



Diagnostic Configurator

Reference Manual

ABSOLUTE BINARY PROGRAM NO. 24296-60001
DATE CODE 2522

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Printing History

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

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.

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Chapter 1

Introduction

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, HP 2644/2645/48 Minicartridges and CS/80 Cartridge Tape.

The diagnostic media listed below include 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 Minicartridge	All configurator-compatible diagnostics on 7 cartridge tapes
24396H	CS/80 Cartridge Tape	

In addition to the 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.

* 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.

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 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.

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 the required hardware section of this chapter.) 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 and Cross Link are covered in Appendix C.

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 Configurator Limitations in this chapter, and Configurator Binary Loader in Chapter 2, 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. Minicartridge: 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.)
 6. CS/80 Cartridge Tape: HP 7911/12/14 disc drive with integrated cartridge tape drive or HP 9144 stand alone cartridge tape drive.

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 implies, in case of an HP 2100A/S, that "INTERNAL 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

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 Chapter 2 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 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 2166A/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 (N5500 through N6500 for a CS/80 device) 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 Chapter 2.

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

Chapter 2

Operating Procedures

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 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.

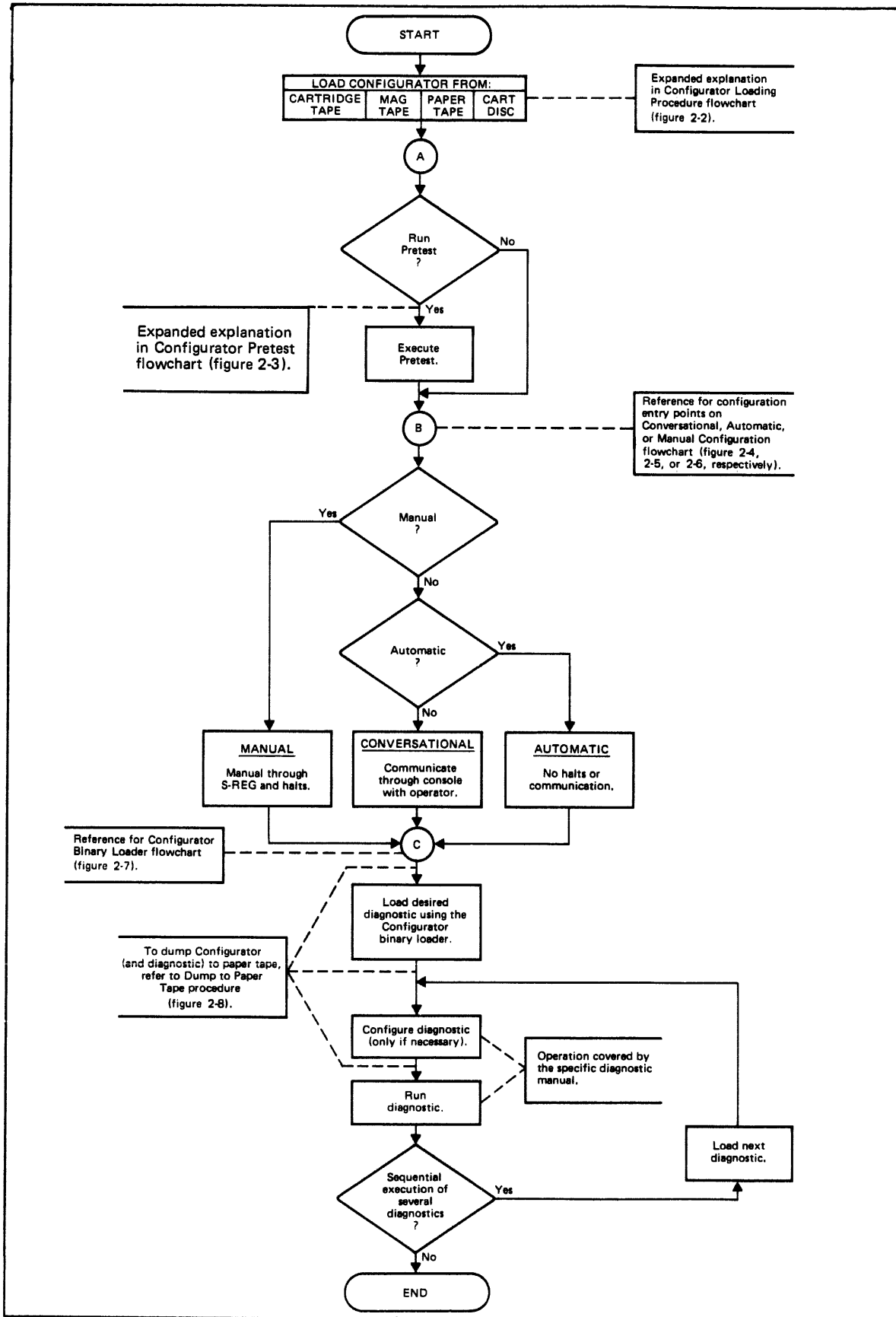


Figure 2-1. Operational Overview Flowchart

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.)

Configurator Loading Procedure

Figure 2-2 is the flowchart for loading diagnostics after the Configurator. The Configurator Binary Loader section of this chapter provides information for loading diagnostics after the Configurator is loaded and configured.

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

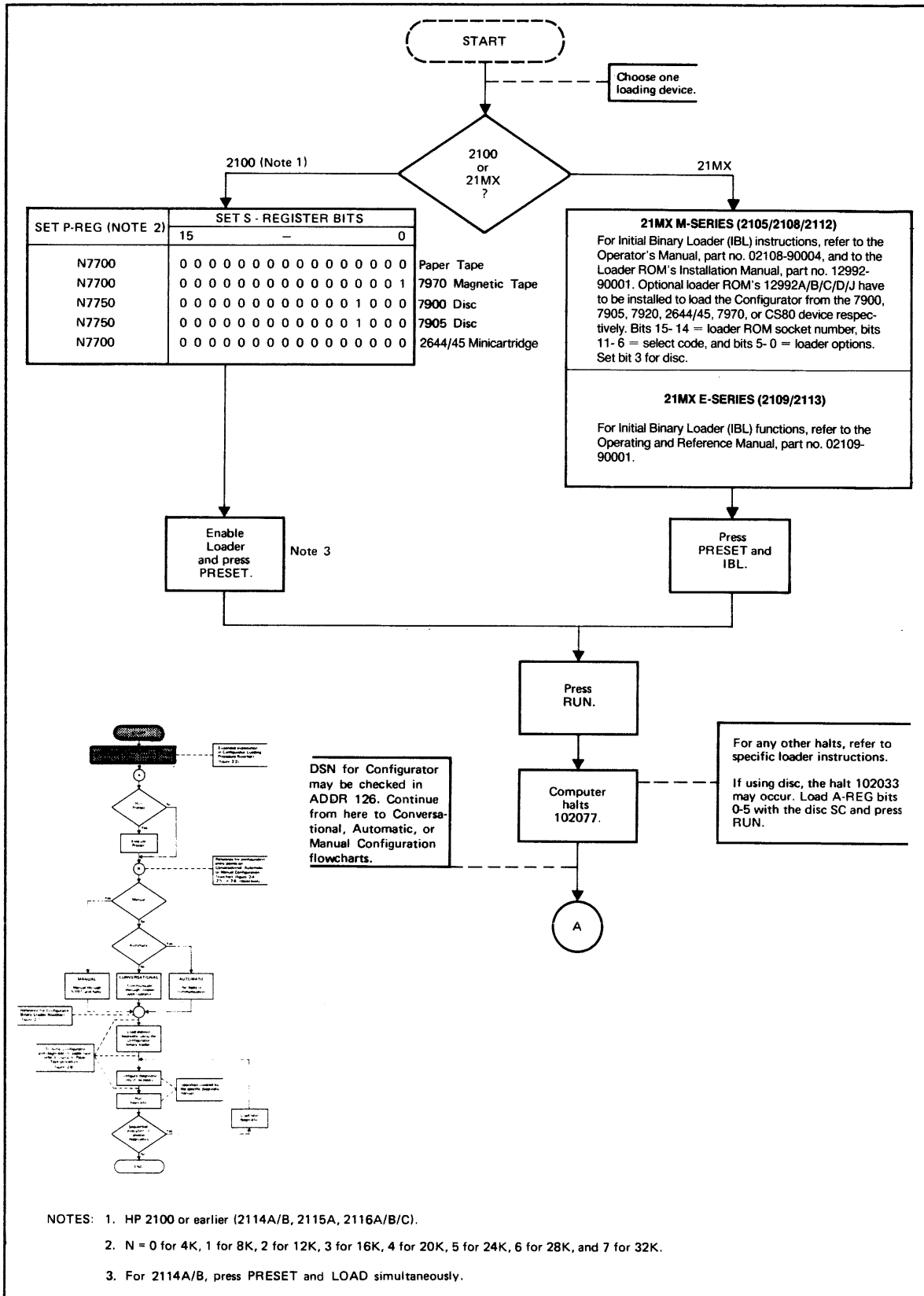


Figure 2-2. Configurator Loading Procedure Flowchart

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.

During the Paper Tape Dump routine, the SC of the punch is specified in the S-Register. (Refer to Dump routine later in this chapter.)

S-REGISTER	PROGRAM SELECTION	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)	

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

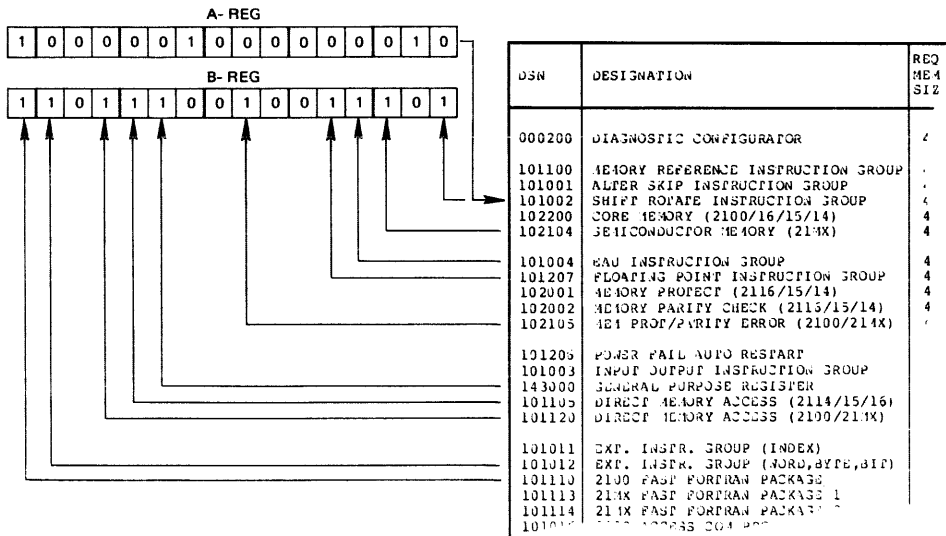
B-REGISTER	A-REGISTER	
	CLEARED	SET TO DSN
Cleared	Load next file (diagnostic) and halt before execution.	Load specified diagnostic and halt before execution.
Set to bit pattern	Load next file and execute from there on each diagnostic specified in the B-Register one time.	Load specified diagnostic, execute 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 the Automatic Configuration section of this chapter) and at the end of Manual configuration (halt 102077; see the Manual Configuration section of this chapter). 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.



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.

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 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.

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 Chapter 1. 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).

* 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.

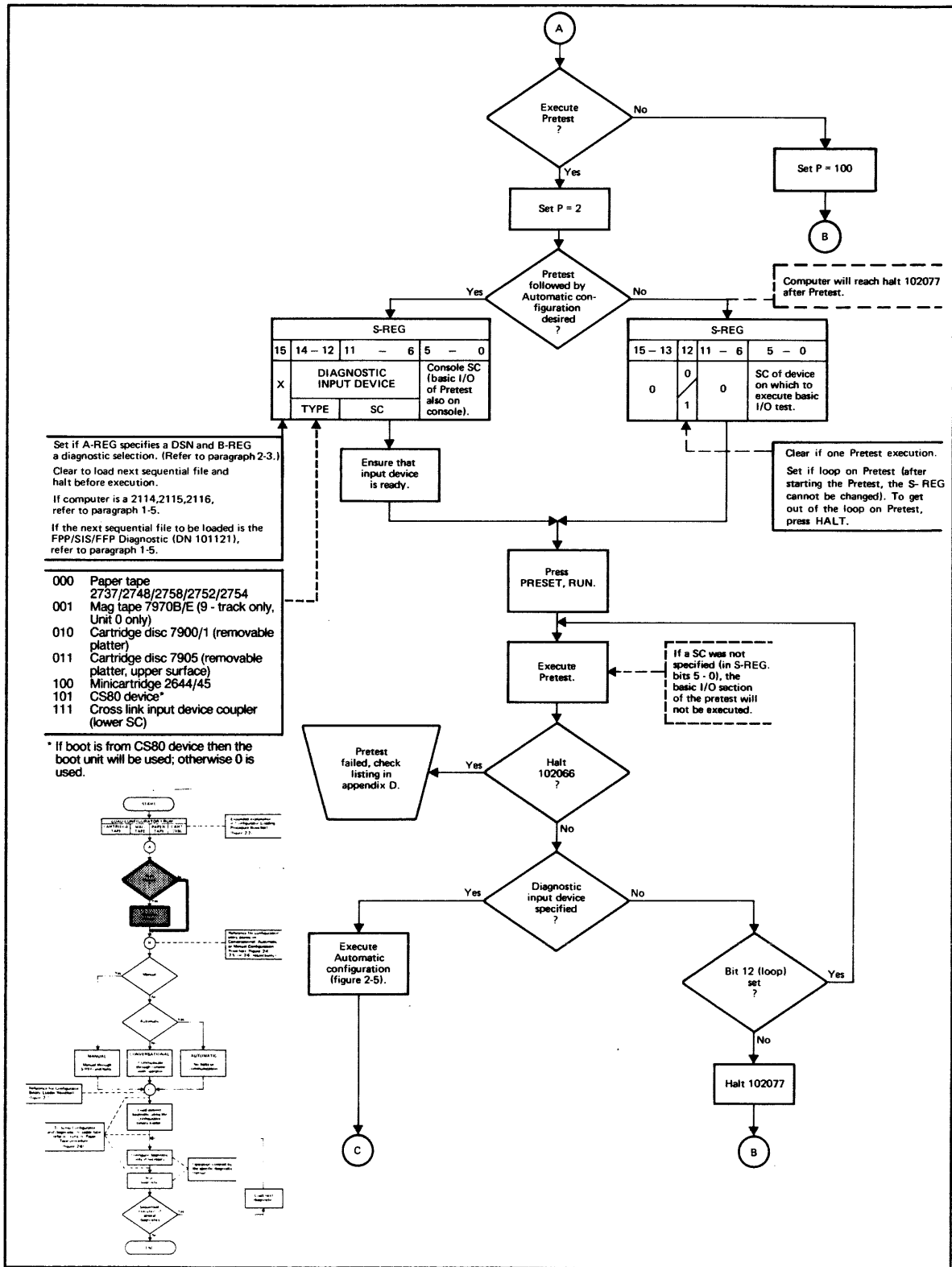
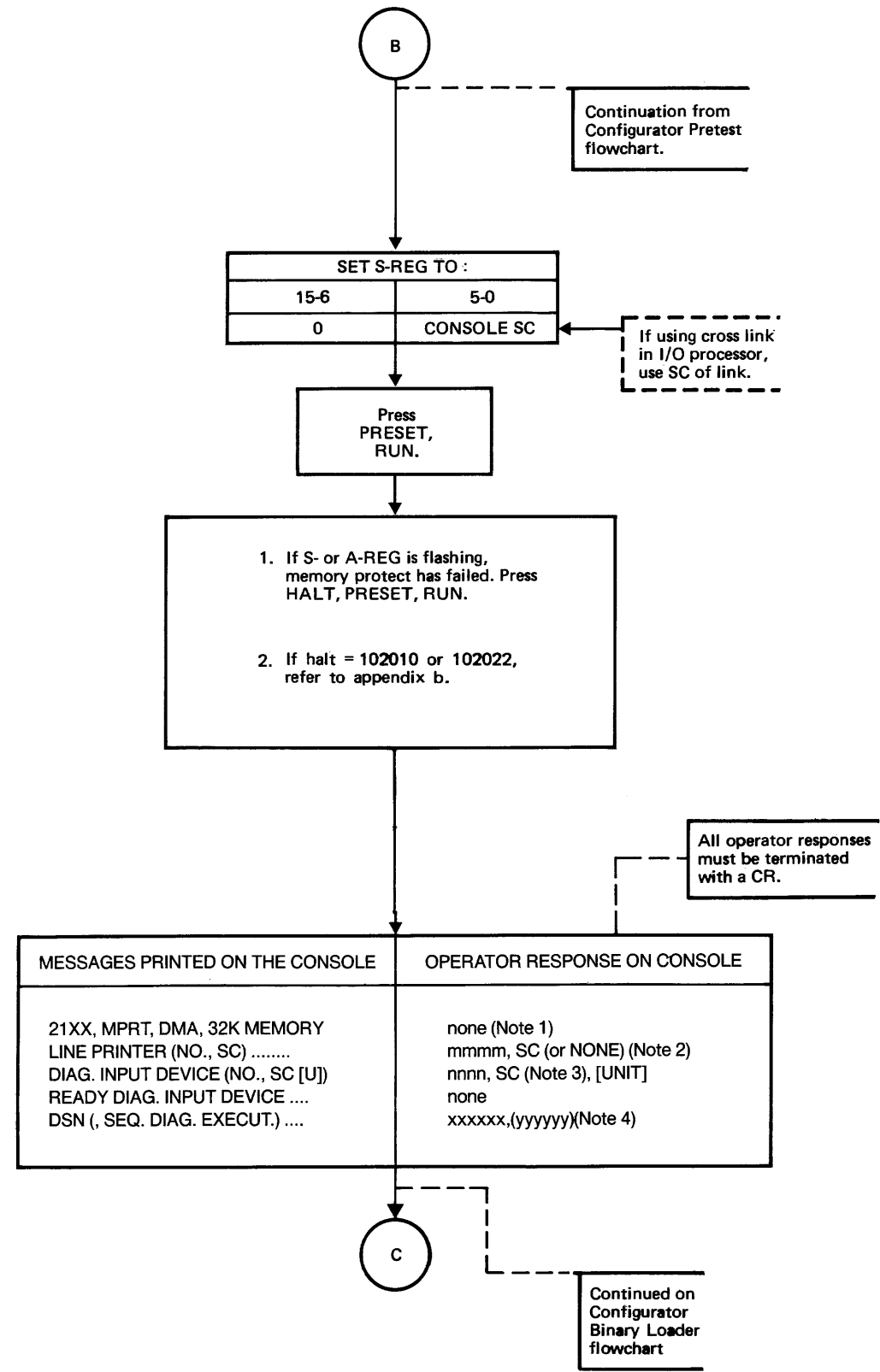


Figure 2-3. Configurator Pretest Flowchart



Console Configuration Notes:

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

m m m m	= 2767, 2610, 2614, 2613, 2617, 2618, 2778, 2607 or 9866	
	NONE (if not available)	
	LINK (if cross link is used)	
SC	= Line printer select code.	
- Respond with the appropriate device number (or LINK) and select code.

n n n n	= 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	Minicartridge (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)
UNIT	= unit number	CS80 device (Default is 0)
- Respond with the desired Diagnostic Serial Number for the indicated value of xxxxxx. Refer to appendix A for a list of available diagnostic 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.

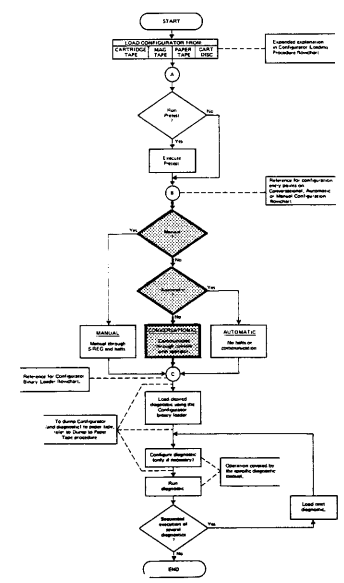


Figure 2-4. Conversational Config. Flowchart 2-9/2-10

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.

NOTE

Because there are no bits available in the S-Register to identify the unit numbers of a CS/80 device, the system tries to load the diagnostic from the boot unit. If the system was not booted using the CS/80 device, unit 0 is used. If you wish to load the diagnostic from another unit, use the Conversational or Manual configuration method.

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:

HALT	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, select code, and unit number
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 the Register Usage section at the beginning of this chapter.) The Manual Configuration flowchart is shown in Figure 2-6.

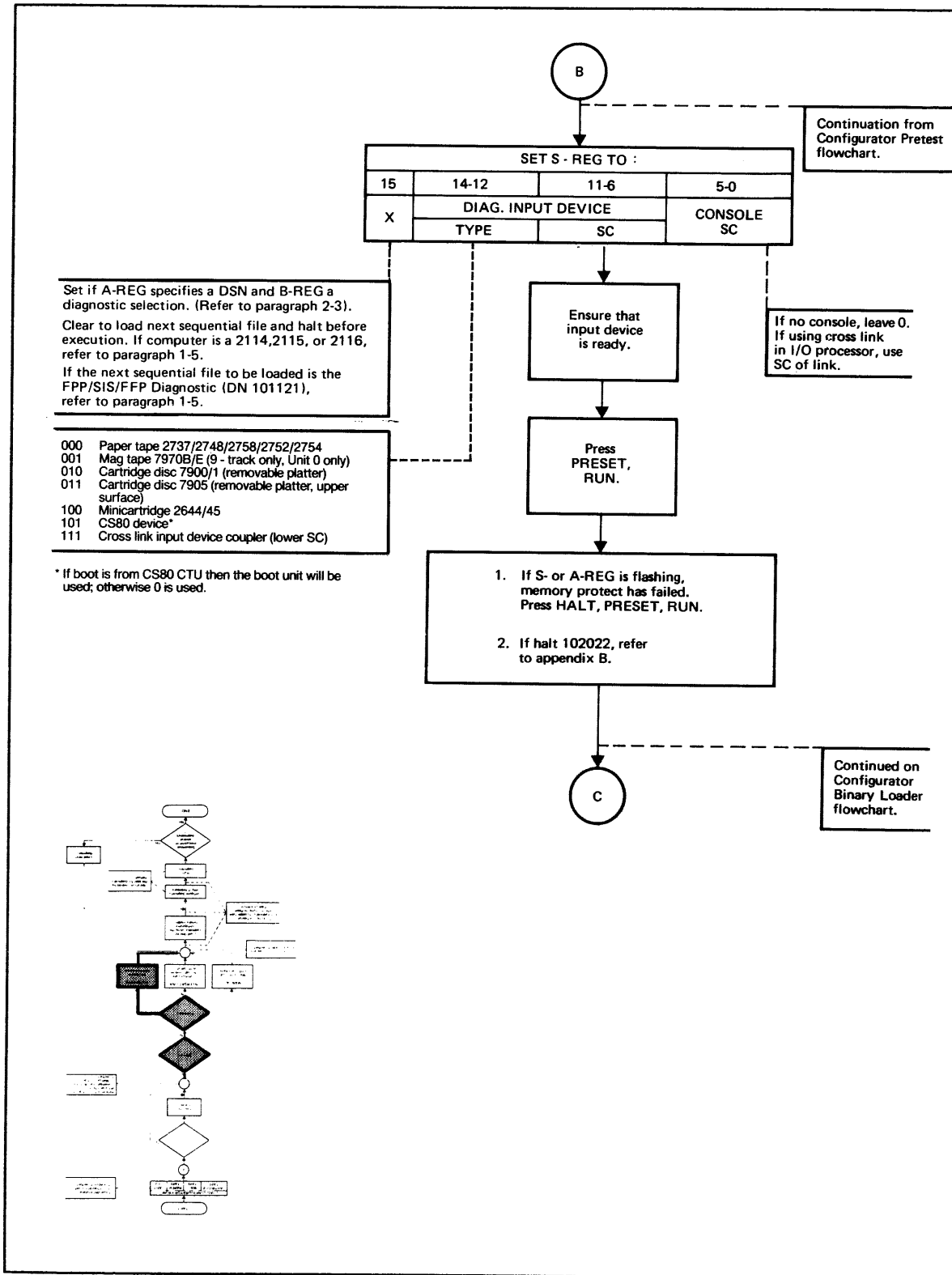
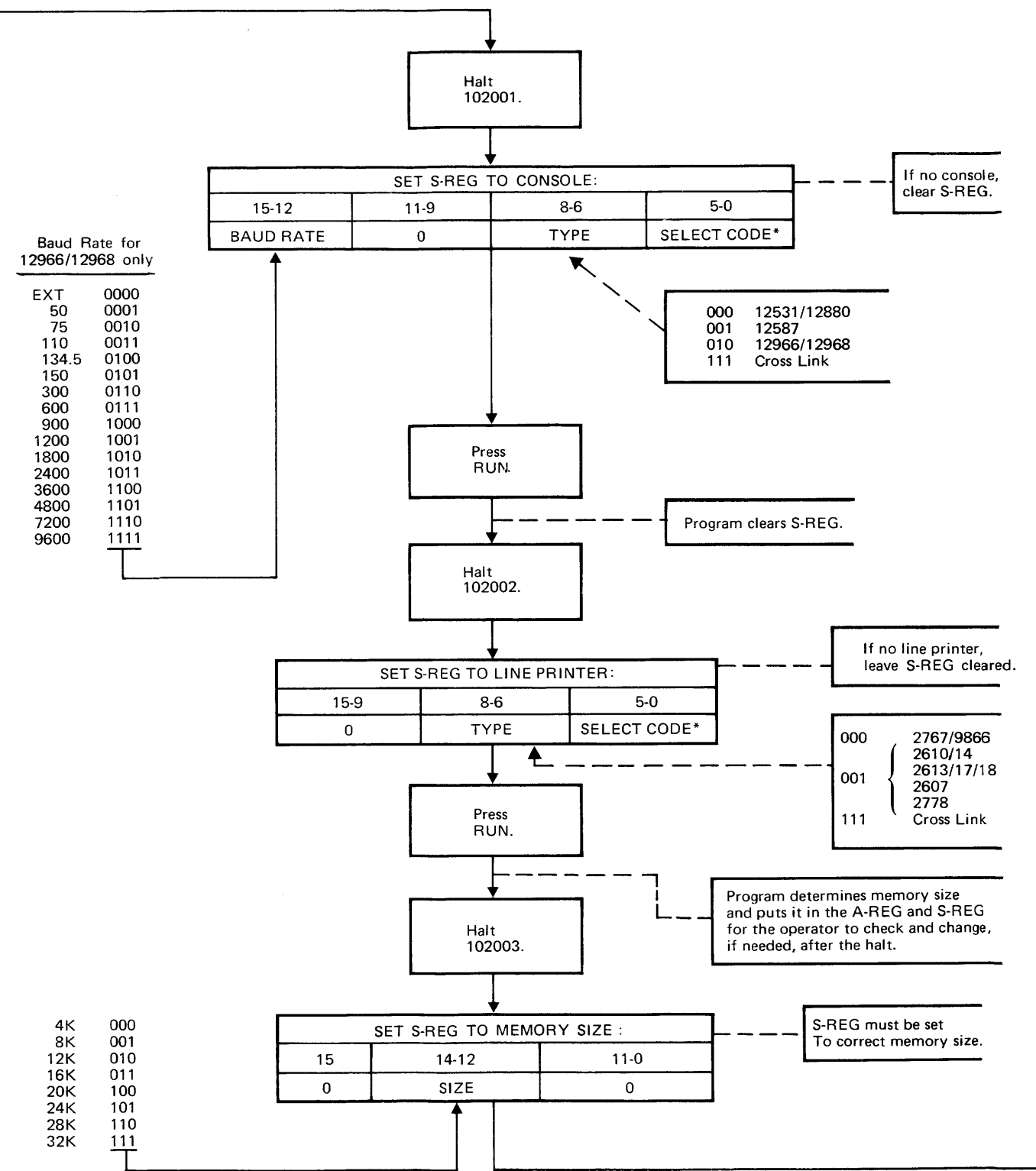
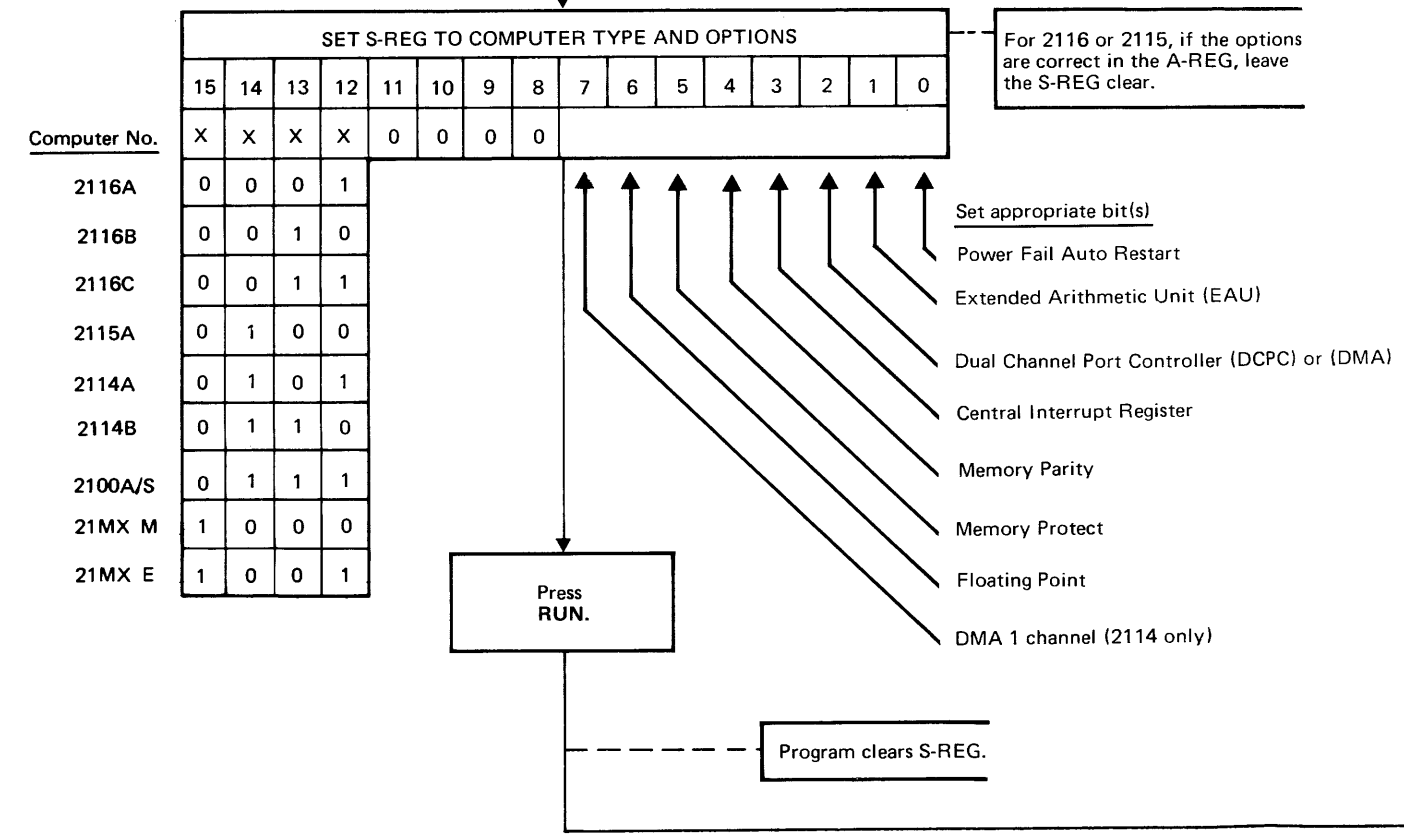
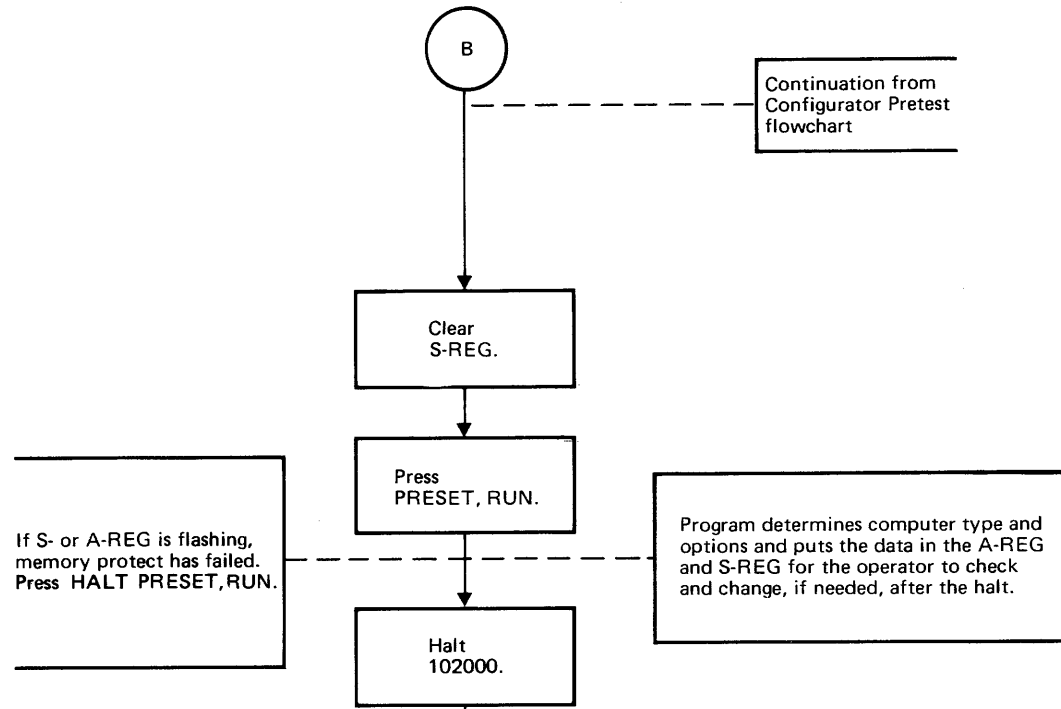
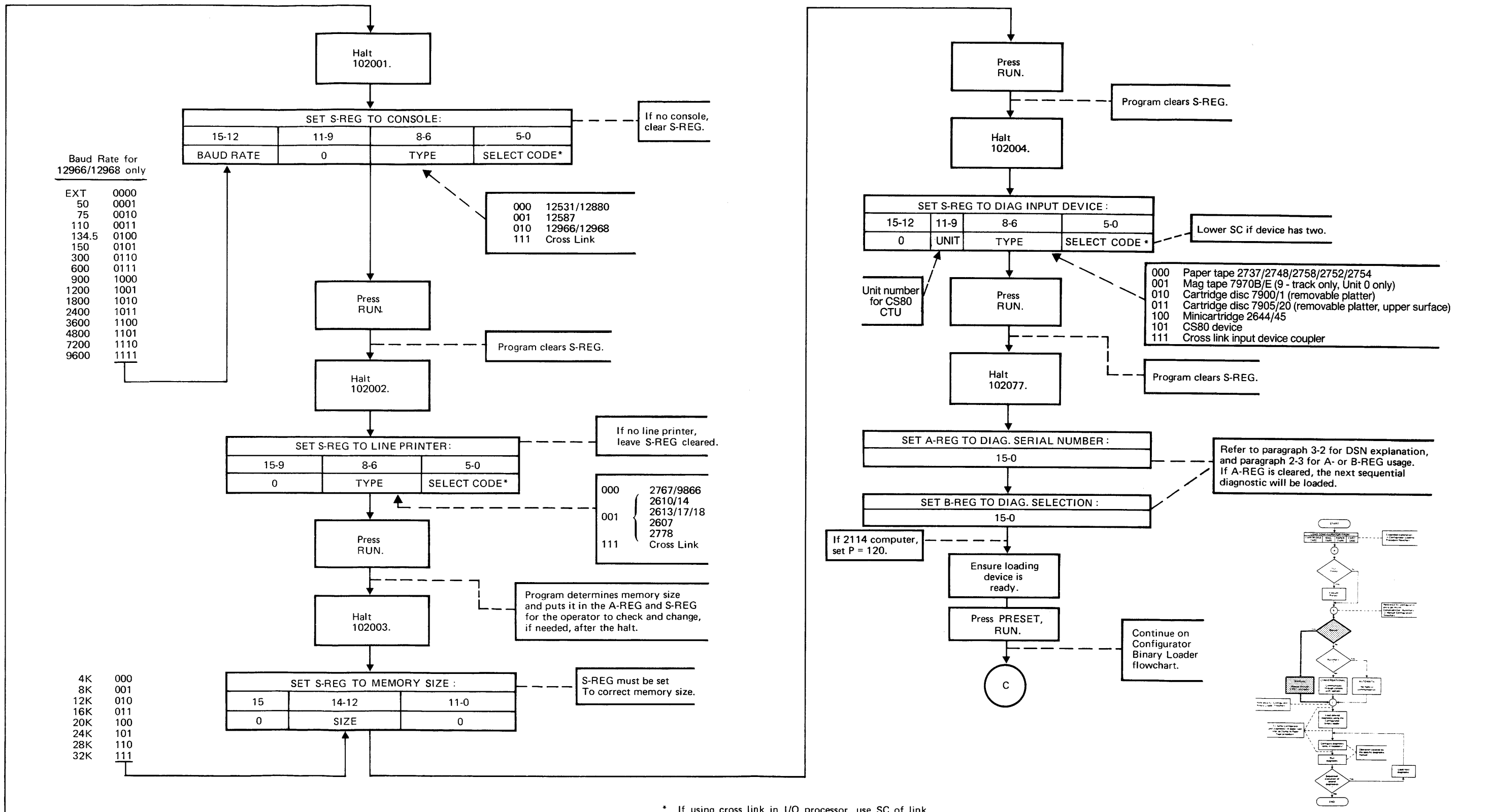


Figure 2-5. Automatic Configuration Flowchart



* If using cross l



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

Figure 2-6. Manual Configuration 2-13/2-14

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 boundary 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 overlaid buffer may cause unpredictable results.
- d. Minicartridge Tape; (Type 4)*: HP 2644 or 2645 Terminal with 12966 interface.
 - e. CS/80 device: The block size must be subtracted from N6500 to arrive at the lower memory address. For a disc this results in N6300. For a CS/80 CTU the block size is 512; thus the lower bound is N5500.
 - f. 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 Appendix C.)

* 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.

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.

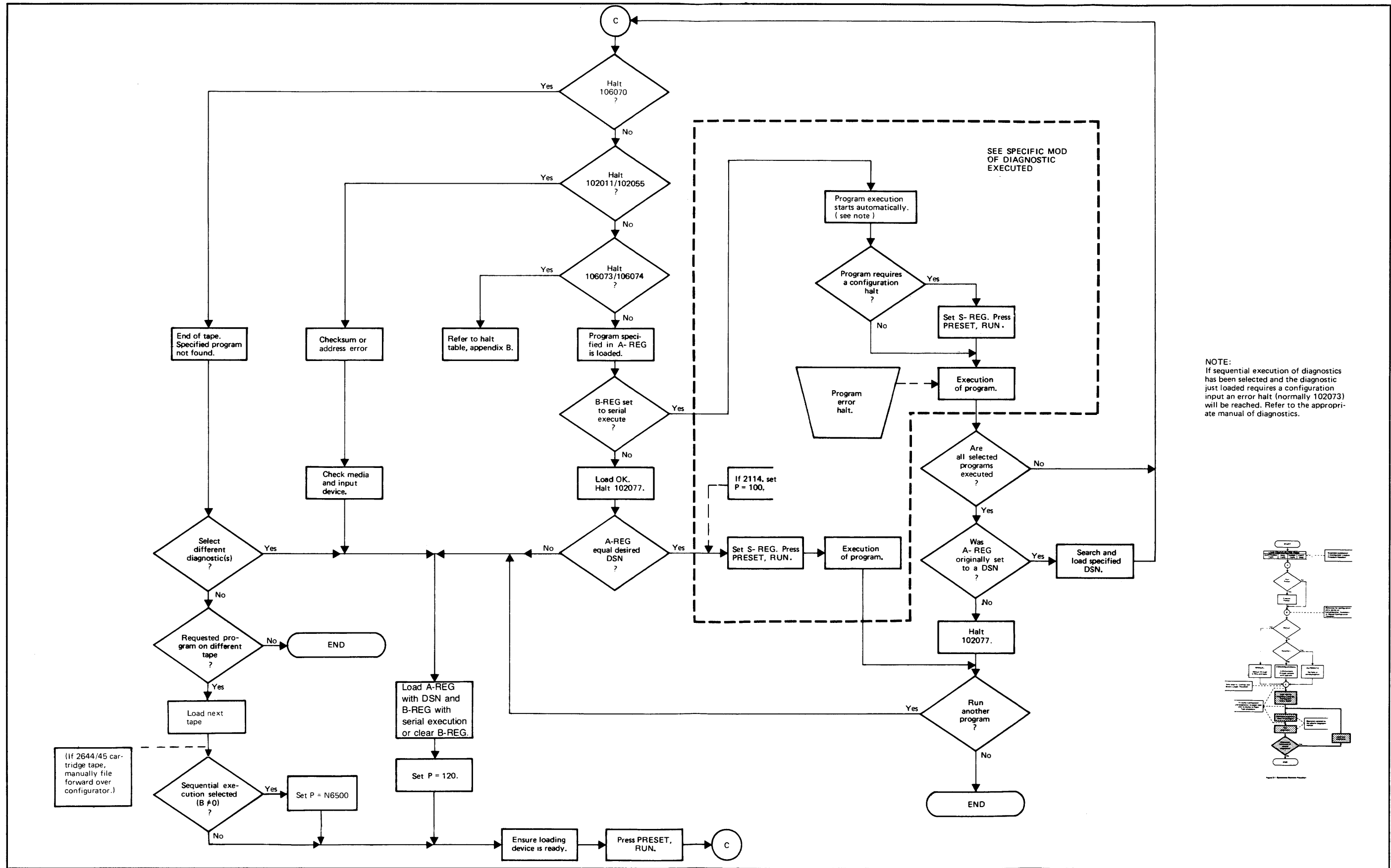
All files are assumed to be absolute and the record length is not longer than 60 words including the count, address, and checksum. The flowchart for the Configurator Binary Loader is in Figure 2-7.

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, HP 2753 (punches)
 - HP 2752, HP 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 2-17/2-18

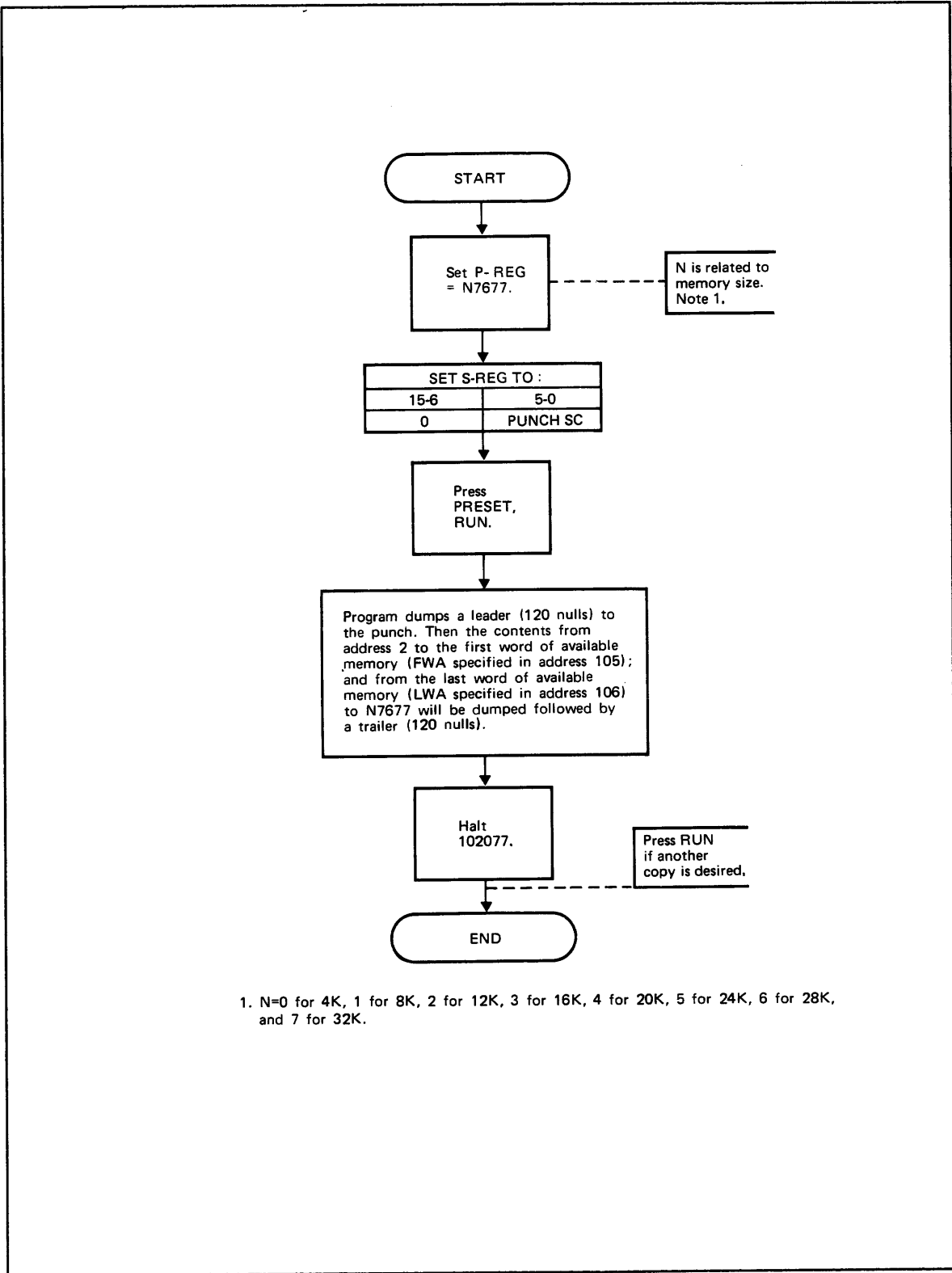


Figure 2-8. Paper Tape Dump Routine Flowchart

Chapter 3

Program Description

General Organization

The program is organized according to the memory map shown in Figure 3-1. The map also includes the name of the section (and chapter) 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 overlaid when a diagnostic is loaded.

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.

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

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.

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.
- b. Halts 102020 and 102021 can occur when testing a 2115 or 2116 computer where the S-Register cannot be modified under program control.
- c. Halt 102077 includes successful Pretest execution.

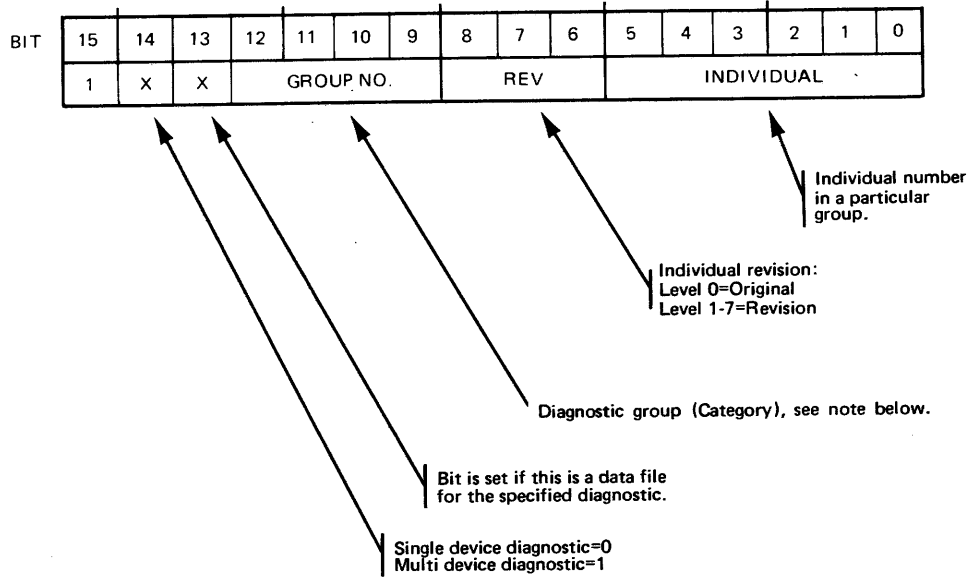
DESCRIPTION PARAGRAPH	STARTING MEMORY ADDRESS	FUNCTION
---	10	Trap cells for I/O select codes
Configuration Linkage Area (Chapter 3)	100	Configurator linkage area (Figure 3-2)
Pretest (Chapter 3)	130	Pretest part A
---	1400	Storage
Pretest (Chapter 3)	3000	Establish computer parameters (memory size,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

Figure 3-1. Memory Map

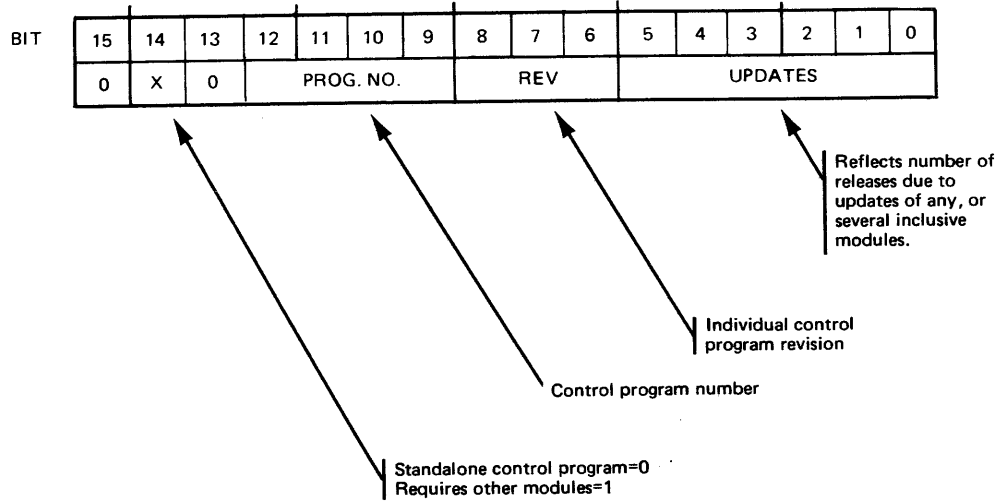
OCTAL ADDRESS	CONTENTS	MEANING
100	JMP START	GO TO START OF USER PROGRAM
101	NOP	RESERVED
102	DEF CNSLO	CONSOLE OUTPUT DRIVER
103	DEF LNPTR	LINE PRINTER DRIVER
104	DEF CNSLI	CONSOLE INPUT DRIVER
105 FWA	OCT 130	FIRST WORD OF AVAILABLE MEMORY
106 LWA	OCT 6477	LAST WORD OF AVAILABLE MEMORY
107	DEF LOADR	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

Figure 3-2. Linkage Area

DIAGNOSTIC PROGRAMS



DIAGNOSTIC CONTROL PROGRAMS



NOTE: The DSN is always at location 126.
 See appendix A for DSN examples.

REV. B

Figure 3-3. Diagnostic Serial Number (DSN)

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.

BIT	SET IF AVAILABLE	21MX E	21MX M	2100 A/S	2116 A/B/C	2115 A	2114 A
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		0	0	1 1	0 1 1	0	0 1
14		0	0	1 1	0 0 0	1	1 1
15		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

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Figure 3-4. Computer Type and Options

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.

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.

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 Appendix C. 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
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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.

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).
 - Minicartridge: 2644/2645 terminal
 - CS/80 cartridge tape: HP 7911/12/14 disc with integrated CTU or 9144 stand alone CTU.

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 overlaid 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.

Timer or Wait Loop (One Millisecond)

CALLING SEQUENCE:

	LDA	TIME	NUMBER OF MILLISECONDS
P	JSB	121B,I	GO TO TIMER
P+1	...		NORMAL RETURN
TIME	DEC	100	100 MILLISECONDS

From P to P+1 = Time x 1 millisecond

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.

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.

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.

* A four-word buffer is required in this mode.

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*

Formatted Output

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

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

* A four-word buffer is required in this mode.

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 NUMBER 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 ←).

Configured Drivers

The following 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

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 in the buffer.

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.

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 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 drive will return to the caller with the A-REG set to the input count.

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.

Appendix A

Diagnostic Serial Numbers

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 Chapter 3 for explanations.
R = revision.

All 1's in the DSN represent 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.

Table A-2. Diagnostic Reference Table for Part No. 24009-14002

DSN	DESIGNATION*	REQ MEM SZ	SINGLE FILE PAPER TAPE			MULTIPLE FILES			
			BINARY	D.C.	MANUAL	2645 CARTRIDGE BINARIES	D.C.		
000200	DIAGNOSTIC CONFIGURATOR	4K	24296-60001	1627	02100-90157	} 24998-13301	2326		
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				
101206	POWER FAIL AUTO RESTART	4K	24321-16001	1635	02100-90216				
141203	I/O INSTR GROUP I/O CHANNEL/EXTENDER	8K	24318-16001	2326	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			} 24998-13302	1926
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				
103023	13197 WCS 1024 W.	4K	13197-16002	1640	13197-90002	} 24998-13303	1928		
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				
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	} 24998-13304	2026		
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	02631-90906				
105105	2608 LINE PRINTER	8K	02608-16001	2026	02608-90906				
105104	9866 LINE PRINTER	4K	12996-16001	1541	12996-90001	} 24998-13305	1822		
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	} 24998-13306	2040		
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				
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.

*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.

Appendix B

Configurator Halt Code Summary

HALT CODE	REASON/RESPONSE
102000	<p>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 2144A/B).</p> <p>Refer to Figure 3-4 and Chapter 3 and if necessary, change the S-REG to the correct, or desired value and press RUN.</p>
102001	<p>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.</p> <p>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.</p>
102002	<p>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.</p> <p>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.</p>
102003	<p>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 2144A/B).</p> <p>Refer to Figure 3-5 and Chapter 3 and if necessary, change the S-REG to correct or desired value then press RUN.</p>
102004	<p>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.</p> <p>Refer to Figure 2-6 for the correct bit setting, set the S-REG accordingly, then press RUN.</p>

HALT CODE

REASON/RESPONSE

102010 Illegal select code (<10) for diagnostic input device or console was chosen. Restart at P = 100 for configuration or P = 2 for Pretest.

(If halt occurs during disc initialization, there was no console specified and the program cannot be run.)

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.

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.

Check the S-REG for the correct select code:

- a. Change it if incorrect, then press RUN.
- 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.
- 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).

Load A-REG bits 5-0 with the disc select code and press RUN.

102044 Disc did not respond with a flag. Restart program.

HALT CODE	REASON/RESPONSE
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. <ul style="list-style-type: none"> a. To leave a pseudo-driver in place, press RUN or b. Restart configuration
102072	An invalid loader type has been specified during configuration. <ul style="list-style-type: none"> a. Press RUN to leave a pseudo-loader in the driver area or b. Restart configuration
102073	CS/80 driver failed to get a valid Describe Response. Restart and check your answers.
102077	End-of-operation <ul style="list-style-type: none"> a. Disc Boot b. Disc Initialization c. Paper Tape Dump d. Load Complete e. Configuration Complete (Manual) f. Pretest Complete
103033	CS/80 boot with bit 3 = 0 and no "other" system on the device. Reboot with bits set in switch register.

HALT CODE

REASON/RESPONSE

106070 "End-of-Files" was reached during a diagnostic load operation. The specified DSN was not found.

If a different diagnostic(s) selection on the current tape is desired:

- a. Load the A-REG with a new DSN.
- b. Clear the B-REG if sequential execution is not desired, otherwise set B-REG to appropriate sequential selection.
- c. Ready input device, set P-REG = 120, press PRETEST and RUN.

If the diagnostic(s) originally selected is on a different tape:

- a. Load the new tape. (If a 2644/45 cartridge tape, manually file forward over the configurator.)
- b. If sequential execution was selected (B = 0) set P-REG = N6500.
- c. Ready input device, press PRETEST 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.

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.

No loading is possible.

106073* This halt has two meanings as follows:

- a. During a transfer using the I/O processor loader link, an error was encountered. Restart the loader program in the I/O processor.
- b. The diagnostic memory size exceeded the available space. (Refer to Chapter 2.)

* These halts can occur during diagnostic execution.

HALT CODE**REASON/RESPONSE**

- 106074* Error on diagnostic input device (paper tape, magnetic tape, cartridge tape, or disc):
- a. Device not ready; ready device: Press RUN.
 - b. Time-out on long paper tape leader: Press RUN.
 - c. Incorrect SC or device type specified: Reconfigure Configurator.
 - 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.

Appendix C

Operator's Notes

General

Appendix C is divided into five 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.
5. CS/80 Media Initialization.

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.

LOAD CONFIGURATOR, DIAGNOSTICS 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 tape and create a memory dump of: a. Configured Configurator - or b. Configured Configurator and unconfigured diagnostic - or - 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
7970 Mag 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 7905 Disc 7920 Disc			
CS/80 Device	RTE-6/VM (or RTE-A if non-disc)		

Figure C-1. Program Transfer Guide

Cartridge Disc Initialization (Non-CS/80)

General

The Cartridge Disc Initialization program is used to write first the Configurator, then Diagnostics and/or Control Programs on an HP 7900/01/05, 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 co-resident on a disc with an RTE or DOLS Operating System or have a disc entirely dedicated to diagnostics 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 co-resident with a system, the system cannot do track sparing in the area where the diagnostics will be stored.

Required Hardware

The following hardware is required:

- a. An HP 2100 series computer with at least 4K of memory.
- b. An HP 7900/01/05, 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 Appendix C.)
- 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 Chapter 1.

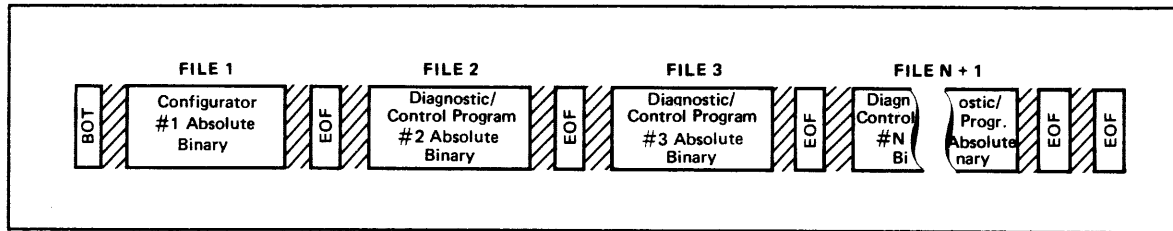


Figure C-2. Magnetic Tape and Cartridge Tape Format

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.

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, then 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 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 7900/01 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 file 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.

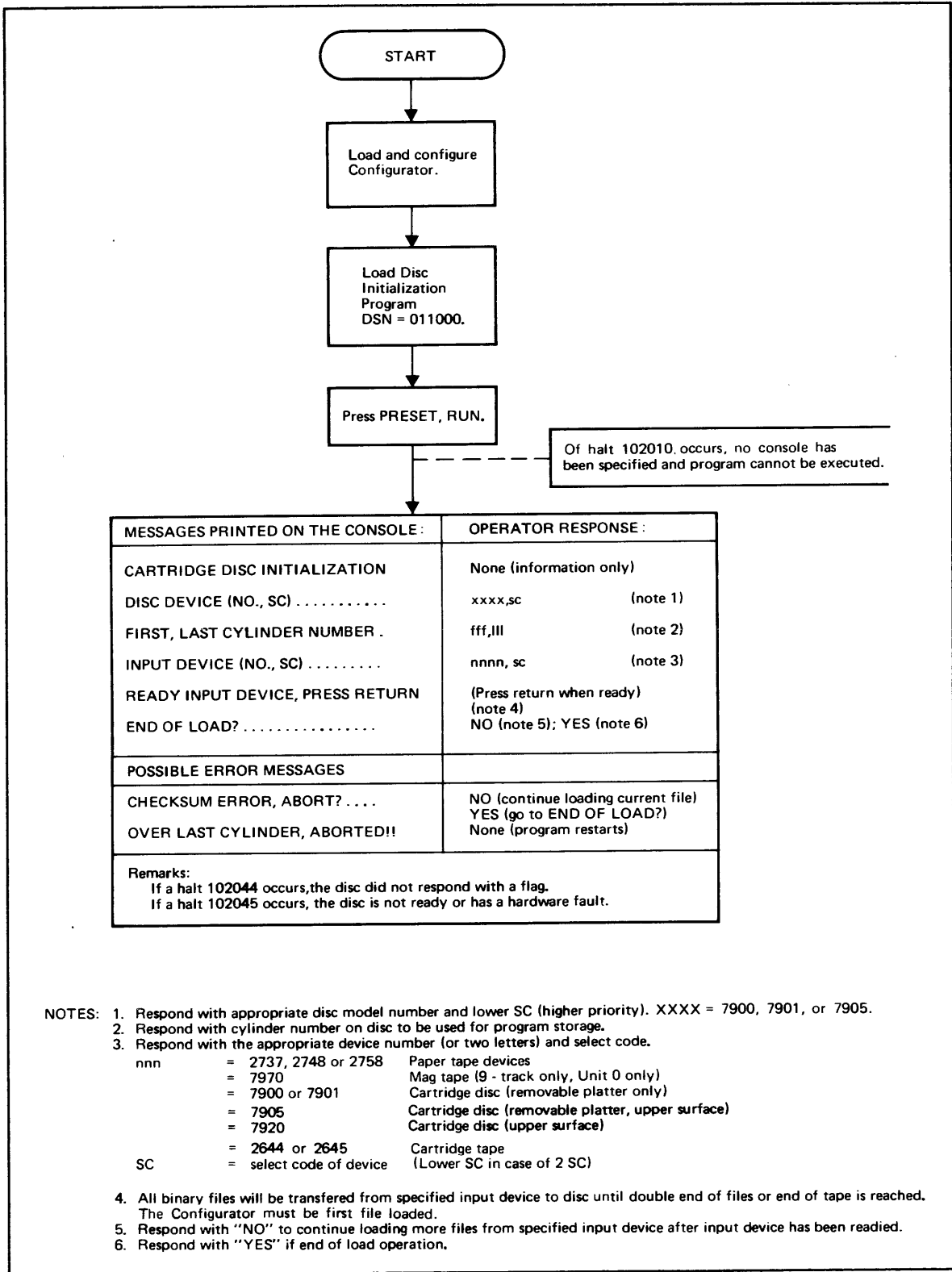


Figure C-3. Disc Initialization Flowchart

Cartridge Disc Format (Non-CS/80)

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 negative of the highest memory address location used by the file.

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.

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)..7920,21

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".

Cross Link

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 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 in 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 on 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 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.

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 Chapter 1.
- d. A program input device as specified in Chapter 1.

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.

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.

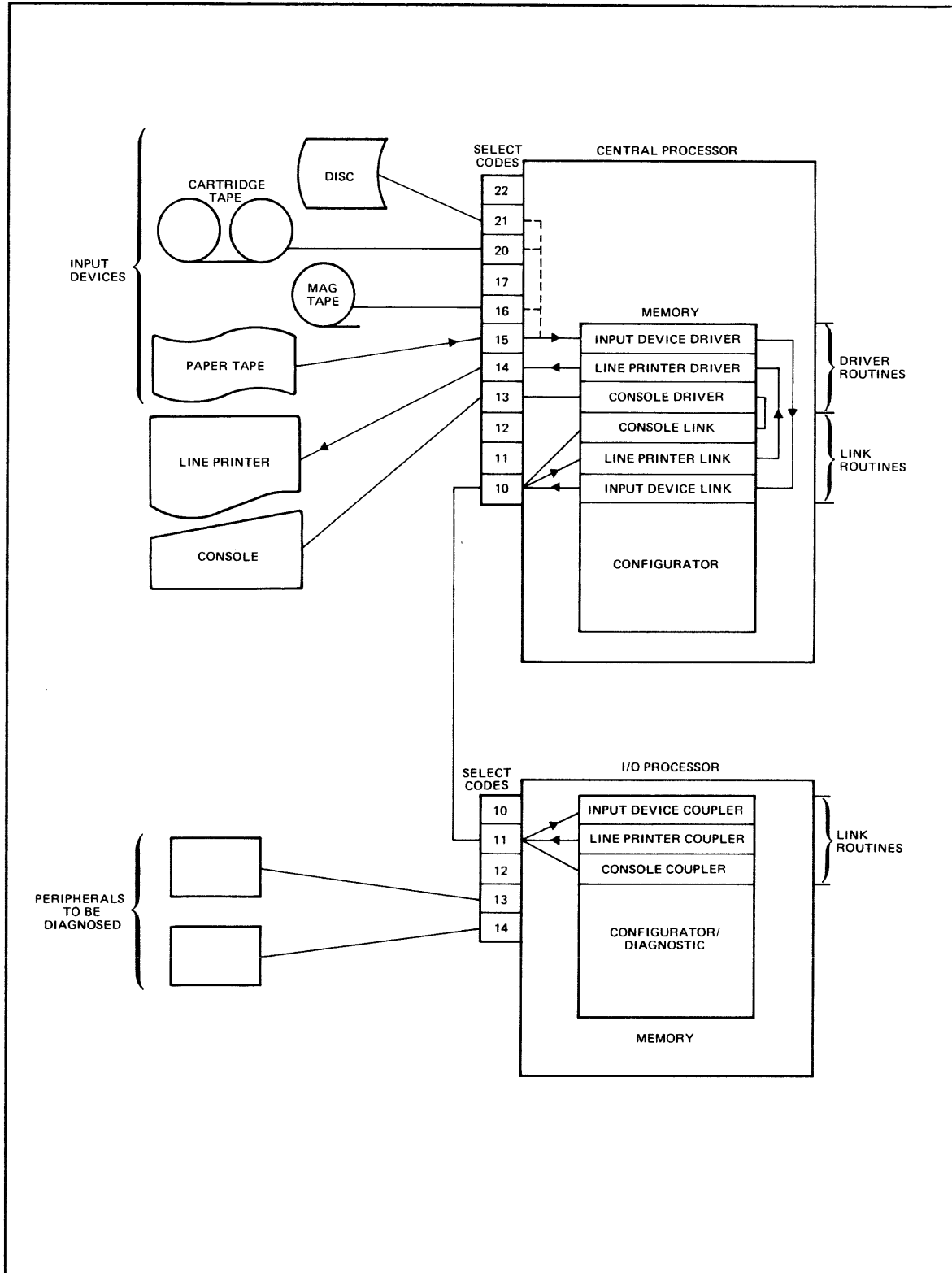


Figure C-4. Dual Computer Link

CS/80 Medium Initialization

General

The CS/80 device is initialized in an RTE environment. The RTE-A system cannot be used to initialize a CS/80 disc, but it can be used to initialize a CS/80 CTU. The CS/80 initialization program allows either the Configurator, diagnostics, and control programs to be co-resident on a disc with an RTE-6/VM system or to have the disc entirely dedicated to diagnostic programs. The CS/80 CTU may also contain other data, however, a bootstrap loader is required in block 0 on the tape. Blocks 1 through n-1 are available for other data (see below for a definition of n). Initialization is done by the program CS/80BD.

Required Hardware and Software

Minimum system is: RTE-6/VM Rev. 2440 or later
or RTE-A Rev. 2440 or later

CS/80BD requires a CS/80 device LU which points at DD.33 (RTE-A) or DVM33 or DVN33 (RTE-VI). Further, if a disc is to be initialized the LU must reference a logical disc which starts at block 0 on the physical disc.

The CI file system must also be installed.

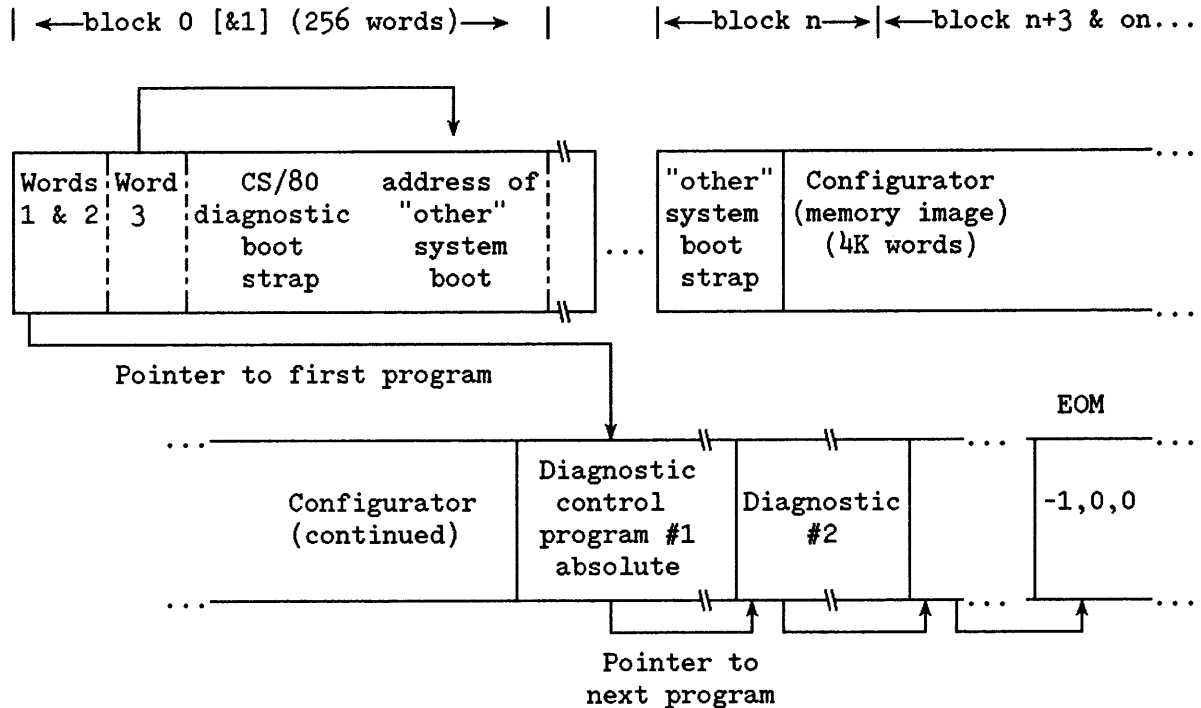
Format of the CS/80 Medium

A CS/80 device is formatted into a string of consecutive blocks of data. Each block contains 128 x M words of data. For the disc M is 1 and for the CTU M is 4. The CONFIGURATOR obtains M by doing a CS/80 'DESCRIBE' call.

Block 0 will always contain the Diagnostic boot strap. This code, when brought into memory by the CS/80 boot ROM, reads either the saved 'other' system boot strap (S-Register bit 3 = 0) or the Configurator (S-Register bit 3 = 1) into memory and transfers control to it. The first two words of block 0 contain the block number of the first block of the first diagnostic control program. Word 3 of block 0 is defined by the CS/80 boot strap and points to the location in the boot of the double word CS/80 block address of the 'other' system boot strap. This block address is set by CS/80BD when it initializes the medium. Each control program starts on a block boundary and is preceded by three words as follows:

- a. Words 1 and 2 = the double word block address of the next control block.
- b. Word 3 = The negative of the highest memory address used by this file.

The last file is an end of medium (EOM) mark and is three words as follows:
-1,0,0.



Preparation for Running CS/80BD

CS/80BD builds the required file structure from a series of absolute files. You will need absolute files for all the diagnostics you want to load plus:

- a. The CS/80 diagnostic boot strap !C80BX (part no. 24396-16002)
- b. The Diagnostic Configurator !DGCNF (part no. 24296-60001)

In addition, you should load the CS/80BD program (part no. 24396-16002) using the #CS/80BD control file (part no. 24396-17001).

CS/80BD runs exclusively from a command file. This file must contain a list of the file names of all the absolute diagnostic programs. The first file name must be the TEMP file name to use. It must be type one. This is the file that is built in phase one and read in phase two. The second file name must be the CS/80 diagnostic boot strap and the third file name must be for the Diagnostic Configurator. Additional files should be for the diagnostic programs and should be in ascending DSN order.

Running CS/80BD

To build a CS/80 Diagnostic Configurator tape or disc.

RU,CS80B, command file,<CS80 LU>,first block #,last block #

where:

command file is a file of file names

or

is a type 1 file built by this program

<CS80 LU> is the CS/80 device LU

or

is 0 if to build the type 1 file only

first block # is the first device block to use

last block # is the last CS/80 device block to use if negative, as much as needed. (If CS/80 LU is 0 the first and last block not needed.)

Note that "first block" allows you to skip over a co-resident system.

CS/80BD has two phases or passes. In pass one it processes each file and builds a temp file that contains an image close to the final format. In pass two it writes the CS/80 files, updating pointers and saving the current "other" system boot strap. If the current boot strap is a Diagnostic boot strap it will be used to find the old "other" system boot strap. If a CTU is being initialized or if a valid boot strap is not found a dummy "other" system boot strap is used. This dummy boot strap consists of 103033 halts.

The program will terminate at the end of a phase one if no CS/80 LU is given in the run string. Likewise, if a output file from this program is given for the command file, it will skip phase one and immediately translate the file to the CS/80 device.

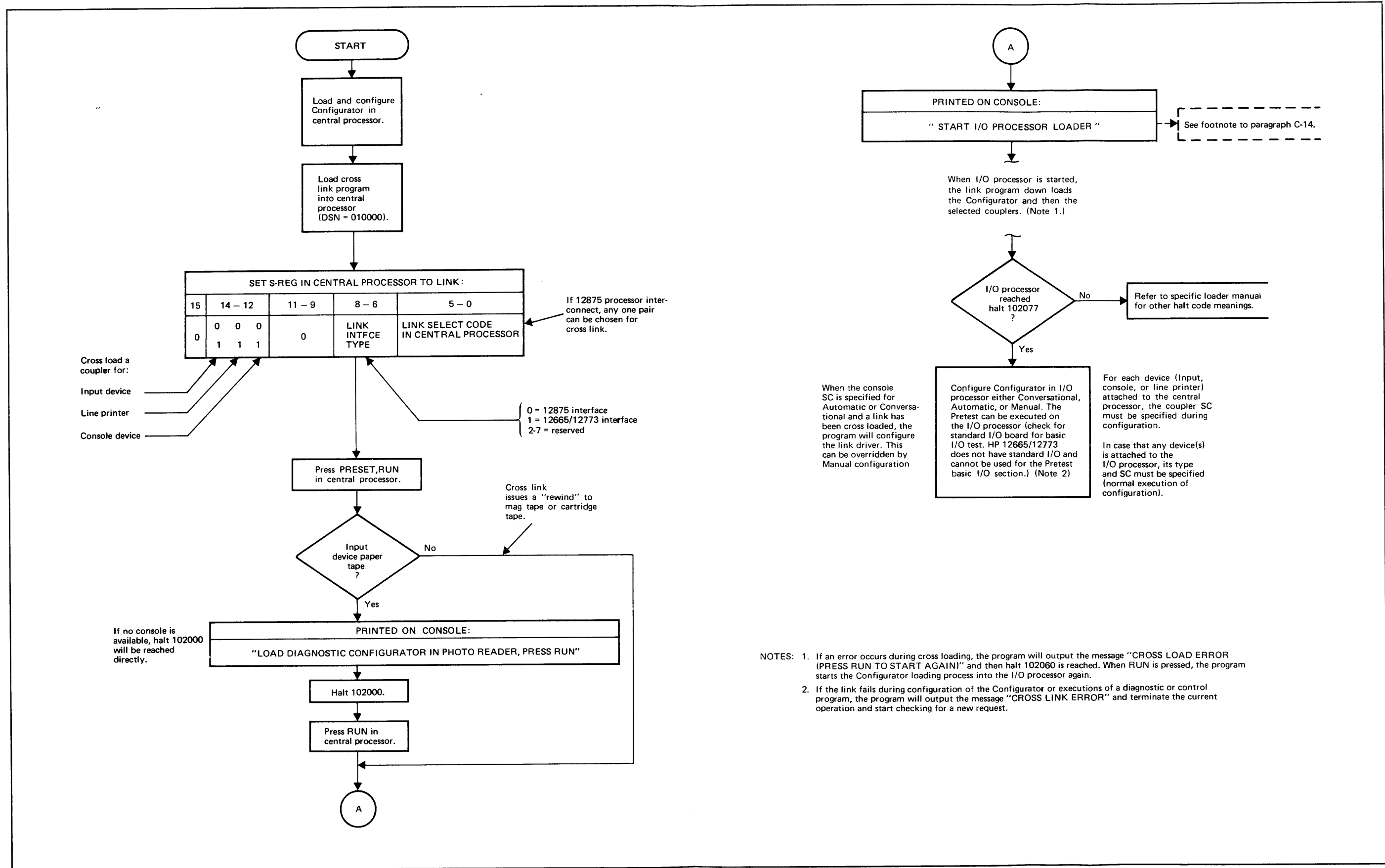


Figure C-5. Cross Link Flowchart C-15/C-16

Appendix D

Pretest Source Listing

```

00003 00002          ORG 2
00004*
00005*      VERSION OF REV.2522 <850523.1632>
00006*
00007*      SOURCE:   24296-80001
00008*      ABSOLUTE: 24296-60001
00009*      MANUAL:   02100-90157
00010          SUP
00011      000000  A    EQU 0
00012      000001  B    EQU 1
00013      000000  SC   EQU 0
00014      000000  INTP EQU 0
00015      000001  SWREG EQU 1
00016      000002  DMA2  EQU 2
00017      000006  DMA6  EQU 6
00018      000005  MPRT  EQU 5
00019 00002 000130      JMP 130B      GO TO START OF PRETEST
00020          REP 60
00021 00003 106077      OCT 106077
00022 00077 000077  CSUNIT JMP *      SET BY BOOT AND/OR CONFIG. BITS 8-10
00023*          THIS VALUE IS 0 IN THOSE BITS
00024*
00025*          LINK TABLE
00026*
00027 00100 001412  START JMP CFG,I    GO DIRECT TO CONFIGURATION
00028 00101 007431  DRI   DEF LDVR    DATA RECORD INPUT
00029 00102 007327  COD   DEF CNSLO   CONSOLE OUTPUT DRIVER
00030 00103 007404  LPD   DEF LNPTR   LINE PRINTER DRIVER
00031 00104 007354  CID   DEF CNSLI   CONSOLE INPUT DRIVER
00032 00105 000130  FWA   OCT 130     FIRST WORD OF AVBL. MEMORY
00033 00106 006477  LWA   DEF LWAA    LAST WORD OF AVBL. MEMORY
00034 00107 007167  DLP   DEF LOAD    DIAG. LOADER PROGRAM
00035 00110 177404          DEC -252    1 MILSEC. TIME COUNT
00036 00111 000000  DRISC OCT 0     DATA RECORD INPUT SELECT CODE
00037 00112 000000  CODSC OCT 0    CONSOLE OUTPUT SELECT CODE
00038 00113 000000  LPDSC OCT 0    LINE PRINTER SELECT CODE
00039 00114 000000  CIDSC OCT 0    CONSOLE INPUT SELECT CODE
00040*
00041*      CPU TYPE AND OPTIONS WORD FORMAT
00042*
00043*      BIT  MASK  MEANING IF SET (=1)
00044*      0    1    POWER FAIL AUTO RESTART
00045*      1    2    EAU INSTALLED
00046*      2    4    DMA PRESENT
00047*      3    10   CENTRAL INTERRUPT REG.
00048*      4    20   MEMORY PARITY
00049*      5    40   MP INSTALLED
00050*      6    100  FLOATING POINT
00051*      7    200  DMA 1 CHANNEL ONLY (2114)
00052*      8    400  <NOT USED>
00053*      9    1000 <NOT USED>
00054*      10   2000 <NOT USED>
00055*      11   4000 <NOT USED>
00056*

```

00057*	HIGH BITS: (MASK=177000)		
00058*	10K 2116A		
00059*	20K 2116B		
00060*	40K 2116C		
00061*	50K 2114A		
00062*	60K 2114B		
00063*	70K 2100A/S		
00064*	100K 21MX M		
00065*	101K 21MX E		
00066	00115 000000 CTO	NOP	COMPUTER TYPE/OPTIONS
00067	00116 000000	NOP	USER CARD TYPE AND SELECT CODE
00068	00117 000000 MEM	NOP	MEMORY SIZE
00069	00120 000107	JSB DLP,I	GO TO DIAG. LOADER PROGRAM
00070	00121 006730 WAIT	DEF TMR	1 MILL SEC TIMER ROUTINE
00071	00122 006722 SWRC	DEF SWR	CHECK SWITCH REG
00072	00123 006610 D2AS	DEF D2ASC	DECIMAL TO ASCII CONVERSION
00073	00124 006566 O2AS	DEF O2ASC	OCTAL TO ASCII CONVERSION
00074	00125 006653 AS2N	DEF ASC2N	ASCII TO BINARY CONVERSION
00075	00126 000200 DSN	OCT 000200	CONF. SERIAL NUMBER
00076	00127 006502 FMTO	DEF FMTR	FORMATTED OUTPUT

00078* ONLY SINGLE OPERATION INSTRUCTIONS ARE TESTED.
 00079* IT IS ASSUMED THAT COMBINATIONS AFTER INITIAL
 00080* TEST WILL WORK (NOT NECESSARILY TRUE BUT NECESSARY).
 00081*
 00082* INSTRUCTIONS ARE TESTED IN THE FOLLOWING SEQUENCE:
 00083*
 00084* RSS SOS SOC STO CLO CLE SEZ CCE CME
 00085*
 00086* CLA CCA CPA SZA STA LDA INA CMA SSA SLA (B-REG INCLUSIVE)
 00087*
 00088* STA B,I STB A,I LDA B,I LDB A,I CPA B,I CPB A,I
 00089*
 00090* JMP (BP) JSB (BP) JSB (BP),I TO (BP)
 00091*
 00092* GENERAL MEMORY TEST (FIRST 4K ONLY)
 00093*
 00094* AND XOR IOR ISZ ADA ADB
 00095*
 00096* MEMORY ADDRESS, PATTERN & WORST CASE TEST (ABOVE 4K ONLY)
 00097*
 00098* CURRENT PAGE / BASE PAGE JMP LDA STA CPA JSB
 00099*
 00100* ALS ARS RAL RAR ALR ALF (BITS 8-6)
 00101*
 00102* ALS ARS RAL RAR ALR ALF (BITS 2-0)
 00103*
 00104* ELA ERA (BITS 8-6) ELA ERA (BITS 2-0)
 00105*
 00106*
 00107* ANY ERROR ENCOUNTERED WILL BE INDICATED BY
 00108* A HALT 66B (102066)
 00109 000066 ERH EQU 66B
 00110* REFER TO LISTING AT THE M-REG. ADDRESS FOR DETAILS IF
 00111* A HALT OCCURS.
 00112* FOR REFERENCES (BP) = BASE PAGE AND (CP) = CURRENT PAGE

00114* ARITHMETIC SETTING OF E & O REGISTERS (INA ADA INB ADB)

00115*

00116* EXTEND & OVERFLOW REGISTER RESULTS

00117*

00118*

AD* MEM	TO REG.	=	REG.	OVF	EXT
00120*	+	+	+	0	0
00121*	+	+	-	1	0
00122*	+	-	+	0	1
00123*	-	+	+	0	1
00124*	-	+	-	0	0
00125*	+	-	-	0	0
00126*	-	-	-	0	1
00127*	-	-	+	1	1


```

00129*          PRE-TEST PART A (BP)
00130*
00131 00130 107700          CLC INTP,C    GENERATE CRS
00132 00131 002001          RSS
00133 00132 102066  HLT0  HLT ERH        RSS FAILED OR I/O CAUSED SKIP
00134*
00135 00133 001377          STA DISN    SAVE A-REG. FOR LATER
00136 00134 001400          STB DIBP    SAVE B-REG FOR LATER ALSO
00137 00135 002400          CLA
00138 00136 001401          STA SWRX    CLEAR S-REG. FLAG IF RESTART.
00139 00137 001402          STA BIOSC   CLEAR BASIC I/O SELECT CODE
00140*
00141 00140 102101  PTL0  STO            START HERE IF PRE TEST LOOP
00142 00141 102201          SOC
00143 00142 102301          SOS
00144 00143 102066          HLT ERH        STO / SOC / SOS
00145 00144 103101          CLO
00146 00145 102301          SOS
00147 00146 102201          SOC
00148 00147 102066          HLT ERH        CLO / SOS / SOC
00149 00150 000040          CLE
00150 00151 002041          SEZ,RSS
00151 00152 002040          SEZ
00152 00153 102066          HLT ERH        CLE / SEZ,RSS / SEZ
00153 00154 002300          CCE
00154 00155 002040          SEZ
00155 00156 002041          SEZ,RSS
00156 00157 102066          HLT ERH        CCE / SEZ / SEZ,RSS
00157 00160 002200          CME
00158 00161 002041          SEZ,RSS
00159 00162 002040          SEZ
00160 00163 102066          HLT ERH        CME / SEZ / SEZ,RSS

```

		PRE-TEST PART A (BP)	
00162*			
00163*			
00164	00164 002400	CLA	
00165	00165 007400	CCB	
00166	00166 001371	STA TMPA	
00167	00167 001372	STB TMPB	
00168	00170 001335	CPA B0	
00169	00171 002002	SZA	
00170	00172 102066	HLT ERH	CLA/CPA/SZA
00171	00173 006002	SZB	
00172	00174 001335	CPB B0	
00173	00175 102066	HLT ERH	CCB/CPB/SZB
00174	00176 001363	CPA M1	
00175	00177 102066	HLT ERH	CPA
00176	00200 001335	CPB B0	
00177	00201 102066	HLT ERH	CPB
00178	00202 001372	LDA TMPB	
00179	00203 001371	LDB TMPA	
00180	00204 002002	SZA	
00181	00205 001335	CPA B0	
00182	00206 102066	HLT ERH	STB/LDA
00183	00207 001335	CPB B0	
00184	00210 006002	SZB	
00185	00211 102066	HLT ERH	STA/LDB
00186	00212 102301	SOS	
00187	00213 002040	SEZ	
00188	00214 102066	HLT ERH	E / O SET
00189	00215 006004	INB	
00190	00216 102301	SOS	
00191	00217 002040	SEZ	
00192	00220 102066	HLT ERH	E / O SET
00193	00221 002004	INA	
00194	00222 002040	SEZ	
00195	00223 102201	SOC	
00196	00224 102066	HLT ERH	E NOT SET / O SET
00197	00225 000040	CLE	
00198	00226 006002	SZB	
00199	00227 002002	SZA	
00200	00230 102066	HLT ERH	INA/INB
00201	00231 001336	CPB B1	
00202	00232 002001	RSS	
00203	00233 102066	HLT ERH	INB

		PRE-TEST PART A (BP)	
00205*			
00206*			
00207	00234 003400	CCA	
00208	00235 006400	CLB	
00209	00236 001371	STA TMPA	
00210	00237 001372	STB TMPB	
00211	00240 001363	CPA M1	
00212	00241 002003	SZA,RSS	
00213	00242 102066	HLT ERH	CCA/CPA/SZA,RSS
00214	00243 006003	SZB,RSS	
00215	00244 001363	CPB M1	
00216	00245 102066	HLT ERH	CLB/CPB/SZB,RSS
00217	00246 001335	CPA B0	
00218	00247 102066	HLT ERH	CPA
00219	00250 001363	CPB M1	
00220	00251 102066	HLT ERH	CPB
00221	00252 001372	LDA TMPB	
00222	00253 001371	LDB TMPA	
00223	00254 002003	SZA,RSS	
00224	00255 001363	CPA M1	
00225	00256 102066	HLT ERH	STB/LDA
00226	00257 001363	CPB M1	
00227	00260 006003	SZB,RSS	
00228	00261 102066	HLT ERH	STA/LDB
00229	00262 102301	SOS	
00230	00263 002040	SEZ	
00231	00264 102066	HLT ERH	E / O SET
00232	00265 002004	INA	
00233	00266 102301	SOS	
00234	00267 002040	SEZ	
00235	00270 102066	HLT ERH	E / O SET
00236	00271 006004	INB	
00237	00272 002040	SEZ	
00238	00273 102201	SOC	
00239	00274 102066	HLT ERH	E NOT SET / O SET
00240	00275 000040	CLE	
00241	00276 006003	SZB,RSS	
00242	00277 002003	SZA,RSS	
00243	00300 102066	HLT ERH	INA/INB
00244	00301 001336	CPA B1	
00245	00302 002001	RSS	
00246	00303 102066	HLT ERH	INA

```
00248* PRE-TEST PART A (BP)
00249*
00250 00304 001406 LDA ALTO
00251 00305 001410 LDB ALT1
00252 00306 001371 STA TMPA
00253 00307 001372 STB TMPB
00254 00310 001406 CPA ALTO
00255 00311 002001 RSS
00256 00312 102066 HLT ERH LDA/CPA
00257 00313 001410 CPB ALT1
00258 00314 002001 RSS
00259 00315 102066 HLT ERH LDB/CPB
00260 00316 001372 LDA TMPB
00261 00317 001371 LDB TMPA
00262 00320 001410 CPA ALT1
00263 00321 002001 RSS
00264 00322 102066 HLT ERH LDA/STB
00265 00323 001406 CPB ALTO
00266 00324 002001 RSS
00267 00325 102066 HLT ERH LDB/STA
00268 00326 002004 INA
00269 00327 006004 INB
00270 00330 001411 CPA ALT1A
00271 00331 002001 RSS
00272 00332 102066 HLT ERH INA
00273 00333 001407 CPB ALTOA
00274 00334 002001 RSS
00275 00335 102066 HLT ERH INB
```

		PRE-TEST PART A (BP)	
00277*			
00278*			
00279	00336 002400	CLA	
00280	00337 007400	CCB	
00281	00340 003000	CMA	
00282	00341 007000	CMB	
00283	00342 001363	CPA M1	
00284	00343 006002	SZB	
00285	00344 102066	HLT ERH	CMA / CMB
00286	00345 002020	SSA	
00287	00346 006020	SSB	
00288	00347 102066	HLT ERH	SSA / SSB
00289	00350 000010	SLA	
00290	00351 004010	SLB	
00291	00352 102066	HLT ERH	SLA / SLB
00292	00353 003000	CMA	
00293	00354 007000	CMB	
00294	00355 001363	CPB M1	
00295	00356 002002	SZA	
00296	00357 102066	HLT ERH	CMA / CMB
00297	00360 006020	SSB	
00298	00361 002020	SSA	
00299	00362 102066	HLT ERH	SSA / SSB
00300	00363 004010	SLB	
00301	00364 000010	SLA	
00302	00365 102066	HLT ERH	SLA / SLB
00303	00366 001406	LDA ALTO	
00304	00367 001410	LDB ALT1	
00305	00370 003000	CMA	
00306	00371 007000	CMB	
00307	00372 001410	CPA ALT1	
00308	00373 002001	RSS	
00309	00374 102066	HLT ERH	CMA
00310	00375 001406	CPB ALTO	
00311	00376 002001	RSS	
00312	00377 102066	HLT ERH	CMB

```

00314*                PRE-TEST PART A (BP)
00315*
00316*    CHECK SWITCH REGISTER I/O
00317*
00318 00400 001401    LDA SWRX    CHECK IF SWREG HAS
00319 00401 002002    SZA          BEEN CHECK BEFORE
00320 00402 000452    JMP NXT00   YES SKIP CHECK
00321 00403 102501    LIA SWREG   GET AND
00322 00404 001401    STA SWRX    SAVE S-REG.
00323 00405 001406    LDA ALTO    TRY ALTERNATING PATTERNS
00324 00406 102601    OTA SWREG
00325 00407 102501    LIA SWREG
00326 00410 001401    CPA SWRX    STILL ORIGINAL?
00327 00411 001406    LDA ALTO    YES 2116/5 FORCE SKIP
00328 00412 001406    CPA ALTO
00329 00413 002001    RSS
00330 00414 102066    HLT ERH
00331 00415 001410    LDA ALT1    OTHER PATTERN
00332 00416 102601    OTA SWREG
00333 00417 102501    LIA SWREG
00334 00420 001401    CPA SWRX    STILL ORIGINAL?
00335 00421 001410    LDA ALT1    YES 2116/5 FORCE SKIP
00336 00422 001410    CPA ALT1
00337 00423 002001    RSS
00338 00424 102066    HLT ERH
00339 00425 003400    CCA          TRY OUTPUTING
00340 00426 102601    OTA SWREG   ALL ONE'S
00341 00427 102501    LIA SWREG   NOW GET IT BACK
00342 00430 001401    CPA SWRX    2115/2116?
00343 00431 000444    JMP *+11    OPERATOR MUST SET S-REG.
00344 00432 102501    LIA SWREG   GET IT AGAIN
00345 00433 001363    CPA M1      DID IT ECHO THE 1'S?
00346 00434 002001    RSS
00347 00435 102066    HLT ERH    NO
00348 00436 002400    CLA          TRY OUTPUTING
00349 00437 102601    OTA SWREG   BO 'S
00350 00440 102501    LIA SWREG   GET IT BACK
00351 00441 002002    SZA          OK
00352 00442 102066    HLT ERH    NO
00353 00443 000452    JMP NXT00   YES
00354 00444 102020    HLT 20B    2115/2116 OPERATOR MUST SET S-REG.
00355 00445 102501    LIA SWREG   GET IT
00356 00446 001363    CPA M1      IS IT ALL ONES
00357 00447 002001    RSS
00358 00450 102066    HLT ERH    NO INFORM OPERATOR
00359 00451 102021    HLT 21B    OPERATOR MUST CLEAR S-REG.
00360      000452    NXT00 EQU *
00361 00452 102501    LIA SWREG   GET IT AGAIN
00362 00453 002002    SZA          DID IT ECHO THE 0'S
00363 00454 102066    HLT ERH    NO
00364 00455 102301    SOS
00365 00456 002040    SEZ
00366 00457 102066    HLT ERH    E O SET

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00368*          PRE-TEST PART A (BP)
00369*
00370 00460 001424      LDA DTMPB
00371 00461 001423      LDB DTMPA
00372 00462 000001      STA B,I
00373 00463 000000      STB A,I
00374 00464 001371      CPA TMPA
00375 00465 002001      RSS
00376 00466 102066      HLT ERH          STA B,I/STB A,I
00377 00467 001372      CPB TMPB
00378 00470 002001      RSS
00379 00471 102066      HLT ERH          STA B,I/STB A,I
00380 00472 000001      LDA B,I
00381 00473 000000      LDB A,I
00382 00474 001371      CPA TMPA
00383 00475 002001      RSS
00384 00476 102066      HLT ERH          LDA B,I
00385 00477 001372      CPB TMPB
00386 00500 002001      RSS
00387 00501 102066      HLT ERH          LDB A,I
00388 00502 000000      LDA A,I
00389 00503 000001      LDB B,I
00390 00504 000001      CPA B,I
00391 00505 002001      RSS
00392 00506 102066      HLT ERH          CPA B,I/LDA A,I
00393 00507 000000      CPB A,I
00394 00510 002001      RSS
00395 00511 102066      HLT ERH          CPB A,I/LDB B,I
  
```

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00397*                PRE-TEST PART A (BP)
00398*
00399 00512 000514      JMP  *+2
00400 00513 102066      HLT  ERH          JMP (BP)
00401 00514 000520      JMP  *+4
00402 00515 102066      HLT  ERH          JMP (BP)
00403 00516 000522      JMP  *+4
00404 00517 102066      HLT  ERH          JMP (BP)
00405 00520 000516      JMP  *-2
00406 00521 102066      HLT  ERH          JMP (BP)
00407*
00408 00522 002400      CLA
00409 00523 000531      STA  JB0
00410 00524 000544      STA  JB1
00411 00525 000132      LDA  HLTO
00412 00526 000132      LDB  HLTO
00413 00527 000531      JSB  *+2
00414 00530 102066      JBR0 HLT  ERH          JSB (BP)
00415 00531 000000      JBO  NOP
00416 00532 000531      LDA  *-1
00417 00533 001427      CPA  DJBR0
00418 00534 002001      RSS
00419 00535 102066      HLT  ERH          JSB (BP)  RETURN ADDRESS
00420 00536 000132      LDA  HLTO
00421 00537 000541      JSB  *+2,I
00422 00540 102066      JBR1 HLT  ERH          JSB (BP),I
00423 00541 000544      DEF  *+3
00424 00542 102066      HLT  ERH          JSB (BP),I
00425 00543 102066      HLT  ERH          JSB (BP),I
00426 00544 000000      JB1  NOP
00427 00545 000544      LDA  *-1
00428 00546 001430      CPA  DJBR1
00429 00547 002001      RSS
00430 00550 102066      HLT  ERH          JSB (BP),I  RETURN ADDRESS
  
```



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00432*                PRE-TEST PART A (BP)
00433*
00434*    GENERAL MEMORY TEST
00435*    COVERS 4K MEMORY (2 TO 7677)
00436*    EXCEPT THIS ROUTINE
00437*
00438        000551  GMTS  EQU  *
00439  00551  006400          CLB          START WITH ADDRESS
00440  00552  006004          INB
00441  00553  006004          INB          TWO
00442  00554  000001  L00  LDA B,I      GET CURRENT CONTENTS
00443  00555  000001          CPA B,I    DID IT LOAD OK?
00444  00556  002001          RSS
00445  00557  102066          HLT ERH    NO FAILED ON LOAD
00446  00560  001371          STA TMPA   OK SAVE ORIGINAL CONTENTS
00447  00561  003400          CCA
00448  00562  000001          STA B,I    PUT ALL M1  IN LOCATION
00449  00563  000001          CPA B,I    DID IT STORE?
00450  00564  002001          RSS
00451  00565  102066          HLT ERH    NO FAILED ON STORE
00452  00566  002400          CLA        PUT 0  IN LOCATION
00453  00567  000001          STA B,I
00454  00570  000001          CPA B,I    DID IT STORE?
00455  00571  002001          RSS
00456  00572  102066          HLT ERH    NO FAILED ON STORE
00457  00573  001406          LDA ALTO  PUT ALTERNATING PATTERN IN LOACTION
00458  00574  000001          STA B,I
00459  00575  000001          CPA B,I    DID IT STORE?
00460  00576  002001          RSS
00461  00577  102066          HLT ERH    NO
00462  00600  001410          LDA ALT1  TRY OPPOSITE PATTERN
00463  00601  000001          STA B,I
00464  00602  000001          CPA B,I    DID IT STORE?
00465  00603  002001          RSS
00466  00604  102066          HLT ERH    NO
00467  00605  001371          LDA TMPA  RESTORE ORIGINAL CONTENTS
00468  00606  000001          STA B,I
00469  00607  000001          CPA B,I    DID IT GO BACK?
00470  00610  002001          RSS
00471  00611  102066          HLT ERH    NO
00472  00612  006004          INB        MOVE TO NEXT LOCATION
00473  00613  001425          CPB GMTSA  GOT TO THIS PROGRAM
00474  00614  001426          LDB GMTEA  YES SKIP OVER THIS SECTION
00475  00615  001357          CPB B7700  DONE THIS 4K?
00476  00616  002001          RSS
00477  00617  000554          JMP L00   NO DO NEXT LOCATION
00478        000620  GMTE  EQU  *

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		PRE-TEST PART A (BP)	
00480*			
00481*			
00482	00620 003400	CCA	
00483	00621 001335	AND BO	
00484	00622 002002	SZA	
00485	00623 102066	HLT ERH	AND
00486	00624 001406	LDA ALTO	
00487	00625 001410	AND ALT1	
00488	00626 002002	SZA	
00489	00627 102066	HLT ERH	AND
00490	00630 001410	LDA ALT1	
00491	00631 001406	AND ALTO	
00492	00632 002002	SZA	
00493	00633 102066	HLT ERH	AND
00494	00634 003400	CCA	
00495	00635 001406	AND ALTO	
00496	00636 001406	CPA ALTO	
00497	00637 002001	RSS	
00498	00640 102066	HLT ERH	AND
00499	00641 003400	CCA	
00500	00642 001410	AND ALT1	
00501	00643 001410	CPA ALT1	
00502	00644 002001	RSS	
00503	00645 102066	HLT ERH	AND
00504*			
00505	00646 002400	CLA	
00506	00647 001335	XOR BO	
00507	00650 002002	SZA	
00508	00651 102066	HLT ERH	XOR
00509	00652 001406	XOR ALTO	
00510	00653 001406	CPA ALTO	
00511	00654 002001	RSS	
00512	00655 102066	HLT ERH	XOR
00513	00656 001410	XOR ALT1	
00514	00657 001363	CPA M1	
00515	00660 002001	RSS	
00516	00661 102066	HLT ERH	XOR
00517	00662 001406	XOR ALTO	
00518	00663 001410	CPA ALT1	
00519	00664 002001	RSS	
00520	00665 102066	HLT ERH	XOR
00521	00666 001410	XOR ALT1	
00522	00667 002002	SZA	
00523	00670 102066	HLT ERH	XOR
00524	00671 003400	CCA	
00525	00672 001363	XOR M1	
00526	00673 002002	SZA	
00527	00674 102066	HLT ERH	XOR

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00529*          PRE-TEST PART A (BP)
00530*
00531 00675 002400      CLA
00532 00676 001335      IOR B0
00533 00677 002002      SZA
00534 00700 102066      HLT ERH          IOR
00535 00701 001406      IOR ALTO
00536 00702 001406      CPA ALTO
00537 00703 002001      RSS
00538 00704 102066      HLT ERH          IOR
00539 00705 001410      IOR ALT1
00540 00706 001363      CPA M1
00541 00707 002001      RSS
00542 00710 102066      HLT ERH          IOR
00543 00711 002400      CLA
00544 00712 001410      IOR ALT1
00545 00713 001410      CPA ALT1
00546 00714 002001      RSS
00547 00715 102066      HLT ERH          IOR
00548 00716 001406      IOR ALTO
00549 00717 001363      CPA M1
00550 00720 002001      RSS
00551 00721 102066      HLT ERH          IOR
```

```

00553*          PRE-TEST PART A (BP)
00554*
00555 00722 002400          CLA
00556 00723 006400          CLB
00557 00724 001371          STA TMPA
00558 00725 001362 L01     CPA B100K
00559 00726 002001          RSS
00560 00727 000734          JMP *+5
00561 00730 102201          SOC
00562 00731 002040          SEZ
00563 00732 102066          HLT ERH          E SET / O NOT SET
00564 00733 103101          CLO
00565 00734 102301          SOS
00566 00735 002040          SEZ
00567 00736 102066          HLT ERH          E / O SET
00568 00737 002004          INA
00569 00740 002003          SZA,RSS
00570 00741 000756          JMP NXT01
00571 00742 006004          INB
00572 00743 006003          SZB,RSS
00573 00744 102066          HLT ERH          INA
00574 00745 001371          ISZ TMPA
00575 00746 002001          RSS
00576 00747 102066          HLT ERH          ISZ
00577 00750 001371          CPA TMPA
00578 00751 002001          RSS
00579 00752 102066          HLT ERH          ISZ / INA
00580 00753 000000          CPB A
00581 00754 000725          JMP L01
00582 00755 102066          HLT ERH          ISZ / INB
00583 00756 002040 NXT01 SEZ
00584 00757 102201          SOC
00585 00760 102066          HLT ERH          E NOT SET / O SET
00586 00761 000040          CLE
00587 00762 006004          INB
00588 00763 002040          SEZ
00589 00764 102201          SOC
00590 00765 102066          HLT ERH          E NOT SET / O SET
00591 00766 000040          CLE
00592 00767 006002          SZB
00593 00770 102066          HLT ERH          INB
00594 00771 001371          ISZ TMPA
00595 00772 102066          HLT ERH          ISZ
00596 00773 102301          SOS
00597 00774 002040          SEZ
00598 00775 102066          HLT ERH          E / O SET
  
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00600*          PRE-TEST PART A (BP)
00601*
00602 00776 002400      CLA
00603 00777 007400      CCB
00604 01000 001336      ADA B1
00605 01001 102301      SOS
00606 01002 002040      SEZ
00607 01003 102066      HLT ERH      E / O SET
00608 01004 001336      ADB B1
00609 01005 002040      SEZ
00610 01006 102201      SOC
00611 01007 102066      HLT ERH      E NOT SET / O SET
00612 01010 000040      CLE
00613 01011 001336      CPA B1
00614 01012 006002      SZB
00615 01013 102066      HLT ERH      ADA/ADB
00616 01014 003400      CCA
00617 01015 006400      CLB
00618 01016 001336      ADB B1
00619 01017 102301      SOS
00620 01020 002040      SEZ
00621 01021 102066      HLT ERH      E / O SET
00622 01022 001336      ADA B1
00623 01023 002040      SEZ
00624 01024 102201      SOC
00625 01025 102066      HLT ERH      E NOT SET / O SET
00626 01026 000040      CLE
00627 01027 001336      CPB B1
00628 01030 002002      SZA
00629 01031 102066      HLT ERH      ADA/ADB
00630 01032 002400      CLA
00631 01033 007400      CCB
00632 01034 001363      ADA M1
00633 01035 102301      SOS
00634 01036 002040      SEZ
00635 01037 102066      HLT ERH      E / O SET
00636 01040 001363      ADB M1
00637 01041 002040      SEZ
00638 01042 102201      SOC
00639 01043 102066      HLT ERH      E NOT SET / O SET
00640 01044 000040      CLE
00641 01045 001363      CPA M1
00642 01046 002001      RSS
00643 01047 102066      HLT ERH      ADA
00644 01050 001364      CPB M2
00645 01051 002001      RSS
00646 01052 102066      HLT ERH      ADB
00647 01053 003400      CCA
00648 01054 006400      CLB
00649 01055 001363      ADB M1
00650 01056 102301      SOS
00651 01057 002040      SEZ
00652 01060 102066      HLT ERH      E / O SET
00653 01061 001363      ADA M1
  
```

00654	01062	002040	SEZ	
00655	01063	102201	SOC	
00656	01064	102066	HLT ERH	E NOT SET / O SET
00657	01065	000040	CLE	
00658	01066	001364	CPA M2	
00659	01067	002001	RSS	
00660	01070	102066	HLT ERH	ADA
00661	01071	001363	CPB M1	
00662	01072	002001	RSS	
00663	01073	102066	HLT ERH	ADB
00664	01074	001406	LDA ALTO	
00665	01075	001410	LDB ALT1	
00666	01076	001410	ADB ALT1	
00667	01077	102201	SOC	
00668	01100	002040	SEZ	
00669	01101	102066	HLT ERH	E SET / O NOT SET
00670	01102	103101	CLO	
00671	01103	001411	ADA ALT1A	
00672	01104	002040	SEZ	
00673	01105	102201	SOC	
00674	01106	102066	HLT ERH	E NOT SET / O SET
00675	01107	000040	CLE	
00676	01110	001406	CPB ALTO	
00677	01111	002002	SZA	
00678	01112	102066	HLT ERH	ADA/ADB
00679	01113	001410	LDA ALT1	
00680	01114	001406	LDB ALTO	
00681	01115	001406	ADA ALTO	
00682	01116	102301	SOS	
00683	01117	002040	SEZ	
00684	01120	102066	HLT ERH	E / O SET
00685	01121	001411	ADB ALT1A	
00686	01122	002040	SEZ	
00687	01123	102201	SOC	
00688	01124	102066	HLT ERH	E NOT SET / O SET
00689	01125	000040	CLE	
00690	01126	001363	CPA M1	
00691	01127	006002	SZB	
00692	01130	102066	HLT ERH	ADA/ADB

```

00694*                PRE-TEST PART A (BP)
00695*
00696*  *  CALCULATE MEMORY SIZE & RUN MEMORY ADDRESS AND PATTERN ON
00697*  MEMORY ABOVE 4K-IF MEMORY>4K.
00698*
00699  01131 001360          LDB B10K          START WITH 8K
00700  01132 001337          ADB B3           MOVE TO ADDRESS 3
00701  01133 002400  L02    CLA              CLEAR WRAPAROUND
00702  01134 000003          STA 3B
00703  01135 001406          LDA ALTO         TRY TO
00704  01136 000001          STA B,I        WRITE PATTERN THERE
00705  01137 000003          CPA 3B          DID IT WRAPAROUND
00706  01140 001152          JMP NXT02        YES - NO MEMORY
00707  01141 000001          CPA B,I        DID THE PATTERN STORE?
00708  01142 001147          JMP *+5        YES.MEMORY IS THERE
00709  01143 002400          CLA              NO.SHOULD
00710  01144 000001          CPA B,I        BE ALL
00711  01145 001152          JMP NXT02        O'S
00712  01146 102066          HLT ERH        NOT O.SOMETHING'S WRONG
00713  01147 001360          ADB B10K       MOVE UP 4K
00714  01150 006021          SSB,RSS        DONE 32K?
00715  01151 001133          JMP L02        NO
00716  01152 000001  NXT02 LDA B            CHANGE HANDS
00717  01153 001365          ADA M10K       BACK UP ONE STEP
00718  01154 000040          CLE
00719  01155 103101          CLO
00720  01156 001337          CPA B3         ONLY 4K?
00721  01157 001771          JMP NXT05       YES - SKIP MEMORY TESTS
00722  01160 001361          AND B70K       ELIMINATE LOWER 2 BITS
00723  01161 001357          ADA B7700      POINT TO BINARY LOADER
00724  01162 001363          ADA M1
00725  01163 102601          OTA SWREG      DISPLAY MEMORY SIZE
00726  01164 002040          SEZ
00727  01165 102201          SOC
00728  01166 102066          HLT ERH        E NOT SET / O SET
00729  01167 000040          CLE
00730  01170 001376          STA LADD       LWAM
00731  01171 001357          LDA B7700      SET FWAM
00732  01172 001375          STA FADD
  
```

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00734*      *   QUICK MEMORY ADDRESS TEST
00735*
00736 01173 001375          LDA FADD
00737 01174 000000 L03    STA A,I      STORE IN EACH
00738 01175 001376          CPA LADD    LOCATION OF AVAILABLE
00739 01176 001201          JMP *+3    MEMORY THE ADDRESS
00740 01177 002004          INA           OF THAT LOCATION
00741 01200 001174          JMP L03
00742 01201 001375          LDA FADD
00743 01202 000000 L04    CPA A,I      VERIFY MEMORY
00744 01203 002001          RSS           CONTENTS
00745 01204 102066          HLT ERH     MEMORY ADDRESS FAILURE
00746 01205 001376          CPA LADD
00747 01206 001211          JMP *+3    GO ON TO MEMORY PATTERN TEST
00748 01207 002004          INA
00749 01210 001202          JMP L04
00750*
00751*      *   QUICK MEMORY PATTERN TEST
00752*
00753 01211 003400          CCA           START WITH 177777
00754 01212 001375 L05    LDB FADD
00755 01213 000001 L06    STA B,I      WRITE PATTERN
00756 01214 006004          INB           IN A REG IN
00757 01215 001376          CPB LADD    AVAILABLE MEMROY
00758 01216 002001          RSS
00759 01217 001213          JMP L06
00760 01220 001375          LDB FADD
00761 01221 000001 L07    CPA B,I      COMPARE PATTERN READ
00762 01222 002001          RSS           TO PATTERN WRITTEN
00763 01223 102066          HLT ERH     MEMORY PATTERN FAILED
00764 01224 006004          INB
00765 01225 001376          CPB LADD
00766 01226 002001          RSS
00767 01227 001221          JMP L07
00768 01230 001410          CPA ALT1    DONE 125252 YET?
00769 01231 001241          JMP NXT03   YES
00770 01232 001406          CPA ALTO
00771 01233 001410          LDA ALT1
00772 01234 002003          SZA,RSS
00773 01235 001406          LDA ALTO
00774 01236 001363          CPA M1
00775 01237 002400          CLA
00776 01240 001212          JMP L05
00777          001241 NXT03 EQU *

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00779*                PRE-TEST PART A (BP)
00780*
00781*    WORST CASE PATTERN TEST
00782*
00783  01241 001375      LDA FADD
00784  01242 001375      LDB FADD
00785  01243 001371  L08  STA TMPA
00786  01244 001353      AND B140    WRITE
00787  01245 001353      CPA B140    WORST
00788  01246 002400      CLA          CASE
00789  01247 002002      SZA          PATTERN
00790  01250 003400      CCA
00791  01251 000001      STA B,I    IN MEMORY
00792  01252 001376      CPB LADD
00793  01253 001260      JMP NXT04
00794  01254 006004      INB
00795  01255 001371      LDA TMPA
00796  01256 002004      INA
00797  01257 001243      JMP L08
00798  01260 001375  NXT04 LDA FADD
00799  01261 001375      LDB FADD
00800  01262 001371  L09  STA TMPA
00801  01263 001353      AND B140    NOW
00802  01264 001353      CPA B140    COMPARE
00803  01265 002400      CLA          PATTERN
00804  01266 002002      SZA
00805  01267 003400      CCA
00806  01270 000001      CPA B,I
00807  01271 002001      RSS
00808  01272 102066      HLT ERH    MEMORY PATTERN FAILED
00809  01273 001376      CPB LADD
00810  01274 001771      JMP NXT05    CONTINUE
00811  01275 001437      LDA MHLT    FILL UNUSED MEMORY
00812  01276 000001      STA B,I    WITH HALTS
00813  01277 006004      INB
00814  01300 001371      LDA TMPA
00815  01301 002004      INA
00816  01302 001262      JMP L09
  
```

```
00818*           PRE-TEST PART A (BP)
00819*
00820*           PROGRAM COMES HERE FROM CURRENT PAGE
00821*
00822*
00823 01303 001305 BPJP0 JMP *+2,I
00824 01304 102066       HLT ERH           JMP (BP),I (TO BP)
00825 01305 001310       DEF *+3
00826 01306 102066       HLT ERH           JMP (BP),I (TO BP)
00827 01307 102066       HLT ERH           " "
00828 01310 001312       JMP *+2,I
00829 01311 102066       HLT ERH           JMP (BP),I (TO CP)
00830 01312 002037       DEF CPJP0
00831 01313 102066       HLT ERH           JMP (BP),I (TO CP)
00832 01314 102066       HLT ERH           " "
00833 01315 001317 BPJP1 JMP *+2,I
00834 01316 102066       HLT ERH           JMP (BP),I (TO CP)
00835 01317 002044       DEF CPJP1
00836 01320 102066       HLT ERH           JMP (BP),I (TO CP)
00837 01321 102066       HLT ERH           " "
00838*
00839 01322 000000 BPJB0 NOP
00840 01323 001322       LDA *-1
00841 01324 001431       CPA DJBR2
00842 01325 002001       RSS
00843 01326 102066       HLT ERH           JSB (BP) FROM CP RETURN ADDRESS
00844 01327 000132       LDA HLTO
00845 01330 001332       JSB *+2,I
00846 01331 102066 JBR5  HLT ERH           JSB (BP),I TO CP
00847 01332 002105       DEF CPJB0
00848 01333 102066       HLT ERH           JSB (BP),I TO CP
00849 01334 102066       HLT ERH           JSB (BP),I TO CP
00850*
00851*           END OF PRE-TEST PART A (BP)
```

00853* * STORAGE AND CONSTANTS
00854*
00855 01335 000000 B0 OCT 0
00856 01336 000001 B1 OCT 1
00857 01337 000003 B3 OCT 3
00858 01340 000004 B4 OCT 4
00859 01341 000005 B5 OCT 5
00860 01342 000006 B6 OCT 6
00861 01343 000007 B7 OCT 7
00862 01344 000017 B17 OCT 17
00863 01345 000037 B37 OCT 37
00864 01346 000040 B40 OCT 40
00865 01347 000054 B54 OCT 54
00866 01350 000060 B60 OCT 60
00867 01351 000070 B70 OCT 70
00868 01352 000077 B77 OCT 77
00869 01353 000140 B140 OCT 140
00870 01354 000170 B170 OCT 170
00871 01355 000177 B177 OCT 177
00872 01356 000777 B777 OCT 777
00873 01357 007700 B7700 OCT 7700
00874 01360 010000 B10K OCT 10000
00875 01361 070000 B70K OCT 70000
00876 01362 100000 B100K OCT 100000
00877 01363 177777 M1 OCT -1
00878 01364 177776 M2 OCT -2
00879 01365 170000 M10K OCT -10000
00880 01366 177760 M17 OCT 177760
00881 01367 177700 M77 OCT 177700
00882 01370 107777 M70K OCT 107777
00883 01371 177777 TMPA OCT -1
00884 01372 000000 TMPB OCT 0
00885 01373 000000 SVA NOP
00886 01374 000000 SVB NOP
00887 01375 000000 FADD NOP
00888 01376 000000 LADD NOP
00889 01377 000000 DISN NOP
00890 01400 000000 DIBP NOP
00891 01401 000000 SWRX NOP
00892 01402 000000 BIOSC NOP
00893 01403 000000 SCX NOP
00894 01404 000000 Ibufp NOP
00895 01405 172525 APTRN OCT 172525
00896 01406 125252 ALTO OCT 125252
00897 01407 125253 ALTOA OCT 125253
00898 01410 052525 ALT1 OCT 052525
00899 01411 052526 ALT1A OCT 052526

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00901 01412 002720 CFGI DEF CFRG
00902 01413 004160 CHSC DEF CKSC
00903 01414 004142 ISCR DEF ISC
00904 01415 004057 MDVR DEF MVDVR
00905 01416 004000 CFM DEF CFMEM
00906 01417 004173 MSG DEF MSGR
00907 01420 004230 IBUFD DEF IBUF
00908 01421 004243 CNST DEF CNTS
00909 01422 004341 CNSC DEF CVSC
00910 01423 001371 DTMPA DEF TMPA
00911 01424 001372 DTMPB DEF TMPB
00912 01425 000551 GMTSA DEF GMTS
00913 01426 000620 GMTEA DEF GMTE
00914 01427 000530 DJBR0 DEF JBR0
00915 01430 000540 DJBR1 DEF JBR1
00916 01431 002104 DJBR2 DEF JBR2
00917 01432 006740 DTMC DEF TMC
00918 01433 006734 DTMI DEF TMI
00919 01434 007431 DLDVR DEF LDVR
00920 01435 007327 DCO DEF CNSLO
00921 01436 007404 LPDV DEF LNPTR
00922 01437 106075 MHLT OCT 106075
00923*
00924*
00925 01440 001441 CFMPJ JSB *+1
00926 01441 000000 NOP
00927 01442 103100 CLF INTP
00928 01443 107705 CLC 5B,C TURN OFF MEMORY PROTECT
00929 01444 006400 CLB
00930 01445 001441 JMP *-4,I RETURN
00931*
00932 01446 101447 DEFT DEF *+1,I
00933 01447 000101 OCT 101,102,103,104,106,107
00934 01455 000121 OCT 121,122,123,124,125,127
00935 01463 001432 DEF DTMC
00936 01464 006501 DEF LDMXA
00937 01465 006562 DEF FMTBF
00938 01466 004132 DEF DOTBUS
00939 01467 004133 DEF DSTDMA
00940 01470 004134 DEF DCSLEN
00941 01471 004135 DEF DCSDMA
00942 01472 004136 DEF DLDMXA
00943 01473 004127 DEF DCSDMAA
00944 01474 004137 DEF CSSDMAA
00945 01475 004131 DEF DCSTATW
00946 01476 001363 DEF M1
00947*
00948 01477 160000 DMABT OCT 160000

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00950	01500	001501	CPTOT	DEF	CPTT	
00951*						
00952	01501	177404	CPTT	DEC	-252	
00953	01502	000000		OCT	0	
00954	01503	177313		DEC	-309	
00955	01504	010000		OCT	10000	16A
00956	01505	177313		DEC	-309	
00957	01506	020010		OCT	20010	16B
00958	01507	177313		DEC	-309	
00959	01510	030010		OCT	30010	16C
00960	01511	177412		DEC	-246	
00961	01512	040000		OCT	40000	15A
00962	01513	177412		DEC	-246	
00963	01514	050010		OCT	50010	14A
00964	01515	177412		DEC	-246	
00965	01516	060210		OCT	60210	14B
00966	01517	177404		DEC	-252	
00967	01520	070033		OCT	70033	2100
00968	01521	177465		DEC	-203	
00969	01522	100133		OCT	100133	21MX
00970	01523	174733	XETC	DEC	-1573	
00971	01524	110133		OCT	110133	21XE
00972	01525	177404		DEC	-252	
00973	01526	000000		OCT	0	
00974	01527	177404		DEC	-252	
00975	01530	000000		OCT	0	
00976	01531	177404		DEC	-252	
00977	01532	000000		OCT	0	
00978	01533	177404		DEC	-252	
00979	01534	000000		OCT	0	
00980	01535	177404		DEC	-252	
00981	01536	000000		OCT	0	
00982	01537	177404		DEC	-252	
00983	01540	000000		OCT	0	

00986	01541	101536	CFCTP	DEF	*-3,I	
00987	01542	031061		ASC	4,2116,	_
00988	01546	031061		ASC	4,2116,	_
00989	01552	031061		ASC	4,2116,	_
00990	01556	031061		ASC	4,2115,	_
00991	01562	031061		ASC	4,2114,	_
00992	01566	031061		ASC	4,2114,	_
00993	01572	031061		ASC	4,2100,	_
00994	01576	031061		ASC	4,21MX M,	_
00995	01602	031061		ASC	4,21MX E,	_
00996*						
00997	01606	001607	CFDNA	DEF	*+1	
00998	01607	020116		ASC	05, NO DMA,	_
00999	01614	001615	CFDIV	DEF	*+1	
01000	01615	020104		ASC	04, DMA,	_
01001	01621	001622	CFMNA	DEF	*+1	
01002	01622	047117		ASC	05,NO MPRT,	_
01003	01627	001630	CFMIV	DEF	*+1	
01004	01630	046520		ASC	04,MPRT,	_
01005*						
01006	01634	001635	CFMTB	DEF	*+1	
01007	01635	001645		DEF	CFMS0	
01008	01636	001647		DEF	CFMS1	
01009	01637	001651		DEF	CFMS2	
01010	01640	001654		DEF	CFMS3	
01011	01641	001657		DEF	CFMS4	
01012	01642	001662		DEF	CFMS5	
01013	01643	001665		DEF	CFMS6	
01014	01644	001670		DEF	CFMS7	
01015*						
01016	01645	032113	CFMS0	ASC	2,4K	_
01017	01647	034113	CFMS1	ASC	2,8K	_
01018	01651	030462	CFMS2	ASC	3,12K	_
01019	01654	030466	CFMS3	ASC	3,16K	_
01020	01657	031060	CFMS4	ASC	3,20K	_
01021	01662	031064	CFMS5	ASC	3,24K	_
01022	01665	031070	CFMS6	ASC	3,28K	_
01023	01670	031462	CFMS7	ASC	3,32K	_
01024	01673	001674	CFMS	DEF	*+1	
01025	01674	046505		ASC	04,MEMORY/	

```

01028 01700 000000 CCSDY NOP
01029 01701 102071 HLT 71B NO DEVICE
01030 01702 002400 CLA
01031 01703 000112 STA CODSC
01032 01704 000114 STA CIDSC
01033 01705 001700 JMP CCSDY,I
01034*
01035 01706 001707 CSLDY DEF *+1
01036*
01037 01707 000000 OCSDY NOP PSEUDO CONSOLE DRIVER
01038 01710 002400 CLA
01039 01711 006400 CLB
01040 01712 127327 ABS JMP+CSLO+100000B
01041*
01042 01713 001714 CNSLD DEF *+1
01043 01714 004612 CD531 DEF 0531
01044 01715 000000 DEF *-*
01045 01716 004661 CD587 DEF 0587
01046 01717 000000 DEF *-*
01047 01720 004753 CD966 DEF 0966
01048 01721 004736 DEF C966
01049 01722 001707 DEF OCSDY
01050 01723 001700 DEF CCSDY
01051 01724 001707 DEF OCSDY
01052 01725 001700 DEF CCSDY
01053 01726 001707 DEF OCSDY
01054 01727 001700 DEF CCSDY
01055 01730 001707 DEF OCSDY
01056 01731 001700 DEF CCSDY
01057 01732 007327 DEF CNSLO MAINTAIN CURRENT DRIVER FOR LINK
01058 01733 000000 DEF *-*
01059*
01060*
01061 01734 000000 ICSDY NOP PSEUDO CONSOLE INPUT DRIVER
01062 01735 002400 CLA (MUST BE 21 WORDS AFTER OCSDY)
01063 01736 006400 CLB
01064 01737 106071 OCT 106071
01065 01740 127354 ABS JMP+CSLI+100000B
  
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01067 01741 001742 LPDF DEF *+1
01068 01742 005024 DEF OLP67
01069 01743 005050 DEF OLPXX
01070 LPDYD REP 5
01071 01744 001752 DEF OLPDY
01072 01751 007404 DEF LNPTR
01073*
01074*
01075 01752 000000 OLPDY NOP
01076 01753 073166 ABS STA+BFR SAVE A
01077 01754 063404 ABS LDA+LPTR GET RETURN ADDRESS
01078 01755 073327 ABS STA+CSLO PUT IT IN CONSOLE
01079 01756 063166 ABS LDA+BFR RESTORE A
01080 01757 027330 ABS JMP+CSLO+1
01081*
01082*
01083 01760 004602 DINDD DEF DINDT
01084*
01085 01761 001762 LDDY DEF LDDY0
01086*
01087 01762 000000 LDDY0 NOP PSEUDO LOADER DRIVER
01088 01763 106072 OCT 106072
01089 01764 003400 CCA SET EOT IF RUN IS PRESSED
01090 01765 127431 ABS JMP+LD+100000B
01091*
01092 000003 BPROOM EQU 1771B-* (PAGE1 SHOULD START PAGE 1)
01093 REP BPROOM ADJUST SO PAGE1 IS FIRST ON PAGE1
01094 01766 106075 OCT 106075 MEMORY HALT

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01096*                START OF PRE-TEST PART B (CP)
01097*
01098 01771 002400  NXT05 CLA
01099 01772 102601      OTA SWREG      CLEAR S-REG.
01100 01773 102301      SOS
01101 01774 002040      SEZ
01102 01775 102066      HLT ERH        E / O SET
01103 01776 000132      LDA HLTO      HALT IF CURRENT PAGE/
01104 01777 000132      LDB HLTO        BASE PAGE DOESN'T WORK
01105 02000 002001  PAGE1 JMP  *+1
01106 02001 002764      LDB .ALT1
01107 02002 001406      LDA ALTO
01108 02003 002001      RSS
01109 02004 000001      OCT 1          USED IN CPU TYPE CALCULATION
01110 02005 002771      STA .TMPA
01111 02006 001372      STB TMPB
01112 02007 002763      CPA .ALTO
01113 02010 002001      RSS
01114 02011 102066      HLT ERH        LDA (BP) / CPA (CP)
01115 02012 001410      CPB ALT1
01116 02013 002001      RSS
01117 02014 102066      HLT ERH        LDB (CP) / CPB (BP)
01118 02015 002771      LDB .TMPA
01119 02016 001372      LDA TMPB
01120 02017 002764      CPA .ALT1
01121 02020 002001      RSS
01122 02021 102066      HLT ERH        STB (BP)   CPA (CP)
01123 02022 001406      CPB ALTO
01124 02023 002001      RSS
01125 02024 102066      HLT ERH        STA (CP) / CPB (BP)

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01127*          PRE-TEST PART B (CP)
01128 02025 002027      JMP *+2
01129 02026 102066      HLT ERH          JMP (CP)
01130 02027 002033      JMP *+4
01131 02030 102066      HLT ERH          JMP (CP)
01132 02031 002035      JMP *+4
01133 02032 102066      HLT ERH          JMP (CP)
01134 02033 002031      JMP *-2
01135 02034 102066      HLT ERH          JMP (CP)
01136*
01137 02035 001303      JMP BPJPO
01138 02036 102066      HLT ERH          JMP (CP) TO (BP)
01139 02037 002041      CPJPO JMP *+2,I
01140 02040 102066      HLT ERH          JMP (CP),I (TO BP)
01141 02041 001315      DEF BPJP1
01142 02042 102066      HLT ERH          JMP (CP),I (TO BP)
01143 02043 102066      HLT ERH          " " "
01144 02044 002046      CPJPI JMP *+2,I
01145 02045 102066      HLT ERH          JMP (CP),I (TO CP)
01146 02046 002051      DEF *+3
01147 02047 102066      HLT ERH          JMP (CP),I (TO CP)
01148 02050 102066      HLT ERH          " "
01149*
01150 02051 002400      CLA
01151 02052 002062      STA .JBO
01152 02053 002075      STA .JB1
01153 02054 001322      STA BPJBO
01154 02055 002105      STA CPJBO
01155 02056 000132      LDA HLTO
01156 02057 000132      LDB HLTO
01157 02060 002062      JSB *+2
01158 02061 102066      JBR3 HLT ERH          JSB (CP)
01159 02062 000000      .JBO NOP
01160 02063 002062      LDA *-1
01161 02064 002773      CPA DJBR3
01162 02065 002001      RSS
01163 02066 102066      HLT ERH          JSB (CP) RETURN ADDRESS
01164 02067 000132      LDA HLTO
01165 02070 002072      JSB *+2,I
01166 02071 102066      JBR4 HLT ERH          JSB (CP),I
01167 02072 002075      DEF *+3
01168 02073 102066      HLT ERH          JSB (CP),I
01169 02074 102066      HLT ERH          JSB (CP),I
01170 02075 000000      .JB1 NOP
01171 02076 002075      LDA *-1
01172 02077 002774      CPA DJBR4
01173 02100 002001      RSS
01174 02101 102066      HLT ERH          JSB (CP),I RETURN ADDRESS
01175 02102 000132      LDA HLTO
01176 02103 001322      JSB BPJBO
01177 02104 102066      JBR2 HLT ERH          JSB (BP)
01178 02105 000000      CPJBO NOP
01179 02106 002105      LDA *-1
01180 02107 002775      CPA DJBR5

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DIAGNOSTIC CONFIGURATOR (DSN 000200)

01181	02110	002001	RSS	
01182	02111	102066	HLT ERH	JSB (BP),I TO CP RETURN ADDRESS

		PRE-TEST PART B (CP)			
01184*					
01185*					
01186	02112 002765	LDA SRGP1	1000100100100111		
01187	02113 002766	LDB SRGP2		1001100000100000	
01188	02114 001000	ALS	1001001001001110		
01189	02115 005100	BRS		1100110000010000	
01190	02116 001100	ARS	1100100100100111		
01191	02117 005400	BLR		0001100000100000	
01192	02120 001000	ALS	1001001001001110		
01193	02121 005700	BLF		1000001000000001	
01194	02122 001300	RAR	0100100100100111		
01195	02123 005000	BLS		1000010000000010	
01196	02124 001100	ARS	0010010010010011		
01197	02125 005300	RBR		0100001000000001	
01198	02126 001400	ALR	0100100100100110		
01199	02127 005000	BLS		0000010000000010	
01200	02130 001200	RAL	1001001001001100		
01201	02131 005700	BLF		0100000000100000	
01202	02132 001100	ARS	1100100100100110		
01203	02133 005200	RBL		1000000001000000	
01204	02134 001400	ALR	0001001001001100		
01205	02135 005100	BRS		1100000000100000	
01206	02136 001700	ALF	0010010011000001		
01207	02137 005200	RBL		1000000001000001	
01208	02140 001200	RAL	0100100110000010		
01209	02141 005100	BRS		1100000000100000	
01210	02142 001000	ALS	0001001100000100		
01211	02143 005300	RBR		0110000000010000	
01212	02144 001300	RAR	0000100110000010		
01213	02145 005400	BLR		0100000000100000	
01214	02146 001700	ALF	1001100000100000		
01215	02147 005000	BLS		0000000001000000	
01216	02150 002766	CPA SRGP2			
01217	02151 002001	RSS			
01218	02152 102066	HLT ERH	SRG INST A-REG.		
01219	02153 002767	CPB SRGP3			
01220	02154 002001	RSS			
01221	02155 102066	HLT ERH	SRG INST B-REG.		
01222	02156 102301	SOS			
01223	02157 002040	SEZ			
01224	02160 102066	HLT ERH	E / O SET		

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01226*          PRE-TEST PART B (CP)
01227*
01228 02161 002765      LDB SRGP1      1000100100100111
01229 02162 002766      LDA SRGP2          1001100000100000
01230 02163 005000      BLS          1001001001001110
01231 02164 001100      ARS          1100110000010000
01232 02165 005100      BRS          1100100100100111
01233 02166 001400      ALR          0001100000100000
01234 02167 005000      BLS          1001001001001110
01235 02170 001700      ALF          1000001000000001
01236 02171 005300      RBR          0100100100100111
01237 02172 001000      ALS          1000010000000010
01238 02173 005100      BRS          0010010010010011
01239 02174 001300      RAR          0100001000000001
01240 02175 005400      BLR          0100100100100110
01241 02176 001000      ALS          0000010000000010
01242 02177 005200      RBL          1001001001001100
01243 02200 001700      ALF          0100000000100000
01244 02201 005100      BRS          1100100100100110
01245 02202 001200      RAL          1000000001000000
01246 02203 005400      BLR          0001001001001100
01247 02204 001100      ARS          1100000000100000
01248 02205 005700      BLF          0010010011000001
01249 02206 001200      RAL          1000000001000001
01250 02207 005200      RBL          0100100110000010
01251 02210 001100      ARS          1100000000100000
01252 02211 005000      BLS          0001001100000100
01253 02212 001300      RAR          0110000000010000
01254 02213 005300      RBR          0000100110000010
01255 02214 001400      ALR          0100000000100000
01256 02215 005700      BLF          1001100000100000
01257 02216 001000      ALS          0000000001000000
01258 02217 002766      CPB SRGP2
01259 02220 002001      RSS
01260 02221 102066      HLT ERH      SRG INST B-REG.
01261 02222 002767      CPA SRGP3
01262 02223 002001      RSS
01263 02224 102066      HLT ERH      SRG INST A-REG.
01264 02225 102301      SOS
01265 02226 002040      SEZ
01266 02227 102066      HLT ERH      E / O SET
  
```

01268*		PRE-TEST PART B (CP)	
01269*			
01270	02230 002765	LDA SRGP1	1000100100100111
01271	02231 002766	LDB SRGP2	1001100000100000
01272	02232 000020	OCT 0020 ALS	1001001001001110
01273	02233 004021	OCT 4021 BRS	1100110000010000
01274	02234 000021	OCT 0021 ARS	1100100100100111
01275	02235 004024	OCT 4024 BLR	0001100000100000
01276	02236 000020	OCT 0020 ALS	1001001001001110
01277	02237 004027	OCT 4027 BLF	1000001000000001
01278	02240 000023	OCT 0023 RAR	0100100100100111
01279	02241 004020	OCT 4020 BLS	1000010000000010
01280	02242 000021	OCT 0021 ARS	0010010010010011
01281	02243 004023	OCT 4023 RBR	0100001000000001
01282	02244 000024	OCT 0024 ALR	0100100100100110
01283	02245 004020	OCT 4020 BLS	0000010000000010
01284	02246 000022	OCT 0022 RAL	1001001001001100
01285	02247 004027	OCT 4027 BLF	0100000000100000
01286	02250 000021	OCT 0021 ARS	1100100100100110
01287	02251 004022	OCT 4022 RBL	1000000001000000
01288	02252 000024	OCT 0024 ALR	0001001001001100
01289	02253 004021	OCT 4021 BRS	1100000000100000
01290	02254 000027	OCT 0027 ALF	0010010011000001
01291	02255 004022	OCT 4022 RBL	1000000001000001
01292	02256 000022	OCT 0022 RAL	0100100110000010
01293	02257 004021	OCT 4021 BRS	1100000000100000
01294	02260 000020	OCT 0020 ALS	0001001100000100
01295	02261 004023	OCT 4023 RBR	0110000000010000
01296	02262 000023	OCT 0023 RAR	0000100110000010
01297	02263 004024	OCT 4024 BLR	0100000000100000
01298	02264 000027	OCT 0027 ALF	10011000000100000
01299	02265 004020	OCT 4020 BLS	0000000001000000
01300	02266 002766	CPA SRGP2	
01301	02267 002001	RSS	
01302	02270 102066	HLT ERH	SRG INST A-REG.
01303	02271 002767	CPB SRGP3	
01304	02272 002001	RSS	
01305	02273 102066	HLT ERH	SRG INST B-REG.
01306	02274 102301	SOS	
01307	02275 002040	SEZ	
01308	02276 102066	HLT ERH	E / O SET

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01310*          PRE-TEST PART B (CP)
01311*
01312 02277 002765      LDB SRGP1      1000100100100111
01313 02300 002766      LDA SRGP2          1001100000100000
01314 02301 004020      OCT 4020 BLS 1001001001001110
01315 02302 000021      OCT 0021 ARS 1100110000010000
01316 02303 004021      OCT 4021 BRS 1100100100100111
01317 02304 000024      OCT 0024 ALR 0001100000100000
01318 02305 004020      OCT 4020 BLS 1001001001001110
01319 02306 000027      OCT 0027 ALF 1000001000000001
01320 02307 004023      OCT 4023 RBR 0100100100100111
01321 02310 000020      OCT 0020 ALS 1000010000000010
01322 02311 004021      OCT 4021 BRS 0010010010010011
01323 02312 000023      OCT 0023 RAR 0100001000000001
01324 02313 004024      OCT 4024 BLR 0100100100100110
01325 02314 000020      OCT 0020 ALS 0000010000000010
01326 02315 004022      OCT 4022 RBL 1001001001001100
01327 02316 000027      OCT 0027 ALF 0100000000100000
01328 02317 004021      OCT 4021 BRS 1100100100100110
01329 02320 000022      OCT 0022 RAL 1000000001000000
01330 02321 004024      OCT 4024 BLR 0001001001001100
01331 02322 000021      OCT 0021 ARS 1100000000100000
01332 02323 004027      OCT 4027 BLF 0010010011000001
01333 02324 000022      OCT 0022 RAL 1000000001000001
01334 02325 004022      OCT 4022 RBL 0100100110000010
01335 02326 000021      OCT 0021 ARS 1100000000100000
01336 02327 004020      OCT 4020 BLS 0001001100000100
01337 02330 000023      OCT 0023 RAR 0110000000010000
01338 02331 004023      OCT 4023 RBR 0000100110000010
01339 02332 000024      OCT 0024 ALR 0100000000100000
01340 02333 004027      OCT 4027 BLF 1001100000100000
01341 02334 000020      OCT 0020 ALS 0000000001000000
01342 02335 002766      CPB SRGP2
01343 02336 002001      RSS
01344 02337 102066      HLT ERH      SRG INST B-REG.
01345 02340 002767      CPA SRGP3
01346 02341 002001      RSS
01347 02342 102066      HLT ERH      SRG INST A-REG.
01348 02343 102301      SOS
01349 02344 002040      SEZ
01350 02345 102066      HLT ERH      E / O SET

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01352*          PRE-TEST PART B (CP)
01353*
01354 02346 002770      LDA SRGEP      0111010001110010
01355 02347 002770      LDB SRGEP          0111010001110010
01356 02350 001500      ERA              0011101000111001 0
01357 02351 005600      ELB              0 1110100011100100
01358 02352 001500      ERA              0001110100011100 1
01359 02353 005600      ELB              1 1101000111001001
01360 02354 001500      ERA              1000111010001110 0
01361 02355 005600      ELB              1 1010001110010010
01362 02356 001500      ERA              1100011101000111 0
01363 02357 005600      ELB              1 0100011100100100
01364 02360 001500      ERA              1110001110100011 1
01365 02361 005600      ELB              0 1000111001001001
01366 02362 001500      ERA              0111000111010001 1
01367 02363 005600      ELB              1 0001110010010011
01368 02364 001500      ERA              1011100011101000 1
01369 02365 005600      ELB              0 0011100100100111
01370 02366 001500      ERA              0101110001110100 0
01371 02367 005600      ELB              0 0111001001001110
01372 02370 005500      ERB              0 0011100100100111
01373 02371 001600      ELA              1011100011101000 0
01374 02372 005500      ERB              1 0001110010010011
01375 02373 001600      ELA              0111000111010001 1
01376 02374 005500      ERB              1 1000111001001001
01377 02375 001600      ELA              1110001110100011 0
01378 02376 005500      ERB              1 0100011100100100
01379 02377 001600      ELA              1100011101000111 1
01380 02400 005500      ERB              0 1010001110010010
01381 02401 001600      ELA              1000111010001110 1
01382 02402 005500      ERB              0 1101000111001001
01383 02403 001600      ELA              0001110100011100 1
01384 02404 005500      ERB              1 1110100011100100
01385 02405 001600      ELA              0011101000111001 0
01386 02406 005500      ERB              0 0111010001110010
01387 02407 001600      ELA              0111010001110010 0
01388 02410 002770      CPA SRGEP
01389 02411 002001      RSS
01390 02412 102066      HLT ERH          SRG E-REG ERROR
01391 02413 002770      CPB SRGEP
01392 02414 002001      RSS
01393 02415 102066      HLT ERH          SRG E-REG ERROR
01394 02416 102301      SOS
01395 02417 002040      SEZ
01396 02420 102066      HLT ERH          E / O SET
  
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01398*                PRE-TEST PART B (CP)
01399*
01400 02421 002770    LDA SRGEP      0111010001110010
01401 02422 002770    LDB SRGEP                0111010001110010
01402 02423 000025    OCT 0025 ERA 0011101000111001 0
01403 02424 004026    OCT 4026 ELB          0 1110100011100100
01404 02425 000025    OCT 0025 ERA 0001110100011100 1
01405 02426 004026    OCT 4026 ELB          1 1101000111001001
01406 02427 000025    OCT 0025 ERA 1000111010001110 0
01407 02430 004026    OCT 4026 ELB          1 1010001110010010
01408 02431 000025    OCT 0025 ERA 1100011101000111 0
01409 02432 004026    OCT 4026 ELB          1 0100011100100100
01410 02433 000025    OCT 0025 ERA 1110001110100011 1
01411 02434 004026    OCT 4026 ELB          0 1000111001001001
01412 02435 000025    OCT 0025 ERA 0111000111010001 1
01413 02436 004026    OCT 4026 ELB          1 0001110010010011
01414 02437 000025    OCT 0025 ERA 1011100011101000 1
01415 02440 004026    OCT 4026 ELB          0 0011100100100111
01416 02441 000025    OCT 0025 ERA 0101110001110100 0
01417 02442 004026    OCT 4026 ELB          0 0111001001001110
01418 02443 004025    OCT 4025 ERB          0 0011100100100111
01419 02444 000026    OCT 0026 ELA 1011100011101000 0
01420 02445 004025    OCT 4025 ERB          1 0001110010010011
01421 02446 000026    OCT 0026 ELA 0111000111010001 1
01422 02447 004025    OCT 4025 ERB          1 1000111001001001
01423 02450 000026    OCT 0026 ELA 1110001110100011 0
01424 02451 004025    OCT 4025 ERB          1 0100011100100100
01425 02452 000026    OCT 0026 ELA 1100011101000111 1
01426 02453 004025    OCT 4025 ERB          0 1010001110010010
01427 02454 000026    OCT 0026 ELA 1000111010001110 1
01428 02455 004025    OCT 4025 ERB          0 1101000111001001
01429 02456 000026    OCT 0026 ELA 0001110100011100 1
01430 02457 004025    OCT 4025 ERB          1 1110100011100100
01431 02460 000026    OCT 0026 ELA 0011101000111001 0
01432 02461 004025    OCT 4025 ERB          0 0111010001110010
01433 02462 000026    OCT 0026 ELA 0111010001110010 0
01434 02463 002770    CPA SRGEP
01435 02464 002001    RSS
01436 02465 102066    HLT ERH          SRG E-REG ERROR
01437 02466 002770    CPB SRGEP
01438 02467 002001    RSS
01439 02470 102066    HLT ERH          SRG E-REG ERROR
01440 02471 102301    SOS
01441 02472 002040    SEZ
01442 02473 102066    HLT ERH          E / O SET
  
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01444*          PRE-TEST PART B (CP)
01445*
01446*          BASIC I/O TEST
01447*
01448          002474 BIOT EQU *
01449 02474 001401 LDA SWRX
01450 02475 001352 AND B77
01451 02476 001402 STA BIOSC      SAVE IT
01452 02477 002003 SZA,RSS        IS THERE ONE?
01453 02500 002702 JMP BIOEX      NO SKIP BASIC I/O
01454 02501 001351 AND B70        CHECK OVER 7B
01455 02502 002003 SZA,RSS
01456 02503 102066 HLT ERH
01457 02504 003001 BIO0 LDB BIOSD      UPDATE I/O INSTRUCTIONS
01458 02505 000001 LDA B,I
01459 02506 001363 CPA M1        END OF LIST
01460 02507 002515 JMP BIO1      YES - START EXECUTION
01461 02510 001367 AND M77      MASK OLD SC OFF
01462 02511 001402 IOR BIOSC      ADD NEW SC
01463 02512 000001 STA B,I      PUT IT BACK IN PLACE
01464 02513 006004 INB          MOVE TO NEXT INSTRUCTION
01465 02514 002505 JMP BIO0+1
01466 02515 001337 BIO1 LDB B3      SET TRAP CELLS
01467 02516 003000 LDA IHLT     TO INTERRUPT HALT
01468 02517 000001 STA B,I
01469 02520 001352 CPB B77      END
01470 02521 002524 JMP *+3      YES
01471 02522 006004 INB
01472 02523 002517 JMP *-4
01473 02524 107700 CLC INTP,C  GENERATE CRS TO ALL I/O

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01475*          PRE-TEST PART B (CP)
01476*
01477*          BASIC I/O TEST
01478*
01479 02525 102100      STF INTP      TOGGLE INTERRUPT
01480 02526 103100      CLF INTP      FLAG TO CLEAR
01481 02527 102200      SFC INTP      IS IT CLEARED?
01482 02530 102066      HLT ERH      NO - ERROR
01483 02531 102300      SFS INTP      IS IT NOT SET
01484 02532 002001      RSS
01485 02533 102066      HLT ERH      NO - ERROR
01486 02534 102100      STF INTP      SET INTERRUPT FLAG
01487 02535 102300      SFS INTP      IS IT SET?
01488 02536 102066      HLT ERH      NO - ERROR
01489 02537 102200      SFC INTP      IS IT NOT CLEARED?
01490 02540 002001      RSS
01491 02541 102066      HLT ERH      NO - ERROR
01492 02542 103100      CLF INTP      TURN FLAG OFF
01493 02543 102100  BS01 STF SC      TOGGLE INTERFACE
01494 02544 103100  BS02 CLF SC      CARD FLAG TO CLEAR
01495 02545 102200  BS03 SFC SC      IS IT CLEARED?
01496 02546 102066      HLT ERH      NO - ERROR
01497 02547 102300  BS04 SFS SC      IS IT NOT SET?
01498 02550 002001      RSS
01499 02551 102066      HLT ERH      NO - ERROR
01500 02552 102100  BS05 STF SC      SET CARD FLAG
01501 02553 102300  BS06 SFS SC      IS IT SET
01502 02554 102066      HLT ERH      NO - ERROR
01503 02555 102200  BS07 SFC SC      IS IT NOT CLEAR?
01504 02556 002001      RSS
01505 02557 102066      HLT ERH      NO - ERROR
01506 02560 002751      JSB BIOI      SET INTERRUPT RETURN
01507 02561 002571      DEF BIOR1     INTERRUPT TO ERROR
01508 02562 102100  BS08 STF SC      SET THE FLAG
01509 02563 102700  BS09 STC SC      AND CONTROL
01510 02564 102100      STF INTP      TURN I/O SYSTEM ON THEN
01511 02565 103100      CLF INTP      TURN I/O SYSTEM OFF
01512 02566 000000      NOP          GIVE IT A CHANCE TO INTERRUPT
01513 02567 000000      NOP
01514 02570 002573      JMP *+3
01515 02571 000000  BIOR1 NOP
01516 02572 102066      HLT ERH      INTERRUPT CANT BE TURNED OFF
01517 02573 107700      CLC INTP,C   GENERATE CRS

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01519*          PRE-TEST PART B (CP)
01520*
01521*          BSIC I/O TEST
01522*
01523 02574 107700 BS10 CLC SC,C      RESET SC FLAG AND CONTROL
01524 02575 003031          LDB B10      START WITH LOWEST ADDRESS
01525 02576 001402 BIO2 CPB BIOSC     IS IT THIS SELECT CODE
01526 02577 002607          JMP BIO3      YES - SKIP CHECK
01527 02600 002776          LDA .STF      SET UP
01528 02601 000001          IOR B        INSTRUCTIONS
01529 02602 002604          STA *+2
01530 02603 103100 BS11 CLF SC        CLEAR SC FLAG
01531 02604 000000          NOP
01532 02605 102200 BS12 SFC SC        CHECK SC FLAG
01533 02606 102066          HLT ERH      NOT CLEAR THEN ERROR
01534 02607 001352 BIO3 CPB B77      IS THAT THE LAST?
01535 02610 002613          JMP *+3      YES - MOVE TO NEXT TEST
01536 02611 006004          INB          NO - MOVE TO NEXT SC
01537 02612 002576          JMP BIO2      AND CHECK IT
01538 02613 107700          CLC INTP,C   CREATE CRS INCASE OF PRIV. INT.
01539 02614 002751          JSB BIOI     SET INTERRUPT LINK
01540 02615 002726          DEF BIOIO
01541 02616 002400          CLA          CLEAR FLAGS
01542 02617 002635          STA BIOJD
01543 02620 002726          STA BIOIO
01544 02621 001371          STA TMPA
01545 02622 102700 BS13 STC SC        TURN ON
01546 02623 102100 BS14 STF SC        CARD
01547 02624 102100          STF INTP     AND INTP'S
01548 02625 102701          STC 1      *
01549 02626 102101          STF 1      *
01550 02627 106701          CLC 1      *
01551 02630 103101          CLF 1      * NO INTERRUPT
01552 02631 002632          JMP *+1,I   * SHOULD OCCUR
01553 02632 002633          DEF *+1    * HERE
01554 02633 002634          JSB *+1,I   *
01555 02634 002635          DEF *+1    *
01556 02635 000000 BIOJD NOP          *
01557 02636 001371          ISZ TMPA     INT. SHOULD BE HERE
01558 02637 001371          ISZ TMPA
01559 02640 103100          CLF INTP     TURN I/O SYSTEM OFF
01560 02641 107700 BS15 CLC SC,C     RESET SC FLAG AND CONTROL
01561 02642 002726          LDB BIOIO   DID IT INTERRUPT?
01562 02643 006003          SZB,RSS
01563 02644 102066          HLT ERH      NO - ERROR
01564 02645 001371          LDB TMPA     RETURN CORRECTLY
01565 02646 003030          CPB B2
01566 02647 002001          RSS
01567 02650 102066          HLT ERH      NO - ERROR

```

```

01569*          PRE-TEST PART B (CP)
01570*
01571*          BASIC I/O TEST
01572*
01573 02651 002751      JSB BIOI
01574 02652 002663      DEF BIOR2
01575 02653 102700     BS16 STC SC          CONTROL ON
01576 02654 102100     BS17 STF SC          FLAG UP
01577 02655 102100      STF INTP        TURN ON INTERRUPTS
01578 02656 106700     BS20 CLC SC        CLEAR SC CONTROL
01579 02657 000000      NOP          GIVE IT A CHANCE
01580 02660 000000      NOP          *
01581 02661 000000      NOP          *
01582 02662 002665      JMP *+3
01583 02663 000000     BIOR2 NOP
01584 02664 102066      HLT ERH          CONTROL NOT CLEARED
01585 02665 103100      CLF INTP        TURN INTP'S OFF
01586 02666 002751      JSB BIOI
01587 02667 002677      DEF BIOR3
01588 02670 102700     BS21 STC SC          TURN CONTROL ON
01589 02671 102100      STF INTP        TURN INTP'S ON
01590 02672 106700      CLC INTP        CLEAR I/O SYSTEM
01591 02673 000000      NOP          GIVE IT A CHANCE
01592 02674 000000      NOP          *
01593 02675 000000      NOP          *
01594 02676 002701      JMP *+3
01595 02677 000000     BIOR3 NOP
01596 02700 102066      HLT ERH
01597 02701 107700     BS22 CLC SC,C      TURN OFF DEVICE
01598 02702 107700     BIOEX CLC INTP,C  TURN OFF ALL I O
01599 02703 001401      LDA SWRX        CHECK IF AUTOMATIC MODE
01600 02704 001357      AND B7700
01601 02705 002002      SZA
01602 02706 003034      JMP CFGR        YES GO TO CONFIGURATION
01603 02707 001401      LDA SWRX        CHECK IF LOOP
01604 02710 001360      AND B10K
01605 02711 002002      SZA
01606 02712 000140      JMP PTLP        YES LOOP
01607 02713 001401      LDA SWRX        RESTORE S-REG.
01608 02714 102601      OTA SWREG
01609 02715 001377      LDA DISN        AND A & B REG
01610 02716 001400      LDB DIBP
01611 02717 102077      HLT 77B        WAIT FOR CONFIGURATION INFORMATION
01612*
01613 02720 107700     CFRG CLC INTP,C  TURN OFF ALL I/O
01614 02721 001377      STA DISN
01615 02722 001400      STB DIBP
01616 02723 102501      LIA SWREG        GET SWITCH REGISTER
01617 02724 001401      STA SWRX
01618 02725 003034      JMP CFGR        GO TO CONFIGURATION

```

```

01620*                PRE-TEST PART B (CP)
01621*
01622*                BASIC I/O TEST
01623*
01624 02726 000000  BIOIO NOP
01625 02727 103100          CLF INTF          TURN I/O SYSTEM OFF
01626 02730 002635          LDB BIOJD        CHECK TO SE IF ALL
01627 02731 002747          CPB BIOD0        INSTRUCTIONS COMPLETED
01628 02732 002001          RSS
01629 02733 102066          HLT ERH          NO - ERROR
01630 02734 002750          LDB BIOD1        CHECK RETURN ADDRESS
01631 02735 002726          CPB BIOIO
01632 02736 002741          JMP *+3
01633 02737 006004          INB
01634 02740 002726          CPB BIOIO
01635 02741 002001          RSS
01636 02742 102066          HLT ERH
01637 02743 002751          JSB BIOI          SET ERROR IF SECOND INTF
01638 02744 002760          DEF BIOE
01639 02745 102100          STF INTF          TURN I/O SYSTEM ON
01640 02746 002726          JMP BIOIO,I      CONTINUE TEST
01641*
01642 02747 002634  BIOD0 DEF BIOJD-1
01643 02750 002636  BIOD1 DEF BIOJD+1
01644*
01645*
01646 02751 000000  BIOI  NOP
01647 02752 002751          LDB BIOI,I
01648 02753 002751          ISZ BIOI
01649 02754 000003          STB 3B
01650 02755 002777          LDB JSBI.
01651 02756 000000  BSSTB STB SC
01652 02757 002751          JMP BIOI,I
01653*
01654*
01655 02760 000000  BIOE  NOP
01656 02761 102066          HLT ERH          SECOND INTERRUPT OCCURED
01657 02762 002760          JMP BIOE,I
01658*

```

01660	02763	125252	.ALTO	OCT	125252		
01661	02764	052525	.ALT1	OCT	052525		
01662	02765	104447	SRGP1	OCT	104447	1000100100100111	
01663	02766	114040	SRGP2	OCT	114040		1001100000100000
01664	02767	000100	SRGP3	OCT	000100		
01665	02770	072162	SRGEP	OCT	072162	011010001110010	
01666	02771	000000	.TMPA	NOP			
01667	02772	000000	.TMPB	NOP			
01668	02773	002061	DJBR3	DEF	JBR3		
01669	02774	002071	DJBR4	DEF	JBR4		
01670	02775	001331	DJBR5	DEF	JBR5		
01671	02776	102100	.STF	STF	0		
01672	02777	000003	JSBI.	JSB	3B,I		
01673	03000	106077	IHLT	OCT	106077		
01674*							
01675*							
01676	03001	103002	BIOSD	DEF	*+1,I		
01677	03002	002543		DEF	BS01		
01678	03003	002544		DEF	BS02		
01679	03004	002545		DEF	BS03		
01680	03005	002547		DEF	BS04		
01681	03006	002552		DEF	BS05		
01682	03007	002553		DEF	BS06		
01683	03010	002555		DEF	BS07		
01684	03011	002562		DEF	BS08		
01685	03012	002563		DEF	BS09		
01686	03013	002574		DEF	BS10		
01687	03014	002603		DEF	BS11		
01688	03015	002605		DEF	BS12		
01689	03016	002622		DEF	BS13		
01690	03017	002623		DEF	BS14		
01691	03020	002641		DEF	BS15		
01692	03021	002653		DEF	BS16		
01693	03022	002654		DEF	BS17		
01694	03023	002656		DEF	BS20		
01695	03024	002670		DEF	BS21		
01696	03025	002701		DEF	BS22		
01697	03026	002756		DEF	BSSTB		
01698	03027	001363		DEF	M1		
01699*							
01700*							
01701	03030	000002	B2	OCT	2		
01702	03031	000010	B10	OCT	10		
01703	03032	010003	D8K3	OCT	10003		
01704	03033	070003	D32K3	OCT	70003		

Appendix E

Basic Binary Loader Listings

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	13210 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

7900/7901 Disc Loader

This disc loader loads a program from an HP 7900 or HP 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.

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.

2644/45 Minicartridge 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.

7970B/7970E Magnetic Tape Loader

This loader is used to load the Configurator from 9-track magnetic tape (unit 0) 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*				
0010*				
0011*				
0012*				
0013*				
0014*				
0015*				
0016*				
0017*				
0018*				
0019	07700 067741	START	LDB SEEKC	GET SEEK COMMAND WORD
0020	07701 10660		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 DC,C	← AND START SEEK
0024	07705 102300		SFS DC	← HAS CYL. 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*				
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*				
0043*				
0044	07723 106700		CLC DC	← PREPARE CNTRLER FOR READ COMMAND
0045	07724 106701		CLC CC	←
0046	07725 063742		LDA READ C	GET READ COMMAND WORD
0047	07726 103601		OTA CC,C	← AND OUTPUT COMMAND
0048	07727 103700		STC DC,C	← PREPARE DATA CHAN FOR READ OPER

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

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 ADDR 2,I	EXIT TO BOOT LOADER
0054*					
0055*			CONSTANTS		
0056*					
0057	07735	120000	DMACW	ABS 120000B+DC	←SC OF CHAN (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 STARTING
0012*      ADDRESS OF THE PROGRAM, SET S-REGISTER TO 10 (OCTAL),
0013*      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,SECT 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 Minicartridge Tape Binary Loader

0001				
0003	07700			
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

Table E-4. HP 2644/45 Minicartridge Tape Binary Loader (Cont.)

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	0775	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.
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 OB	
0089	00000		A	EQU OB	
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 CMB 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 CHAN STATUS

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

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 OB	
0068	00001		CC	EQU DC+1	
0069				END	
** NO ERRORS *TOTAL **RTE ASMB 750420**					

Table E-6. HP 12992J 7908/7911/7912/7914/7933 CS/80 Disc Loader ROM

00001					
00002	*****				
00003*	CS80 BOOT LOADER		RPL COMPATIBLE	810915	*
00004*					*
00005*					*
00006*	PRODUCT NUMBER	12292J			*
00007*	PART NUMBER	12992-80005			*
00008*					*
00009*					*
00010*	S REG				*
00011*	15 - 14	BOOT ROM			*
00012*	11 - 6	IBI SELECT CODE			*
00013*	2 - 0	UNIT			*
00014	*****				
00015*					
00016	07700		ORG 7700B		
00017		000010	IBI EQU 10B		
00018	07700	102501	START LIA 1	GET SWITCH REGISTER	
00019	07701	013751	AND XXX	AND OUT UNIT	
00020	07702	033742	IOR UNIT	PUT IN UNIT COMMAND	
00021	07703	073742	STA UNIT	SAVE FOR BUS	
00022	07704	000040	CLE		
00023*					
00024*	WAIT FOR DRIVE 0	READY			
00025*					
00026	07705	017756	JSB BTCTL	SEND UDC,PPOL	
00027	07706	102510	LIA IBI	READ INPUT REGISTER	
00028	07707	101027	ASR 7	SHIFT DRIVE 0 RESPONSE TO LSB	
00029	07710	002011	SLA,RSS	DID DRIVE 0 RESPOND	
00030	07711	027706	JMP *-3	NO GO WAIT	
00031*					
00032	07712	107700	CLC 0,C	SHUT DOWN EVERYONE ELSE	
00033	07713	017756	JSB BTCTL	SEND TALK,READ,BUS HOLDER	
00034	07714	002300	CCE		
00035	07715	017756	JSB BTCTL	TELL CARD TO LISTEN	
00036*					
00037*	PERFORM DMA TRANSFER				
00038*					
00039	07716	063776	LDA DMACW	LOAD DMA CONTROL WORD	
00040	07717	102606	OTA 6	OUTPUT TO DCPC	
00041	07720	106702	CLC 2	READY DCPC	
00042	07721	063733	LDA ADDR1	LOAD DMA BUFFER ADDRESS	
00043	07722	102602	OTA 2	OUTPUT TO DCPC	
00044	07723	063736	LDA DMAWC	LOAD DMA WORD COUNT	
00045	07724	102702	STC 2	READY DCPC	
00046	07725	102602	OTA 2	OUTPUT TO DCPC	
00047	07726	103706	STC 6,C	START DCPC	
00048	07727	102206	TEST SFC 6	SKIP IF DMA NOT DONE	

Table E-6. HP 12992J 7908/7911/7912/7914/7933 CS/80 DISC LOADER ROM (Cont.)

00049	07730	117747		JSB ADDR2,I	SUCCESSFUL END OF TRANSFER
00050	07731	102310		SFS IBI	SKIP IF DISC ABORTED TRANSFER
00051	07732	027727		JMP TEST	WAIT...WAIT...WAIT
00052	07733	102011	ADDR1	HLT 11B	ERROR HALT
00054*					
00055*				PROGRAM CONSTANT TABLE	
00056*					
00057	07734	000677	UNCLR	OCT 677	UNLISTEN
00058	07735	000737		OCT 737	UNTALK
00059	07736	176624	DMAWC	OCT 176624	UNIVERSAL CLEAR,LBO/DMA WORD CNT
00060	07737	000624		OCT 624	SECOND UNIVERSAL CLEAR
00061	07740	000440	LIST	OCT 440	LISTEN BUS ADDRESS 0
00062	07741	000745	CMSEC	OCT 745	COMMAND MESSAGE
00063	07742	000040	UNIT	OCT 40	UNIT
00064	07743	001000	READ	OCT 1000	READ
00065	07744	000677	UNLST	OCT 677	UNLISTEN
00066	07745	000500	TALK	OCT 500	DEVICE TALK
00067	07746	100556	EXEC	OCT 100556	EXECUTION MESSAGE
00068	07747	102055	ADDR2	OCT 102055	BOOT EXTENSION STARTING ADDRESS
00069	07750	004003	CTLP	OCT 4003	INT=LBO,T,CIC
00070	07751	000047	XXXX	OCT 47	PPE,L,T,CIC
00071	07752	004003		OCT 4003	INT=LBO,T,CIC
00072	07753	000413		OCT 413	ATN,PL,L,CIC
00073	07754	001015		OCT 1015	INT=EOI,P,L,CIC
00074	07755	000000		NOP	
00075*					
00076*					
00077*					
00078	07756	000000	BTCTL	NOP	
00079	07757	107710		CLC IBI,C	RESET IBI
00080	07760	063750	BM	LDA CTLP	LOAD CONTROL WORD
00081	07761	102610		OTA IBI	OUTPUT TO IBI
00082	07762	102710		STC IBI	RETURN IBI TO DATA MODE
00083	07763	037760		ISZ BM	INCREMENT CONTROL WORD POINTER
00084	07764	002240		SEZ,CME	
00085	07765	127756		JMP BTCTL,I	RETURN
00086	07766	063734	LABL	LDA UNCLR	LOAD DATA WORD
00087	07767	03766		ISZ LABL	INCREMENT WORD POINTER
00088	07770	102610		OTA IBI	OUTPUT TO HPIB
00089	07771	002021		SSA,RSS	SKIP IF LAST WORD
00090	07772	027766		JMP LABL	GO BACK FOR NEXT WORD
00091	07773	102310		SFS IBI	SKIP IF LAST WORD SENT TO BUS
00092	07774	027773		JMP *-1	WAIT FOR ACCEPTANCE
00093	07775	027757		JMP BTCTL+1	
00094	07776	000010	DMACW	ABS IBI	
00095	07777	170100		ABS -START	
00096				END	
MACRO:	No errors total				

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HP 1000 Computers

Diagnostic Configurator
Reference Manual

02100-90157 June 1985

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