



# HP 12992 Loader ROM's installation manual

*(copy of same date)*

12992A	7900/7901/2883 Disc Loader
12992B	7905/7906/7920/7925 Disc Loader
12992C	2664/2645/2648 Mini-Cartridge Tape Loader
12992D	7970 Mag Tape Loader
12992E	9885 Flexible Disc Loader
12992F	7900/7901 Disc Loader
12992H	7906H/7920H/7925H/9895 Disc Loader
12992J	7908/7911/7912/7935 CS80 Disc Loader

# 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.

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

First Edition ..... January 1980

Second Edition ..... November 1981

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# MANUAL UPDATE

## MANUAL IDENTIFICATION

**Title:** HP 12992 Loader ROM's  
Installation Manual

**Part Number:** 12992-90001

## UPDATE IDENTIFICATION

**Update Number:** 2 (January 1983)

**This Packet  
also Includes:** Update 1

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**THIS UPDATE GOES WITH:** Second Edition (November 1981)



## THE PURPOSE OF THIS MANUAL UPDATE

is to provide new information for your manual to bring it up to date. This is important because it ensures that your manual accurately documents the current version of the product.

## THIS UPDATE CONSISTS OF

this cover sheet, a printing history page, all replacement pages, and write-in instructions (if any). Replacement pages are identified by the update number at the bottom of the page. A vertical line (change bar) in the margin indicates new or changed text material. The change bar is not used for typographical or editorial changes that do not affect the text. New pages to be added do not contain change bars.

## TO UPDATE YOUR MANUAL

identify the latest Update (if any) already contained in your manual by referring to the Printing History Page (page ii). Incorporate only the Updates from this packet not already included in your manual. Following the instructions on the back of this page, replace existing pages with the Update pages and insert new pages as indicated. If any page is changed in two or more Updates, such as the Printing History Page which is furnished new for each Update, only the latest page will be included in the Update package. Destroy all replaced pages. If "write-in" instructions are included they are listed on the back of this page.



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**HEWLETT-PACKARD COMPANY**  
Data Systems Division  
11000 Wolfe Road  
Cupertino, California 95014

**12992-90001  
U0183**

**TECHNICAL MANUAL UPDATE  
(12992-90001)**

Note that "\*" indicates a changed page.

**UPDATE**

**DESCRIPTION**

- 1 A. Replace the following pages with pages supplied.

Title Page\*/ii\*

1\*/2\*

3/4\*

13/14\*

27/28\*

Update 2 incorporates Update 1

- 2 A. Replace the following pages with pages supplied.

Title Page\*/ii\*

1\*/2\*

3\*/4

7A\*/7B

9\*/10

13/14\*

25/26\*

27\*/28

## 1. INTRODUCTION

This manual provides installation instructions for HP 12992 Loader ROM's, which are optional initial binary loaders (IBL) for the HP 1000 F-Series (2111/2117F), E-Series (2109/2113A, 2109/2113B) and M-Series (2105/2108/2112A, 2108/2112B) Computers. HP 1000 F-, E, and M-Series Computers have a standard paper tape loader ROM and disc loader ROM installed. In addition to this manual, the following documentation may be of use.

- a. The appropriate *HP 1000 Operating and Reference Manual*.
- b. The appropriate *HP 1000 Installation and Service Manual*.

## 2. DESCRIPTION

Eight optional loader ROM's are available, for loading programs from magnetic tape, mini-cartridge tape, 7900/7901/2883 discs, 7905/7906/7920/7925 discs, 7908/11/12/35 discs, 7906H/7920H/7925H/9825 discs, 7900/7901 discs, and 9885 flexible disc. The eight loader ROM program listings are contained in table 13 through 20 at the back of this manual. Information concerning ROM part numbers, associated devices, and loader format are given in table 1.

Each loader ROM consists of a single ROM integrated circuit (IC) mounted in 16-pin IC sockets on the component side of the CPU printed circuit assembly (PCA). The F-Series (2111/2117F) and E-Series (2109/2113B) provide four sockets to accommodate four optional loader ROMs (standard ROMs removed). The E-Series (2109/2113A) can accommodate two optional loader ROMs, and the M-Series computer can accommodate up to three optional loader ROMs. Special IC sockets are provided on the computer CPU PCA for installation of the ROM IC's. These IC sockets are designated as sockets 01 and 11 in the E-Series 2109/2113A, as sockets 00, 01, 10 and 11 in the F-Series 2111/2117F and E-Series 2109/2113B, and as sockets 1, 2 and 3 in the M-Series computer. See figure 1 for socket locations in the F-Series and E-Series, and figure 2 for socket locations in the M-Series. Any of the loader ROM's can be installed in any of the designated loader ROM sockets. S-register bits 14-15 are used to select the proper loader ROM. If the loader ROM's are installed on the CPU PCA by Hewlett-Packard prior to shipment to the customer, they are installed as follows.

In the F- and E-Series computers, RPL compatible ROMs (12992B/E/F/H/J) are installed in socket 11. The 12992D is installed in socket 01 if a disc ROM is ordered, or in socket 11 if no disc ROM is ordered. The 12992C is installed in socket 01 if this socket is not occupied. If more than one disc ROM is ordered, an ascending sequence of the alphabetical suffix to the product numbers will match the ROM socket numbers. On M-Series computers, an ascending sequence of the alphabetical suffix to the product number will match the ROM socket numbers.

## 3. HP 1000 F- SERIES AND E-SERIES INSTALLATION PROCEDURE

### 2109A/2113A Computers

Optional loader ROM's in 2109/2113A Computers are accessed through the memory PCA cage. To install any loader ROM, refer to figure 1 and proceed as follows:

### WARNING

**Hazardous voltages are present inside the computer mainframe. Before attempting to install a loader ROM, switch OFF the computer power and battery supply, if installed. Failure to comply may result in serious injury.**

- a. Switch OFF the computer power and battery supply. (Refer to appropriate Installation and Service Manual for switch locations.)
- b. Lower the operator panel to the access position.
- c. Remove the two screws and lockwashers securing memory PCA retainer to the memory PCA cage.
- d. Disconnect cable assembly from memory PCA's.
- e. Remove enough memory PCA's from the card cage, starting at the bottom PCA, to gain access to the loader ROM sockets.
- f. At bottom of memory PCA cage, locate opening in deck for access to the optional loader ROM sockets. (See figure 1.)
- g. Install optional loader ROM integrated circuit(s). Ensure that the ROM IC is oriented with the notched end facing in the same direction as the other integrated circuits on the CPU PCA.
- h. Note loader ROM(s) installed and corresponding socket numbers for future reference.

After installing optional loader ROM, replace all PCA's in memory PCA cage, reconnect cable assemblies, and reinstall memory PCA cage cover and operator panel.

### 2109B/2113B/2111F/2117F Computers

Loader ROM sockets in 2109B/2113B/2111F/2117F Computers are accessed through the Memory PCA cage (sockets 01 and 11) or on the CPU board (sockets 00 and 10). To install any loader ROM in sockets 01 or 11, refer to figure 1 and proceed as described above for the 2109A/2113A E-Series Computer, Steps a through h.

Table 1. Loader ROM Identification

HP PRODUCT NUMBER	HP PART NUMBER	ASSOCIATED DEVICE			FORMAT
		PERIPHERAL PRODUCT	INTERFACE	SUBSYSTEM NUMBER	
12992A	1816-0863	7900 Cartridge Disc 7901 Cartridge Disc 2883 Disc Drive	13210A Disc Interface 13210A Disc Interface 12565A Disc Interface	12960A 12961A 12965A	Disc Boot Disc Boot Disc Boot
12992B	12992-80002	7905 Cartridge Disc 7906 Cartridge Disc 7920 Cartridge Disc 7925 Cartridge Disc	13175A/B Disc Interface 13175A/B Disc Interface 13175A/B Disc Interface 13175A/B Disc Interface	12962C/D N/A N/A N/A	Disc Boot Disc Boot Disc Boot Disc Boot
12992C	1816-0857	CRT Terminal 2644/ 2645/4648	12966A Buffered Async Interface or 12968A Async Interface	N/A	Absolute Binary
12992D	1816-0962	7970B Mag Tape 7970E Mag Tape	13181A Mag Tape Interface 13183A Mag Tape Interface	12970A 12972A	Absolute Binary Absolute Binary
12992E	1816-1051	9885 Flexible Disc	Included in Subsystem	12732A	Absolute Binary
12992F	12992-80003	7900 Cartridge Disc 7901 Cartridge Disc	13210A Disc Interface 13210A Disc Interface	12960A 12961A	Disc Boot Disc Boot
12992H	12992-80004	7906H Cartridge Disc 7920H Cartridge Disc 7925H Cartridge Disc 9895 Flexible Disc	12821A Disc Interface 12821A Disc Interface 12821A Disc Interface 12821A Disc Interface	N/A N/A N/A N/A	Disc Boot Disc Boot Disc Boot Disc Boot
12992J	12992-80005	7908 Cartridge Disc 7911 Cartridge Disc 7912 Cartridge Disc 7935 Cartridge Disc	12821A Disc Interface 12821A Disc Interface 12821A Disc Interface 12821A Disc Interface	N/A N/A N/A N/A	Disc Boot Disc Boot Disc Boot Disc Boot

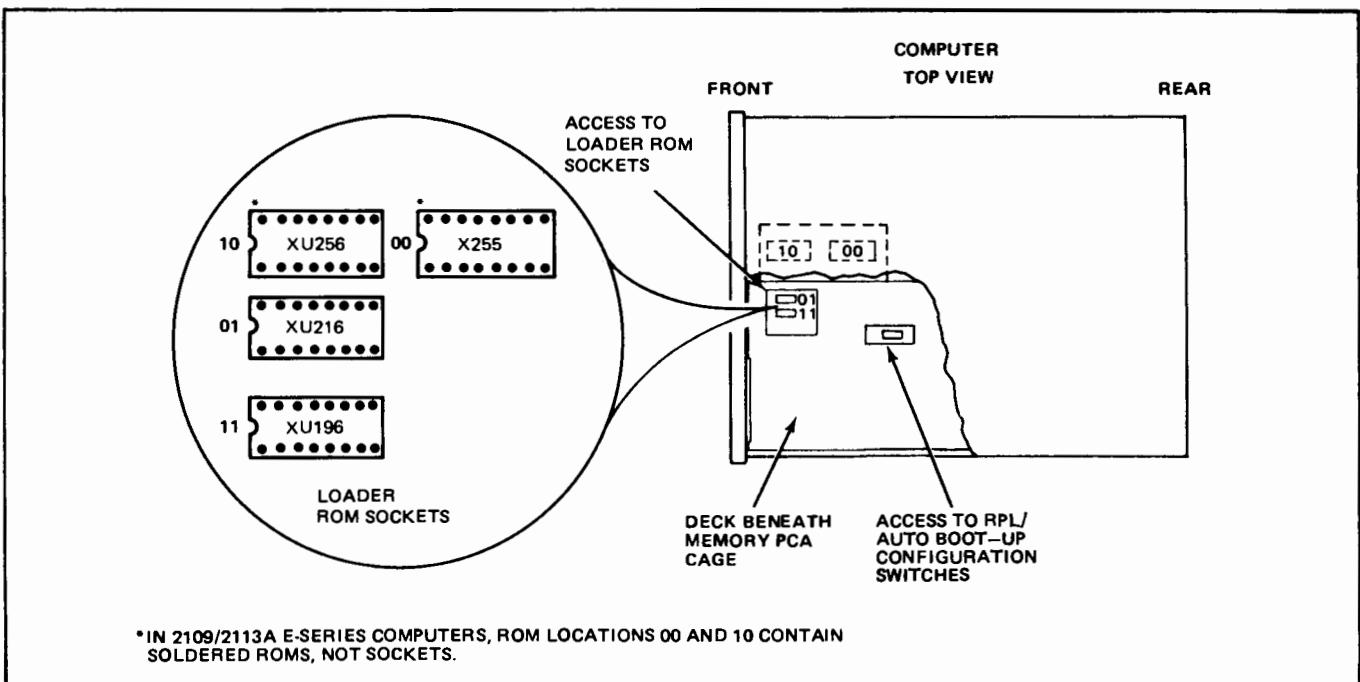


Figure 1. Optional Loader ROM Sockets (E-Series Computer)

To install any loader ROM in sockets 00 or 10 refer to figure 1 and proceed as follows:

### WARNING

**Hazardous voltages are present inside the computer mainframe. Before attempting to install a loader ROM, switch OFF the computer power and power supply, if installed. Failure to comply may result in serious injury.**

- a. Switch OFF the computer power and battery supply. (Refer to appropriate Installation and Service Manual for switch locations.)
- b. If present, disconnect I/O extender cable assemblies, Memory Extender cable assemblies, and WCS cable assembly from CPU PCA edge connector.
- c. Disconnect I/O interface cables and remove computer from cabinet if applicable.
- d. Remove computer bottom cover.
- e. Disconnect operator panel cable assembly from CPU PCA edge connector.
- f. Remove 12 screws and lockwashers securing the CPU PCA to bottom of computer mainframe.
- g. Remove three nuts and six washers from power terminals located in center of CPU PCA.
- h. Carefully disengage CPU PCA from memory and I/O backplanes.
- i. Remove standard loader ROM(s) and install optional loader ROM(s). Note the loader ROM(s) installed and corresponding socket numbers for future reference.
- j. Reinstall power terminals in center of CPU PCA and secure in place with three nuts and six washers.
- k. Reinstall CPU PCA onto memory and I/O backplanes and secure in place with 12 screws and lockwashers.
- l. Connect operator panel cable assembly to CPU PCA edge connector.
- m. Replace computer bottom cover.
- n. If present, connect I/O extender cable assembly, Memory Extender cable assemblies, and WCS cable assembly from CPU PCA edge connector.

#### 4. HP 1000 M-SERIES INSTALLATION PROCEDURE

Optional loader ROM's in HP 1000 M-Series Computers (2105, 2108, 2112) are accessed by removal of the CPU

PCA. To install any loader ROM in the M-Series computer, refer to figure 2 and proceed as follows:

### WARNING

**Hazardous voltages are present inside the computer mainframe. Before attempting to install a loader ROM, switch OFF the computer power and battery supply, if installed. Failure to comply may result in serious injury.**

- a. Remove the CPU board as described for the HP 1000 E-Series Computer, Steps a through h.
- b. On the component side of the CPU PCA, install loader ROM(s) into any of the three ROM sockets shown in figure 2. Ensure that the loader ROM is installed with the notched end oriented the same as other installed IC's.
- c. Note loader ROM(s) installed and corresponding socket number(s) for future reference.
- d. Replace CPU board as described for the HP 1000 E-Series computer, Steps j through n.

#### 5. CHECKOUT

After installing the loader ROM(s), verify proper operation as follows:

- a. Connect computer power cord into power mains receptacle and switch computer power on.
- b. Load contents of loader ROM(s) into memory as follows:

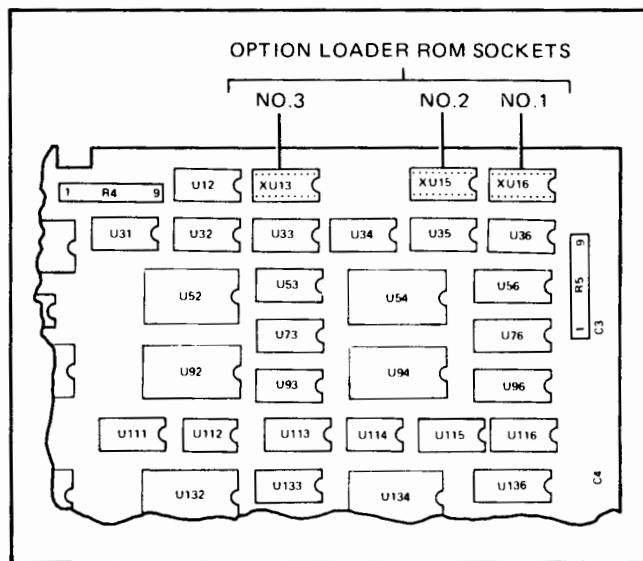


Figure 2. Optional Loader ROM Sockets (M-Series Computer)



Table 2. Loader ROM Selection

BITS		LOADER SELECTED		
15	14	E-SERIES (2109/2113A)	E-SERIES (2109/2113B) F-SERIES (2111/2117F)	M-SERIES
0	0	Standard Paper Tape	Loader ROM 00	Standard Paper Tape
0	1	Optional ROM 01	Loader ROM 01	Optional Loader ROM 01
1	0	Standard Disc Loader	Loader ROM 10	Optional Loader ROM 10
1	1	Optional ROM 11	Loader ROM 11	Optional Loader ROM 11

1. Select the S-register for display on the computer front panel.
2. Press CLEAR DISPLAY.
3. Set S-register bits 15-14 to select loader ROM that corresponds to ROM socket being used. Table 2 contains loader selection information for F-Series, E-Series and M-Series computers.
4. Set S-register bits 6-11 to octal select code of loading device being used. (Use lower select code for loading devices that occupy two channels.)
5. Depending on loader ROM being used, set S-register bits 13, 12, and 5 through 0 in accordance with paragraphs 6 through 12.

6. Press STORE.
7. For the 12992D Magnetic Tape Loader ROM, the A-register can be used to specify the file number desired. Press STORE.
8. For the 12992E Flexible Disc Loader ROM, the B-register can be used to specify starting track and sector address by setting the appropriate bits, as shown in tables 7 and 8. Press STORE.
9. Press PRESET and IBL to load contents of selected loader ROM into the uppermost 64 locations of directly addressable memory. A successful load is indicated if the OVERFLOW indicator is not lighted. If memory is inoperative or if the octal select code programmed in step (4) above is less than 10 (octal), the OVERFLOW indicator will be lighted.

c. Load absolute programs from selected loading device as follows:

1. Select P-register for display on computer front panel. The P-register contains the address of the first instruction associated with the loader ROM. This address will depend on the size of memory being used. Starting addresses and corresponding memory sizes are listed in table 3. (This step is included for program reference information only and may be omitted if desired.)

2. Press RUN. The RUN indicator will be lighted and the program will be loaded from the selected loading device into memory.

For description of loader program, or error halts and appropriate actions, refer to the specific loader ROM's discussed in paragraphs 6 through 13. If servicing is required, notify your nearest HP service representative. A list of HP Sales and Service Offices is contained in the *HP 1000 F-Series Computer Operating and Reference Manual*, *HP 21MX E-Series Computer Operating and Reference Manual*, and the *HP 21MX Computer Series Reference Manual*.

## 6. 7900/7901/2883 DISC LOADER ROM (12992A)

This disc loader loads a program from an HP 7900, HP 7901, or HP 2883 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 6144 (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 an operating system after RUN is pressed. If the load is not successful, the result is unpredictable. Due to the fact that the loader overwrites itself with a HALT 102011 (octal), it has to be reloaded if a second load execution is desired. Table 4 lists the S-register settings to load from a specific device and platter. These settings are to be set into the Display Register along with the other bits specified in paragraph 5, steps b. (3) and b. (4). The 7900/7901/2883 loader ROM program is listed in table 13.

Table 3. Starting Address vs. Memory Size

MEMORY SIZE	OCTAL STARTING ADDRESS OF LOADER ROM
4k	007700
8k	017700
12k	027700
16k	037700
24k	057700
32k and up	077700

### 7. 7905/7906/7920/7925 CARTRIDGE DISC LOADER ROM (12992B)

This disc loader loads a program from an HP 7905/7906/7920/7925 disc 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 6144 (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 an operating system after RUN is pressed. Table 5 lists the S-register settings to load from a specific device and platter. These settings are to be set into the Display Register along with the other bits specified in paragraph 5, steps b. (3) and b. (4). If a HLT 30 (102030) occurs, check the disc for a DRIVE FAULT condition. If the disc is READY the disc boot may be tried again by pressing RUN. The 12992B loader ROM program is listed in table 14. The 12992B cartridge disc loader ROM is auto boot up/RPL compatible. Bit 12 of the S-Register dis-

tinguishes between an RPL and manual load; therefore bit 12 must be equal to one to perform a manual load successfully.

### 8. 2644/2645A/2648 CARTRIDGE TAPE LOADER ROM (12992C)

This loader is used to load absolute binary programs stored on an HP 2644/2645/2648 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 *HP 2645A Display Station User's Manual* part no. 12645-90001.) There are no other S-register settings required other than those previously discussed in paragraph 5, steps b. (3) and b. (4). During loading, the loader can come to any of the following halts:

Table 4. 7900/7901/2883 Cartridge Disc Loader ROM S-Register Settings

DEVICE AND PLATTER	S-REGISTER BIT SETTINGS																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
HP 7900A (Removable Platter) or HP 7901	L	S	0	0	SELECT						R*	0	0	1			
HP 7900A (Fixed Platter)	A	E	0	0	CODE						E	0	0	0			
HP 2883A	D	R	1	0	OF						R	0	0	0			
	R	O			LOADING						V						
	M	N			DEVICE						E						
											D						

\*S-register bits 5 through 3 are reserved and must be 0 unless specifically called for by the operating system; i.e., diagnostics bit 3 set.

Table 5. 7905/7906/7920/7925 Cartridge Disc Loader ROM S-Register Settings

DEVICE AND PLATTER	S-REGISTER BIT SETTINGS																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
HP 7905/7906 (Removable Platter, Upper Surface) or 7920/7925 (Platter 1, Upper Surface).	L	S	0	1							R*	0	0	0			
HP 7905/7906 (Removable Platter, Lower Surface) or 7920/7925 (Platter 1, Lower Surface).	A	E	0	1	SELECT CODE OF						E	0	0	1			
HP 7905/7906 (Fixed Platter) or 7920/7925 (Platter 2, Upper Surface).	D	R	0	1	LOADING DEVICE						R	0	1	0			
HP 7906 (Fixed Platter) or 7920/7925 (Platter 2, Lower Surface).	R	O	0	1							V	0	1	1			
	M	N									E						

\*S-register bits 5 through 3 are reserved and must be 0 unless specifically called for by the operating system; i.e., diagnostics bit 3 set.

Display Register (Octal)	Meaning
102077	Successful load
102055	Address error (record exceeds available memory)
102011	Checksum error (record data incorrect)
102000	Device error (no tape or tape read error)

If an attempt is made to load a file which is not in absolute binary, a HALT 102000 may occur or the loader may hang up. It should be noted that to execute the program loader in, the P-Register should be set to the starting address. If RUN is pressed after HALT 102077 (octal), the results are unpredictable. The 12992C loader ROM program is listed in table 15.

## 9. 7970/7970E MAGNETIC TAPE LOADER ROM (12992D)

This loader is used to load absolute binary programs from 9-track magnetic tape (Unit 0 only) into memory. The format must be absolute binary and there must be an End-Of-File Mark between files. Table 6 lists the S-register setting to load from a 7970B/E Magnetic Tape. If S-register bit 0 is set, the A-register specifies the desired file number. If S-register bit 0 is cleared, the program will read the next sequential file. When using the 7970E Magnetic Tape with an HP 1000 M-Series computer, the mag tape unit should not be run above 37.5 ips. The 7970 loader ROM program is listed in table 16. There are three halts that can be reached when using this loader. They are:

Display Register (Octal)	Meaning
102077	Successful load
102011	Checksum error (record read incorrectly)
102000	Device error or wrong data format

## 10. 9885 FLEXIBLE DISC LOADER ROM (12992E)

The flexible disc loader loads a program in absolute binary format from drive 0 into memory. If S-register bit 0 is clear, the B-register specifies the starting track and sector addresses. If S-register bit 0 is set, loading starts at track 0, sector 1. The program is loaded to a location in memory specified in the format of the file on disc. After the program has been loaded, the loader program clears the A and B registers, and jumps to memory location 002 to execute the program just loaded from the disc without an intervening halt.

Table 7 lists the S-register settings to load from the flexible disc. Table 8 shows the B-register settings to load from a particular track and sector address. Note that B-register bits 5-11 are set to one of 67 addresses, and bits 0-4 are set to one of 30 physical sector addresses. Octal equivalent values for the track and logical sector addresses are provided in table 9 to aid in calculating the required value for the B-register. The HP 9885 loader ROM program is listed

If any of the following errors occur, halt the computer and restart the loading procedure as described in paragraph 5:

Error Condition	Meaning
HALT 102011	Checksum error (format of data read is not absolute binary)
DRIVER SELECT light on flexible disc front panel not ON.	Illegal Sector Address; reset the B-Register
Loader hangs up	Illegal track address (greater than 4100 octal)
Loader is overlayed by program being loaded	Result is unpredictable.

Table 6. 7970B/E Magnetic Tape Loader ROM S-Register Setting

DEVICE	S-REGISTER BIT SETTING															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
HP 7970B/E Magnetic Tape			0	0							0	0	0	0	0	0/1*

\*S-REG bit 0 = 0 = Read next sequential file

= 1 = Rewind magnetic tape and search for file number specified in A-register; for example, file 1 = 1. The A-register cannot be 0.

Table 7. 9885 Flexible Disc Loader ROM S-Register Settings

DEVICE	S-REGISTER BIT SETTING																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
HP 9885 Flexible Disc	LOADER ROM SELECTION		0	0	SELECT CODE OF LOADING DEVICE						0	0	0	0	0	0	0/1*
*S-register bit 0 = 0 Load from track and sector address specified in B-register = 1 Load from track 0, sector 1.																	

Table 8. 9885 Flexible Disc Loader ROM B-Register Setting

DEVICE	B-REGISTER BIT SETTING															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
HP 9885 Flexible Disc	0	0	0	0	STARTING TRACK ADDRESS 0-66 (decimal)						PHYSICAL SECTOR ADDRESS 0-29 (decimal)					

boot up/RPL environment only one 7900/7901 disc can be on-line to the I/O card selected for auto boot up/RPL.

## 11. 7900/7901 DISC LOADER ROM (12992F)

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 (subchannel) of disc drive 0 a block of 6144 (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. The program loaded in can be a disc boot loader which loads an operating system after RUN is pressed. Table 10 lists the S-Register settings to load from a specific device and platter. These settings are to be set into the Display Register along with the other bits specified in paragraph 5 steps b. (3) and b. (4). If the computer comes to a HALT 102030, check the disc for a DRIVE FAULT condition. If the disc is READY, the disc boot may be tried again by pressing RUN. The 7900/7901 loader program is listed in table 18. In an auto

## 12. 7906H/7920H/7925H/9895 DISC LOADER ROM (12992H)

This disc loader loads a program from an HP 7906H/7920H/7925H/9895 disc into memory. Starting at the beginning of cylinder 0, it is used to load from the selected surface of the disc drive 0 a block of 256 (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 an operating system after RUN is pressed. Table 11 lists the S-register settings to load from a specific device and platter. These settings are to be set into the Display Register along with the other bits specified in paragraph 5, steps b. (3) and b. (4). If the computer comes to a HALT 102011, the disc aborted the DMA transfer. The 7906H/7920H/7925H/9895 loader program is listed in table 19.



### 13. CS80 (7908x/7911x/7912x/7935x) DISC LOADER ROM (12992J)

The disc loader loads a program from an HP 7908x/7911x/7912x/7935x disc drive into CPU memory. Starting at the beginning of block 0, it is used to load from the selected unit of volume 0, disc drive 0 a continuous set of 620 (decimal) words into memory (starting at location 2011 (octal) to execute the program loaded from the disc. This program can be a boot loader, which loads an operating system from a predefined area of the disc. Table 12 lists the S-register settings to load from a specific device. After setting these bits in the S-register, press PRESET, IBL, PRESET (again) and then RUN.

A successful load into memory is indicated by the OVERFLOW indicator not being lit. If the computer comes to a HALT 102011, the disc aborted the DMA transfer. For any other halts, consult either the RTE-IVB or RTE-6/VM Programmer's Reference Manual, HP 92068-90004 or 92084-90005 respectively. This loader fully supports RPL loads from unit 0 or unit 1. The CS80 loader program is listed in Table 20.

### 14. RPL/AUTOBOOT COMPATIBLE ROMS

Loader ROMs 12992B, 12992E, 12992F, 12992H and 12992J are RPL compatible. The disc loader ROM programs, 12992B, 12992F, and 12992H wait for status from the disc before a read from the disc is attempted. This allows time for the disc to reach the READY state after power up. The auto boot up/RPL capability is enabled by a switch on the CPU configuration block located on the CPU board in the HP 1000 F-Series (2111F/2117F) and E-Series computer (2109B/2113B). The switches are accessible through a cut in the memory cage once the front panel is open. As shown in Figure 3, the configuration block switches correspond to specific S-Register bits. The function of the switches is, also, described in Figure 3. Since switch S8 must be closed to enable the RPL feature, and S8 also corresponds to bit 15 of the loader select bits, RPL compatible ROMs must be installed in sockets 10 or 11.



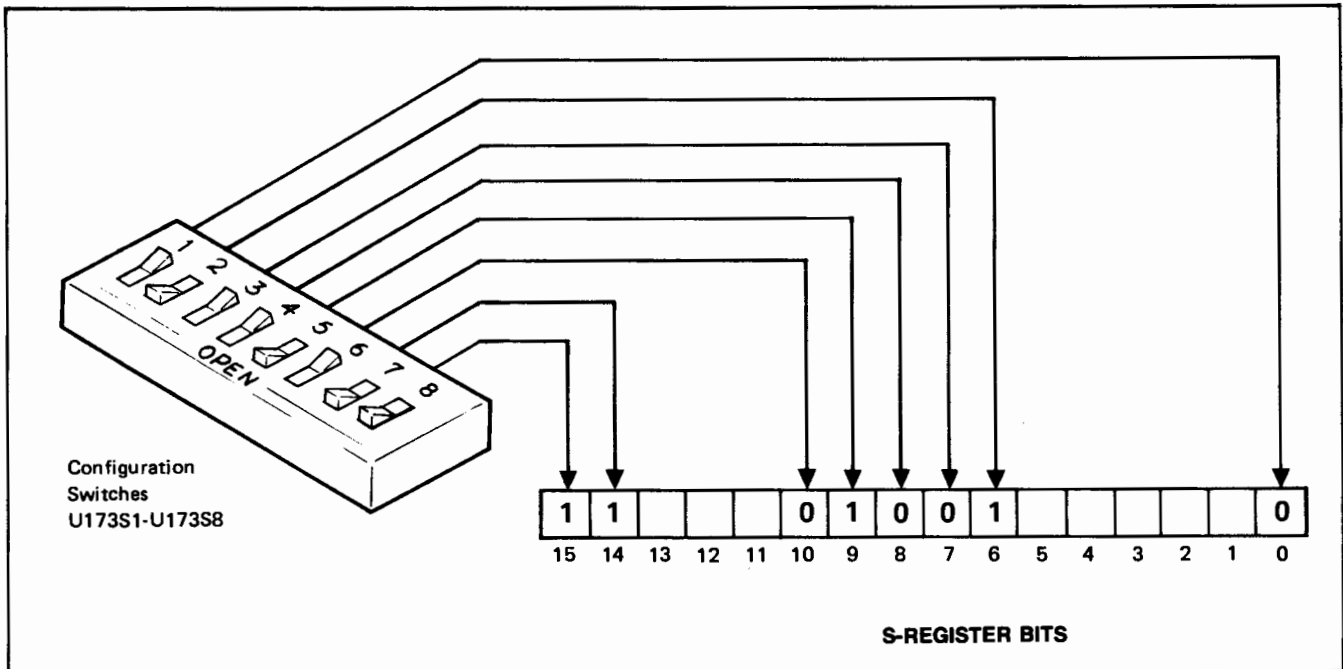
Table 9. Flexible Disc Starting Track and Sector Address Octal Equivalents

TRACK ADDRESS	B-REGISTER OCTAL EQUIVALENT	TRACK ADDRESS	B-REGISTER OCTAL EQUIVALENT	LOGICAL SECTOR ADDRESS	B-REGISTER PHYSICAL SECTOR ADDRESS OCTAL EQUIVALENT
00	000000	34	002100	00	000000
01	000040	35	002140	02	000001
02	000100	36	002200	04	000002
03	000140	37	002240	06	000003
04	000200	38	002300	08	000004
05	000240	39	002340	10	000005
06	000300	40	002400	12	000006
07	000340	41	002440	14	000007
08	000400	42	002500	16	000010
09	000440	43	002540	18	000011
10	000500	44	002600	20	000012
11	000540	45	002640	22	000013
12	000600	46	002700	24	000014
13	000640	47	002740	26	000015
14	000700	48	003000	28	000016
15	000740	49	003040	30	000017
16	001000	50	003100	32	000020
17	001040	51	003140	34	000021
18	001100	52	003200	36	000022
19	001140	53	003240	38	000023
20	001200	54	003300	40	000024
21	001240	55	003340	42	000025
22	001300	56	003400	44	000026
23	001340	57	003440	46	000027
24	001400	58	003500	48	000030
25	001440	59	003540	50	000031
26	001500	60	003600	52	000032
27	001540	61	003640	54	000033
28	001600	62	003700	56	000034
29	001640	63	003740	58	000035
30	001700	64	004000		
31	001740	65	004040		
32	002000	66	004100		
33	002040				

Table 10. 7900/7901 Cartridge Disc Loader ROM S-Register Settings

DEVICE AND PLATTER	S-REGISTER BIT SETTINGS														
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
HP 7900A (Removable) or HP 7901	L O A D E R	S E L E C T I O N	0	0	SELECT CODE OF LOADING DEVICE						R* E S E R V E D	0	0	1	
HP 7900A (fixed platter)			0	0	0	0	0								

\*S-Register bits 5 through 3 are reserved and must be 0 unless specifically called for by the operating system, i.e., diagnostic bit 3 set.



SWITCH	FUNCTION
U173S1	12992B (7905/7906/7920 disc) open position selects head 000, removable platter on 7905/7906 or head 000, platter 1 on 7920/7925 closed position selects head 010, fixed platter on 7905/7906 or head 010, platter 2 on 7920/7925  12992E (9885 flexible disc) must be in closed position. All loading starts at track 0, sector 1  12992F (7900/7901 disc) open position selects fixed platter closed position selects removable platter  12992H (7906H/7920H/7925H/9895) open position selects head 00, removable platter on 7906H or head 000, platter 1 on 7920H/7925H or head 0, drive 0 on 9895 closed position selects head 010, fixed platter on 7906H or head 010, platter 2 on 7920H/7925H  12992J (7908/7911/7912/7935) open position selects disc (unit 0) on 7908/11/12/35
U173S2 U173S3 U173S4 U173S5 U173S6	decodes the five bit octal select code of the input device (S.C. 10-37) switches shown set to select code $11_8 (01001_2)$
U173S7	if RPL enabled, open position selects ROM 10; closed position selects ROM 11
U173S8	open position RPL not enabled closed position RPL enabled

NOTE: open position = logic 0  
 closed position = logic 1

Figure 3. Configuration Block/S-Register Relationship for HP 1000 F-Series and E-Series Computers



Table 11. 7906H/7920H/7925H/9895 Cartridge Disc Loader ROM S-Register Settings

DEVICE AND PLATTER	S-REGISTER BIT SETTINGS															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
HP 7906H (Removable Platter, Upper Surface, Head 00) or 7920H/7925H (Platter 1, Upper Surface, Head 00) or 9895 (drive 0, head 0)	L O A D E R  R O M	S E L E C T I O N	0	1	SELECT CODE OF LOADING DEVICE						R* E S E R V E D				0	0
HP 7906H (Removable Platter, Lower Surface, Head 01) or 7920H/7925H (Platter 1, Lower Surface, Head 01) or 9895 (drive 0, head 1)			0	1											1	0
HP 7906H (Fixed Platter, Head 10) or 7920H/7925H (Platter 2, Upper Surface, Head 10)			0	1											1	1
HP 7906H (Fixed Platter, Head 11) or 7920H/7925H (Platter 2, Lower Surface, Head 11)																

Table 12. 7908/7911/7912/7935 CS80 Cartridge Disc Loader ROM S-Register Settings

DEVICE	S-REGISTER BIT SETTINGS															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7908/7911/ 7912/7935	LDR ROM		0	0	SELECT CODE OF LOADING DEVICE						0	0	0	Unit #		

Table 13. HP 12992A 7900/7901/2883 Loader ROM Program Listing

PAGE 0002 #01 7900/7901/2883 DISC BOOT (12992A) PART # 1816-0863

```

0001          ASMB,A,B,L,C
0003 07700          ORG 7700B
0004*****
0005*
0006*          REV.          1-27-76          *
0007*          PART NUMBER    1816-0863      *
0008*          PRODUCT NUMBER 12992A        *
0009*
0010*****
0011*
0012* SWITCH REGISTER USAGE
0013*
0014*
0015* 15-14          LOADER SELECT
0016* 13-12          00 - 7900 DISC
0017*                01 - RESERVED
0018*                10 - 2883 DISC
0019* 11-6          DISC SELECT CODE
0020* 5-3           RESERVED FOR DIAGNOSTIC GROUP
0021* 2-0           SUBCHANNEL NUMBER
0022*
0023*
0024 00010          DC      EQU 10B
0025 00011          CC      EQU DC+1
0026*
0027*** "PRESET" MUST BE PRESSED
0028*

0030 07700          START EQU *
0031 07700 102501          LIA 1          GET CONTENTS OF S-REG
0032 07701 106501          LIB 1
0033 07702 013765          AND D7          ISOLATE SUBCHANNEL #
0034 07703 005750          BLF,CLE,SLB
0035 07704 027741          JMP READ
0036 07705 005335          RBR,SLB,ERB  PUT BIT 13 IN E - SET = 2883
0037 07706 027717          JMP ISS
0038*
0039* FALL THROUGH
0040*          A HAS LAST 3 BITS OF S REG
0041*          B HAS S REG SHIFTED
0042*          13 / 12 11 10 / 9 8 7 / 6 5 4 / 3 2 1 / 0 15 14
0043*          E IS 0
0044*
0045 07707          LOOP EQU *
0046 07707 102611          OTA CC          DO 7900 STATUS TO
0047 07710 103711          STC CC,C          CLEAR FIRST SEEK
0048 07711 102310          SFS DC          STATUS
0049 07712 027711          JMP *-1
0050 07713 002004          INA          GET NEXT DRIVE
0051 07714 053765          CPA D7          ALL CLEARED?
0052 07715 002001          RSS          YES
0053 07716 027707          JMP LOOP
0054*

```

Table 13. HP 12992A 7900/7901/2883 Loader ROM Program Listing (Continued)

PAGE 0003 #01 7900/7901/2883 DISC BOOT (12992A) PART # 1816-0863

```

0055* FALL THROUGH
0056*   A HAS A 7
0057*   B HAS S REG SHIFTED - SEE ABOVE COMMENT
0058*   E HAS CONDITION OF BIT 13 OF S REG
0059*
0060* JMP ISS
0061*   A HAS LAST 3 BITS OF S REG
0062*   B HAS S REG SHIFTED - SEE ABOVE COMMENT
0063*   E IS A 1
0064*
0065 07717          ISS EQU *
0066 07717 067761   LDB SEEKC          GET SEEK COMND
0067 07720 106610   OTB DC              ISSUE CYLINDER ADDR (0)
0068 07721 103710   STC DC,C          TELL CTRL. CYC. ADDR LOADED
0069 07722 106611   OTB CC
0070 07723 103711   STC CC,C          START SEEK
0071 07724 102310   SFS DC
0072 07725 027724   JMP *-1
0073 07726 006400   CLB
0074 07727 102501   LIA 1
0075 07730 002051   SEZ,SLA,RSS          SUBCHAN=1 OR ISS SKIP
0076 07731          ISSRD EQU *
0077 07731 047770   ADB BIT9
0078 07732 106610   OTB DC          SEND SECTOR ADDR
0079 07733 103710   STC DC,C
0080 07734 102311   SFS CC          WAIT FOR SEEK
0081 07735 027734   JMP *-1
0082 07736 063731   LDA ISSRD          GET ISS READ COMND
0083 07737 002341   SEZ,CCE,RSS          ISS DISC?
0084 07740 001100   ARS              NO-MAKE 7900 READ COMND
0085*
0086* FALL THROUGH
0087*   A HAS DISC READ COMND
0088*   B HAS EITHER A 0 OR BIT 9 SET
0089*   E IS A 1
0090*
0091* JMP READ
0092*   A HAS LAST 3 BITS OF THE S REG
0093*   B HAS S REG SHIFTED
0094*   E IS A 0
0095*
0096 07741          READ EQU *
0097 07741 067776   LDB DMACW          GET DMA CONTROL WORD
0098 07742 106606   OTB 6              ISSUE DMA CONTROL WORD
0099 07743 067762   LDB ADDR1          GET MEMORY ADDR
0100 07744 077741   STB READ           MAKE BOOT NONREEXECUTABLE
0101 07745 106602   OTB 2              ISSUE MEMORY ADDR
0102 07746 102702   STC 2              SET WORD COUNT
0103 07747 067764   LDB CNT            GET WORD COUNT
0104 07750 106602   OTB 2              ISSUE WORD COUNT
0105*
0106* FALL THROUGH
0107*   A HAS EITHER THE DISC READ COMND
0108*           OR THE LAST 3 BITS OF THE S REG
0109*   B HAS DMA WORD COUNT
0110*   E IS EITHER A 1

```

Table 13. HP 12992A 7900/7901/2883 Loader ROM Program Listing (Continued)

PAGE 0004 #01 7900/7901/2883 DISC BOOT (12992A) PART # 1816-0863

```

0111*          OR A 0
0112*
0113 07751 002041      SEZ,RSS
0114 07752 027766      JMP NEW
0115 07753 102611      OTA CC          ISSUE READ COMMD
0116 07754 103710      STC DC,C
0117 07755 103706      STC 6,C          START DMA
0118 07756 103711      STC CC,C          START DISK READING
0119 07757 037773      ISZ SKIP
0120 07760 027773      JMP SKIP
0121*
0122*
0123* CONSTANTS
0124*
0125 07761 030000      SEEKC OCT 30000
0126 07762 102011      ADDR1 OCT 102011
0127 07763 102055      ADDR2 OCT 102055
0128 07764 164000      CNT      DEC -6144
0129 07765 000007      07      DEC 7
0130*
0131*
0132 07766 106710      NEW      CLC DC          SET "NEXT WRD IS COMMD FLC"
0133 07767 001720      ALF,ALS      MOVE TO HEAD NUMBER LOC.
0134 07770 001000      BIT9      ALS
0135 07771 103610      OTA DC,C          OUTPUT CGLD LOAD COMMD
0136 07772 103706      STC 6,C
0137 07773              SKIP      EQU *
0138 07773 102310      SFS DC
0139 07774 027773      JMP *-1
0140 07775 117763      EXIT      JSB ADDR2,I
0141*
0142* EXIT
0143* TRACK 0, SECTOR 0 OF APPROPRIATE
0144* SUBCHANNEL NOW IN MEMORY
0145*
0146 07776 120010      DNACW ABS 120000B+DC
0147 07777 170100      ABS -START
0148                      END
** NO ERRORS* RTE ASMB 92001B (10/74)**

```

Table 14. HP 12992C 2644/2645/2648 Loader ROM Program Listing

## 7905/06/20/25 DISC BOOT LOADER (12992B) - RPL COMPATIBLE

```

0001          ASMB,A,B,L
0003 07700          ORG 7700B
0004*****
0005*                                     *
0006*      REVISION          05 AUG 77          *
0007*      PART NUMBER      12992-80002        *
0008*      PRODUCT NUMBER   12992B           *
0009*                                     *
0010*****
0011*
0012*      SWITCH REGISTER USAGE
0013*
0014*      15-14      LOADER SELECT
0015*      13         UNUSED
0016*      12         =0/1=RPL/MANUAL BOOT
0017*      11-6      DISC SELECT CODE
0018*      5-3       RESERVED
0019*      2-0       SUECHANNEL NUMBER
0020*
0021 00010          DC      EQU 10B
0022*
0023 07700 017727   START JSB STAT          GET STATUS
0024 07701 002021   SSA,RSS              IS DRIVE READY ?
0025 07702 027742   JMP DMA                YES, SET UP DMA
0026 07703 013714   AND B20              NO, CHECK STATUS BITS
0027 07704 002002   SZA                  IS DRIVE FAULTY OR HARD DOWN ?
0028 07705 102030   HLT 30B              YES, HALT 30B, "RUN" TO TRY AGAIN
0029 07706 027700   JMP START              NO, TRY AGAIN FOR DISC READY
0030*
0031*      CONSTANTS
0032*
0033 07707 102011   ADDR1 OCT 102011
0034 07710 102055   ADDR2 OCT 102055
0035 07711 164000   CNT      DEC -6144
0036 07712 000007   D7       OCT 7
0037 07713 001400   STCMD  OCT 1400
0038 07714 000020   B20     OCT 20
0039 07715 017400   STMSK  OCT 17400
0040*      9 NOP'S
0044          LST
0045*
0046 07727 000000   STAT  NOP          STATUS CHECK SUBROUTINE
0047 07730 107710   CLC DC,C          SET STATUS COMMAND MODE
0048 07731 063713   LDA STCMD         GET STATUS COMMAND
0049 07732 102610   OTA DC           OUTPUT STATUS COMMAND
0050 07733 102310   SFS DC           WAIT FOR STATUS#1 WORD
0051 07734 027733   JMP *-1
0052 07735 107510   LIB DC,C          B-REG = STATUS#1 WORD
0053 07736 102310   SFS DC           WAIT FOR STATUS#2 WORD
0054 07737 027736   JMP *-1
0055 07740 103510   LIA DC,C          A-REG = STATUS#2 WORD

```

Table 14. HP 12992B 7905/7906/7920/7925 Loader ROM Program Listing (Continued)

```

0056 07741 127727      JMP STAT,I      RETURN
0057*
0058*  SET UP DMA CHANNEL
0059*
0060 07742 067776  DMA  LDB DMACW  GET DMA CONTROL WORD
0061 07743 106606      OTB 6          OUTPUT DMA CONTROL WORD
0062 07744 067707      LDB ADDR1     GET MEMORY ADDRESS
0063 07745 106702      CLC 2        SET MEMORY ADDRESS INPUT MODE
0064 07746 106602      OTB 2        OUTPUT MEMORY ADDRESS TO DMA
0065 07747 102702      STC 2        SET WORD COUNT INPUT MODE
0066 07750 067711      LDB CNT      GET WORD COUNT
0067 07751 106602      OTB 2        OUTPUT WORD COUNT TO DMA
0068*FALL THRU
0069* 7905/20 COLD LOAD COMMAND
0070*
0071 07752 106710  CLDLD CLC DC    SET COMMAND INPUT MODE
0072 07753 102501      LIA 1        LOAD SWITCH
0073 07754 106501      LIB 1        REGISTER SETTINGS
0074 07755 013712      AND D7       ISOLATE HEAD NUMBER
0075 07756 005750      BLF,CLE,SLB BIT 12=0?
0076 07757 027762      JMP *+3      NO,MANUAL BOOT
0077 07760 002002      SZA         YES,RPL BOOT. HEAD#=0?
0078 07761 001000      ALS        NO,HEAD#=1, MAKE HEAD#=2
0079 07762 001720      ALF,ALS     FORM COLD LOAD
0080 07763 001000      ALS        COMMAND WORD
0081 07764 103706      STC 6,C     ACTIVATE DMA
0082 07765 103610      OTA DC,C   OUTPUT COLE LOAD COMMAND
0083 07766 102310      SFS DC     IS COLD LOAD COMPLETED ?
0084 07767 027766      JMP *-1     NO, WAIT
0085 07770 017727      JSB STAT    YES, GET STATUS
0086 07771 060001      LDA 1
0087 07772 013715      AND STMSK  A-REG = STATUS BITS OF STATUS#1 WORD
0088 07773 002002      SZA        IS TRANSFER OK ?
0089 07774 027700      JMP START  NO,TRY AGAIN
0090 07775 117710  EXIT JSB ADDR2,I  YES, EXECUTE LOADED PROGRAM @ 2055B
0091*FALL THRU
0092*  THE NEXT 2 WORDS MUST BE THE LAST 2 WORDS
0093*  IN THE BOOTSTRAP LOADER IN THE LAST 2 MEMORY LOCATIONS
0094 07776 000010  DMACW ABS DC
0095 07777 170100      ABS -START
0096                          END

```

Table 15. HP 12992C 2644/2645/2648 Loader ROM Program Listing

PAGE 0002 #01 \*\*\* HP 2644/45/48 CARTRIDGE TAPE BINARY LOADER (12992C) \*\*\*

```

0001          ASMB,A,B,L      CARTRIDGE TAPE BINARY LOADER
0003 07700          ORG 7700B
0004*****
0005*
0006*          REV.          2-18-76          *
0007*          PART NUMBER  1816-0857        *
0008*
0009*****
0010 00010          SC      EQU 10B
0011 00000          A      EQU 0
0012 00001          B      EQU 1
0013*
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 07700 063773   START LDA LDOTP      RESET POINTER
0020 07701 073702           STA ++1
0021 07702 063763   NCW  LDA OTP        GET A WORD FROM THE TABLE
0022 07703 037702           ISZ *-1      MOVE TO NEXT WORD IN TABLE
0023 07704 103610           OTA SC,C     OUTPUT CURRENT WORD
0024 07705 053771           CPA EOT     END OF TABLE?
0025 07706 027717           JMP NRD        YES - START INPUT
0026 07707 001727           ALF,ALF     IS THIS A CHARACTER?
0027 07710 013772           AND .377
0028 07711 002002           SZA        ?
0029 07712 027702           JMP NCW        NO - DO NEXT CONTROL WORD
0030 07713 103710           STC SC,C     PUT CARD IN DATA MODE
0031 07714 102310           SFS SC      IS CHARACTER OUT?
0032 07715 027714           JMP *-1      NO - WAIT FOR IT
0033 07716 027702           JMP NCW        YES - DO NEXT CONTROL WORD
0034 07717 017750   HRD  JSB INPUT     READ IN FIRST WORD (RECORD COUNT)
0035 07720 005727           BLF,BLF     POSITION COUNT TO LOWER BYTE
0036 07721 007007           CMB,INB,SZB,RSS MAKE IT NEG AND IS IT EOF?
0037 07722 102077           HLT 77B    YES - END-OF-FILE
0038 07723 006021           SSB,RSS    IF COUNT WAS ALL ONES
0039 07724 102000           HLT 0      THEN TAPE ERROR
0040 07725 077776           STB WCT    SAVE COUNT
0041 07726 017750           JSB INPUT  READ STORE ADDRESS
0042 07727 077774           STB CKSUM  START CHECKSUM
0043 07730 077775           STB ADD    AND SAVE ADDRESS
0044 07731 017750   MWD  JSB INPUT     GET WORD TO BE STORED
0045 07732 063775           LDA ADD    CHECK IF ADDRESS
0046 07733 043777           ADA MXAD   IS ABOVE LOADER
0047 07734 002040           SEZ        IS IT?
0048 07735 102055           HLT 55B    YES
0049 07736 177775           STB ADD,1  NO - PUT WORD IN MEMORY
0050 07737 047774           ADB CKSUM  ADD IT TO CHECKSUM
0051 07740 077774           STB CKSUM
0052 07741 037775           ISZ ADD    MOVE ADDRESS UP ONE
0053 07742 037776           ISZ WCT    FINISHED WITH THIS RECORD?
0054 07743 027731           JMP MWD    NO - READ NEXT WORD

```

Table 15. HP 12992C 2644/2645/2648 Loader ROM Program Listing (Continued)

PAGE 0003 #01 \*\*\* HP 2644/45/48 CARTRIDGE TAPE BINARY LOADER (12992C) \*\*\*

0056	07744	017750		JSB INPUT	YES - READ CHECKSUM
0057	07745	057774		CPB CKSUM	IS CHECKSUM OK?
0058	07746	027717		JMP HRD	YES - READ NEXT RECORD
0059	07747	102011		HLT 11B	NO
0060	07750	000000	INPUT	NOP	INPUT ONE WORD FROM INTERFACE
0061	07751	006700		CLB,CCE	ZERO WORD AND START WITH UPPER HALF
0062	07752	102510		LIA SC	GET DATA
0063	07753	002021		SSA,RSS	IS IT VALID DATA?
0064	07754	027752		JMP *-2	NO
0065	07755	013772		AND .377	YES - ELIMINATE UPPER HALF
0066	07756	044000		ADB A	ADD DATA TO B REG.
0067	07757	002041		SEZ,RSS	SECOND HALF READ?
0068	07760	127750		JMP INPUT,I	YES - RETURN WITH WORD IN B REG.
0069	07761	005767		BLF,CLE,BLF	NO - MOVE BYTE TO UPPER HALF
0070	07762	027752		JMP INPUT+2	SET LOWER HALF FLAG AND READ IT
0071*					
0072	07763	150077	OTP	OCT 150077	MASTER RESET
0073	07764	040740		OCT 40740	INTERFACE CONTROL
0074	07765	030003		OCT 30003	CHAR FRAME CONTROL
0075	07766	000033	CHR1	OCT 33	ASCII "ESC"
0076	07767	050077		OCT 50077	RESET BUFFER STATUS
0077	07770	000145	CHR2	OCT 145	ASCII LOWER CASE "E"
0078	07771	040340	EOT	OCT 40340	INPUT COMMAND WORD
0079*					
0080	07772	000377	.377	OCT 377	UPPER HALF WORD MASK
0081	07773	063763	LDOTP	LDA OTP	POINTER TO OUTPUT TABLE
0082	07774	000000	CKSUM	NOP	CHECKSUM STORAGE
0083	07775	000000	ADD	NOP	ADDRESS STORAGE
0084	07776	000000	WCT	NOP	INPUT WORD COUNT
0085	07777	170100	HXAD	ABS -START	START BINARY LOADER AREA
0086				END	

\*\* NO ERRORS\* RTE ASMB 920018 (10/74)\*\*



Table 16. HP 12992D 7970B/7970E Loader ROM Program Listing

PAGE 0002 #01 \*\*\* HP 7970 MAG TAPE ABSOLUTE BINARY LOADER (12992D) \*\*\*

```

0001          ASMB,A,B,L      MAG TAPE LOADER
0003 07700          ORG 7700B
0004*****
0005*                                     *
0006*          REV.          6-23-76      *
0007*          PART NUMBER  1816-0962    *
0008*                                     *
0009*****
0010 00010          DC      EQU 10B
0011 00011          CC      EQU DC+1
0012*
0013**** "RUN" CAN NOT BE PRESSED AFTER ANY HALT
0014*
0015 07700 106501  START LIB 1          CHECK IF FILE FORWARD WAS REQUESTED
0016 07701 006011          SLB,RSS      ???
0017 07702 027714          JMP NRD      NO JUST READ A FILE
0018 07703 003004          CMA,INA      MAKE REQUEST NEG FOR COUNTER
0019 07704 073775          STA WCT      SAVE NUMBER AS COUNTER
0020 07705 067772          LDB SLOWR   SELECT 0 AND REWIND
0021 07706 017762  FFL   JSB CMD      OUTPUT COMMAND
0022 07707 102311          SFS CC      WAIT FOR COMPLETION
0023 07710 027707          JMP *-1
0024 07711 067774          LDB FFC      GET FILE FORWARD COMMAND
0025 07712 037775          ISZ WCT     ANY FILES LEFT?
0026 07713 027706          JMP FFL   YES
0027 07714 067773  NRD   LDB RDCMD    GET READ COMMAND
0028 07715 017762          JSB CMD     DO IT
0029 07716 103710          STC DC,C  START DATA CHANNEL
0030 07717 102211          SFC CC      CHECK FOR STATUS
0031 07720 027752          JMP STAT   YES
0032 07721 102310          SFS DC      ANY DATA
0033 07722 027717          JMP *-3    NO
0034 07723 107510          LIB DC,C  YES GET IT (RECORD COUNT)
0035 07724 005727          BLF,BLF  POSITION COUNT TO LOWER BYTE
0036 07725 007000          CMB      MAKE IT NEGATIVE
0037 07726 077775          STB WCT  SAVE INPUT COUNT
0038 07727 102211          SFC CC      CHECK FOR STATUS
0039 07730 027752          JMP STAT   YES EXIT TO STATUS
0040 07731 102310          SFS DC      WAIT TO READ NEXT WORD
0041 07732 027727          JMP *-3
0042 07733 107510          LIB DC,C  GET LOAD ADDRESS
0043 07734 074000          STB 0      START CHECKSUM
0044 07735 077762          STB CMD    AND ADDRESS POINTER
0045 07736 027742          JMP *+4
0046 07737 177762  NWD   STB CMD,I  PUT WORD IN MEMORY
0047 07740 040001          ADA 1      ADD IT TO CHECK SUM
0048 07741 037762          ISZ CMD    MOVE UP ADDRESS
0049 07742 102310          SFS DC      WAIT FOR NEXT WORD
0050 07743 027742          JMP *-1
0051 07744 107510          LIB DC,C  GET DATA TO STORE IN MEMORY
0052 07745 037775          ISZ WCT   FINISHED WITH DATA?
0053 07746 027737          JMP NWD    NO READ NEXT WORD
0054 07747 054000          CPB 0      IS CHECKSUM OK?
0055 07750 027717          JMP NRD+3  YES - WAIT FOR COMMAND CHANNEL STATUS
0056 07751 102011          HLT 11B   NO

```

Table 16. HP 12992D 7970B/7970E Loader ROM Program Listing (Continued)

PAGE 0003 #01 \*\*\* HP 7970 MAG TAPE ABSOLUTE BINARY LOADER (12992D) \*\*\*

0058	07752	102511	STAT	LIA CC	GET STATUS
0059	07753	001727		ALF,ALF	POSITION EOF BIT
0060	07754	002020		SSA	IS IT EOF?
0061	07755	102077		HLT 77B	YES
0062	07756	001727		ALF,ALF	REPOAITION STATUS
0063	07757	001310		RAR,SLA	YES READ OK?
0064	07760	102000		HLT 0	NO TELL OPERATOR
0065	07761	027714		JMP NRD	YES READ NEXT RECORD
0066*					
0067*					
0068	07762	000000	CMD	NOP	
0069	07763	106611		OTB CC	OUTPUT COMMAND
0070	07764	102511		LIA CC	CHECK IF REJECTED
0071	07765	001323		RAR,RAR	
0072	07766	001310		RAR,SLA	??
0073	07767	027763		JMP *-4	YES TRY AGAIN
0074	07770	103711		STC CC,C	NO START COMMAND
0075	07771	127762		JMP CMD, I	RETURN
0076*					
0077*					
0078	07772	001501	SLURW	OCT 1501	MT SELECT 0 / REWIND
0079	07773	001423	RDCMD	OCT 1423	MT READ A RECORD COMMAND
0080	07774	000203	FFC	OCT 203	MT FILE FORWARD COMMAND
0081	07775	000000	WCT	NOP	INPUT WORD COUNT
0082	07776	000000		NOP	
0083	07777	000000		NOP	
0084				END	
** NO ERRORS *TOTAL **RTE ASMB 750420**					



Table 17. HP 12992E 9885 Flexible Disc Loader ROM Program Listing

PAGE 0002 #01 HP9885 FLEXIBLE DISC LOADER -- 12992E

```

0001          ASMH,A,B,L          761227
0003*****
0004*
0005*      PART NO. 1816-1051
0006*
0007*      LOADER JUMPS TO 2 UPON SUCCESSFUL COMPLETION (NO HALT).
0008*      ENTER STARTING TRACK IN B-REG BITS 11-5.
0009*      ENTER STARTING SECTOR IN B-REG BITS 4-0.
0010*      SET S-REG BIT 0 TO SELECT TRACK 0, SECTOR 1.
0011*      RESTART LOADING PROCEDURE IF HALT OCCURS.
0012*      LOADER USUALLY HANGS UP IF DEVICE ERROR OCCURS.
0013*****
0014 07700          ORG 7700B
0015 00010          CC EQU 10B
0016 00011          DC EQU CC+1
0017 00000          A EQU 0
0018 00001          B EQU 1
0019*
0020 07700 102501  START LIA 1          IF S-REG BIT 0 IS SET
0021 07701 000010          SLA
0022 07702 006404          CLB,INH          ASSUME TR 0, SEC 1
0023 07703 060001          LDA B
0024 07704 013711          AND R36          MASK OPERATOR INPUT
0025 07705 053711          CPA R36          SEC=36: FORMAT -- SEC=37: MARK DEFECTI
0026 07706 027706          JMP *          ILLEGAL SECTOR -- LOADER CANNOT PROCEED
0027 07707 002504          CLA,CLE,INA
0028 07710 103610          OTA CC,C          PRESET CONTROLLER
0029 07711 000036  B36  SLA,ELA
0030 07712 102610          OTA CC          CLEAR PRESET BIT
0031 07713 017766          JSR OTA          CLEAR POSSIBLE ERROR FLAG
0032 07714 063774          LDA PASWD
0033 07715 017766          JSR OTA          OUTPUT PASSWORD TO CONTROLLER
0034 07716 060001          LDA B
0035 07717 033775          IOR SEEK          CONVERT OPERATOR INPUT TO SEEK COMMAND
0036 07720 017766          JSR OTA          OUTPUT SEEK TO CONTROLLER
0037 07721 063774          LDA PASWD
0038 07722 017766          JSR OTA          OUTPUT PASSWORD AGAIN
0039 07723 063734          LDA READ          READ AT LEAST 3300 SECTORS
0040 07724 017766          JSR OTA          OUTPUT READ COMMAND
0041 07725 002400          CLA          CLEAR INTERFACE
0042 07726 017766          JSR OTA
0043 07727 017760  RECLP JSB OTLI          INPUT FMGR WORD COUNT
0044 07730 002007          INA,SZA,RSS          END OF FILE?
0045 07731 024002          JMP 2B          LOAD COMPLETE -- START PROGRAM
0046 07732 017760          JSR OTLI          INPUT ABSOLUTE COUNT
0047 07733 001727          ALF,ALF          POSITION COUNT TO LOWER BYTE
0048 07734 003304  READ  CMA,CCE,INA
0049 07735 073766          STA COUNT
0050 07736 017760          JSR OTLI          INPUT ADDRESS
0051 07737 073777          STA ADDR
0052 07740 070001          STA B          START CHECKSUM
0053 07741 102311  DATLP SFS DC          WAIT FOR DATA CHANNEL
0054 07742 027741          JMP *-1
0055 07743 103711          STC DC,C          START NEXT TRANSFER
0056 07744 102511          LIA DC          INPUT DATA
0057 07745 173777          STA ADDR,I          STORE INTO MEMORY

```

Table 17. HP 12992E 9885 Flexible Disc Loader ROM Program Listing (Continued)

PAGE 0003 #01 HP9885 FLEXIBLE DISC LOADER -- 12992E

```

0058 07746 044000      ADB A      ADD T0 CHECKSUM
0059 07747 037777      ISZ ADDR   MOVE T0 NEXT ADDRESS
0060 07750 037766      ISZ COUNT  DONE?
0061 07751 027741      JMP DATLP  NO, DO NEXT DATA WORD
0062 07752 017760      JSR OTLI   INPUT CHECKSUM
0063 07753 050001      CPA B      DOES CHECKSUM AGREE?
0064 07754 006401      CLB,RSS
0065 07755 102011      HLT 11B   NO, TELL OPERATOR
0066 07756 017760      JSR OTLI   DISCARD SECOND FMGR COUNT
0067 07757 027727      JMP RECLP
0068*
0069 07760 000000  OTLI  NOP      INPUT FROM DATA CHANNEL
0070 07761 102311      SFS DC    WAIT FOR DATA CHANNEL
0071 07762 027761      JMP *-1
0072 07763 103711      STC DC,C  START NEXT TRANSFER
0073 07764 102511      LIA DC    INPUT DATA
0074 07765 127760      JMP OTLI,I
0075*
0076 07766 000000  OTA   NOP      OUTPUT TO DATA CHANNEL
0077 07767 102311      SFS DC    WAIT FOR DATA CHANNEL
0078 07770 027767      JMP *-1
0079 07771 102611      OTA DC    OUTPUT DATA
0080 07772 103711      STC DC,C  START NEXT TRANSFER
0081 07773 127766      JMP OTA,I
0082*
0083*
0084 07774 127207  PASWD OCT 127207
0085 07775 140000  SEEK  OCT 140000
0086 07776 000010  SC    ABS CC
0087 07777 000000  ADDR  NOP
0088*
0089 07766          COUNT EQU OTA
0090*
0091*
0092          END
** NO ERRORS *TOTAL **RTE ASMB 760924**

```

Table 18. HP 12992F 7900/7901 Disc Loader ROM Program Listing

## 7900 DISC BOOT LOADER (12992F) - RPL COMPATIBLE

```

0001          ASMB,A,B,L
0003 07700          ORG 7700B
0004*****
0005*
0006*      REVISION          05 AUG 77          *
0007*      PART NUMBER      12992-80003        *
0008*      PRODUCT NUMBER   12992F           *
0009*
0010*****
0011*
0012*      SWITCH REGISTER USAGE
0013*
0014*      15-14      LOADER SELECT
0015*      13-12      UNUSED
0016*      11-6       DISC SELECT CODE
0017*      5-3        RESERVED
0018*      2-0        HEAD(SUBCHANNEL) NUMBER
0019*
0020 00010          DC      EQU 10B
0021 00011          CC      EQU DC+1
0022*
0023 07700 106710   START CLC DC      INSURE CONTROL SIGNALS ARE CLEARED
0024 07701 106711   CLC CC          ON COMMAND AND DATA CHANNELS
0025*
0026 07702 017757   JSB STAT      GET DISC STATUS
0027*
0028*      ISSUE SEEK COMMAND
0029*
0030 07703 067746   SEEK  LDB SEEKC   GET SEEK COMMAND
0031 07704 106610   OTB DC          OUTPUT CYLINDER ADDRESS
0032 07705 103710   STC DC,C       TO DATA CHANNEL
0033 07706 106611   OTB CC          OUTPUT SEEK COMMAND
0034 07707 103711   STC CC,C       TO COMMAND CHANNEL
0035 07710 102310   SFS DC          FIRST ADDRESS WORD ACCEPTED ?
0036 07711 027710   JMP *-1        NO, WAIT
0037 07712 006400   CLB           YES, SET UP HEAD/SECTOR ADDRESS
0038 07713 102501   LIA 1         INPUT SWITCH REGISTER
0039 07714 002011   SLA,RSS      IS SUBCHANNEL 0 SELECTED ?
0040 07715 047747   ADB BIT9     YES, SET BIT 9 IN HEAD ADDRESS
0041 07716 106610   OTB DC          NO, BIT 9 = 0, OUTPUT HEAD/SECTOR
0042 07717 103710   STC DC,C     ADDRESS TO DATA CHANNEL
0043 07720 102311   SFS CC          IS SEEK COMPLETE ?
0044 07721 027720   JMP *-1        NO, WAIT
0045*
0046*
0047 07722 017757   JSB STAT      YES, CHECK STATUS ON DRIVE 0
0048*
0049*      ALLOCATE DMA CHANNEL
0050*
0051 07723 067776   DMA  LDB DMACW   START DMA SET-UP
0052 07724 106606   OTB 6         OUTPUT DMA CONTROL WORD

```

Table 18. HP 12992F 7900/7901 Disc Loader ROM Program Listing (Continued)

```

0053 07725 067750          LDB ADDR1      GET MEMORY ADDRESS
0054 07726 106602          OTB 2         OUTPUT MEMORY ADDRESS TO DMA
0055 07727 102702          STC 2         SET WORD COUNT INPUT
0056 07730 067752          LDB CNT       GET WORD COUNT
0057 07731 106602          OTB 2         OUTPUT WORD COUNT TO DMA
0058 07732 063745  READ   LDA RDCMD      GET READ COMMAND
0059 07733 102611          OTA CC       OUTPUT READ COMMAND
0060 07734 103710          STC DC,C     PREPARE DATA CHANNEL FOR READING
0061 07735 103706          STC 6,C     ACTIVATE DMA
0062 07736 103711          STC CC,C     INITIATE READ COMMAND
0063 07737 102311          SFS CC       IS READ COMPLETE ?
0064 07740 027737          JMP *-1      NO, WAIT
0065*
0066*
0067 07741 017757          JSB STAT     CHECK STATUS ON DRIVE 0
0068*
0069*
0070 07742 027775          JMP EXIT
0071*
0072*
0073*  CONSTANTS
0074*
0075*
0076 07743 037766  FSMSK OCT 37766
0077 07744 004000  STMSK OCT 4000
0078 07745 020000  RDCMD OCT 20000
0079 07746 030000  SEEKC OCT 30000
0080 07747 001000  BIT9  OCT 1000
0081 07750 102011  ADDR1 OCT 102011
0082 07751 102055  ADDR2 OCT 102055
0083 07752 164000  CNT   DEC -6144
0084*  4NOP'S
0088          LST
0089*
0090*  REQUEST DISC STATUS
0091*
0092 07757 000000  STAT  NOP
0093 07760 002400          CLA
0094 07761 102611          OTA CC       OUTPUT STATUS REQUEST
0095 07762 103711          STC CC,C     INITIATE STATUS REQUEST
0096 07763 102310          SFS DC       IS STATUS READY?
0097 07764 027763          JMP *-1      NO, WAIT
0098 07765 102510          LIA DC       YES, INPUT STATUS WORD
0099 07766 013743          AND FSMSK   MASK BITS 14,3,0 OFF
0100 07767 002003          SZA,RSS     IS DRIVE READY?
0101 07770 127757          JMP STAT,I   YES, EXIT
0102 07771 013744          AND STMSK   NO, MASK BIT 9
0103 07772 002002          SZA         IS DRIVE FAULTY?
0104 07773 102030          HLT 30B     YES, HALT 30B, "RUN" TO TRY AGAIN
0105 07774 027700          JMP START   NO, REPEAT SEEK REQUEST
0106*
0107*
0108 07775 117751  EXIT  JSB ADDR2,I   YES, EXECUTE LOADED PROGRAM @ 2055B
0109* THE FOLLOWING 2 WORDS MUST BE THE LAST 2 LOCATIONS
0110*  IN THE BOOT STRAP
0111 07776 120010  DMACW ABS 120000B+DC
0112 07777 170100          ABS -START
0113          END

```

Table 19. HP 12992H 7906H/7920H/7925H/9895 Disc Loader ROM Program Listing

```

0001          ASMB,A,B,L
0002* * * * *
0003*      ICD DISC BOOT LOADER - RPL COMPATABLE      *
0004* * * * *
0005*      PRODUCT NUMBER - 12992H                    *
0006*      PART NUMBER - 12992-80004                  *
0007* * * * *
0008* * * * *
0009*      SWITCH REGISTER OPTIONS:                   *
0010* * * * *
0011*      15-14  LOADER SELECT                       *
0012*      12      0/1 = RPL/MANUAL BOOT             *
0013*      11-6   IBI SELECT CODE                    *
0014*      1-0    HEAD #                             *
0015* * * * *
0016  07700          ORG 7700B
0017  00010          IBI EQU 10B
0018* * * * *
0019  07700 102501  START LIA 1          GET SWITCH REGISTER SETTING
0020  07701 100044          LSL 4          SHIFT A LEFT 4
0021  07702 006111          CLE,SLB,RSS   SR BIT 12 SET FOR MANUAL BOOT?
0022  07703 100041          LSL 1          NO. SHIFT HEAD # FOR RPL BOOT
0023  07704 001424          ALR,ALR        SHIFT HEAD 2, CLEAR SIGN
0024* * * * *
0025*      WAIT FOR DRIVE 0 READY
0026* * * * *
0027  07705 033744          IOR HDSEC      SET EOI BIT
0028  07706 073744          STA HDSEC      PLACE IN COMMAND BUFFER
0029  07707 017756          JSB BTCTL      SEND DUMMY,U-CLR,PP
0030  07710 102510          LIA IBI        READ INPUT REGISTER
0031  07711 101027          ASR 7          SHIFT DRIVE 0 RESPONSE TO LSB
0032  07712 002011          SLA,RSS        DID DRIVE 0 RESPOND?
0033  07713 027710          JMP *-3      NO, GO LOOK AGAIN
0034  07714 107700          CLC 0,C
0035  07715 017756          JSB BTCTL      SEND TALK,CL-RD,BUS HOLDER
0036  07716 002300          CCE
0037  07717 017756          JSB BTCTL      TELL CARD TO LISTEN
0038* * * * *
0039*      NEXT PERFORM THE DMA TRANSFER
0040* * * * *
0041  07720 063776          LDA DMACW      LOAD DMA CONTROL WORD
0042  07721 102606          OTA 6          OUTPUT TO DCPC
0043  07722 106702          CLC 2          READY DCPC
0044  07723 063735          LDA ADDR1     LOAD DMA BUFFER ADDRESS
0045  07724 102602          OTA 2          OUTPUT TO DCPC
0046  07725 063740          LDA DMAWC      LOAD DMA WORD COUNT
0047  07726 102702          STC 2          READY DCPC
0048  07727 102602          OTA 2          OUTPUT TO DCPC
0049  07730 103706          STC 6,C       START DCPC
0050  07731 102206          TEST SFC 6     SKIP IF DMA NOT DONE
0051  07732 117750          JSB ADDR2,I   SUCCESSFUL END OF TRANSFER
0052  07733 102310          SFS IBI       SKIP IF DISC ABORTED TRANSFER
0053  07734 027731          JMP TEST      RECHECK FOR TRANSFER END
0054  07735 102011          ADDR1 HLT 11B  ERROR HALT
0055* * * * *

```

Table 19. HP 12992H 7906H/7920H/7925H/9895 Disc Loader ROM Program Listing (Continued)

0056\*  
 0057\*           PROGRAM CONSTANT TABLE  
 0058\*  
 0059\*  
 0060 07736 000677 UNCLR OCT 677           UNLISTEN  
 0061 07737 000737           OCT 737           UNTALK  
 0062 07740 176624 DMAWC OCT 176624       UNIVERSAL CLEAR,LBO  
 0063 07741 000440 LIST OCT 440           LISTEN BUS ADDRESS 0  
 0064 07742 000550 CMSEC OCT 550          SECONDARY GET COMMAND  
 0065 07743 000000 BOOT OCT 0            COLD LOAD READ COMMAND  
 0066 07744 001000 HDSEC OCT 1000        HEAD,SECTOR PLUS EOI  
 0067 07745 000677 UNLST OCT 677         ATN,PRIMARY UNLISTEN,PARITY  
 0068 07746 000500 TALK OCT 500          SEND READ DATA  
 0069 07747 100740 RDSEC OCT 100740       SECONDARY READ DATA  
 0070 07750 102055 ADDR2 OCT 102055       BOOT EXTENSION STARTING ADDRESS  
 0071 07751 004003 CTLP OCT 4003         INT=LBO,T,CIC  
 0072 07752 000047           OCT 47           PPE,L,T,CIC  
 0073 07753 004003           OCT 4003          INT=LBO,T,CIC  
 0074 07754 000413           OCT 413          ATN,P,L,CIC  
 0075 07755 001015           OCT 1015         INT=EOI,P,L,CIC  
 0076\*  
 0077\*  
 0078\*  
 0079 07756 000000 BTCTL NOP  
 0080 07757 107710           CLC IBI,C           RESET IBI  
 0081 07760 063751 BM       LDA CTLP           LOAD CONTROL WORD  
 0082 07761 102610           OTA IBI           OUTPUT TO CONTROL REGISTER  
 0083 07762 102710           STC IBI           RETURN IBI TO DATA MODE  
 0084 07763 037760           ISZ BM           INCREMENT CONTROL WORD POINTER  
 0085 07764 002240           SEZ,CME  
 0086 07765 127756           JMP BTCTL,I        RETURN  
 0087 07766 063736 LABEL LDA UNCLR        LOAD DATA WORD  
 0088 07767 037766           ISZ LABEL         INCREMENT WORD POINTER  
 0089 07770 102610           OTA IBI           OUTPUT TO HPIB  
 0090 07771 002021           SSA,RSS           SKIP IF LAST WORD  
 0091 07772 027766           JMP LABEL         GO BACK FOR NEXT WORD  
 0092 07773 102310           SFS IBI           SKIP IF LAST WORD SENT TO BUS  
 0093 07774 027773           JMP \*-1           RECHECK ACCEPTANCE  
 0094 07775 027757           JMP BTCTL+1  
 0095 07776 000010 DMACW ABS IBI  
 0096 07777 170100           ABS -START  
 0097                    END  
 \*\* NO ERRORS \*TOTAL \*\*RTE ASMB 92067-16011\*\*





Table 20. HP 12992J 7908/7911/7912/7935 CS80 Disc Loader ROM Program Listing

```

00001          ASMB,A,L
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
00049 07730 117747          JSB ADDR2,I      SUCCESSFUL END OF TRANSFER

```

Table 20. HP 12992J 7908/7911/7912/7935 CS80 Disc Loader ROM Program Listing (Continued)

```

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 COUNT
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  XXX   OCT 47       PPE,L,T,CIC
00071 07752 004003      OCT 4003     INT=LBO,T,CIC
00072 07753 000413      OCT 413     ATN,P,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 037766      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
MACRO: No errors total

```



