 021366            XOR M1
0493   00673 002002            SZA
0494   00674 102066            HLT ERH          XOR
```

```
0496*                       PRE-TEST PART A (BP)
0497*
0498   00675 002400           CLA
0499   00676 031335           ICR B0
0500   00677 002002           SZA
0501   00700 102066           HLT ERH          ICR
0502   00701 031413           ICR ALT0
0503   00702 051413           CPA ALT0
0504   00703 002001           RSS
0505   00704 102066           HLT ERH          ICR
0506   00705 031415           ICR ALT1
0507   00706 051366           CPA M1
0508   00707 002001           RSS
0509   00710 102066           HLT ERH          ICR
0510   00711 002400           CLA
0511   00712 031415           ICR ALT1
0512   00713 051415           CPA ALT1
0513   00714 002001           RSS
0514   00715 102066           HLT ERH          ICR
0515   00716 031413           ICR ALT0
0516   00717 051366           CPA M1
0517   00720 002001           RSS
0518   00721 102066           HLT ERH          ICR
```

PAGE 0015 #01  DIAGNOSTIC CONFIGURATOR  (DSN 000200)

```
0520*                       PRE-TEST PART A (BP)
0521*
0522   00722 002400           CLA
0523   00723 006400           CLB
0524   00724 071376           STA TMPA
0525   00725 051365  L01      CPA B100K
0526   00726 002001           RSS
0527   00727 024734           JMP *+5
0528   00730 102201           SOC
0529   00731 002040           SEZ
0530   00732 102066           HLT ERR         E SET / O NOT SET
0531   00733 103101           CLO
0532   00734 102301           SOS
0533   00735 002040           SEZ
0534   00736 102066           HLT ERR         E / O  SET
0535   00737 002004           INA
0536   00740 002003           SZA,RSS
0537   00741 024756           JMP NXT01
0538   00742 006004           INB
0539   00743 006003           SZB,RSS
0540   00744 102066           HLT ERR         INA
0541   00745 035376           ISZ TMPA
0542   00746 002001           RSS
0543   00747 102066           HLT ERR         ISZ
0544   00750 051376           CPA TMPA
0545   00751 002001           RSS
0546   00752 102066           HLT ERR         ISZ / INA
0547   00753 054000           CPB A
0548   00754 024725           JMP L01
0549   00755 102066           HLT ERR         ISZ / INB
0550   00756 002040  NXT01     SEZ
0551   00757 102201           SOC
0552   00760 102066           HLT ERR         E NOT SET / O SET
0553   00761 000040           CLE
0554   00762 006004           INB
0555   00763 002040           SEZ
0556   00764 102201           SOC
0557   00765 102066           HLT ERR         E NOT SET / O  SET
0558   00766 000040           CLE
0559   00767 006002           SZB
0560   00770 102066           HLT ERR         INB
0561   00771 035376           ISZ TMPA
0562   00772 102066           HLT ERR         ISZ
0563   00773 102301           SOS
0564   00774 002040           SEZ
0565   00775 102066           HLT ERR         E / O SET
```

```
0567*                          PRE-TEST PART A (BP)
0568*
0569   00776 002400            CLA
0570   00777 007400            CCB
0571   01000 041336            ADA B1
0572   01001 102301            SCS
0573   01002 002040            SEZ
0574   01003 102066            HLT ERH        E / O SET
0575   01004 045336            ADB B1
0001   01005 002040            SEZ
0002   01006 102201            SCC
0003   01007 102066            HLT ERH        E NOT SET / O SET
0004   01010 000040            CLE
0005   01011 051336            CPA B1
0006   01012 006002            SZB
0007   01013 102066            HLT ERH        ADA/ADB
0008   01014 003400            CCA
0009   01015 006400            CLB
0010   01016 045336            ADB B1
0011   01017 102301            SCS
0012   01020 002040            SEZ
0013   01021 102066            HLT ERH        E / O SET
0014   01022 041336            ADA B1
0015   01023 002040            SEZ
0016   01024 102201            SCC
0017   01025 102066            HLT ERH        E NOT SET / O SET
0018   01026 000040            CLE
0019   01027 055336            CPB B1
0020   01030 002002            SZA
0021   01031 102066            HLT ERH        ADA/ADB
0022   01032 002400            CLA
0023   01033 007400            CCB
0024   01034 041366            ADA M1
0025   01035 102301            SCS
0026   01036 002040            SEZ
0027   01037 102066            HLT ERH        E / O SET
0028   01040 045366            ADB M1
0029   01041 002040            SEZ
0030   01042 102201            SCC
0031   01043 102066            HLT ERH        E NOT SET / O SET
0032   01044 000040            CLE
0033   01045 051366            CPA M1
0034   01046 002001            RSS
0035   01047 102066            HLT ERH        ADA
0036   01050 055367            CPB M2
0037   01051 002001            RSS
0038   01052 102066            HLT ERH        ADB
0039   01053 003400            CCA
0040   01054 006400            CLB
0041   01055 045366            ADB M1
0042   01056 102301            SCS
0043   01057 002040            SEZ
0044   01060 102066            HLT ERH        E / O SET
0045   01061 041366            ADA M1
0046   01062 002040            SEZ
0047   01063 102201            SCC
```

PAGE 0017 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```
0048  01064 102066          HLT ERH         E NOT SET / O SET
0049  01065 000040          CLE
0050  01066 051367          CPA M2
0051  01067 002001          RSS
0052  01070 102066          HLT ERH         ADA
0053  01071 055366          CPB M1
0054  01072 002001          RSS
0055  01073 102066          HLT ERH         ADB
0056  01074 061413          LDA ALT0
0057  01075 065415          LDB ALT1
0058  01076 045415          ADB ALT1
0059  01077 102201          SOC
0060  01100 002040          SEZ
0061  01101 102066          HLT ERH         E SET / C NOT SET
0062  01102 103101          CLO
0063  01103 041416          ADA ALT1A
0064  01104 002040          SEZ
0065  01105 102201          SOC
0066  01106 102066          HLT ERH         E NOT SET / O SET
0067  01107 000040          CLE
0068  01110 055413          CPB ALT0
0069  01111 002002          SZA
0070  01112 102066          HLT ERH         ADA/ADB
0071  01113 061415          LDA ALT1
0072  01114 065413          LDB ALT0
0073  01115 041413          ADA ALT0
0074  01116 102301          SOS
0075  01117 002040          SEZ
0076  01120 102066          HLT ERH         E / O  SET
0077  01121 045416          ADB ALT1A
0078  01122 002040          SEZ
0079  01123 102201          SOC
0080  01124 102066          HLT ERH         E NOT SET / O SET
0081  01125 000040          CLE
0082  01126 051366          CPA M1
0083  01127 006002          SZB
0084  01130 102066          HLT ERH         ADA/ADB
```

```
0085*                    PRE-TEST PART A (BP)
0087*
0088*      *   CALCULATE MEMORY SIZE & RUN MEMORY ADDRESS AND PATTERN CH
0089*          MEMORY ABOVE 4K-IF MEMORY>4K.
0090*
0091  01131 065363          LDB B10K       START WITH 8K
0092  01132 045340          ADB B3         MOVE TO ADDRESS 3
0093  01133 002400  L02     CLA            CLEAR WRAPAROUND
0094  01134 070003          STA 3B
0095  01135 061413          LDA ALT0       TRY TO
0096  01136 170001          STA B,I         WRITE PATTERN THERE
0097  01137 050003          CPA 3B         DID IT WRAPAROUND
0098  01140 025152          JMP NXT02      YES - NO MEMORY
0099  01141 150001          CPA B,I        DID THE PATTERN STORE?
0100  01142 025147          JMP **5        YES,MEMORY IS THERE
0101  01143 002400          CLA            NO,SHOULD
0102  01144 150001          CPA B,I         BE ALL
0103  01145 025152          JMP NXT02         0'S
0104  01146 102066          HLT ERH        NOT 0,SOMETHING'S WRONG
0105  01147 045363          ADB B10K       MOVE UP 4K
0106  01150 006021          SSB,RSS        DONE 32K?
0107  01151 025133          JMP L02        NO
0108  01152 060001  NXT02 LDA B            CHANGE HANDS
0109  01153 041370          ADA M10K       BACK UP ONE STEP
0110  01154 000040          CLE
0111  01155 103101          CLC
0112  01156 051340          CPA B3         ONLY 4K?
0113  01157 025771          JMP NXT05      YES - SKIP MEMORY TESTS
0114  01160 011364          AND B70K       ELIMINATE LOWER 2 BITS
0115  01161 041361          ADA B7700      POINT TO BINARY LOADER
0116  01162 041366          ADA M1
0117  01163 102601          OTA SWREG      DISPLAY MEMORY SIZE
0118  01164 002040          SEZ
0119  01165 102201          SOC
0120  01166 102066          HLT ERH        E NOT SET / O SET
0121  01167 000040          CLE
0122  01170 071403          STA LADD        LWAM
0123  01171 061361          LDA B7700      SET FWAM
0124  01172 071402          STA FADD
```

```
PAGE 0019 #02  DIAGNOSTIC CONFIGURATOR  (CSN 000200)


0126*      *   QUICK MEMORY ADDRESS TEST
0127*
0128  01173 061402          LDA FADD
0129  01174 170000  L03     STA A,I         STORE IN EACH
0130  01175 051403          CPA LADD         LOCATION OF AVAILABLE
0131  01176 025201          JMP *+3           MEMORY THE ADDRESS
0132  01177 002004          INA                OF THAT LOCATION
0133  01200 025174          JMP L03
0134  01201 061402          LDA FADD
0135  01202 150000  L04     CPA A,I         VERIFY MEMORY
0136  01203 002001          RSS              CONTENTS
0137  01204 102066          HLT ERH         MEMORY ADDRESS FAILURE
0138  01205 051403          CPA LADD
0139  01206 025211          JMP *+3         GO ON TO MEMORY PATTERN TEST
0140  01207 002004          INA
0141  01210 025202          JMP L04
0142*
0143*      *   QUICK MEMORY PATTERN TEST
0144*
0145  01211 003400          CCA             START WITH 177777
0146  01212 065402  L05     LDB FADD
0147  01213 170001  L06     STA B,I         WRITE PATTERN
0148  01214 006004          INB              IN A REG IN
0149  01215 055403          CPB LADD          AVAILABLE MEMRCY
0150  01216 002001          RSS
0151  01217 025213          JMP L06
0152  01220 065402          LDB FADD
0153  01221 150001  L07     CPA B,I         COMPARE PATTERN READ
0154  01222 002001          RSS              TO PATTERN WRITTEN
0155  01223 102066          HLT ERH         MEMORY PATTERN FAILED
0156  01224 006004          INB
0157  01225 055403          CPB LADD
0158  01226 002001          RSS
0159  01227 025221          JMP L07
0160  01230 051415          CPA ALT1        DONE 125252 YET?
0161  01231 025241          JMP NXT03       YES
0162  01232 051413          CPA ALT0
0163  01233 061415          LDA ALT1
0164  01234 002003          SZA,RSS
0165  01235 061413          LDA ALT0
0166  01236 051366          CPA M1
0167  01237 002400          CLA
0168  01240 025212          JMP L05
0169  01241          NXT03  EQU *
```

```
PAGE 0020 #02  DIAGNOSTIC CONFIGURATOR  (DSN 000200)


0171*                    PRE-TEST PART A (BP)
0172*
0173*      WORST CASE PATTERN TEST
0174*
0175   01241 061402         LDA FADD
0176   01242 065402         LDB FADD
0177   01243 071376  L08    STA TMPA
0178   01244 011355         AND B140      WRITE
0179   01245 051355         CPA B140        WORST
0180   01246 002400         CLA               CASE
0181   01247 002002         SZA                 PATTERN
0182   01250 003400         CCA
0183   01251 170001         STA B,I           IN MEMORY
0184   01252 055403         CPB LADD
0185   01253 025260         JMP NXT04
0186   01254 006004         INB
0187   01255 061376         LDA TMPA
0188   01256 002004         INA
0189   01257 025243         JMP L08
0190   01260 061402  NXT04 LDA FADD
0191   01261 065402         LDB FADD
0192   01262 071376  L09    STA TMPA
0193   01263 011355         AND B140      NOW
0194   01264 051355         CPA B140        COMPARE
0195   01265 002400         CLA               PATTERN
0196   01266 002002         SZA
0197   01267 003400         CCA
0198   01270 150001         CPA B,I
0199   01271 002001         RSS
0200   01272 102066         HLT ERH        MEMORY PATTERN FAILED
0201   01273 055403         CPB LADD
0202   01274 025771         JMP NXT05      CONTINUE
0203   01275 061444         LDA MHLT       FILL UNUSED MEMORY
0204   01276 170001         STA B,I          WITH HALTS
0205   01277 006004         INB
0206   01300 061376         LDA TMPA
0207   01301 002004         INA
0208   01302 025262         JMP L09
```

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PAGE 0021 #02  DIAGNOSTIC CONFIGURATOR  (CSN 002200)


0210*                    PRE-TEST PART A (BP)
0211*
0212*                    PROGRAM COMES HERE FROM CURRENT PAGE
0213*
0214*
0215  01303 125305  BPJP0 JMP **2,I
0216  01304 102066        HLT ERH        JMP (BP),I (TO BP)
0217  01305 001310        DEF **3
0218  01306 102066        HLT ERH        JMP (BP),I (TO BP)
0219  01307 102066        HLT ERH          "          "
0220  01310 125312        JMP **2,I
0221  01311 102066        HLT ERH        JMP (BP),I (TO CP)
0222  01312 002037        DEF CPJP0
0223  01313 102066        HLT ERH        JMP (BP),I (TO CP)
0224  01314 102066        HLT ERH          "          "
0225  01315 125317  BPJP1 JMP **2,I
0226  01316 102066        HLT ERH        JMP (BP),I (TO CP)
0227  01317 002044        DEF CPJP1
0228  01320 102066        HLT ERH        JMP (BP),I (TO CP)
0229  01321 102066        HLT ERH          "          "
0230*
0231  01322 000000  BPJB0 NOP
0232  01323 061322        LDA **1
0233  01324 051436        CPA DJBR2
0234  01325 002001        RSS
0235  01326 102066        HLT ERH        JSB (BP) FROM CP RETURN ADDRESS
0236  01327 060132        LDA HLT0
0237  01330 115332        JSB **2,I
0238  01331 102066  JBR5  HLT ERH        JSB (BP),I TO CP
0239  01332 002105        DEF CPJB0
0240  01333 102066        HLT ERH        JSB (BP),I TO CP
0241  01334 102066        HLT ERH        JSB (BP),I TO CP
0242*
0243*                    END OF PRE-TEST PART A (BP)
```

PAGE 0022 #02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```
0245*      *   STORAGE AND CONSTANTS
0246*
0247   01335 000000  B0     OCT 0
0248   01336 000001  B1     OCT 1
0249   01337 000002  B2     OCT 2
0250   01340 000003  B3     OCT 3
0251   01341 000004  B4     OCT 4
0252   01342 000005  B5     OCT 5
0253   01343 000006  B6     OCT 6
0254   01344 000007  B7     OCT 7
0255   01345 000010  B10    OCT 10
0256   01346 000017  B17    OCT 17
0257   01347 000037  B37    OCT 37
0258   01350 000040  B40    OCT 40
0259   01351 000054  B54    OCT 54
0260   01352 000060  B60    OCT 60
0261   01353 000070  B70    OCT 70
0262   01354 000077  B77    OCT 77
0263   01355 000140  B140   OCT 140
0264   01356 000170  B170   OCT 170
0265   01357 000177  B177   OCT 177
0266   01360 000777  B777   OCT 777
0267   01361 007700  B7700  OCT 7700
0268   01362 006500  B6,5K  OCT 6500
0269   01363 010000  B10K   OCT 10000
0270   01364 070000  B70K   OCT 70000
0271   01365 100000  B100K  OCT 100000
0272   01366 177777  M1     OCT -1
0273   01367 177776  M2     OCT -2
0274   01370 170000  M10K   OCT -10000
0275   01371 177760  M17    OCT 177760
0276   01372 177700  M77    OCT 177700
0277   01373 107777  M70K   OCT 107777
0278   01374 010003  D8K3   OCT 10003
0279   01375 070003  D32K3  OCT 70003
0280   01376 177777  TMPA   OCT -1
0281   01377 000000  TMPB   OCT 0
0282   01400 000000  SVA    NOP
0283   01401 000000  SVB    NOP
0284   01402 000000  FADD   NOP
0285   01403 000000  LADD   NOP
0286   01404 000000  DISN   NOP
0287   01405 000000  DISP   NOP
0288   01406 000000  SWRX   NOP
0289   01407 000000  BIOSC  NOP
0290   01410 000000  SCX    NOP
0291   01411 000000  IBUFP  NOP
0292   01412 172525  APTRN  OCT 172525
0293   01413 125252  ALT0   OCT 125252
0294   01414 125253  ALT0A  OCT 125253
0295   01415 052525  ALT1   OCT 052525
0296   01416 052526  ALT1A  OCT 052526
```

```
0298   01417 002720   CFIG   DEF CFRG
0299   01420 004100   CKSC   DEF CKSC
0300   01421 004062   ISCR   DEF ISC
0301   01422 004024   MDVR   DEF MVDVR
0302   01423 004000   CFM    DEF CFMEM
0303   01424 004113   MSG    DEF MSGR
0304   01425 004150   IBUFD  DEF IBUF
0305   01426 004163   CNST   DEF CNTS
0306   01427 004261   CNSC   DEF CVSC
0307   01430 001376   DTMPA  DEF TMPA
0308   01431 001377   DTMPB  DEF TMPB
0309   01432 000551   GMTSA  DEF GMTS
0310   01433 000620   GMTEA  DEF GMTE
0311   01434 000530   DJBR0  DEF JBR0
0312   01435 000540   DJBR1  DEF JBR1
0313   01436 002104   DJBR2  DEF JBR2
0314   01437 006740   DTMC   DEF TMC
0315   01440 006734   DTMI   DEF TMI
0316   01441 007431   DLDVR  DEF LDVR
0317   01442 007327   DCO    DEF CNSLO
0318   01443 007404   LPDV   DEF LNPTR
0319   01444 106075   MHLT   OCT 106075
0320*
0321*
0322   01445 015446   CFMPJ  JSB **1
0323   01446 000000          NOP
0324   01447 103100          CLF INTP
0325   01450 107705          CLC 5B,C       TURN OFF MEMORY PROTECT
0326   01451 006400          CLB
0327   01452 125446          JMP **-4,I     RETURN
0328*
0329   01453 101454   DEFT   DEF **1,I
0330   01454 000101          OCT 101,102,103,104,106,107
0331   01462 000121          OCT 121,122,123,124,125,127
0332   01470 001437          DEF DTMC
0333   01471 006501          DEF LDMXA
0334   01472 006562          DEF FMTBF
0335   01473 001366          DEF M1
0336*
0337   01474 160000   CMABT  OCT 160000
```

PAGE 0028 #02  DIAGNOSTIC CONFIGURATOR  (DSN 000200)

```
0484#                        START OF PRE-TEST PART B (CP)
0485#
0486   01771 002400  NXT05 CLA
0487   01772 102601         OTA SWREG      CLEAR S-REG.
0488   01773 102301         SOS
0489   01774 002040         SEZ
0490   01775 102066         HLT ERH        E / O SET
0491   01776 060132         LDA HLT0       HALT IF CURRENT PAGE/
0492   01777 064132         LDB HLT0          BASE PAGE DOESN'T WORK
0493   02000 026001         JMP *+1
0494   02001 066764         LDB .ALT1
0495   02002 061413         LDA ALT0
0496   02003 002001         RSS
0497   02004 000001         OCT 1          USED IN CPU TYPE CALCULATION
0498   02005 072771         STA .TMPA
0499   02006 075377         STB TMPB
0500   02007 052763         CPA .ALT0
0501   02010 002001         RSS
0502   02011 102066         HLT ERH        LDA (BP) / CPA (CP)
0503   02012 055415         CPB ALT1
0504   02013 002001         RSS
0505   02014 102066         HLT ERH        LDB (CP) / CPB (BP)
0506   02015 066771         LDB .TMPA
0507   02016 061377         LDA TMPB
0508   02017 052764         CPA .ALT1
0509   02020 002001         RSS
0510   02021 102066         HLT ERH        STB (BP)   CPA (CP)
0511   02022 055413         CPB ALT0
0512   02023 002001         RSS
0513   02024 102066         HLT ERH        STA (CP) / CPB (BP)
```

PAGE 0029 #02  DIAGNOSTIC CONFIGURATOR  (CSN 000200)

```
0515*                          PRE-TEST PART B (CP)
0516   02025 026027              JMP *+2
0517   02026 102066              HLT ERH        JMP (CP)
0518   02027 026033              JMP *+4
0519   02030 102066              HLT ERH        JMP (CP)
0520   02031 026035              JMP *+4
0521   02032 102066              HLT ERH        JMP (CP)
0522   02033 026031              JMP *-2
0523   02034 102066              HLT ERH        JMP (CP)
0524*
0525   02035 025303              JMP BPJP0
0526   02036 102066              HLT ERH        JMP (CP) TO (BP)
0527   02037 126041  CPJP0       JMP *+2,I
0528   02040 102066              HLT ERH        JMP (CP),I (TO BP)
0529   02041 001315              DEF BPJP1
0530   02042 102066              HLT ERH        JMP (CP),I (TO BP)
0531   02043 102066              HLT ERH          "   "        "
0532   02044 126046  CPJP1       JMP *+2,I
0533   02045 102066              HLT ERH        JMP (CP),I (TO CP)
0534   02046 002051              DEF *+3
0535   02047 102066              HLT ERH        JMP (CP),I (TO CP)
0536   02050 102066              HLT ERH            "          "
0537*
0538   02051 002400              CLA
0539   02052 072062              STA .JB0
0540   02053 072075              STA .JB1
0541   02054 071322              STA BPJB0
0542   02055 072105              STA CPJB0
0543   02056 060132              LDA HLT0
0544   02057 064132              LDB HLT0
0545   02060 016062              JSB *+2
0546   02061 102066  JBR3        HLT ERH        JSB (CP)
0547   02062 000000  .JB0        NOP
0548   02063 062062              LDA *-1
0549   02064 052773              CPA DJBR3
0550   02065 002001              RSS
0551   02066 102066              HLT ERH        JSB (CP) RETURN ADRESS
0552   02067 060132              LDA HLT0
0553   02070 116072              JSB *+2,I
0554   02071 102066  JBR4        HLT ERH        JSB (CP),I
0555   02072 002075              DEF *+3
0556   02073 102066              HLT ERH        JSB (CP),I
0557   02074 102066              HLT ERH        JSB (CP),I
0558   02075 000000  .JB1        NOP
0559   02076 062075              LDA *-1
0560   02077 052774              CPA DJBR4
0561   02100 002001              RSS
0562   02101 102066              HLT ERH        JSB (CP),I  RETURN ADDRESS
0563   02102 060132              LDA HLT0
0564   02103 015322              JSB BPJB0
0565   02104 102066  JBR2        HLT ERH        JSB (BP)
0566   02105 000000  CPJB0       NOP
0567   02106 062105              LDA *-1
0568   02107 052775              CPA DJBR5
0569   02110 002001              RSS
0570   02111 102066              HLT ERH        JSB (BP),I TO CP RETURN ADDRESS
```

PAGE 0030 #02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```
0572*                          PRE-TEST PART B (CP)
0573*
0574  02112 062765        LDA SRGP1     1000100010001111
0575  02113 066766        LDB SRGP2                      1001110000100000
0576  02114 001000        ALS           1001001000100111
0001  02115 005100        BRS                            1100111000001000
0002  02116 001100        ARS           1100100100010011
0003  02117 005400        BLR                            0001110000100000
0004  02120 001000        ALS           1001001000100111
0005  02121 005700        BLF                            1000001000000001
0006  02122 001300        RAR           0100100100010011
0007  02123 005000        BLS                            1000010000000010
0008  02124 001100        ARS           0010010010010011
0009  02125 005300        RBR                            0100001000000001
0010  02126 001400        ALR           0100100100010010
0011  02127 005000        BLS                            0000010000000010
0012  02130 001200        RAL           1001001001001100
0013  02131 005700        BLF                            0100000000100000
0014  02132 001100        ARS           1100100100010010
0015  02133 005200        RBL                            1000000001000000
0016  02134 001400        ALR           0001001001001100
0017  02135 005100        BRS                            1100000000100000
0018  02136 001700        ALF           0010010011000001
0019  02137 005200        RBL                            1000000001000001
0020  02140 001200        RAL           0100100110000010
0021  02141 005100        BRS                            1100000000100000
0022  02142 001000        ALS           0001001100000100
0023  02143 005300        RBR                            0110000000010000
0024  02144 001300        RAR           0000100110000010
0025  02145 005400        BLR                            0100000000100000
0026  02146 001700        ALF           1001100000100000
0027  02147 005000        BLS                            0000000001000000
0028  02150 052766        CPA SRGP2
0029  02151 002001        RSS
0030  02152 102066        HLT ERR       SRG INST A-REG.
0031  02153 056767        CPB SRGP3
0032  02154 002001        RSS
0033  02155 102066        HLT ERR       SRG INST B-REG.
0034  02156 102301        SOS
0035  02157 002040        SEZ
0036  02160 102066        HLT ERR       E / O SET
```

PAGE 0031 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```
0038*                          PRE-TEST PART B (CP)
0039*
0040   02161 066765              LDB SRGP1      1000100100100111
0041   02162 062766              LDA SRGP2                      1001110000100000
0042   02163 005000              BLS            1001001001001110
0043   02164 001100              ARS                            1100110000010000
0044   02165 005100              BRS            1100100100100111
0045   02166 001400              ALR                            0001110000100000
0046   02167 005000              BLS            1001001001001110
0047   02170 001700              ALF                            1000001000000001
0048   02171 005300              RBR            0100100100100111
0049   02172 001000              ALS                            1000010000000010
0050   02173 005100              BRS            0010010010010011
0051   02174 001300              RAR                            0100001000000001
0052   02175 005400              BLR            0100100100100110
0053   02176 001000              ALS                            0000010000000010
0054   02177 005200              RBL            1001001001001100
0055   02200 001700              ALF                            0100000000100000
0056   02201 005100              BRS            1100100100100110
0057   02202 001200              RAL                            1000000001000000
0058   02203 005400              BLR            0001001001001100
0059   02204 001100              ARS                            1100000000100000
0060   02205 005700              BLF            0010010011000001
0061   02206 001200              RAL                            1000000001000001
0062   02207 005200              RBL            0100100110000010
0063   02210 001100              ARS                            1100000000100000
0064   02211 005000              BLS            0001001100000100
0065   02212 001300              RAR                            0110000000010000
0066   02213 005300              RBR            0000100110000010
0067   02214 001400              ALR                            0100000000100000
0068   02215 005700              BLF            1001100000100000
0069   02216 001000              ALS                            0000000001000000
0070   02217 056766              CPB SRGP2
0071   02220 002001              RSS
0072   02221 102066              HLT ERR        SRG INST B-REG.
0073   02222 052767              CPA SRGP3
0074   02223 002001              RSS
0075   02224 102066              HLT ERR        SRG INST A-REG.
0076   02225 102301              SCS
0077   02226 002040              SEZ
0078   02227 102066              HLT ERR        E / O SET
```

PAGE 0032 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```
0080*                          PRE-TEST PART B (CP)
0081*
0082  02230 062765               LDA SRGP1      1000100100100111
0083  02231 066766               LDB SRGP2                      1001100000100000
0084  02232 000020               OCT 0020 ALS   1001001001001110
0085  02233 004021               OCT 4021 BRS                   1100110000010000
0086  02234 000021               OCT 0021 ARS   1100100100100111
0087  02235 004024               OCT 4024 BLR                   0001100000100000
0088  02236 000020               OCT 0020 ALS   1001001001001110
0089  02237 004027               OCT 4027 BLF                   1000001000000001
0090  02240 000023               OCT 0023 RAR   0100100100100111
0091  02241 004020               OCT 4020 BLS                   1000010000000010
0092  02242 000021               OCT 0021 ARS   0010010010010011
0093  02243 004023               OCT 4023 RBR                   0100001000000001
0094  02244 000024               OCT 0024 ALR   0100100100100110
0095  02245 004020               OCT 4020 BLS                   0000010000000010
0096  02246 000022               OCT 0022 RAL   1001001001001100
0097  02247 004027               OCT 4027 BLF                   0100000000100000
0098  02250 000021               OCT 0021 ARS   1100100100100110
0099  02251 004022               OCT 4022 RBL                   1000000001000000
0100  02252 000024               OCT 0024 ALR   0001001001001100
0101  02253 004021               OCT 4021 BRS                   1100000000100000
0102  02254 000027               OCT 0027 ALF   0010010011000001
0103  02255 004022               OCT 4022 RBL                   1000000001000001
0104  02256 000022               OCT 0022 RAL   0100100110000010
0105  02257 004021               OCT 4021 BRS                   1100000000100000
0106  02260 000020               OCT 0020 ALS   0001001100000100
0107  02261 004023               OCT 4023 RBR                   0110000000010000
0108  02262 000023               OCT 0023 RAR   0000100110000010
0109  02263 004024               OCT 4024 BLR                   0100000000100000
0110  02264 000027               OCT 0027 ALF   1001100000100000
0111  02265 004020               OCT 4020 BLS                   0000000001000000
0112  02266 052766               CPA SRGP2
0113  02267 002001               RSS
0114  02270 102066               HLT ERH        SRG INST A-REG.
0115  02271 056767               CPB SRGP3
0116  02272 002001               RSS
0117  02273 102066               HLT ERH        SRG INST B-REG.
0118  02274 102301               SCS
0119  02275 002040               SEZ
0120  02276 102066               HLT ERH        E / O SET
```

PAGE 0033 #03 DIAGNOSTIC CONFIGURATOR (DSN 002200)

```
0122*                          PRE-TEST PART B (CF)
0123*
0124   02277 066765              LDB SRGP1      1000100100100111
0125   02300 062766              LDA SRGP2                       1001100000100000
0126   02301 004020              OCT 4020 BLS   1001001001001110
0127   02302 000021              OCT 0021 ARS                    1100110000010000
0128   02303 004021              OCT 4021 BRS   1100100100100111
0129   02304 000024              OCT 0024 ALR                    0001100000100000
0130   02305 004020              OCT 4020 BLS   1001001001001110
0131   02306 000027              OCT 0027 ALF                    1000001000000001
0132   02307 004023              OCT 4023 RBR   0100100100100111
0133   02310 000020              OCT 0020 ALS                    1000010000000010
0134   02311 004021              OCT 4021 BRS   0010010001001011
0135   02312 000023              OCT 0023 RAR                    0100001000000001
0136   02313 004024              OCT 4024 BLR   0100100100100110
0137   02314 000020              OCT 0020 ALS                    0000010000000010
0138   02315 004022              OCT 4022 RBL   1001001001001100
0139   02316 000027              OCT 0027 ALF                    0100000000100000
0140   02317 004021              OCT 4021 BRS   1100100100100110
0141   02320 000022              OCT 0022 RAL                    1000000001000000
0142   02321 004024              OCT 4024 BLR   0001001001001100
0143   02322 000021              OCT 0021 ARS                    1100000000100000
0144   02323 004027              OCT 4027 BLF   0010010011000001
0145   02324 000022              OCT 0022 RAL                    1000000001000001
0146   02325 004022              OCT 4022 RBL   0100100110000010
0147   02326 000021              OCT 0021 ARS                    1100000000100000
0148   02327 004020              OCT 4020 BLS   0001001100000100
0149   02330 000023              OCT 0023 RAR                    0110000000010000
0150   02331 004023              OCT 4023 RBR   0000100110000010
0151   02332 000024              OCT 0024 ALR                    0100000000100000
0152   02333 004027              OCT 4027 BLF   1001100000100000
0153   02334 000020              OCT 0020 ALS                    0000000001000000
0154   02335 056766              CPB SRGP2
0155   02336 002001              RSS
0156   02337 102066              HLT ERH        SRG INST B-REG.
0157   02340 052767              CPA SRGP3
0158   02341 002001              RSS
0159   02342 102066              HLT ERH        SRG INST A-REG.
0160   02343 102301              SCS
0161   02344 002040              SEZ
0162   02345 102066              HLT ERH        E / O SET
```

PAGE 0034 #03  DIAGNOSTIC CONFIGURATOR  (DSN 000200)

```
0164*                    PRE-TEST PART B (CF)
0165*
0166   02346 062770        LDA SRGEP      0111010001110010
0167   02347 066770        LDB SRGEP                       0111010001110010
0168   02350 001500        ERA            0011101000111001 0
0169   02351 005600        ELB                             0 1110100011100100
0170   02352 001500        ERA            0001110100011100 1
0171   02353 005600        ELB                             1 1101000111001001
0172   02354 001500        ERA            1000111010001110 0
0173   02355 005600        ELB                             1 1010001110010010
0174   02356 001500        ERA            1100011101000111 0
0175   02357 005600        ELB                             1 0100011100100100
0176   02360 001500        ERA            1110000111010011 1
0177   02361 005600        ELB                             0 1000111001001001
0178   02362 001500        ERA            0111000111010001 1
0179   02363 005600        ELB                             1 0001110010010011
0180   02364 001500        ERA            1011100011101000 1
0181   02365 005600        ELB                             0 0011100100100111
0182   02366 001500        ERA            0101110001110100 0
0183   02367 005600        ELB                             0 0111001001001110
0184   02370 005500        ERB                             0 0011100100100111
0185   02371 001600        ELA            1011100011101000 0
0186   02372 005500        ERB                             1 0001110010010011
0187   02373 001600        ELA            0111000111010001 1
0188   02374 005500        ERB                             1 1000111001001001
0189   02375 001600        ELA            1110000111010011 0
0190   02376 005500        ERB                             1 0100011100100100
0191   02377 001600        ELA            1100011101000111 1
0192   02400 005500        ERB                             0 1010001110010010
0193   02401 001600        ELA            1000111010001110 1
0194   02402 005500        ERB                             0 1101000111001001
0195   02403 001600        ELA            0001110100011100 1
0196   02404 005500        ERB                             1 1110100011100100
0197   02405 001600        ELA            0011101000111001 0
0198   02406 005500        ERB                             0 0111010001110010
0199   02407 001600        ELA            0111010001110010 0
0200   02410 052770        CPA SRGEP
0201   02411 002001        RSS
0202   02412 102066        HLT ERH        SRG E-REG ERROR
0203   02413 056770        CPB SRGEP
0204   02414 002001        RSS
0205   02415 102066        HLT ERH        SRG E-REG ERROR
0206   02416 102301        SOS
0207   02417 002040        SEZ
0208   02420 102066        HLT ERH        E / C SET
```

PAGE 0035 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```
0210*                          PRE-TEST PART B (CP)
0211*
0212  02421 062770             LDA SRGEP      0111010001110010
0213  02422 066770             LDB SRGEP                      0111010001110010
0214  02423 000025             OCT 0025 ERA   0011110100011100 0
0215  02424 004026             OCT 4026 ELB                   0 1110100011100100
0216  02425 000025             OCT 0025 ERA   0001111010001100 1
0217  02426 004026             OCT 4026 ELB                   1 1101000111001001
0218  02427 000025             OCT 0025 ERA   1000111010001110 0
0219  02430 004026             OCT 4026 ELB                   1 1010001110010010
0220  02431 000025             OCT 0025 ERA   1100011101000111 0
0221  02432 004026             OCT 4026 ELB                   1 0100011100100100
0222  02433 000025             OCT 0025 ERA   1110001110100011 1
0223  02434 004026             OCT 4026 ELB                   0 1000111001001001
0224  02435 000025             OCT 0025 ERA   0111000111010001 1
0225  02436 004026             OCT 4026 ELB                   1 0001110010010011
0226  02437 000025             OCT 0025 ERA   1011100011101000 1
0227  02440 004026             OCT 4026 ELB                   0 0011100101001111
0228  02441 000025             OCT 0025 ERA   0101110001110100 0
0229  02442 004026             OCT 4026 ELB                   0 0111001001001110
0230  02443 004025             OCT 4025 ERB                   0 0011100100100111
0231  02444 000026             OCT 0026 ELA   1011100011101000 0
0232  02445 004025             OCT 4025 ERB                   1 0001110010010011
0233  02446 000026             OCT 0026 ELA   0111000111010001 1
0234  02447 004025             OCT 4025 ERB                   1 1000111001001001
0235  02450 000026             OCT 0026 ELA   1110001110100011 0
0236  02451 004025             OCT 4025 ERB                   1 0100011100100100
0237  02452 000026             OCT 0026 ELA   1100011101000111 1
0238  02453 004025             OCT 4025 ERB                   0 1010001110010010
0239  02454 000026             OCT 0026 ELA   1000111010001110 1
0240  02455 004025             OCT 4025 ERB                   0 1101000111001001
0241  02456 000026             OCT 0026 ELA   0001110100011100 1
0242  02457 004025             OCT 4025 ERB                   1 1110100011100100
0243  02460 000026             OCT 0026 ELA   0011101000111001 0
0244  02461 004025             OCT 4025 ERB                   0 0111010001110010
0245  02462 000026             OCT 0026 ELA   0111010001110010 0
0246  02463 052770             CPA SRGEP
0247  02464 002001             RSS
0248  02465 102066             HLT ERH        SRG E-REG ERROR
0249  02466 056770             CPB SRGEP
0250  02467 002001             RSS
0251  02470 102066             HLT ERH        SRG E-REG ERROR
0252  02471 102301             SCS
0253  02472 002040             SEZ
0254  02473 102066             HLT ERH        E / C SET
```

```
 PAGE 0036 #03  DIAGNOSTIC CONFIGURATOR  (DSN 000200)


0256*                    PRE-TEST PART B (CP)
0257*
0258*                    BASIC I/O TEST
0259*
0260   02474          BIOT  EQL *
0261   02474 061406         LDA SWRX
0262   02475 011354         AND B77
0263   02476 071407         STA BIOSC      SAVE IT
0264   02477 002003         SZA,RSS        IS THERE ONE?
0265   02500 026702         JMP BIOEX      NO SKIP BASIC I/O
0266   02501 011353         AND B70        CHECK OVER 7B
0267   02502 002003         SZA,RSS
0268   02503 102066         HLT ERH
0269   02504 067001  BIO0   LDB BIOSD      UPDATE I/O INSTRUCTIONS
0270   02505 160001         LDA B,I
0271   02506 051366         CPA M1         END OF LIST
0272   02507 026515         JMP BIO1       YES - START EXECUTION
0273   02510 011372         AND M77        MASK OLD SC OFF
0274   02511 031407         IOR BIOSC       ADD NEW SC
0275   02512 170001         STA B,I        PUT IT BACK IN PLACE
0276   02513 006004         INB            MOVE TO NEXT INSTRUCTION
0277   02514 026505         JMP BIO0+1
0278   02515 065340  BIO1   LDB B3         SET TRAP CELLS
0279   02516 063000         LDA IHLT       TO INTERRUPT HALT
0280   02517 170001         STA B,I
0281   02520 055354         CPB B77        END
0282   02521 026524         JMP *+3        YES
0283   02522 006004         INB
0284   02523 026517         JMP *-4
0285   02524 107700         CLC INTP,C     GENERATE CRS TO ALL I/O
```

```
0287*                       PRE-TEST PART B (CP)
0288*
0289*                       BASIC I/O TEST
0290*
0291   02525 102100           STF INTP        TOGGLE INTERRUPT
0292   02526 103100           CLF INTP          FLAG TO CLEAR
0293   02527 102200           SFC INTP        IS IT CLEARED?
0294   02530 102066           HLT ERH         NO - ERROR
0295   02531 102300           SFS INTP        IS IT NOT SET
0296   02532 002001           RSS
0297   02533 102066           HLT ERH         NO - ERROR
0298   02534 102100           STF INTP        SET INTERRUPT FLAG
0299   02535 102300           SFS INTP        IS IT SET?
0300   02536 102066           HLT ERH         NO - ERROR
0301   02537 102200           SFC INTP        IS IT NOT CLEARED?
0302   02540 002001           RSS
0303   02541 102066           HLT ERH         NO - ERROR
0304   02542 103100           CLF INTP        TURN FLAG OFF
0305   02543 102100  BS01      STF SC          TOGGLE INTERFACE
0306   02544 103100  BS02      CLF SC            CARD FLAG TO CLEAR
0307   02545 102200  BS03      SFC SC          IS IT CLEARED?
0308   02546 102066           HLT ERH         NO - ERROR
0309   02547 102300  BS04      SFS SC          IS IT NOT SET?
0310   02550 002001           RSS
0311   02551 102066           HLT ERH         NO - ERROR
0312   02552 102100  BS05      STF SC          SET CARD FLAG
0313   02553 102300  BS06      SFS SC          IS IT SET
0314   02554 102066           HLT ERH         NO - ERROR
0315   02555 102200  BS07      SFC SC          IS IT NOT CLEAR?
0316   02556 002001           RSS
0317   02557 102066           HLT ERH         NO - ERROR
0318   02560 016751           JSB BICI        SET INTERRUPT RETURN
0319   02561 002571           DEF BIOR1       INTERRUPT TO ERROR
0320   02562 102100  BS08      STF SC          SET THE FLAG
0321   02563 102700  BS09      STC SC            AND CONTROL
0322   02564 102100           STF INTP        TURN I/O SYSTEM ON THEN
0323   02565 103100           CLF INTP        TURN I/O SYSTEM OFF
0324   02566 000000           NOP             GIVE IT A CHANCE TO INTERRUPT
0325   02567 000000           NOP
0326   02570 026573           JMP *+3
0327   02571 000000  BIOR1     NOP
0328   02572 102066           HLT ERH         INTERRUPT CANT BE TURNED OFF
0329   02573 107700           CLC INTP,C      GENERATE CRS
```

```
 PAGE 0038 #03  DIAGNOSTIC CONFIGURATOR  (CSN 002200)


0331*                    PRE-TEST PART B (CP)
0332*
0333*                    BSIC I/C TEST
0334*
0335   02574 107700  BS10  CLC SC,C       RESET SC FLAG AND CONTROL
0336   02575 065345        LDB B10        START WITH LOWEST ADDRESS
0337   02576 055407  BIO2  CPB BIOSC       IS IT THIS SELECT CODE
0338   02577 026607        JMP BIO3       YES - SKIP CHECK
0339   02600 062776        LDA .STF       SET UP
0340   02601 030001        IOR B            INSTRUCTIONS
0341   02602 072604        STA *+2
0342   02603 103100  BS11  CLF SC         CLEAR SC FLAG
0343   02604 000000        NOP
0344   02605 102200  BS12  SFC SC         CHECK SC FLAG
0345   02606 102066        HLT ERH        NOT CLEAR THEN ERROR
0346   02607 055354  BIO3  CPB B77        IS THAT THE LAST?
0347   02610 026613        JMP *+3        YES - MOVE TO NEXT TEST
0348   02611 006004        INB            NO - MOVE TO NEXT SC
0349   02612 026576        JMP BIO2         AND CHECK IT
0350   02613 107700        CLC INTP,C     CREATE CRS INCASE OF PRIV. INT.
0351   02614 016751        JSB BIOI       SET INTERRUPT LINK
0352   02615 002726        DEF BIOI0
0353   02616 002400        CLA            CLEAR FLAGS
0354   02617 072635        STA BIOJD
0355   02620 072726        STA BIOI0
0356   02621 071376        STA TMPA
0357   02622 102700  BS13  STC SC         TURN ON
0358   02623 102100  BS14  STF SC           CARD
0359   02624 102100        STF INTP        AND INTF'S
0360   02625 102701        STC 1          *
0361   02626 102101        STF 1          *
0362   02627 106701        CLC 1          *
0363   02630 103101        CLF 1          *  NO INTERRUPT
0364   02631 126632        JMP **1,I      *  SHOULD OCCUR
0365   02632 002633        DEF **1        *  HERE
0366   02633 116634        JSB **1,I      *
0367   02634 002635        DEF **1        *
0368   02635 000000  BIOJD NOP            *
0369   02636 035376        ISZ TMPA        INT. SHOULD BE HERE
0370   02637 035376        ISZ TMPA
0371   02640 103100        CLF INTP       TURN I/O SYSTEM OFF
0372   02641 107700  BS15  CLC SC,C       RESET SC FLAG AND CONTROL
0373   02642 066726        LDB BIOI0      DID IT INTERRUPT?
0374   02643 006003        SZB,RSS
0375   02644 102066        HLT ERH        NO - ERROR
0376   02645 065376        LDB TMPA        RETURN CORRECTLY
0377   02646 055337        CPB B2
0378   02647 002001        RSS
0379   02650 102066        HLT ERH        NO - ERROR
```

```
0381*                       PRE-TEST PART B (CF)
0382*
0383*                       BASIC I/O TEST
0384*
0385   02651 016751           JSB BICI
0386   02652 002663           DEF BICR2
0387   02653 102700   BS16    STC SC          CONTROL ON
0388   02654 102100   BS17    STF SC          FLAG UP
0389   02655 102100           STF INTP        TURN ON INTERRUPTS
0390   02656 106700   BS20    CLC SC          CLEAR SC CONTROL
0391   02657 000000           NOP             GIVE IT A CHANCE
0392   02660 000000           NOP             *
0393   02661 000000           NOP             *
0394   02662 026665           JMP *+3
0395   02663 000000   BICR2   NOP
0396   02664 102066           HLT ERH         CONTROL NOT CLEARED
0397   02665 103100           CLF INTP        TURN INTP'S OFF
0398   02666 016751           JSB BICI
0399   02667 002677           DEF BICR3
0400   02670 102700   BS21    STC SC          TURN CONTROL ON
0401   02671 102100           STF INTP        TURN INTP'S ON
0402   02672 106700           CLC INTP        CLEAR I/O SYSTEM
0403   02673 000000           NOP             GIVE IT A CHANCE
0404   02674 000000           NOP             *
0405   02675 000000           NOP             *
0406   02676 026701           JMP *+3
0407   02677 000000   BICR3   NOP
0408   02700 102066           HLT ERH
0409   02701 107700   BS22    CLC SC,C        TURN OFF DEVICE
0410   02702 107700   BIOEX   CLC INTP,C      TURN OFF ALL I O
0411   02703 061406           LDA SWRX        CHECK IF AUTOMATIC MODE
0412   02704 011361           AND B7700
0413   02705 002002           SZA
0414   02706 027030           JMP CFGR        YES GO TO CONFIGURATION
0415   02707 061406           LDA SWRX        CHECK IF LOOP
0416   02710 011363           AND B10K
0417   02711 002002           SZA
0418   02712 024140           JMP PTLP        YES LOOP
0419   02713 061406           LDA SWRX        RESTORE S-REG.
0420   02714 102601           OTA SWREG
0421   02715 061404           LDA DISN          AND A & B REG
0422   02716 065405           LDB DIBP
0423   02717 102077           HLT 77B         WAIT FOR CONFIGURATION INFORMATION
0424*
0425   02720 107700   CFRG    CLC INTP,C      TURN OFF ALL I/O
0426   02721 071404           STA DISN
0427   02722 075405           STB DIBP
0428   02723 102501           LIA SWREG       GET SWITCH REGISTER
0429   02724 071406           STA SWRX
0430   02725 027030           JMP CFGR        GO TO CONFIGURATION
```

```
 PAGE 0040 #03  DIAGNOSTIC CONFIGURATOR  (DSN 000200)


0432*                       PRE-TEST PART B (CP)
0433*
0434*                       BASIC I/O TEST
0435*
0436   02726 000000  BIOI0 NOP
0437   02727 103100         CLF INTP        TURN I/O SYSTEM OFF
0438   02730 066635         LDB BIOJD       CHECK TO SE IF ALL
0439   02731 056747         CPB BIOD0          INSTRUCTIONS COMPLETED
0440   02732 002001         RSS
0441   02733 102066         HLT ERH         NO - ERROR
0442   02734 066750         LDB BIOD1       CHECK RETURN ADDRESS
0443   02735 056726         CPB BIOI0       *
0444   02736 026741         JMP **3         *
0445   02737 006004         INB             *
0446   02740 056726         CPB BIOI0       *
0447   02741 002001         RSS             *
0448   02742 102066         HLT ERH         *
0449   02743 016751         JSB BIOI        SET ERROR IF SECOND INTP
0450   02744 002760         DEF BIOE
0451   02745 102100         STF INTP        TURN I/O SYSTEM ON
0452   02746 126726         JMP BIOI0,I     CONTINUE TEST
0453*
0454   02747 002634  BIOD0 DEF BIOJD-1
0455   02750 002636  BIOD1 DEF BIOJD+1
0456*
0457*
0458   02751 000000  BIOI  NOP
0459   02752 166751         LDB BIOI,I
0460   02753 036751         ISZ BIOI
0461   02754 074003         STB 3B
0462   02755 066777         LDB JSBI,
0463   02756 074000  BSSTB STB SC
0464   02757 126751         JMP BIOI,I
0465*
0466*
0467   02760 000000  BIOE  NOP
0468   02761 102066         HLT ERH         SECOND INTERRUPT OCCURED
0469   02762 126760         JMP BIOE,I
0470*
```

```
PAGE 0041 #03  DIAGNOSTIC CONFIGURATOR  (DSN 002200)


0472   02763 125252   .ALT0  OCT  125252
0473   02764 052525   .ALT1  OCT  052525
0474   02765 104447   SRGP1  OCT  104447     1000100100100111
0475   02766 114040   SRGP2  OCT  114040                       1001100000100000
0476   02767 000100   SRGP3  OCT  000100
0477   02770 072162   SRGEP  OCT  072162     0111010001110010
0478   02771 000000   .TMPA  NOP
0479   02772 000000   .TMPB  NOP
0480   02773 002061   DJBR3  DEF  JBR3
0481   02774 002071   DJBR4  DEF  JBR4
0482   02775 001331   DJBR5  DEF  JBR5
0483   02776 102100   .STF   STF  0
0484   02777 114003   JSBI.  JSB  3B,I
0485   03000 106077   IHLT   OCT  106077
0486*
0487*
0488   03001 103002   BIOSD  DEF  *+1,I
0489   03002 002543          DEF  BS01
0490   03003 002544          DEF  BS02
0491   03004 002545          DEF  BS03
0492   03005 002547          DEF  BS04
0493   03006 002552          DEF  BS05
0494   03007 002553          DEF  BS06
0495   03010 002555          DEF  BS07
0496   03011 002562          DEF  BS08
0497   03012 002563          DEF  BS09
0498   03013 002574          DEF  BS10
0499   03014 002603          DEF  BS11
0500   03015 002605          DEF  BS12
0501   03016 002622          DEF  BS13
0502   03017 002623          DEF  BS14
0503   03020 002641          DEF  BS15
0504   03021 002653          DEF  BS16
0505   03022 002654          DEF  BS17
0506   03023 002656          DEF  BS20
0507   03024 002670          DEF  BS21
0508   03025 002701          DEF  BS22
0509   03026 002756          DEF  BSSTB
0510   03027 001366          DEF  M1
```

# BASIC BINARY LOADER LISTINGS

APPENDIX E

## E-1. GENERAL

With the availability of the Configurator and diagnostics on different media and the 2100A/S, 2114A/B, 2115A, and 2116A/B/C computers not having appropriate absolute binary ROM loaders, it will be necessary to toggle the corresponding loader into the last 64 locations of any one page in the available base memory, excluding pages 0, 1, or 2. (The configurator will load into any memory location from 2 to 7677.)

Table E-1 summarizes the four loaders listed in tables E-2 through E-5. Table E-1 also specifies the peripheral product and corresponding interface, subsystem, and loader format.

Table E-1. Basic Binary Loader Reference

| LOADER LISTING | ASSOCIATED DEVICE | | | FORMAT |
|---|---|---|---|---|
| | PERIPHERAL PRODUCT | INTERFACE | SUBSYSTEM NUMBER | |
| Table E-2 | 7900 Cartridge Disc | 13210A Disc Interface | 12960A | Disc Boot |
| | 7901 Cartridge Disc | 13210A Disc Interface | 12961A | Disc Boot |
| Table E-3 | 7905/20 Cartridge Disc | 13175A or 13178B Disc Interface | 12962A/B/C/D (For 7905 Only) | Disc Boot |
| Table E-4 | 2644/45 CRT Terminal | 12966A Buffered Async Interface or 12968A Async Interface | N/A | Absolute Binary |
| Table E-5 | 7970B Mag Tape | 13181A Mag Tape Interface | 12970A | Absolute Binary |
| | 7970E Mag Tape | 13183A Mag Tape Interface | 12972A | Absolute Binary |

## E-2. 7900/7901 DISC LOADER

This disc loader loads a program from an HP 7900 or 7901 into memory. Starting at the beginning of cylinder 0, it is used to load from the selected surface of disc drive 0 a block of 128 (decimal) words into memory starting at location 2011 (octal). It then jumps indirect to a subroutine via memory address 2055 (octal) to execute the program just loaded from the disc. This program can be a boot loader which loads the Configurator after RUN is pressed. If the load is not successful, the result is unpredictable and the disc loader may have to be reloaded if a second load execution is desired. Before execution, the S-register must be set to 10 (octal). Table E-2 lists the loading and execution procedure.

## E-3. 7905/7920 DISC LOADER

This disc loader loads a program from an HP 7905 or an HP 7920 into memory. Starting at the beginning of cylinder 0, it is used to load from the selected surface of disc drive 0 a block of 128

words into memory starting at location 2011 (octal). It then jumps indirect to a subroutine via memory address 2055 (octal) to execute the program just loaded from the disc. This program can be a boot loader which loads the Configurator after RUN is pressed. If the load is not successful, the result is unpredictable and the disc loader may have to be reloaded if a second load execution is desired. Before execution, the S-register must be set to 10 (octal). Table E-3 lists the loading and execution procedure.

## E-4. 2644/45 CARTRIDGE TAPE LOADER

This loader is used to load the Configurator stored on an HP 2644/45 cartridge tape via an HP 12966A Buffered Asynchronous Interface or an HP 12968A Asynchronous Interface into memory. The operator must select via the console the unit and file number prior to starting the loader. (Refer to *HP 2644A Mini Data Station Owner's Manual,* part no. 02644-90001, or to the *HP 2645A Display Station User's Manual,* part no. 02645-90001.) There are no S-register settings required. Table E-4 lists the loading and execution procedure.

## E-5. 7970B/7970E MAGNETIC TAPE LOADER

This loader is used to load the Configurator from 9-track magnetic tape (unit 0 only) into memory. Due to the fact that this loader does not have file selection capabilities, it is the responsibility of the operator to ensure that the next file to be read is the Configurator. There are no S-register settings required. Table E-5 lists the loading and execution procedure.

Table E-2. HP 7900/7901 Disc Boot Loader

```
0001                    ASMB,A,B,L,C
0003  07700                   ORG 7700B
0004*
0005*
0006****  7900 DISC BOOT LOADER  ****
0007*
0008*
0009*     LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*     ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC'S FOR
0011*     THE DATA (DC) AND CONTROL (CC) CHANNELS. BRING THE
0012*     P-REGISTER TO THE STARTING ADDRESS OF THE PROGRAM,
0013*     SET S-REGISTER TO 10 (OCTAL), PRESS PRESET (INT.
0014*     AND EXT.) AND RUN.
0015*
0016*
0017*     SEEK CYLINDER 0, UPPER/LOWER PLATTER, SECTOR 0
0018*
0019  07700 067741  START LDB SEEKC       GET SEEK COMMAND WORD
0020  07701 106600        OTB DC    <--   USE WORD FOR ADDRESS 0
0021  07702 103700        STC DC,C  <--     AND OUTPUT TO DATA CHANNEL
0022  07703 106601        OTB CC    <--   OUTPUT SEEK COMMAND
0023  07704 103701        STC CC,C  <--     AND START SEEK
0024  07705 102300        SFS DC    <--   HAS CYLINDER ADDRESS BEEN ACCEPTED?
0025  07706 027705        JMP *-1           NO
0026  07707 002400        CLA               SPECIFY HEAD 0 AND SECTOR 0
0027  07710 102600        OTA DC    <--     AND OUTPUT TO DATA CHANNEL
0028  07711 103700        STC DC,C  <--
0029  07712 102301        SFS CC    <--   IS SEEK OPERATION COMPLETED?
0030  07713 027712        JMP *-1           NO
0031*
0032*     DMA INITIALIZATION
0033*
0034  07714 067735        LDB DMACW         GET DMA CONTROL WORD
0035  07715 106606        OTB 6             ISSUE DMA CONTROL WORD
0036  07716 067736        LDB ADDR1         GET MEMORY ADDR AND SPECIFY INPUT
0037  07717 106602        OTB 2             ISSUE MEMORY ADDR
0038  07720 102702        STC 2             SELECT WORD COUNT
0039  07721 067740        LDB CNT           GET WORD COUNT
0040  07722 106602        OTB 2             ISSUE WORD COUNT
0041*
0042*     7900 READ ROUTINE
0043*
0044  07723 106700        CLC DC    <--   PREPARE CONTROLLER FOR READ COMMAND
0045  07724 106701        CLC CC    <--
0046  07725 063742        LDA READC         GET READ COMMAND WORD
0047  07726 103601        OTA CC,C  <--     AND OUTPUT COMMAND
0048  07727 103700        STC DC,C  <--   PREPARE DATA CHANNEL FOR READ OPERATION
0049  07730 103706        STC 6,C           START DMA TRANSFER
0050  07731 103701        STC CC,C  <--   INITIATE READ OPERATION
0051  07732 102301        SFS CC    <--   CHECK FOR TRANSFER FINISHED
0052  07733 027732        JMP *-1
0053  07734 117737  EXIT  JSB ADDR2,I     EXIT TO BOOT LOADER
0054*
0055*     CONSTANTS
0056*
0057  07735 120000  DMACW ABS 120000B+DC-SC OF CHANNEL (BITS 15 & 13 SET)
0058  07736 102011  ADDR1 OCT 102011
0059  07737 102055  ADDR2 OCT 102055
0060  07740 177600  CNT   DEC -128
0061  07741 030000  SEEKC OCT 030000      SEEK COMMAND WORD
0062  07742 020000  READC OCT 020000      READ COMMAND WORD
0063*
0064  00000         DC    EQU 0B
0065  00001         CC    EQU DC+1
0066                      END
**  NO ERRORS *TOTAL **RTE ASMB 750420**
```

Table E-3. HP 7905/20 Disc Boot Loader

```
0001                    ASMB,A,B,L,C
0003  07700                    ORG 7700B
0004*
0005*
0006****  7905 DISC BOOT LOADER  ****
0007*
0008*
0009*     LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*     ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC FOR
0011*     THE DISC CHANNEL. BRING THE P-REGISTER TO THE STAR-
0012*     TING ADDRESS OF THE PROGRAM, SET S-REGISTER TO 10
0013*     (OCTAL), PRESS PRESET (INT. AND EXT.) AND RUN.
0014*
0015*
0016*     DMA INITIALIZATION
0017*
0018  07700 067716  START LDB DMACW       GET DMA CONTROL WORD
0019  07701 106606        OTB 6           ISSUE DMA CONTROL WORD
0020  07702 067717        LDB ADDR1       GET MEMORY ADDR AND SPECIFY INPUT
0021  07703 106602        OTB 2           ISSUE MEMORY ADDR
0022  07704 102702        STC 2           SELECT WORD COUNT
0023  07705 067721        LDB CNT         GET WORD COUNT
0024  07706 106602        OTB 2           ISSUE WORD COUNT
0025*
0026*     7905 COLD LOAD ROUTINE
0027*
0028  07707 106700        CLC SC    <--   PREPARE CONTROLLER FOR COMMAND
0029  07710 002400        CLA             CREATE COLD LOAD READ, HEAD 0, SECTOR 0
0030  07711 103600        OTA SC,C  <--   OUTPUT COLD LOAD COMMAND
0031  07712 103706        STC 6,C         START DMA TRANSFER
0032  07713 102300        SFS SC    <--   CHECK FOR TRANSFER FINISHED
0033  07714 027713        JMP *-1
0034  07715 117720  EXIT  JSB ADDR2,I     EXIT TO BOOT LOADER
0035*
0036*     CONSTANTS
0037*
0038  07716 000000  DMACW ABS SC    <--   SC OF CHANNEL (BITS 15 & 13 CLEARED)
0039  07717 102011  ADDR1 OCT 102011
0040  07720 102055  ADDR2 OCT 102055
0041  07721 177600  CNT   DEC -128
0042*
0043  00000         SC    EQU 0B
0044                      END
**  NO ERRORS *TOTAL **RTE ASMB 750420**
```

Table E-4. HP 2644/45 Cartridge Tape Binary Loader

```
0001                    ASMB,A,B,L
0003  07700                    ORG 7700B
0004*
0005*
0006****  2644/45 CARTRIDGE TAPE ABSOLUTE BINARY LOADER
0007*
0008*
0009*     LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*     ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC FOR
0011*     THE CHANNEL. BRING THE P-REGISTER TO THE STARTING
0012*     ADDRESS OF THE PROGRAM, PRESS PRESET (INT. AND EXT.)
0013*     AND RUN.
0014*     THIS ASSUMES THE INTERFACE IS A 12966 OR 12968
0015*     THE BAUD RATE IS EXTERNAL
0016*     THE CARTRIDGE IS POSITIONED AT THE FILE TO BE READ
0017*    "RUN" CAN NOT BE PRESSED AFTER HALT 77B OR HALT 11B
0018*
0019*
0020  07700 063773  START LDA LDOTP      RESET POINTER
0021  07701 073702        STA *+1
0022  07702 063763  NCW   LDA OTP       GET A WORD FROM THE TABLE
0023  07703 037702        ISZ *-1       MOVE TO NEXT WORD IN TABLE
0024  07704 103600        OTA SC,C ←    OUTPUT CURRENT WORD
0025  07705 053771        CPA EOT       END OF TABLE?
0026  07706 027717        JMP NRD       YES - START INPUT
0027  07707 001727        ALF,ALF       IS THIS A CHARACTER?
0028  07710 013772        AND .377
0029  07711 002002        SZA           ?
0030  07712 027702        JMP NCW       NO - DO NEXT CONTROL WORD
0031  07713 103700        STC SC,C ←    PUT CARD IN DATA MODE
0032  07714 102300        SFS SC   ←    IS CHARACTER OUT?
0033  07715 027714        JMP *-1       NO - WAIT FOR IT
0034  07716 027702        JMP NCW       YES - DO NEXT CONTROL WORD
0035  07717 017750  NRD   JSB INPUT     READ IN FIRST WORD (RECORD COUNT)
0036  07720 005727        BLF,BLF       POSITION COUNT TO LOWER BYTE
0037  07721 007007        CMB,INB,SZB,RSS  MAKE IT NEG AND IS IT EOF?
0038  07722 102077        HLT 77B       YES - END-OF-FILE
0039  07723 006021        SSB,RSS       IF COUNT WAS ALL ONES
0040  07724 102000        HLT 0         THEN TAPE ERROR
0041  07725 077776        STB WCT       SAVE COUNT
0042  07726 017750        JSB INPUT     READ STORE ADDRESS
0043  07727 077774        STB CKSUM     START CHECKSUM
0044  07730 077775        STB ADD         AND SAVE ADDRESS
0045  07731 017750  NWD   JSB INPUT     GET WORD TO BE STORED
0046  07732 063775        LDA ADD       CHECK IF ADDRESS
0047  07733 043777        ADA MXAD        IS ABOVE LOADER
0048  07734 002040        SEZ           IS IT?
0049  07735 102055        HLT 55B       YES
0050  07736 177775        STB ADD,I     NO - PUT WORD IN MEMORY
0051  07737 047774        ADB CKSUM     ADD IT TO CHECKSUM
0052  07740 077774        STB CKSUM
0053  07741 037775        ISZ ADD       MOVE ADDRESS UP ONE
0054  07742 037776        ISZ WCT       FINISHED WITH THIS RECORD?
0055  07743 027731        JMP NWD       NO - READ NEXT WORD
0057  07744 017750        JSB INPUT     YES - READ CHECKSUM
0058  07745 057774        CPB CKSUM     IS CHECKSUM OK?
0059  07746 027717        JMP NRD       YES - READ NEXT RECORD
0060  07747 102011        HLT 11B       NO
0061  07750 000000  INPUT NOP           INPUT ONE WORD FROM INTERFACE
0062  07751 006700        CLB,CCE       ZERO WORD AND START WITH UPPER HALF
0063  07752 102500        LIA SC   ←    GET DATA
0064  07753 002021        SSA,RSS       IS IT VALID DATA?
0065  07754 027752        JMP *-2       NO
0066  07755 013772        AND .377      YES - ELIMINATE UPPER HALF
0067  07756 044000        ADB A         ADD DATA TO B REG.
0068  07757 002041        SEZ,RSS       SECOND HALF READ?
0069  07760 127750        JMP INPUT,I   YES - RETURN WITH WORD IN B REG.
```

Table E-4. HP 2644/45 Cartridge Tape Binary Loader (Continued)

```
0070   07761 005767          BLF,CLE,BLF    NO - MOVE BYTE TO UPPER HALF
0071   07762 027752          JMP INPUT+2    SET LOWER HALF FLAG AND READ IT
0072*
0073   07763 150077  OTP     OCT 150077     MASTER RESET
0074   07764 040740          OCT 40740      INTERFACE CONTROL
0075   07765 030003          OCT 30003      CHAR FRAME CONTROL
0076   07766 000033  CHR1    OCT 33         ASCII "ESC"
0077   07767 050077          OCT 50077      RESET BUFFER STATUS
0078   07770 000145  CHR2    OCT 145        ASCII LOWER CASE "E"
0079   07771 040340  EOT     OCT 40340      INPUT COMMAND WORD
0080*
0081   07772 000377  .377    OCT 377        UPPER HALF WORD MASK
0082   07773 063763  LDOTP   LDA OTP        POINTER TO OUTPUT TABLE
0083   07774 000000  CKSUM   NOP            CHECKSUM STORAGE
0084   07775 000000  ADD     NOP            ADDRESS STORAGE
0085   07776 000000  WCT     NOP            INPUT WORD COUNT
0086   07777 170100  MXAD    ABS -START     START BINARY LOADER AREA
0087*
0088   00000         SC      EQU 0B
0089   00000         A       EQU 0B
0090   00001         B       EQU 1B
0091                         END
**   NO ERRORS *TOTAL **RTE ASMB 750420**
```

Table E-5. HP 7970B/7970E Magnetic Tape Binary Loader

```
0001                    ASMB,A,B,L      MAG TAPE LOADER
0003  07700                   ORG 7700B
0004*
0005*
0006****  7970 MAG TAPE ABSOLUTE BINARY LOADER
0007*
0008*
0009*     LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*     ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC'S FOR
0011*     THE DATA (DC) AND CONTROL (CC) CHANNELS. BRING THE
0012*     P-REGISTER TO THE STARTING ADDRESS OF THE PROGRAM,
0013*     PRESS PRESET (INT. AND EXT.) AND RUN.
0014*
0015*
0016  07700 067753  START LDB RDCMD      GET READ COMMAND
0017  07701 106601        OTB CC    <--   OUTPUT COMMAND
0018  07702 102501        LIA CC    <--   CHECK IF REJECTED
0019  07703 001323        RAR,RAR
0020  07704 001310        RAR,SLA         ??
0021  07705 027701        JMP *-4         YES, TRY AGAIN
0022  07706 103701        STC CC,C  <--   NO, START COMMAND
0023  07707 103700        STC DC,C  <--   START DATA CHANNEL
0024  07710 102201  WFST  SFC CC    <--   CHECK FOR STATUS
0025  07711 027743        JMP STAT        YES
0026  07712 102300        SFS DC    <--   ANY DATA
0027  07713 027710        JMP *-3         NO
0028  07714 107500        LIB DC,C  <--   YES GET IT (RECORD COUNT)
0029  07715 005727        BLF,BLF         POSITION COUNT TO LOWER BYTE
0030  07716 007000        CMB             MAKE IT NEGATIVE
0031  07717 077755        STB WCT         SAVE INPUT COUNT
0032  07720 102201        SFC CC    <--   CHECK FOR STATUS
0033  07721 027743        JMP STAT        YES EXIT TO STATUS
0034  07722 102300        SFS DC    <--   WAIT TO READ NEXT WORD
0035  07723 027720        JMP *-3
0036  07724 107500        LIB DC,C  <--   GET LOAD ADDRESS
0037  07725 074000        STB 0           START CHECKSUM
0038  07726 077756        STB CMD           AND ADDRESS POINTER
0039  07727 027733        JMP *+4
0040  07730 177756  NWD   STB CMD,I       PUT WORD IN MEMORY
0041  07731 040001        ADA 1           ADD IT TO CHECK SUM
0042  07732 037756        ISZ CMD         MOVE UP ADDRESS
0043  07733 102300        SFS DC    <--   WAIT FOR NEXT WORD
0044  07734 027733        JMP *-1
0045  07735 107500        LIB DC,C  <--   GET DATA TO STORE IN MEMORY
0046  07736 037755        ISZ WCT         FINISHED WITH DATA?
0047  07737 027730        JMP NWD         NO READ NEXT WORD
0048  07740 054000        CPB 0           IS CHECKSUM OK?
0049  07741 027710        JMP WFST        YES - WAIT FOR COMMAND CHANNEL STATUS
0050  07742 102011        HLT 11B         NO
0052  07743 102501  STAT  LIA CC    <--   GET STATUS
0053  07744 001727        ALF,ALF         POSITION EOF BIT
0054  07745 002020        SSA             IS IT EOF?
0055  07746 102077        HLT 77B         YES
0056  07747 001727        ALF,ALF         REPOSITION STATUS
0057  07750 001310        RAR,SLA         YES READ OK?
0058  07751 102000        HLT 0           NO TELL OPERATOR
0059  07752 027700        JMP START       YES READ NEXT RECORD
0060*
0061*
0062  07753 001423  RDCMD OCT 1423        MT READ A RECORD COMMAND
0063  07754 000203  FFC   OCT 203         MT FILE FORWARD COMMAND
0064  07755 000000  WCT   NOP             INPUT WORD COUNT
0065  07756 000000  CMD   NOP
0066*
0067  00000         DC    EQU 0B
0068  00001         CC    EQU DC+1
0069                      END
**  NO ERRORS *TOTAL **RTE ASMB 750420**
```

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