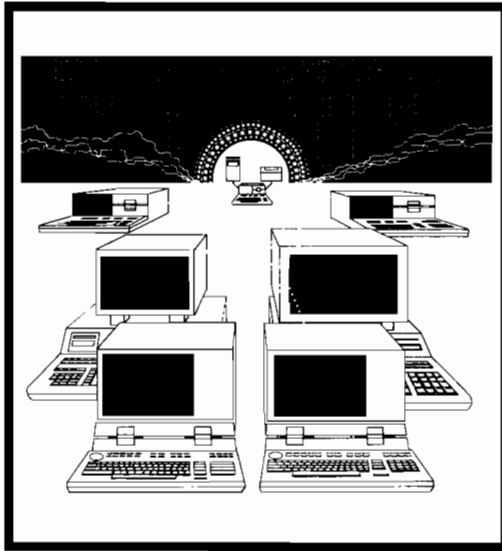


Disc Drive CE Handbook



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Chapter 1

Desktop Discs Product Information

9835A/B Magnetic Tape and Disc Drive Systems

Storage

1. 7970E Option 826. 5 M Bytes to 35 M Bytes per tape depending upon record size (256 Byte to 4096 Byte).
2. 7905M. 10 M Bytes removable, 5 M Bytes fixed.
3. 7906H/M/S. 10 M Bytes removable, 10 M Bytes fixed.
4. 7910H. 12 M Bytes.
5. 7920H/M. 50 M Bytes removable.
6. 7925H/M. 120 M Bytes removable.
7. 9134. 5 M Bytes.
8. 9895A. 2.3 M Byte Flexible disc.

System components

1. 7970E (MUST be an Option 826) with 98041A interface. Not a unified mass storage device. Requires utility binary (09845-15524).
2. 7905M, 13037B, 12745B, and 98041A interface. Default MSUS is:
 - Removable :Y12,0,0
 - Fixed :Z12,0,0
3. 7906H/M/S,98041A interface (and 13037B with 12745B for M or S drives). The default MSUS is:
 - Removable :C12,0,0
 - Fixed :D12,0,0
4. 7910H, 98034B (only mass storage devices on the 98034B). Requires 98331B - Rev C - Mass Storage. The default MSUS is:
 - :M7,0,0
5. 7920H/M/S,98041A interface (and 13037B with 12745B for M or S drives). The default MSUS is:
 - :P12,0,0
6. 7925H/M/S,98041A interface (and 13037B with 12745B for M or S drives). The default MSUS is:
 - :X12,0,0
7. 9134,98034B (only mass storage devices on the 98034B). Requires 98331B - Rev C - Mass Storage. The default MSUS is:
 - :H7,0,0 (thru H7,0,3)
8. 9895, 98034B (only mass storage devices on the 98034B). Requires 98331B - Rev C - Mass Storage. The default MSUS is:
 - :H7,0,0

PSP Components

Here are the PSP components in addition to the system unit PSPs:

1. 09845-90010 Disc Diagnostic Cartridge (currently Rev F).
2. 07970-90968 7970 HP-IB 9835A Diagnostic Manual.
3. 07970-16005 7970 Diagnostic Cartridge.

9845A/B/C Magnetic Tape and Disc Drive Systems

Storage

1. 7970E Option 826. 5 M Bytes to 35 M Bytes per tape depending upon record size (256 Byte to 4096 Byte).
2. 7905M. 10 M Bytes removable, 5 M Bytes fixed.
3. 7906M/S. 10 M Bytes removable, 10 M Bytes fixed.
4. 7908. 16 M Bytes.
5. 7910H. 12 M Bytes.
6. 7911. 28 M Bytes.
7. 7912. 65 M Bytes.
8. 7920M. 50 M Bytes removable.
9. 7925M. 120 M Bytes removable.
10. 9134. 5 M Bytes.
11. 9895A. 2.3 M Byte Flexible disc.

System components

1. 7970E (MUST be an Option 826) with 98041A interface. Not a unified mass storage device. Requires utility binary (09845-15224)¹.
2. 7905M, 13037B, 12745B, and 98041A interface. The default MSUS is:
Removable :Y12,0,0
Fixed :Z12,0,0
3. 7906M/S, 13037B and 12745B and 98041A interface. The default MSUS is:
Removable :C12,0,0
Fixed :D12,0,0
4. 7908, 98034B (only mass storage devices on the 98034B). The streaming tape requires 7908 Utility 09845-10840. Requires 98413C - Rev D - Mass Storage. The default MSUS is:
:Q12,0,0¹
5. 7910H, 98034B (only mass storage devices on the 98034B). Requires 98413B - Rev C - Mass Storage. The default MSUS is:
:M7,0,0¹
6. 7911, 98034B (only mass storage devices on the 98034B). The streaming tape requires 7908 Utility 09845-10840. Requires 98413C - Rev D - Mass Storage. The default MSUS is:
:R12,0,0¹
7. 7912, 98034B (only mass storage devices on the 98034B). The streaming tape requires 7908 Utility 09845-10840. Requires 98413C - Rev D - Mass Storage. The default MSUS is:
:S12,0,0¹
8. 7920M/S, 13037B and 12745B and 98041A interface. The default MSUS is:
:P12,0,0
9. 9134, 98034B. Only mass storage devices on the 98034B. Requires 98413B - Rev C - Mass Storage. The default MSUS is:
:H7,0,0 (thru H7,0,3)¹

¹ These discs are not supported on the 9845A

1-4 98028 Product Information

10. 9895, 98034B. Only mass storage devices on the 98034B. Requires 98413B - Rev C - Mass Storage. The default MSUS is:
:H7,0,0¹

Notes

1. Later versions of Mass Storage ROMs will work.
2. See Service Note 9835A/B-16A.
3. See Service Notes 9845B/C-5 and -10 series.
4. See Service Notes 9845A-8,-8A,-21.

PSP components. (In addition to the system unit PSPs.)

PSP components in addition to the PSP requirements of individual system units are:

1. 09845-90010 Disc Diagnostic Cartridge².
2. 07970-90968 7970 HP-IB 9845B/C Diagnostic Manual.
3. 07970-16005 7970 9835/9845 Diagnostic Cartridge.
4. 09845-94064 9845B/C CS/80 Exerciser.
5. 09845-10840 7908 Utility Cartridge.

¹ These discs are not supported on the 9845A

² As of 1 Sept 82, the 09845-90010 is Rev F.

Shared Resource Management Systems

System Description

An SRM consists of the following hardware:

1. One or more 9826 Option 500 computers used as controllers.
2. Shared peripherals and interfaces. A typical system has one to four CS/80 disc drives and one or more line printers.
3. Up to 12 workstations connected to each controller thru multiplexers.

System Components

1. Standard minimum Controller hardware includes a 9826A with one 256 K-byte RAM card (98256A), one DMA card (98620A), one High Speed Disc Interface card (98625A), one Resource Management Interface card (98629A), one Resource Management Multiplexer (98028A), and one (98621A Opt 500) SRM Operating System.
2. 9826/36 Workstation hardware includes a Resource Management Interface card (98629A), SRM access disc (09826-10020) with an HP 97061 cable.
3. 9845B/C Workstation hardware includes a Resource Management interface card (98029A), a Shared Resource Management ROM (98419A), with an HP 97061 cable.

PSP Components

PSP Components in addition to the PSP requirements of individual system units are:

1. 09826-87905 SRM Manual set.
2. 98261-90065 SRM Utility disc (Backup and disc exerciser).
3. 5061-4247 98629A Test connector.
4. 09836-90030 System Test disc pack for the 9826A/9836A.

Recommended FSI

FSI recommended for SRM system support (in addition to the FSI recommended for individual system units) is:

1. 98028-66501 Resource Management Multiplexer.
2. 98029-66501 9845B Resource Management Interface card.
3. 98029-66502 9845B Resource Management Interface card.
4. 09845-65585 9845B SRM ROM (LPU).
5. 09845-65586 9845B SRM ROM (PPU).
6. 98625-66501 9826 Disc Interface card.
7. 98629-66501 9826 Resource Management Interface card.
8. 98620-66501 DMA Interface card.



Chapter 2

Desktop Discs

Environmental/Installation/PM.

Notes

1. All values stated here are typical values. These values are not meant as specifications and do not represent final approval values. Actual values will vary with individual products. The technical data sheets for the products are the official specification of expected performance. This document should never be used to state guaranteed or contracted performance.
2. Disc drives are usually the most restrictive peripherals in these systems. Their critical electro-mechanical performance requirements make it imperative that smoke, dust, and other air contaminants be controlled, and that power be maintained within tighter tolerances than may be necessary for other equipment. To ensure maximum system reliability, you may need to install power line conditioners and provide special grounding or shielding for the disc drives. While it may not be necessary to use conditioned power on desktop computers in normal applications, it is a good rule of thumb to connect all equipment at a given location to conditioned power if any device at that location requires conditioned power. This practice minimizes the risk of susceptibility to unusual transients or other power line anomalies.

Magnetic Tape Systems

1. Environmental descriptions are contained in the individual product documentation (ie., 7970E, 9835A/B, 9845B/C, 98041A).
2. No SYSTEM installation or PM is required, however individual products may require installation and PM. See the following manuals for information:

7970 Series Operator's Manual	07970-90885
7970 Lo-Boy Cabinet Manual	07970-90000
98041A Disc Interface Inst. & Service	98041-90030



Non-CS/80 Disc Drive Systems

1. Environmental descriptions are contained in the individual product documentation with the discs requiring the tightest specifications as follows:

Ambient Temperature

Operating 10 to 40°C (rate of temperature change not to exceed 10°C/hour.)

Non-operating -40 to 65°C

Relative Humidity

Operating 8% to 80% with max wet bulb temperature not to exceed 25.6°C

Non-operating 5 to 95%

Heat Dissipation 1700 Btu/hr (max)

Air Flow 100 cfm @ 60 Hz (85 cvm @ 50 Hz)

Altitude

Operating 0 to 10000 ft.

Non-operating - 1000 to 50,000 ft.

Input Power Requirements 100 to 120 VAC +5% -10%, 1 phase
200 to 240 VAC +5% -10%, 1 phase
(see individual drive installation manuals for respective current/power requirements)

Line Frequency 47.5 to 66 Hz

2. No SYSTEM installation or PM is required, however individual products may require installation and PM. See the following manuals for information:

07906-90902 7906 Drive Installation Manual
07906-90903 7906 Disc Drive Service Manual
07920-90902 7920 Drive Installation Manual
07920-90903 7920 Disc Drive Service Manual
07925-90902 7925 Drive Installation Manual
07925-90903 7925 Disc Drive Service Manual
13037-90006 13037A/B Disc Controller Inst. & Service
12745-90901 12745A HP-IB Adapter Inst. & Service
98041-90030 Disc Interface Inst & Service

CS/80 Disc Drive Systems

1. 7908/7911/7912 environmental information is listed under the SRM environmental section.
2. See the disc drive installation manual (07912-90902) for 7911 and 7912 drives. Note that these drives require that shipping locks be removed prior to operation. Power strapping may also be required.
3. PM on these discs consists of capstan and head cleaning on the tape drive unit.
4. Initialization times on CS/80 discs are under four minutes when connected as a part of an SRM. When these discs are connected as a dedicated peripheral for a 9845B/C the times are LONG: 11 minutes for a 7908; 28 minutes for a 7911 and 45 minutes for a 7912. There is no external indication of anything happening during an initialization. Be patient and wait for the run light to go out on the 9845.

Shared Resource Management Systems

1. Equipment Power and Space Requirements (98028-90001 SRM System Planning Guide).

a. General Environmental Limits.

AC Line Voltage Range	Nominal value +5% - 10%
Ambient Temperature	Range 10 to 40°C
Relative Humidity Range	25 to 80% (25.6°C maximum wet bulb temp)
Maximum Temperature Change	10°C per hour.

b. 9826/9836 Computers.

Dimensions: 43 cm wide, 66 cm deep; 9826: 19 cm high, 9836: 43 cm high.
 Weight: 9826: 20.5 kg; 9836: 35.3 kg.
 Power: 100 to 120 V (2.8 to 2.4 A) + 10% - 10%¹
 220 to 240 V (1.3 to 1.2 A) + 10% - 10%¹
 48-66 Hz.

Clearance: 8 cm both sides, 16 cm rear for ventilation and cables.

c. 9845B/C Computers.

Dimensions: 49 cm wide, 77 cm deep, 55 cm high.
 Weight: 9845B: 37.5 kg; 9845C: 56 kg.
 Power: 90 to 126 V (7.5A maximum) 48-66 Hz²
 198 to 250 V (3.5A maximum) 48-66 Hz²

Clearance: 10 cm top and 15 cm rear for ventilation and interfaces. CRT displays a small amount of current continuously, and must not be covered.

d. 7908P Disc Drive. (5955-3456 Disc Environmental Guide.)

Dimensions: 35 cm wide, 74 cm high, 69 cm deep.
 Weight: 72.5 kg.
 Power: 88 to 127 V (7A maximum) 44-66 Hz³
 180 to 253 V (4A maximum) 44-66 Hz³

Clearance: 8 cm front and rear for ventilation.
 Noise: 48 dba (front) to 51 dba (rear).

e. 7911P/7912P Disc Drive. (5955-3456 Disc Environmental Guide.)

Dimensions: 35 cm wide, 74 cm high, 71 cm deep.
 Weight: 85.4 kg.
 Power: 100 to 120 V (8.8A to 7.4A, 47-55 Hz)⁴
 100 to 120 V (8.0A to 7.0A, 54-66 Hz)⁴
 220 to 240 V (4.0 to 3.7A, 47-55 Hz).⁴

Clearance: 8 cm front and rear for ventilation.
 Noise: 48 dba (front) to 51 dba (rear).

¹ 210 watts maximum.

² 500 watts maximum (plus another 500 watts maximum for the 9845C CRT).

³ 400 watts maximum. 1365 BTU hour.

⁴ 700 Watts, 2389 BTU/hour.

f. 2608A Line Printer.

Dimensions: 69 cm wide, 107 cm high, 87 cm deep.
 Weight: 98 kg.
 Power: 110 to 120 V, 220 to 240 V, 48-66 Hz, 225 W non-printing,
 700 W typical printing, 1350 W 100% printing.
 Clearance: Due to electromagnets on right side, disc drives should be at least
 50 cm from the printer (other devices at least 30 cm).
 Noise: 72 dba without cover, 68 dba with cover.

g. 2631 Line Printer.

Dimensions: 66 cm wide, 22.3 cm high, 49 cm deep.
 Power: 110 to 120 V, 220 to 240 V, 48-66 Hz, 85 W, 2.2A maximum.
 Clearance: 8 cm minimum for ventilation and power connections.

2. Power Distribution summary (see 98028-90001 SRM System Planning Manual).

a. Resource Management Controller, capacity requirements:

(includes a 25% safety factor)

Device	110/120V 60 Hz	110/120V 50 Hz	220-240V 50-60 Hz
9826	5A	5A	3A
7908/11/12	10A	11A	5A
2608	15A	15A	9A
2631	3A	3A	2A

- b. 9826/9836 Workstations require a 5A breaker for 90-126V or a 3A breaker for 198-250V.
- c. 9845B Workstations require a 10A breaker for 90-126V or a 5A breaker for 198/250V.
- d. 9845C Workstations require a 17A breaker for 90-126V or a 9A breaker for 198-250V.

3. SYSTEM site preparation requirements are listed in the 98028-90001 site preparation manual. Refer to individual products information concerning installation requirements for these units (eg., discs). An HP installation option is sold as Option #101. Disc installation cost is not included in this quote.

4. Installation.

a. Refer to 98028-90000 (SRM Hardware Installation Manual) and 09826-90080 (SRM System Manual).

b. Controller Hardware Installation:

1. Set up the internal HP-IB as a System Controller.
2. Install the DMA card (98620A) in slot 7.
3. Set up the disc interface (98625A) to desired select code (factory setting = 14) and hardware interrupt level of 6 (MSB and LSB = 1).
4. Install the disc interface card in slot 8.
5. Install 256 K Byte memory boards in odd slots, addressed contiguous (eg. FC,F8,F4, etc.).

6. Set up the resource management interface (98629A) to a hardware interrupt level of 4 and the desired node address (0 to 63 are legal). Set the desired interface select code (factory setting = 21).
7. Connect HP-IB peripherals observing 10 metre maximum cable length. Use HP 10833 cables. Only 1 2608A printer allowed per controller, and it must be configured to execute CR,LF, FF, and SRQ. Connect to controller at the internal HP-IB port.

Note

Use only HP10833 series interface cables to connect the disc interface to disc drives.

8. Connect the disc interface card to the disc drives (only CS/80 drives are supported). Connect multiple drives by daisy-chaining. Observe maximum cable length restrictions noted in 98028-90000 (SRM System Manual).

c. 9845B/C Workstation Hardware Installation.

1. Install the two Resource Management ROMs.
2. Configure the 98029 Interface card to the correct node address (1 to 63 allowable) by separating the card case parts to gain access to the node switches.
3. Set the 98029 to the select code desired, factory default is 5.

d. 9826/9836 Workstation Hardware Installation.

1. Configure the 98629A interface card to the correct node address and select code, the select code factory default setting is 21.
2. Set the hardware interrupt level to 4 and install the card.

e. System hardware turn-on.

1. Verify all hardware has been installed, and all interconnections are complete.
2. Turn on power at the controller and its peripherals. The multiplexer POWER lights should be on, but the BUSY light should be dark. Repeat step for each controller.
3. Turn on power at the remote workstations and their peripherals. Multiplexers connected to workstations should have the POWER light on and the BUSY light dark.

f. Controller Operating system turn-on.

1. Insert the SRM operating system disc (98261-10064) and press **SHIFT** **PAUSE**.
2. Input Month.
3. Input Day.
4. Input Year. (four digit number)
5. Input Hour (24 hour clock).
6. Input Minute.
7. At this point the Main Display should be up with the Enter Command prompt displayed.
8. Verify controller interfaces by typing INT and pressing **ENTER**. System interfaces will be displayed (the internal HP-IB will display a negative number).

9. Configure units (System must be Down, if not type in SYSTEM DOWN and press **ENTER**). Enter the system units as outlined on the system map in the following format: UNIT <unit number> <device model> <interface select code> <HP-IB bus address> **ENTER** (See 09826-90080 SRM software installation manual for a more detailed explanation).
10. Verify configuration by typing in UNIT and pressing **ENTER**. (For a hard copy, use the Print All key.)
11. Media Initialization.

*** REMEMBER THE PASSWORD ***

Note

Both upper and lower case characters are recognized. The volume password is a super password. If you do not understand the SRM file system and protect access codes, you should NOT use the following commands.

- a. Type in:
INITIALIZE <unit number>'<volume name> <<volume password>>' "<<root dir password>>" and press **ENTER**. Note that the inner carats (<>) in the password parts of the syntax are required to be entered.
 - b. The system will prompt: "Are you SURE you want to initialize this? Answer YES or NO."
 - c. Answer with a YES.
 - d. During the initialization process a flashing D is displayed along with --
Executing command--
 - e. Initialization takes from 1 to 3 minutes, and completion is indicated by the message: "Disc is now initialized"
 - f. To verify initialization, type in V and press **ENTER**.
12. Set up the spooler files on disc units as follows:
 - a. Type in: SPOOLER <printer unit number> <disc unit number> "<spooler name>" and press ENTER.
 - b. To verify the process type in SPOOLER and press **ENTER**.
 13. Save the configuration by typing in SAVE and pressing **ENTER**.
 14. Verify all nodes are up by typing in NODES and then pressing **ENTER**.
 15. Up the system by typing in SYSTEM UP and pressing **ENTER**.
- g. 9826/9836 Workstation Operating system turn-on.
1. Get BASIC 2.0 up.
 2. Install access disc (09826-10020).
 3. Type in LOAD BIN "SRM_BINARY" and press **EXECUTE**.
 4. Type in CAT":REMOTE" and press **EXECUTE**. You should see the system's root directory catalog.

h. 9845B/C Workstation Operating system turn-on.

1. The Resource Management ROMs must be installed.
2. Type in CAT ":REMOTE" and press EXECUTE. You should see the system's root directory catalog.

5. Shared Resource Management SYSTEM PM is not required. Note, however, that individual units (peripherals) may need PM.



Chapter 3

Desktop Discs Configuration

Magnetic Tape Systems

1. These systems require the 7970E Tape Utilities cartridge (09845-15524) for use by the customer.
2. Multiple 7970E tape drives are not supported.
3. The utilities cannot be run on a 9835B due to the short line length of the single line display.
4. Mass Storage ROM required if TRANSFER is from a disc drive to a 7970E or if BACKUP is from a disc drive to a 7970E.
5. Figure 3-1 is the 7970E supported configuration drawing.

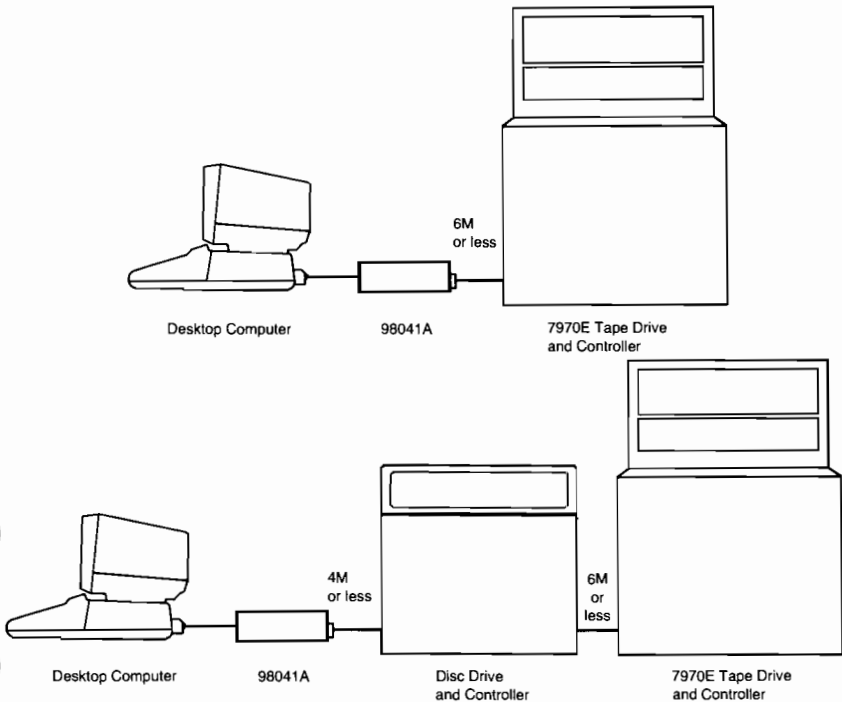


Figure 3-1. Desktop 7970E Supported Configurations.

Disc Drive Systems Interfaced with the 98041A

1. 9835A/B requires 98331B ROM, 9845B/C requires 98413B ROM. 128K of RAM in a 9835A or 187K of RAM in a 9845B/C.
2. Disc utilities will not run on the 9835B due to the single line display.
3. 98041A based systems support up to four disc drives. One of the disc drives can be replaced with a 7970E.
4. One 98041A per mainframe. One Master disc per mainframe. (Cannot have two 98041As on the same HP-IB bus, the power supply will only support one 12745B, and more than one master has never been tested at DCD.)
5. HP-IB cable maximum length (sum) is 6 metres. No restriction on slave data cables. Multi-unit cables can be up to 15.24 metres maximum (sum). HP-IB cables type 10631, Multi-unit cables type 13013B, Data cables type 1321B.
6. H series drives are only supported on the 9835A due to transfer bandwidth considerations.
7. Figure 3-2 is the 98041A supported configuration drawing.

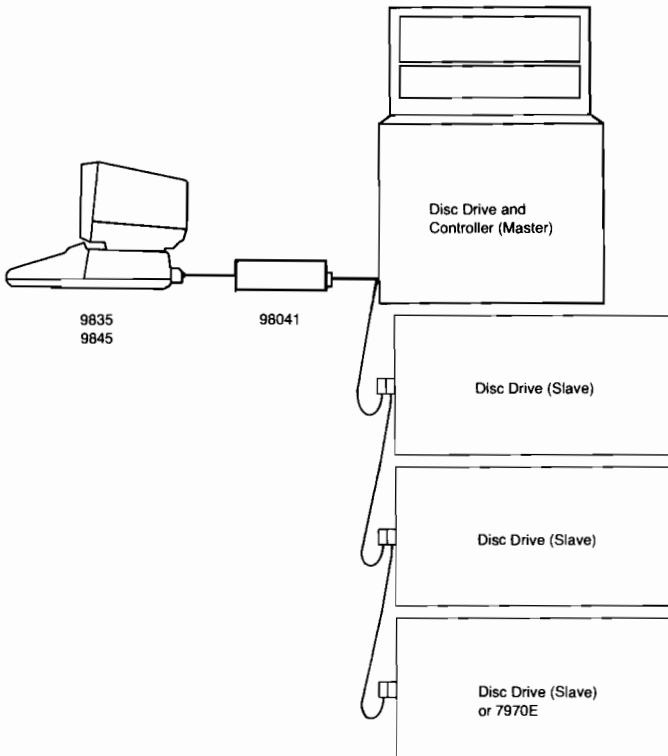
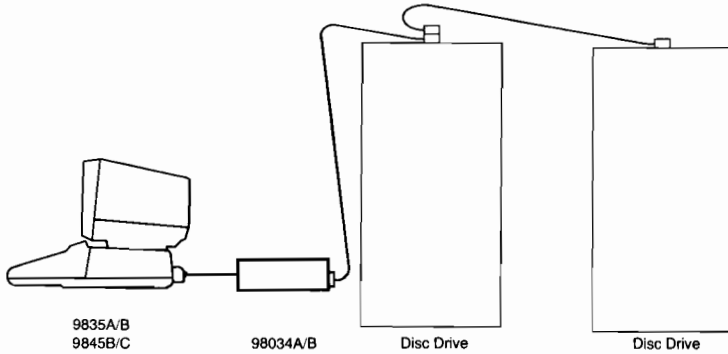


Figure 3-2. 98041A Supported Configurations.

Disc Drive Systems Interfaced with the 98034A/B

1. CS-80 discs are only supported on 9845B/C and require a 98413C Mass Storage ROM.
2. 9895, 9134, and 7910 discs require 98331B ROM on the 9835A/B and 98413B ROM on the 9845B/C.
3. Maximum configuration is 2 discs per mainframe. This can be on one 98034A/B and drive types can be mixed.
4. The 98034A/B must have a 66501 Board of Rev E or later, or a 66503 card.
5. Figure 3-3 is the 98034A/B supported configuration drawing.



Note: Supported Disc Drives are: 7908,7910,7911,7912,9895

Figure 3-3. 98034A/B Supported Configurations.

Shared Resource Management Systems

1. Workstations. Each computer, together with its associated peripherals, comprises a user workstation. There are no specific limitations on how many peripherals can be connected to the workstation.
2. Resource Management Controllers. Each SRM includes one or more controllers. Each controller is connected to a set of shared peripherals including up to four disc drives, one or more line printers, and other peripherals that may be supported by the controller operating system. Controllers are connected to user workstations thru one or more multiplexers.
3. Interconnecting Computers. Each computer in the system comprises a node. Each node is assigned a unique node address which is used to route message packets between computers. Message traffic between computers goes thru multiplexers. The multiplexer gets electrical power thru a 1 meter cable that must be connected to a 98629A interface. Up to five computers can be connected to a single multiplexer (one of which must be a controller). Only two multiplexers can obtain power from a single controller due to interface power supply limitations. Only one multiplexer can obtain power from a non controller (workstation).
4. Single controller systems. Figure 3-4 is an example of a single controller with four workstations. In this example, all work-stations have unlimited access to the controller.

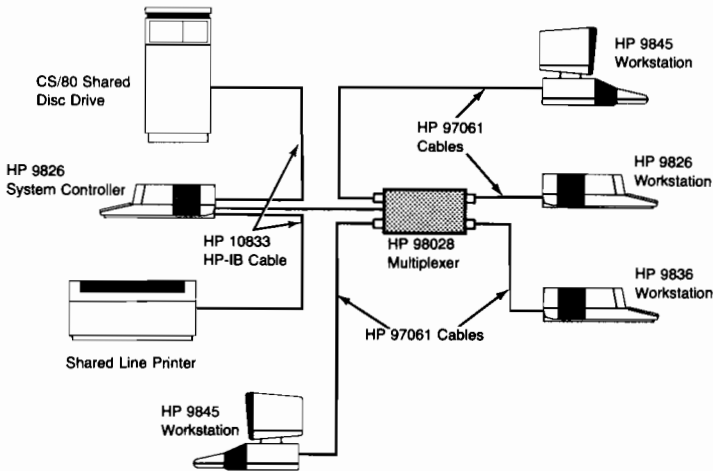


Figure 3-4. Single Controller and Four Workstations

5. Multiple controller systems. Figure 3-5 is an example of a dual controller system using multiple multiplexers.

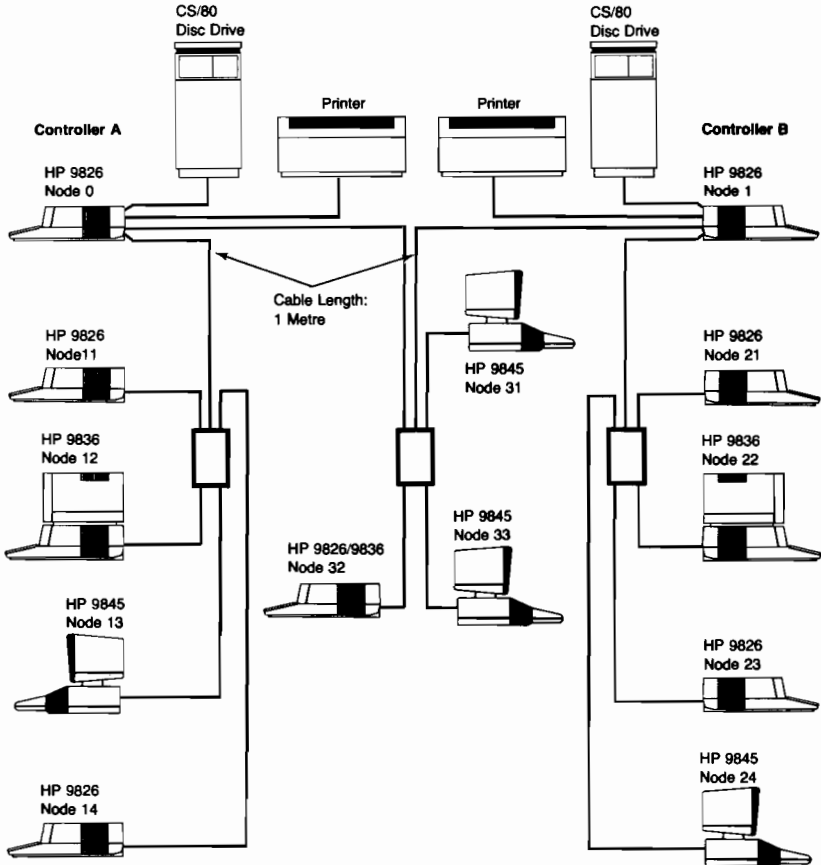


Figure 3-5. Dual Controller System Using Multiple Multiplexers

Controller A is set to Node Address 0; Controller B to Address 1.

Workstation Node Addresses 11, 12, 13, & 14 can access Controller A only. Node Addresses 21, 22, 23, & 24 can access Controller B only. Node Addresses 31, 32, and 33 can access BOTH controllers. Note that the multiplexer for nodes 31, 32, and 33 obtains power from Controller B. Therefore Controller B must be powered in order for the workstations to access Controller A.



3-6 98028 Configuration

6. Controller installation data. Figures 3-7 thru 3-11 show the installation/configuration switches. Full information on the allowable configurations is contained in 98028-90000. Shared printers can be connected in star, tree, or daisy chain, with daisy chain being the most practical (keep connector piggybacks to a maximum of three on the SRMs motherboard).

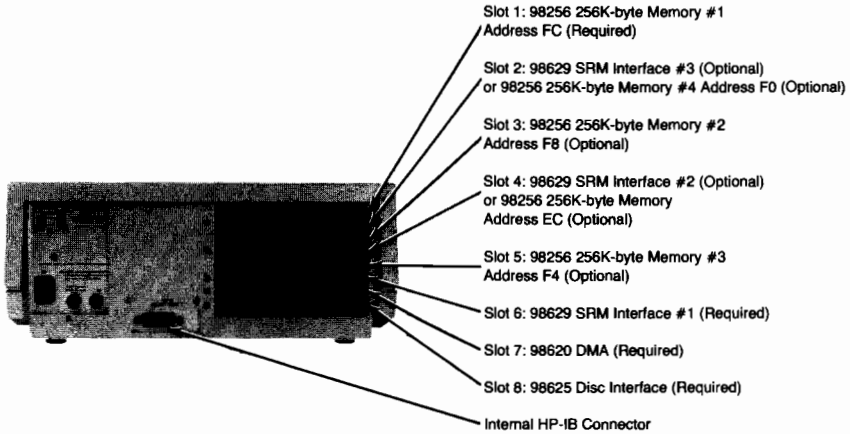


Figure 3-7. Backplane Slot Assignments

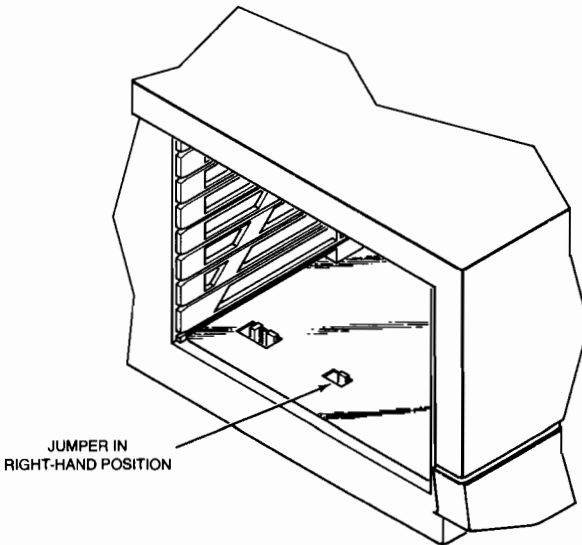
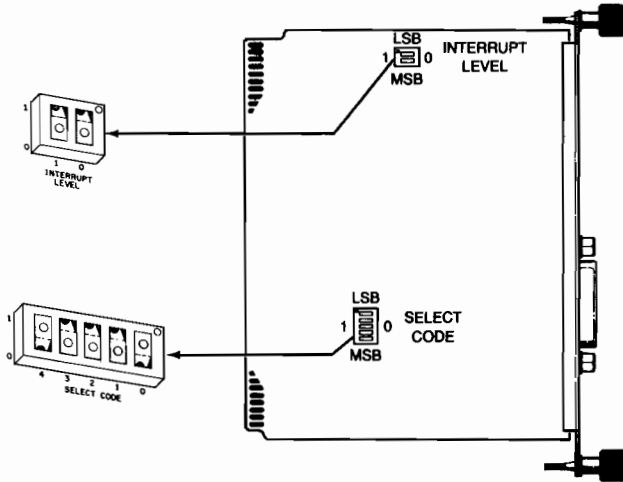
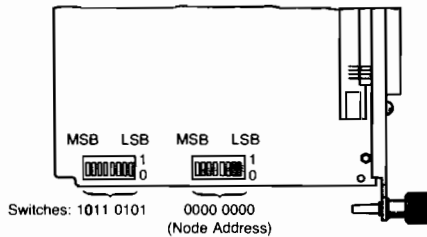


Figure 3-8. HP-IB Configuration Jumper Setting



Note: Interrupt level switch must be set to 11 (Level 6).

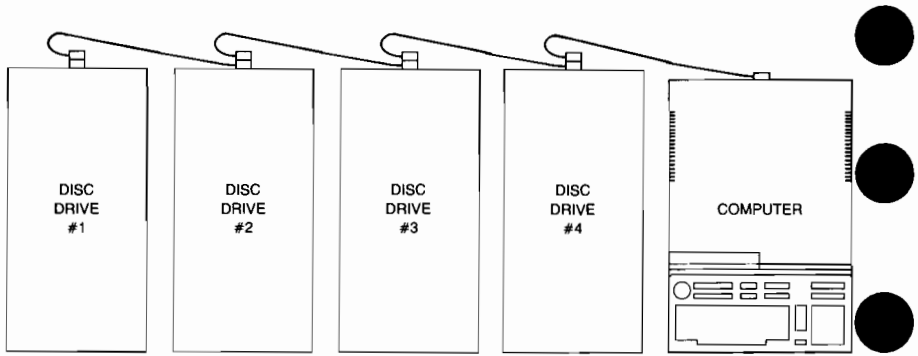
Figure 3-9. 98625A Disc Interface Configuration



- Notes: 1. Upper two bits (6 and 7) of the Node Address switch must be zero.
- 2. Upper bit (7) of the Select Code/Interrupt Level switch should be set to one. Bits 5 and 6 are the hardware interrupt level which MUST be bit 6 equal zero, and bit 5 equal one. Bits 0 thru 4 are the select code.

Figure 3-10. 98629A Resource Management Configuration Switches

3-8 98028 Configuration



Note: The interface presents seven equivalent loads. CS80 discs present one equivalent load. Line length must not exceed one metre per equivalent load. Maximum load is eleven equivalent loads and ten metres total line per interface.

Figure 3-11. Daisy-Chaining Computer and Disc Drives



7. Workstation installation data. Configure the 98629A interface in a 9826 or 9836 using the controller installation data. The 9845B/C workstations require configuration of the 98029A card as shown in figures 3-12 and 3-13.

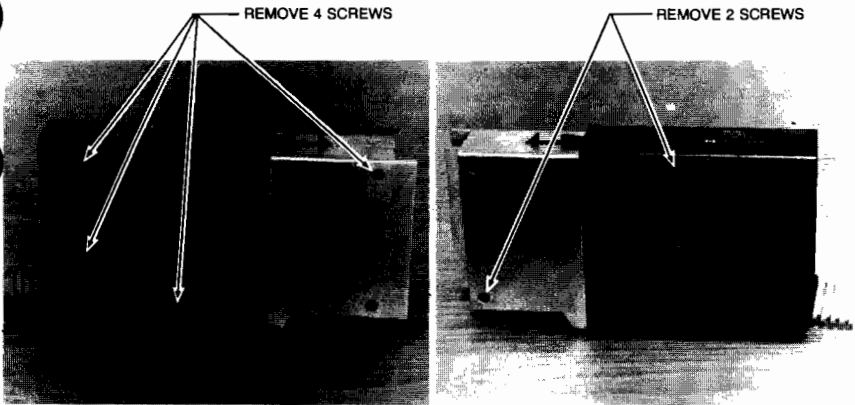


Figure 3-12. 98029A Interface Access Screws

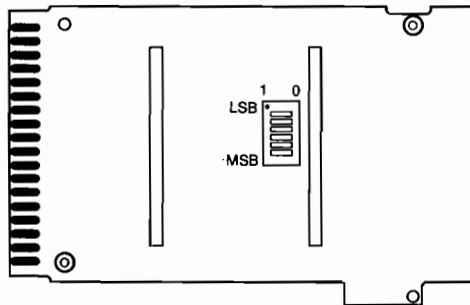


Figure 3-13. Locating Guide for Node Address Switches



Chapter 4

Desktop Disc Troubleshooting

Magnetic Tape Systems

Refer to 7970E Diagnostic (part number 07970-90968).

1. The 7970E must be an Option 826. (Low boy with HP-IB.)
2. 7970E must be unit 0 and no other devices on the 98041A during testing.
3. Automatic diagnostic test sequence:
 - a. Connect and turn on the computer, 98041A, and 7970E.
 - b. Mount a tape with a write ring and press ON LINE.
 - c. Insert the 07970-16005 diagnostic cartridge.
 - d. Type in GET "D7970" and press EXECUTE.
 - e. Press RUN.
 - f. Answer the model prompt e.g., 9845C, and press CONT.
 - g. When COMMAND appears (approx. 3 minutes), press CONT.
 - h. Note that complete syntax and available tests can be obtained by entering the Help command.
 - i. Utilize diagnostic tests 1 thru 4 to isolate the faulty system component as follows:
 1. Test 1 does a PHI-Loopback test of the 98041A. Most probable cause of failure is the 98041-66507 PCA, followed by the 98041-66501 and 98041-66502 PCAs.
 2. Tests 2 and 3 establish communications between the 98041A and the 7970E. Most probable cause of failure here is in the interconnecting HP-IB cable, the 98041-66505 PCA or in the 7970E input buffers.
 3. Test 4 does a loopback of the CHI and processor in the 7970E. Failures in this test, or higher numbered tests indicate faults specific to the 7970E.

Non-CS/80 Disc Drive Systems

1. Verify a legal configuration, and that all components are connected and powered.

Note

In the following steps USE a SCRATCH DISC, NOT the customer's disc.

2. Conduct a quick test of the disc as follows:
 - a. Type in MASS STORAGE IS “:<Select Code>,<Controller Address>,<Unit Number>” and press **EXECUTE**.
 - b. Type in CAT and press **EXECUTE**. (If this fails, fix the most probable cause as determined by the error message - see list in the reference section).

Note

If record 0,1,2, or 3 has a read error, the operating system will not recognize the disc. Assuming all of the rest of the disc is okay, you can rewrite record zero using DISKEY's Shift K0 Write Data with the appropriate data in the array Data(*). Do not attempt this the first time on customer's data, and do not use Shift K1 unless you are prepared to calculate CRC and ECC. If records 1-3 have read errors you can copy the correct data from the spare directory, using K0 Read Data and Shift K0 Write Data. Spare directory locations are listed in the reference section.

CAUTION

INITIALIZE WILL DESTROY ALL DATA ON THE DISC.

If the error messages are initialization; type in INITIALIZE “:<Select Code>,<Controller Address>,<Unit Number>” and press **EXECUTE**. If errors 66, 88, or 90 occur during the initialization perform the format procedure of the diagnostic.

- c. Create a short program (using EDIT). Save the program on the disc by typing in SAVE “<Program Name>” and pressing EXECUTE. d.) Get the program off of the disc by typing in GET “<Program Name>” and pressing **EXECUTE**.
3. If more extensive testing is required, load the DISKEY diagnostic as outlined in the diagnostic section. If DISKEY will not run, attempt to diagnose the failure as follows:
 - a. Type in and run the program in Figure 4-1 (Dead System.)
 - b. If the system hangs in executing a POP, HCLR, or CL; substitute the 98034A/B for the 98041A using the HPIXXX binary. Invalid data/commands from the 12745/13037 can hang the 98041 PHI chip. If the trouble still exists with the 98034A/B the problem is in the 12745 or beyond. Note that the 98041 PHI chip can get in a hang where the only recovery is to cycle its power.

If DISKEY will run, isolate the system problem to a major component as outlined in Figure 4-2 (System Fault Isolation).

```

10      OPTION BASE 0
20      INTEGER Inloop(255),Outloop(255),Data(128)
30      INTEGER Scode,Ctad,Unth,Count,Cyl,Hd,Sec,Q
40      Scode=12
50      Ctad=Unth=Id=0
60      INPUT "ENTER SELECT CODE, CONTROLLER ADDRESS, UNIT
NUMBER (DEFAULT 12,0,0)",Scode,Ctad,Unth
70      SD Scode,Ctad,Unth      ! SET UP DEVICE ADDRESS
80      Philoo: Count = 8      ! PROGRAMMED I/O LOOPBACK
90      POP                      ! RESET THE GREYHOUND
100     GOSUB Rndata
110     FWPL Outloop(*),Count
120     PRPL Inloop(*),Count
130     GOSUB Compare
140     PRINT "PROGRAMMED I/O PHI LOOPBACK TEST COMPLETE"
150     Dmaloo: Count=8        ! DMA PHI LOOPBACK
160     POP                      ! RESET THE GREYHOUND
170     GOSUB Rndata
180     DWPL Outloop(*),Count
190     DRPL Inloop(*),Count
200     GOSUB Compare
210     PRINT "DMA PHI LOOPBACK TEST COMPLETE"
220     HP-IB1o: Count=256     ! HP-IB (12745) LOOPBACK
230     POP                      ! RESET THE GREYHOUND
240     CL                        ! RESET THE 12745B
250     GOSUB Rndata
260     WRTLPL Outloop(*),Count
270     REDLP Inloop(*),Count
280     GOSUB Compare
290     PRINT "HP-IB LOOPBACK TEST COMPLETE"
300     Contrl:                 ! CONTROLLER READ
310     POP                      ! RESET THE GREYHOUND
320     CL                        ! RESET THE 12745B
330     HCLR                      ! RESET THE 13037
340     AR 0,0,0
350     RDA Cyl,Hd,Sec
360     IF ((Cyl=Hd)=Sec)<>0 THEN GOSUB Cdown
370     AR 400,2,47
380     RDA Cyl,Hd,Sec
390     IF (Cyl<>400) OR (Hd<>2) DR (Sec<>47) THEN GOSUB Cdown
400     PRINT "CYL,HD,SEC READ FROM CONTRDLLER OK"
410     Seek:                   ! SEEK 0 TO 400
420     POP                      ! RESET THE GREYHOUND
430     CL                        ! RESET THE 12745B
440     HCLR                      ! RESET THE 13037
450     FOR I=1 TO 5
460         SK 0,0,0,Q
470         SK 410,0,0,Q
480     NEXT I
490     PRINT "SEEK COMPLETE 5 TIMES (0 TO 410)"
500     Read:                   ! READ RECORD 0
510     Count=128
520     SM 0,1,0,1
530     SK 0,0,0,Q
540     REDD Data(*),Count
550     PRINTER IS 0
560     PRINT "CYLINDER 0, HEAD 0, SECTOR 0";LIN(1)
570     PRINT USING Format;Data(*)
580     PRINT LIN(3)
590     STOP
600     Format: IMAGE 8(4X,6D)
610     Rndata: Outloop(0)=0      ! GENERATE RANDOM DATA
620         Outloop(1)=32767
630         Outloop(2)=21845
640         Outloop(3)=21846
650         RANDOMIZE 2*PI
660         FOR I=4 TO Count-1
670             Outloop(I)=32767*(1-2*RND)
680         NEXT I
690         MAT Inloop=(0)
700         RETURN
710     Compare:                 ! CMPARE DATA ARRAYS
720         FOR I=0 TO Count-1
730             IF Inloop(I)=Outloop(I) THEN Match
740             PRINT LIN(2);"WORD";I;"EXPECTED";Outloop(I);
750             PRINT "RECEIVED"; Inloop(I)
760     Match: NEXT I
770     RETURN

```

4-4 98028 Troubleshooting

```
780 Cdown:                ! CONTROLLER FAILED
790 PRINT "CONTROLLER ADDRESS REGISTER PROBLEM"
800 PRINT "CYLINDER=",Cyl,"HEAD=",Hd,"SECTOR=",Sec
810 BEEP
820 RETURN
830 END
```

Figure 4-1. Dead System Troubleshooting Program

Use this procedure to isolate a system fault:

1. Test the 98041 to computer interface by running K6 and K7 (98041 Loopback tests). Most probable cause of failures here are the 98041-66507, -66501, and -66502 PCAs.
2. Test the 98041 to controller interface by running the K5 (HP-IB Loopback) test. (K5 test works on a 12745A/B only.) The most probable cause of failures here are the HP-IB cable, the 12745B or the 98041-66505 PCA.
3. Troubleshooting of the computer to 98041 to controller interface can be simplified by bypassing the 98041 interface and HP-IB cable entirely. Use the 98041-90010 binary HPIXXX (XXX = 35A, 45A, or 45B), which allows the diagnostic to communicate with the 12745/13037 via a 98034A/B card. To verify a failure in the 98041A, run the diagnostic test again with the 98034A/B, after doing SCRATCH A, LOAD BIN "HPIXXX", GET "<Diagnostic>".
4. Test 'H' series discs by doing the DISKEY K11 Self Test.
5. GET "DISCO" and do a dynamic test of the positioning circuits with RND SKS and ALTSKS.

Note

Be sure you have a SCRATCH disc installed for the next step.

6. Test the Disc's read and write capability by running the DISCO programs; VERIFY, and RAW.
7. See the appropriate disc documentation (this includes DMD's Disc CE Handbook chapter) for troubleshooting and repair of the disc drive or controller.
8. Figure 4-2 contains a sample program for a long term test of the disc system.

```
10 OPTION BASE 0
20 PRINTER IS 0
30 INTEGER Count,Dummy,Pass,Pattern
40 INTEGER Outdata(255),Indata(255)
50 SD 12,0,0 ! MODIFY ADDRESS IF NEEDED
60 Pass=0
70 Pattern=-21846
80 Count=128
90 PDP ! RESET THE GREYHOUND
100 HCLR ! RESET THE 12745
110 CL ! RESET THE 13037
120 MAT Outdata=Pattern
130 Forever: IF Pass = 32767 THEN Pass = 0
140 Pass=Pass+1
150 Seek: ! SMALL SEEKS
160 FOR I=0 TO 410
170 SK I,0,0,Dummy
180 NEXT I
190 SK 0,0,0,Dummy ! LARGE SEEKS
200 SK 410,0,0,Dummy
210 WRD Outdata(*),Count ! WRITE RECORD AT CYL 410
220 SK 0,0,0,Dummy
230 SK 210,0,0,Dummy
240 SK 356,0,0,Dummy
250 SK 0,0,0,Dummy
260 SK 410,0,0,Dummy
270 REDD Indata(*),Count ! READ RECORD AT CYL 410
280 Compare: !
290 FOR I=0 TO 255
300 IF Outdata(I)=Indata(I) THEN Match
310 Mismatch: !
320 PRINT "ERROR IN PASS",Pass,"BYTE",I,
```



```

330      PRINT "EXPECTED",Outloop(I),"RECEIVED",Inloop(I)
340 Match: !
350      NEXT I
360      Pattern=Pattern+1
370      IF Pattern=32767 THEN Pattern=-21846
380      MAT Outdata=Pattern
390      GOTO Forever
400      END

```

Figure 4-2. Long Term Testing Program

9845B/C CS/80 Disc Drive Systems

Refer to the CS/80 External Exerciser Reference Manual (part number 5955-3462).

1. Verify that the system is configured correctly. In particular ensure that no more than two discs are attached to the 9845, and that only mass storage devices are on the CS/80 HP-IB select code. (This is a 9845B/C Operating System requirement; use of other than mass storage devices on the bus will ultimately result in a hang or garbaged data.)
2. Do a quick check of the system as follows:
 - a. Type in MASS STORAGE IS ":<appropriate MSUS>" and press **EXECUTE**.
 - b. Type in CAT and press **EXECUTE**. If error message(s) indicate an initialization problem proceed to initialize as follows:

Note

INITIALIZE will destroy data on the media.

Type in INITIALIZE ":<appropriate MSUS>" and press **EXECUTE**.

Note

Initialization times are long, (11, 28, and 45 minutes for 7908, 7911, and 7912), with no indications.

3. If further disc testing is required, test the disc using the 09845-94064 CS/80 External Exerciser cartridge as follows:

Note

The 9845B/C CS/80 Exerciser prompts to the operator are identical to the HP85 CS/80 Exerciser prompts.

- a. Power-on the 9845 and the CS/80 disc.
- b. Insert 09845-94064 into :T15.
- c. Use the following syntax to load the desired test.
 1. For a full menu of choices type in LOAD "AUTOST",1 and press **EXECUTE**.
 2. For EXRSIZ type in LOAD "EXRSIZ",1 and press **EXECUTE**.
 3. For EXRSI2 type in LOAD "EXRSI2",1 and press **EXECUTE**.
 4. For TAPE type in LOAD "TAPE",1 and press **EXECUTE**.
 5. For OPER type in LOAD "OPER",1 and press **EXECUTE**.
 6. If you require the Help file, use the autostart method of step 1. Pressing the appropriate soft key and the shift key simultaneously will load the help file for that portion of the exerciser.

- d. While a test is running the following soft key definition is in effect:
 - 1. K1 initiates the abort sequence.
 - 2. K2 directs printer output to the CRT.
 - 3. K3 directs printer output to the internal printer.
- e. EXRSIZ and EXRSI2 are disc and controller oriented exercisers, TAPE exercises the backup tape, and OPER allows operator designed testing. Refer to CS/80 external exerciser reference manual (5955-3462) if operator design testing is required, or the Help file for other tests.

Shared Resource Management System

Refer to the SRM System Manual (part number 09826-90080).

- 1. Troubleshooting of the SRM is contained in figures 4-4 and 4-5. Detailed information on these flowcharts and an overall composite flowchart are contained in 09826-90080 Chapter 5.

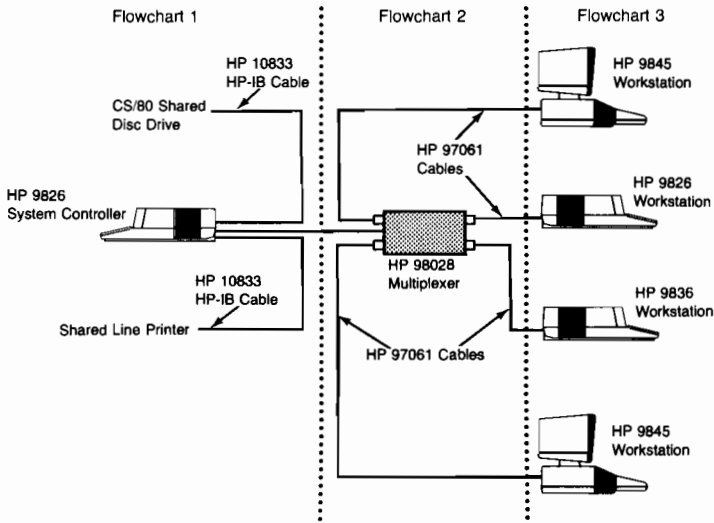


Figure 4-3. Diagnostic Flowchart Break-out

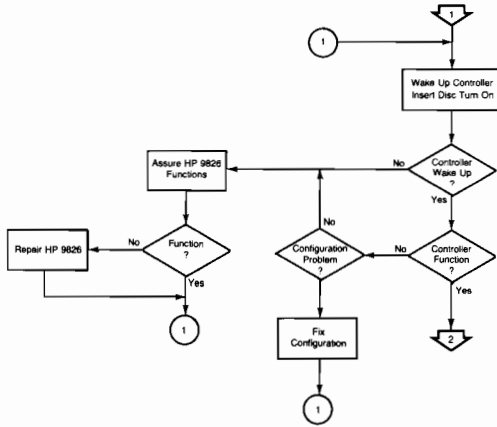


Figure 4-4A. Diagnostic Flowchart Sheet 1

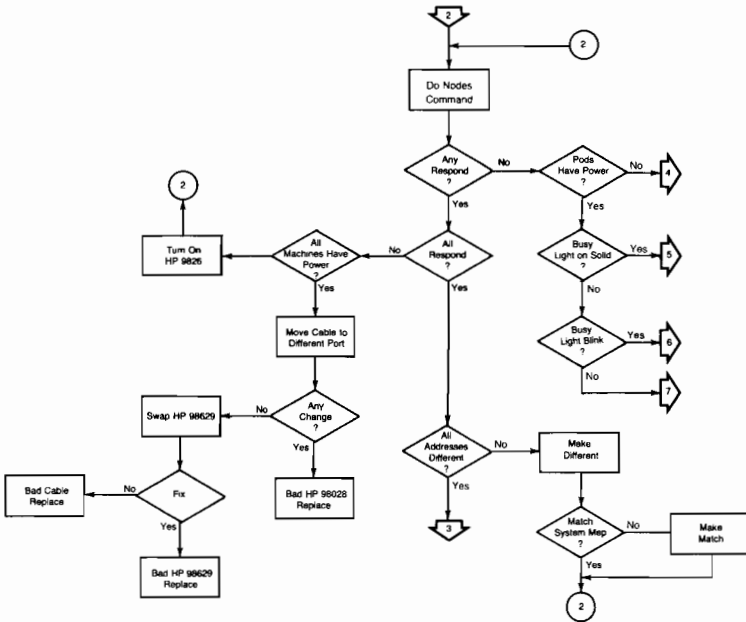


Figure 4-4B. Diagnostic Flowchart Sheet 2

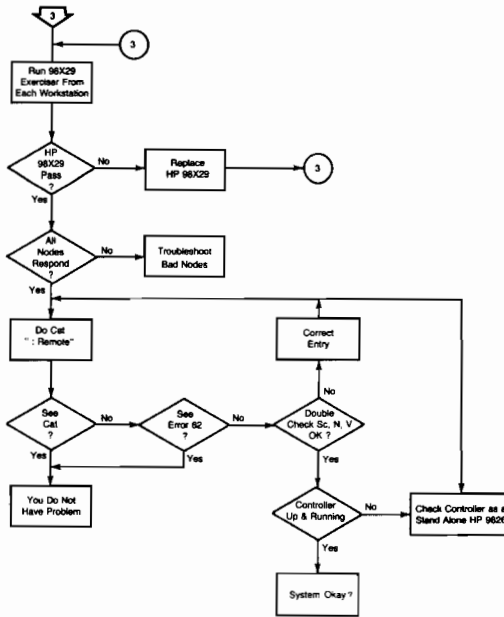


Figure 4-4C. Diagnostic Flowchart Sheet 3

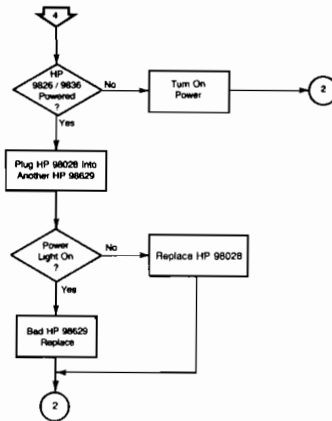


Figure 4-4D. Diagnostic Flowchart Sheet 4

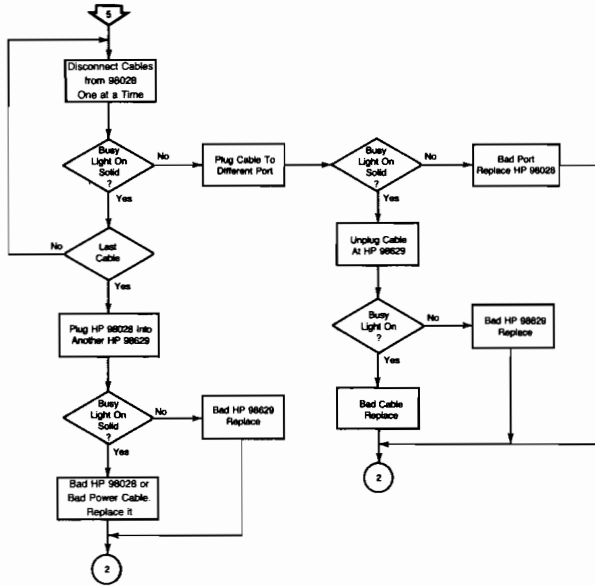


Figure 4-4E. Diagnostic Flowchart Sheet 5

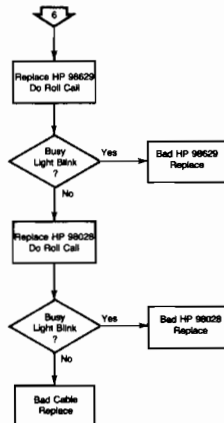


Figure 4-4F. Diagnostic Flowchart Sheet 6

4-10 98028 Troubleshooting

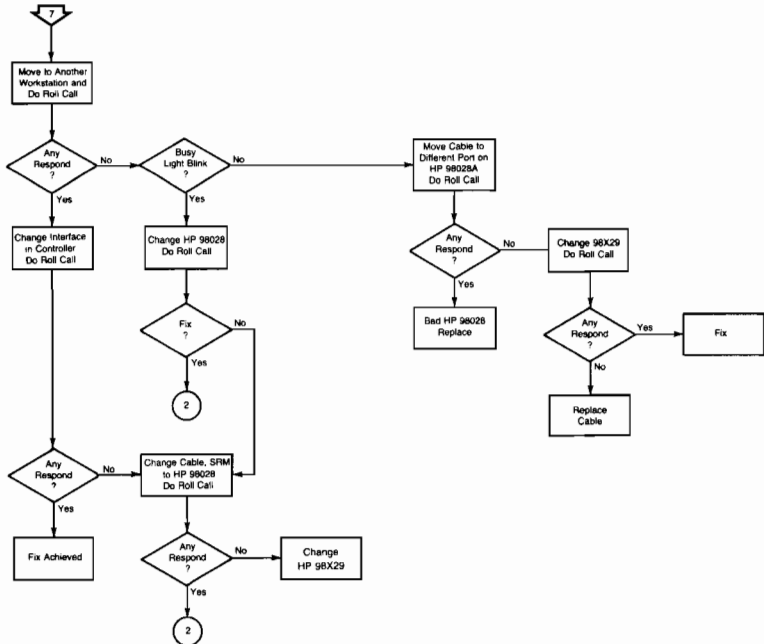


Figure 4-4G. Diagnostic Flowchart Sheet 7

Shared Resource Management System Disc Drives

1. The disc utility (98261-90065) is a run-only program. It requires 128K of memory, a 98625A disc interface, and a 98620A DMA card. (Note that 98261-90065 is a diagnostic.)
2. Boot up the 9826/9836 with the 98261-90065 Utility disc.
3. Initiate the disc utility by pressing softkey K0.
4. The utility will scan for correct I/O cards and discs, if none are found the utility will stop. If the I/O cards are set up incorrectly, it will stop and display the problem.
5. Use the knob to position the arrow at the disc to be tested and press the desired softkey.
6. Choose external printer DUMP if desired (701).
7. The utility builds a line of dots when waiting for the disc to respond, it will flash a D in the lower right corner when the disc is being accessed, it will flash a P in the lower right corner when the printer is being accessed.
8. Status failures will be printed out in 20 Hex characters.
9. The diagnostic runs as follows:
 - a. Channel Test.
 - b. Read Channel.
 - c. Write Channel.
 - d. Disc ROM Revision.
 - e. Loop (input number of times) on:
 1. Internal Diagnostics
 2. Error Rate Testing (2 to 3 minutes if no failures).
 - f. Completion is indicated by:
COMMAND SET 80 DIAGNOSTIC COMPLETED.
10. Diagnose failures with the HP-85 Service Tool.



Chapter 5

Desktop Disc Diagnostics

07970-16005 Diagnostic Cartridge

Refer to the 7970E HP-IB Diagnostic (part number 07970-90968).

1. The diagnostic is loaded from tape 07970-16005 by typing in GET "D7970" and pressing **EXECUTE**, followed by **RUN**.
2. Soft key definitions are as follows:

KEY	COMMAND	START UP DEFAULT
K0	TESTPAUSE	OFF
K1	ERRPAUSE	OFF
K2	LOOP	OFF
K3	REPEAT	OFF
K4	ERRPRINT	ON
K5	INFOPRINT	ON
K6	MANUAL	OFF
K7	REWIND	ON
K8	Abort routine	
K9	UNDEFINED	
K10	CLEAR SCREEN	

3. Available tests are as follows:

TEST	DESCRIPTION
1	98041A Interface Test
2	Power On Test
3	Identify Test
4	Loopback Test
5	Manual Test
6	Write Gap Test
7	Device Clear/Selected Device Clear Test
8	Write Test
9	Forward Space/Backspace Record Test
10	Backspace/Forward Space File Test
11	Read/Write Test
12	Read Backward Test
13	Rewind, Command Rejected, and Busy Test
14	BOT Checks
15	Tape Runaway Test
16	Single/Multiple Track Error Test
17	Data Timing Error (DTE) Test
18	Variable Length Record Test

4. Diagnostic Commands are as follows:

COMMAND SYNTAX	PROMPT
Abort[Pass]	PC
ADr[Address]	C
Bsf[repeat count]	C,PC
BSr[repeat count]	C,PC
Clear[type[, repeat count]]	C,PC
Dotest test number[, repeat count]	C
Eof[repeat count]	C,PC
ERRPause[OFF]	C,PC
ERRPRint[OFF]	C,PC
Fsf[repeat count]	C,PC
Gap[repeat count]	C,PC
Help	C,PC
Infoprint[OFF]	C,PC
Loop[OFF]	C,PC
Print[OFF]	C,PC
PRINTEr[isc[, HP-IB address]]	C,PC
Read[repeat count]	C,PC
READBack[repeat count]	C,PC
REClen[record length]	C
REPeat[OFF]	C,PC
REPOrt	C,PC
REStart	PC
REWind	C
RUn	C,PC
Selectcode[isc]	C
SHow	C,PC
StArtstop[repeat count]	C,PC
STATus[repeat count]	C,PC
SUPpress option[, option]	
option = MANUAL or REWIND	C,PC
Test[[+][-]test range[, test range...]	
test range =	
test number[/test number]	C,PC
TESTPause[OFF]	C,PC
Unsuppress option[, option]	
option = MANUAL or REWIND	C,PC
Write[repeat count]	C,PC

98041-90010 Disc Diagnostic Cartridge

1. The complete documentation for this diagnostic is on the 98041-90010 file HELP!. A printout of this file WHICH IS VERY LONG AND WON'T FIT IN MINIMUM MACHINES can be obtained by typing in GET "PRINT" and pressing **EXECUTE**. If the HELP! file will fit in your machine, important addresses (in Revision F) are:

DATA	LABEL	LINE #
DISCO start up	Disco	360
DISKEY start up	Diskey	1890
DISKEY SFKs		2135
Binary keywords	Words	3525
SHOXXX	Show_binaries	5575
ROMREV	Rom_revisions	5635
Disc Status Bytes	Status	5770
Self Test Data	Stest	6010
Directory Entry Data	Dir	6355
Record 0 and AVT	Disc	6110
Error listing	Error	6670

2. The diagnostic programs DISCO and DISKEY require a binary to be loaded. Do a SCRATCH A prior to loading. The binary names are:

a. DSC45A	98041 diagnostic binary for the 9845A.
b. DSC35A	98041 diagnostic binary for the 9835A/B.
c. DSC45B	98041 diagnostic binary for the 9845B/C.
d. HPI45B	98034 diagnostic binary for the 9845B/C.
e. HPI35A	98034 diagnostic binary for the 9835A/B.

3. DISCO and DISKEY are data file programs that call in segments, you must keep the program tape in the drive while running the diagnostic. After loading in the binary (e.g., LOAD BIN "DSC45B") do a GET "DISKEY" (or "DISCO"), and RUN.
4. DISCO contains the following menu-driven programs:

RNDSKS
 ALTSKS
 VERIFY
 MAP
 FORMAT
 RAW
 SPARE
 COPY
 DUMP
 ALIGN (9895 only)
 7906,7920,795,9895,7910



5. DISKEY contains the following softkey-driven programs:

	K0	READ DATA
SHIFT	K0	WRITE DATA
	K1	READ FULL SECTOR
SHIFT	K1	WRITE FULL SECTOR
	K2	VERIFY DATA
SHIFT	K2	INITIALIZE
	K3	READ WITH OFFSET
	K4	STATUS
	K5	HP-IB LOOPBACK
	K6	PROGRAMMED I/O PHI LOOPBACK
	K7	DMA PHI LOOPBACK
	K8	CHANGE PARAMETERS
	K9	INCREMENT THE SECTOR POINTER

SHIFT	K9	DECREMENT THE SECTOR POINTER
	K10	INCREMENT THE CYLINDER POINTER
SHIFT	K10	DECREMENT THE CYLINDER POINTER
	K11	PERFORM SELF TEST (H DRIVES ONLY)

6. All disc commands are issued with incremental seek, sparing enabled, surface mode, and automatic seek. Data is in the integer array Data with first element of 0.
7. Use of the binary keywords to design your own diagnostic is shown in the troubleshooting section of this handbook. Note that all variables are integers, and must be declared as such. You should always include POP, CL, and HCLR in your programs, and pay attention to disc status.
8. An abbreviated DSCxxx and HPIxxx binary syntax listing is contained in the reference section of this handbook chapter.
9. Status returned from the controller is in the following form:

Status array

Array Element	Status Bits
(0)	

Un = Unit number to which status applies

(1)	S1 = Encoded controller termination status
(2)	D = Defective track bit
(3)	P = Protected track bit
(4)	S = Spare track bit
(5)	Bs = Drive busy
(6)	Nr = Drive not ready
(7)	Sc = Seek check
(8)	Fs = First status
(9)	Flt = Drive fault
(10)	Frm = Format switch
(11)	Ro = Read only switch
(12)	Atn = Drive attention
(13)	Drv = Drive type
(14)	Er = Error (bits 0, 1, 2, or 4 set)

S1 values and meanings


value	Meaning
0	Normal completion
1	Illegal opcode
2	Unit available
7	Cylinder compare error
8	Uncorrectable data error
9	Head/sector compare error
10	I/O program error
12	End of cylinder
14	Overrun
15	Possibly correctable data error
16	Illegal access to spare track
17	Defective track
18	Access not ready during data operation
19	Status 2 error
22	Attempt to write on a protected track
23	Unit unavailable
31	Drive attention

Bs and Nr bits values and meanings


Bs	Nr	79XX meaning	9895 meaning
0	0	Unit available	Drive ready
0	1	Unit busy	Undefined
1	0	Unit not present	Unit not present
1	1	Heads not loaded	No disc in drive

 Self test

Array element	Contents
(0)	A 'A' led
(1)	TTT Test number
(2)	SSSSS Subtest number
(3)	F Format of operation
(4)	UU Unit number
(5)	H Head number
(6)	E Error bit



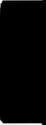
10. Refer to the diagnostic help file for greater detail.





Chapter 6

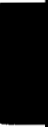
Desktop Disc Adjustments





Chapter 7

Desktop Disc Peripherals





Chapter 8

Desktop Disc System Parts

98041A Parts

98041-60201	Front panel assembly
98041-60202	Rear panel assembly
98041-61602	I/O cable assembly
98041-61603	Power cable
98041-61604	Primary cable
98041-61606	Dc power cable
98041-61607	Transformer
98041-66501	I/O control board
98041-66502	Data logic board
98041-66503	Power supply board
98041-66504	Support board
98041-66505	HP-IB connector board
98041-66507	HP-IB board

(-69507)



System Diagnostic and Manual Part Numbers

09845-15521	7970E Opt 826 programming manual.
09845-15524	7970E utility binary.
07970-16005	7970E diagnostic cartridge.
07970-90968	9835/9845 7970E diagnostic manual.
98041-90010	9835/9845 non-CS/80 diagnostic cartridge.
07906-90902	7906 Drive installation manual.
07906-90903	7906 Drive service manual.
07920-90902	7920 Drive installation manual.
07920-90903	7920 Drive service manual.
07925-90902	7925 Drive installation manual.
07925-90903	7925 Drive service manual.
13037-90006	13037A/B Installation and service manual.
12745-90901	12745A/B Installation and service manual.
98041-90000	98041A Installation manual.
98041-90030	98041A Service manual.
09845-94064	9845B/D CS/80 external exerciser cartridge.
5955-3462	CS/80 external exerciser reference manual.
09845-10844	Streaming Tape back-up utility cartridge.
09845-10841	Backup utility programming manual.
98261-90065	SRM utility disc.
09826-87905	SRM manual set (complete set)
	09826-90080 SRM system manual
	98028-90000 SRM hardware installation manual
	98028-90001 SRM system planing guide



Chapter 9

Desktop Disc Diagrams

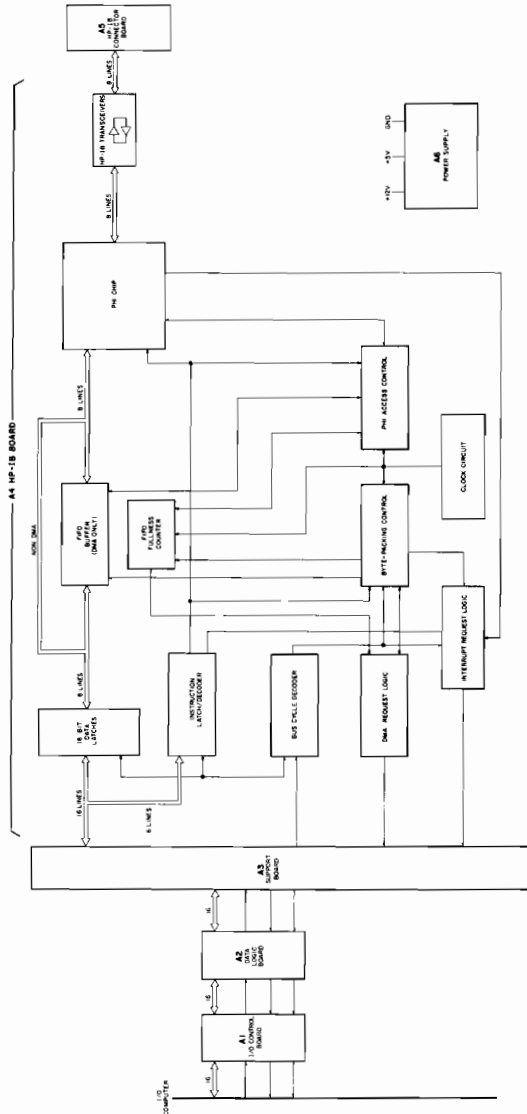


Figure 9-1. Disc Interface Block Diagram

9-2 98028 Diagrams

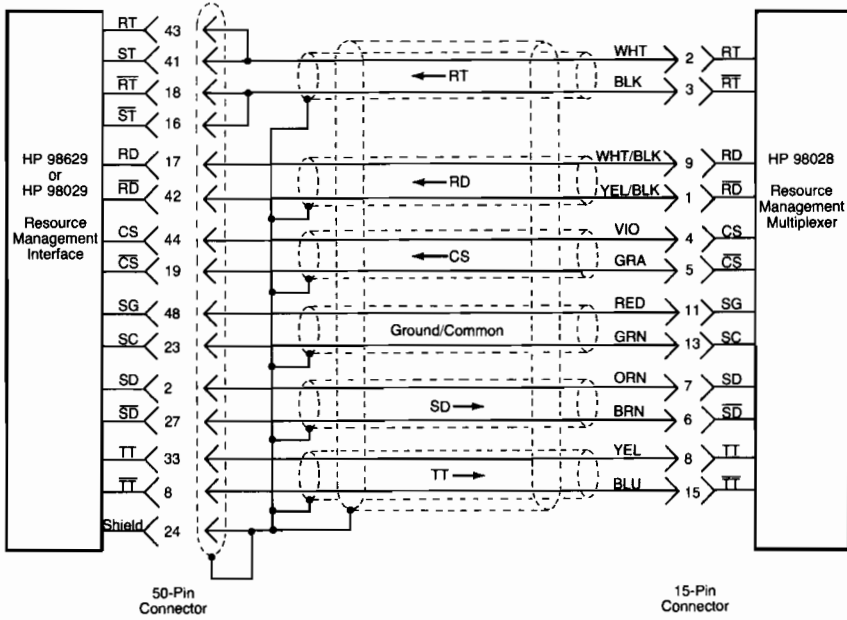
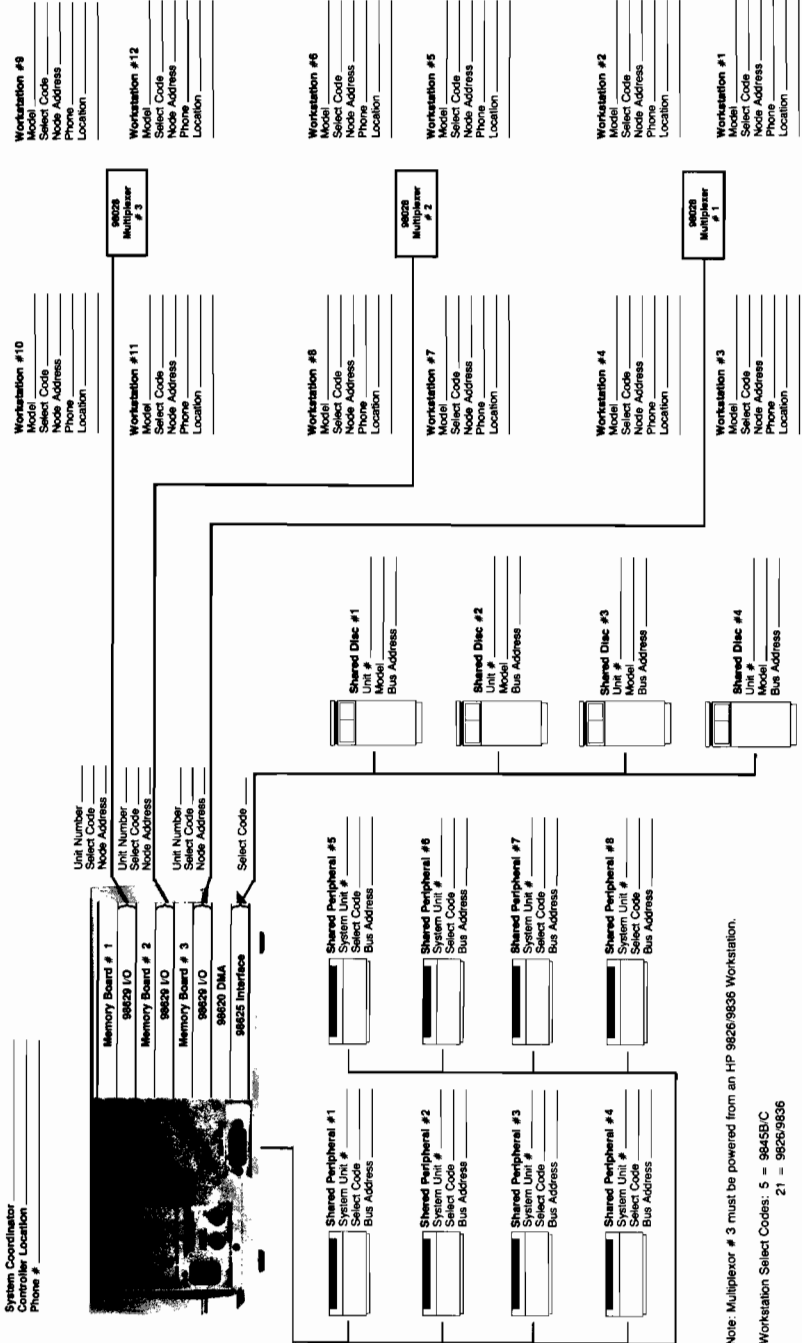


Figure 9-2. SRM Cable Connections

Shared Resource Management System Map



Note: Multiplexer # 3 must be powered from an HP 9826/9836 Workstation.

Workstation Select Codes: 5 = 9845B/C

21 = 9826/9836



Chapter 10

Desktop Disc References

Magnetic Tape Systems Error Messages

09845-15524 7970 Utility Cartridge Binary Error Messages

- 240 Tape unit is off-line. Put tape unit on-line by pressing the ON LINE key of the HP 7970E. Make sure that the unit number is not OFF.
- 241 Incorrect device in ASSIGN @T statement. Check select code and controller address.
- 242 Data track error. Record not read/written. Tape may be bad. If so, back up to new tape and discard old tape. Note that the tape head is left past the current record when a track error is encountered.
- 243 Command rejected. Reassign using ASSIGN @T.
- 244 Tape unit busy. Reassign using ASSIGN @T.
- 245 Command parity error. Reassign using ASSIGN @T.
- 246 Time-out error. Reassign using ASSIGN @T.
- 247 Tape runaway. Drive has read 25 feet of blank tape without finding a record.
- 248 End-of-Tape or Beginning-of-Tape.
- 249 Tape unit is not currently assigned. Reassign using ASSIGN @T.

07970-16005 Diagnostic Cartridge Information and Error Messages

Note

% prefix = octal, no prefix = decimal,
= number supplied at run time.

- E01 DSJ is # and should be #.
- E01 Premature EOT reset.
- E03 EOT reset failed.
- E04 Status is %% %% %% should be %% %% %% after command name.

Note

If error and information messages are enabled, E04 will be followed by a display of the actual and expected status in binary. Status bits in error will be flagged and the names of the bits will be indicated.

- E05 Poll response is %% should be %%.
- E06 Length of record read exceeds buffer length.
- E07 Byte # is %% should be %%.
- E08 EOF not found where expected.
- E09 EOF found where not expected.
- E10 Read # bytes, expected #.
- E11 Byte counter = #, expected #.
- I12 Turn power Off and On.
- E13 No poll response.
- E14 Poll response not cleared.
- E15 98041A loopback data error.

- E16 7970E loopback failed.
- E17 Identify is %# %#, should be %# %#.
- I18 Mount tape without write ring, press load and on-line.
- I19 Testing Address #.
- I20 Select and type new address; type - 1 to exit.
- I21 Select address #, press reset and on-line.
- I22 Mount tape with write ring, press load and on-line.
- E23 Unit still on-line.
- I24 Put unit on-line.
- I25 EOT.
- E26 Command Reject error.
- E27 Unit-Came-On-Line Bit (R3BIT0) not set.
- E28 GAP command failed to move tape.]
- E29 CLRf fail.
- E30 Tape runaway fail.
- E31 STE/MTE fail.
- E32 DTE fail.
- E33 HPIB time out.
- I34 # Retries.
- E35 Unit off-line.
- E36 98041A loopback time-out.

Status Register 1 DIO Lines

- 1 On-Line.
- 2 Multiple Track Error(s) MTE.
- 3 File Protected (Not Write Enabled; No Write Ring).
- 4 Command Rejected.
- 5 Single Track Error STE.
- 6 End-of-Tape EOT.
- 7 Load Point LP/Beginning-of-Tape BOT.
- 8 End-of-File EOF.

Status Register 2 DIO lines

- 1 Interface Busy.
- 2 Tape Unit Busy.
- 3 Rewinding.
- 4 Tape Runaway.
- 5 Data Timing Error DTE.
- 6 Selected Tape Unit LSB.
- 7 Selected Tape Unit MSB.
- 8 Reserved.

Status Register 3 DIO lines

- 1 Tape Unit 0 has been placed on-line.
- 2 Tape Unit 1 has been placed on-line.
- 3 Tape Unit 2 has been placed on-line.
- 4 Tape Unit 3 has been placed on-line.
- 5 Command Parity Error.
- 6 Power has been restored.
- 7 Reserved.
- 8 Reserved.

Note

In general the system will abort after seven tries. A message such as 'T8.1, I34 #2' means that test 8, subtest 1 required two tries before completing successfully. An information message such as this with no fatal/abort errors indicates the test ran successfully.

Non-CS/80 Disc Drive Systems

Error Messages

Here are the error messages for the Mass Storage ROM and HPIxxx and DSCxxx binaries.

- 52 Improper MSUS specifier:
9895 ':I' MSUS and HP format disc.
OR 9895 ':H' MSUS and IBM format disc.
 - 64 Media overflow:
Directory full.
OR no space in AVT during PURGE.
 - 66 Excessive defective tracks. (Can occur during
an initialize if the disc has P bit
set from an HP 1000 initialize - to cure
this situation reformat the disc.)
 - 69 Format switch off.
 - 70 Not a disc interface.
 - 71 Disc interface power off.
 - 72 Incorrect controller address.
OR 13037 power off.
OR 98041 Disc access time out.
OR 9895 HP-IB read time out.
 - 73 Incorrect device type in MSUS (Disc type from controller
did not match.).
 - 74 Drive missing. OR drive power off.
 - 75 Generic Disc System Error:
98041A time out on command transfer.
OR 98041A unexpected interrupt.
OR 13037A status # 3,5,6,13,21,24-26,
30-36 (Octal values).
 - 76 Incorrect unit code in MSUS (e.g., unit number <> 0 and controller only supports 1 unit).
 - 77 Unused. (Not a factory supported binary error.)
 - 78 Unused non CS/80 disc drive systems.
 - 79 Unused. (Not a factory supported binary error.)
 - 80 Cartridge out.
OR door open.
OR heads not loaded.
 - 81 Generic Mass Storage Device Error.
TAPE unexpected hole seen or servo error.
OR 98041A status 2 error.
OR 9895 EOI when not expected.
 - 82 Mass Storage Device not present.
98041: Not a 98041 interface.
9895: HP-IB not present or parallel poll timeout.
 - 83 Write protected.
 - 84 Record not found. (This error during an initialize
indicates P bits set on disc - disc needs
to be reformatted.)
 - 85 Medium not initialized.
OR no disc in drive.
OR 9895 disc: 'D' bit found with IBM format.
- Mass Storage ROM and HPIxxx, DSCxxx binary error messages.)
- 86 Not a desktop compatible medium.

10-4 98028 Reference

- 87 Record address error.
OR TAPE: excessive retries on read.
OR 98041A: excessive retries on recalibrate.
- 88 Read data error.
98041: excessive retries on read.
OR could not initialize a spare track during an INITIALIZE.
- 89 Check read error.
- 90 Mass Storage system error.
13037: Status #1,12,13,27 (octal).
98041: Could not mark a track defective during an INITIALIZE.
9895: Unassigned controller error.
- 94 During a REPACK, files were not moved because of data errors. No data was lost. Media problems.
- 96 During a REPACK, more than six error 94's found. The program was terminated.
- 97 During a REPACK, the program terminated for an unknown error.
- 98 During a REPACK, program terminated due to invalid MSUS.
- 99 During a REPACK, the buffer size was out of range.

DSCxxx and HPIxxx binary specific error messages.

- 7 Undefined operation for this disc.
- 180 No room in the PHI buffers or no PHI buffers.
OR no 98041 interface was found.
- 181 No parallel poll response from the 13037.
OR EOI seen on the 98034A/B before it was expected.
- 182 Interrupt timeout.
- 183 Array crosses block boundary.

9835A/B and 9845A/B/C Record 0 Format

This material is from the 98041-90010 HELP file.

WORD	7905	7906	7910	7920	7925	9895
0 ID Type	1280	1280	1280	1280	1280	1280
1 Records/Track	48	48	32	48	64	30
2 Good Tracks	800/400	800	1470	4000	7200	150
3 Spare Dir Track	4/2	4	6	16	29	1
4 Record 1 of Dir.	1	1	1	1	1	1
5 Record 1 of AVT	144/72	144	144	501	1190	23
6 Record after AVT	191/95	191	191	767	1855	29
7 First User Track	8/4	8	12	32	58	2
8 User Tracks	792	792	1458	3968	7142	148
9 Interleave			1			7
14 DBM Vol Label						

4. DSCxxx and HPIxxx binary abbreviated syntax listing. Refer to the 98041-90010 diagnostic Help file for detailed information.
- a. Control keywords.
- AR (Address Register)
AR <cylinder>,<head>,<sector>
 - CL (Clear)
CL
 - HCLR (Hard Clear)
HCLR
 - POP (Reset the 98041)
POP

- RC (Recalibrate)
 - RC
- SD (Specified device)
 - SD <Select Code>, <Bus Address>, <Unit Number>
- SK (Seek)
 - SK <Cylinder>, <head>, <sector>, <time>
- SM (Set Mask)
 - SM <Dseek>, <Spare>, <Cylinder>, <aseek>
- b. Sense keywords.
 - DSJ (Device Specified Jump)
 - DSJ <Var>
 - WRU (What kind of processor aRe yoU)
 - WRU <processor>, <interface>, <dummy>
 - IDY (Identify Controller)
 - IDY <var>
 - RDA (Read Address Register)
 - RDA <Cylinder>, <head>, <sector>
 - STS (Controller Status)
 - STS <array(*)>
 - PPR (Parallel Poll Response)
 - PPR <var>
- c. Loopback keywords.
 - DWPL (DMA Write PHI Loopback)
 - DWPL <array(*)>, <count>
 - DRPL (DMA Read PHI Loopback)
 - DRPL <array(*)>, <count>
 - PWPL (Programmed I/O Write PHI Loopback)
 - PWPL <array(*)>, <count>
 - PRPL (Programmed I/O Read PHI Loopback)
 - PRPL <array(*)>, <count>
 - WRTLP (12745 HP-IB Write Loopback)
 - WRTLP <array(*)>, <count>
 - REDLP (12745 HP-IB Read Loopback)
 - REDLP <array(*)>, <count>
- d. Read/Write keywords.
 - REDD (Read)
 - REDD <array(*)>, <count>
 - RFS (Read Full Sector)
 - RFS <array(*)>, <count>
 - RWO (Read With Offset)
 - RWO <array(*)>, <count>, <abit>, <dbit>, <offset>
 - VF (Verify Read)
 - VF <count>
 - INITD (Initialize Sectors)
 - INITD <spare>, <protect>, <defective>, <count>
 - WRTD (Write)
 - WRTD <array(*)>, <count>
 - WFS (Write Full Sector)
 - WFS <array(*)>, <count>

CS/80 Disc Drive Systems

Refer to the External Exerciser Reference Manual (part number 5955-3462).

9845B/C CS/80 Disc Drive Error Messages

- 66 Initialize error. The error rate test discovered more than 64 bad records on a single head.
OR no spares available (status 34).
OR bad record after 5 sparing attempts.
OR the final verify failed 3 times.
- 70 Wrong ID (device doesn't match MSUS).
- 72 Disc power is off.
OR the HP-IB address in the MSUS is wrong.
OR the disc is servicing a front panel request.
OR the HP-IB cable is disconnected.
OR 98034 card timeout waiting on flag to go ready.
OR hardware problem in the disc is causing a timeout waiting for read completion or assertion of EOI.
- 75 Disc hardware fault (status 19, 22, or 24).
- 78 No interface card at the MSUS select code.
OR interface is not a 98034.
OR the 98034 is not a system or active controller.
- 84 Attempt to address a record outside the disc's address space (probably misused PHYREC).
- 86 Not 9845 initialized media.
- 88 Unrecoverable data error on read (status 40 or 41).
- 89 Checkread error, an unrecoverable data error occurred during read-to-check (status 40 or 41).
OR read-to-check data miscompare with the device buffer.
- 90 Generic other (undiagnosable error). The occurrence of a status byte other than 19, 22, 24, 30, 31, 34, 40 or 41.
Or EOI received before the last byte of a read.
Or NOT EOI on the last byte of a read.

CS/80 External Exerciser Commands and Steps

Name	Description	Unit to Address
CANCEL	Cancel previous command	Same for all units
CERT	Certify tape cartridge	Tape only
CHANNEL	HP-IB channel test utility	Same for all units
CICLEAR	Channel independent clear	Same for all units
CLEAR LOGS	Clear drive logs utility	Disc or tape
CLR	Channel independent clear	Oper step
CMPR	Write then read and compare	Oper step
COMP	Complementary command	Oper step
DIAG	Execute internal diagnostic	Controller only
EDIT	Replace oper program step	Oper command
ENDLP	End loop	Oper step
ERRSUM	Read error summary utility	Same for all units
ERT LOG	Read error rate log utility	Disc or tape
EXEC	Execute oper program steps	Oper command
EXIT	Exit the current program	Same for all units
FAULT LOG	Read fault log utility	Disc only
HELP	Print list of commands	Same for all units
INIT MEDIA	Initialize disc or tape	Disc or tape
INSK	Incremental seek	Oper step
LCRD	Locate and read	Oper step
LCWR	Locate and write	Oper step
LIST	List oper program steps	Oper command
LOOP	Loop	Oper step

NEW	Clear current oper program	Oper command
NULL	Delete oper program step	Oper step
PRESET	Preset drive utility	Disc or tape
REQSTAT	Request status	Same for all units
RELS	Release device	Oper step
REV	Read firmware/PCA revision	Disc only
RF SECTOR	Read full sector	Disc only
RO ERT	Read only error rate test	Disc or tape
RQST	Request status	Oper step
RUN LOG	Read run time log utility	Disc or tape
SDCLEAR	Selected device clear	Same for all units
SENSE	Read sensors utility	Disc only
SPARE	Spare block/sector utility	Disc or tape
TABLES	Read drive tables utility	Disc or tape
STOP	Exit oper program	Oper command
UNIT	Set unit number utility	Disc or tape
UNLOAD	Unload the tape	Tape only
USE LOG	Display tape use log	Tape only
WRITE FM	Write filemark on tape	Tape only
WTR ERT	Write then read ERT	Disc or tape

9845B/C CS/80 Disc Record 0 Format

Note

The 98041-90010 diagnostic can NOT access CS-80 discs. PHYREC is the only binary with this capability (PHYREC is on (09845-10150) 9845B Utilities II Revision C as PHYR).

WORD	7908	7911	7912
0 ID Type	1280	1280	1280
1 Records/Track	35	64	64
2 Good Tracks	1850	1716	4004
3 Spare Dir Track	8	9	19
4 Record 1 of Dir.	1	1	1
5 Record 1 of AVT	223	383	810
6 Record after AVT	279	575	1215
7 First User Track	16	18	38
8 User Tracks	1834	1698	3966
9 Interleave	1	1	1
14 DBM Vol Label			

09845-94064 Cartridge Commands to Program Cross-Reference

COMMAND	EXRSIZ	EXRSI2	TAPE	OPER
CANCEL	X	X	X	
CERT			X	
CHANNEL		X		
CICLEAR	X	X	X	
CLEAR LOGS	X		X	
CLR				X
CMPR				X
COMP				X
DIAG		X		
EDIT				X
ENDLP				X
ERRSUM	X		X	
ERT LOG	X		X	
EXEC				X
EXIT	X	X	X	X
FAULT LOG	X			
HELP		X	X	
INIT MEDIA				X
INSK				X
LCRD				X
LCWR				X
LIST				X
LOOP				X
NEW				X
NULL				X
PRESET	X	X	X	
REQSTAT	X	X	X	
RELS				X
REV		X		
RF SECTOR		X		
RO ERT	X		X	
RQST				X
RUN LOG	X		X	
SDCLEAR	X	X	X	
SENSE		X		
SPARE	X	X	X	
TABLES		X	X	
STOP				X
UNIT	X	X	X	
UNLOAD			X	
USE LOG			X	
WRITE FM			X	
WTR ERT	X		X	

09845-10844 Backup Tape Utility Error Messages

ERROR DESCRIPTION

53	Error occurs on EXIT
66	Media out of spares
72	Device not responding
74	Drive powerfail recoverd.
76	Incorrect unit code
78	Interface error
80	Tape not accessible
81	Device Failure
88	Unrecoverable data

CAUSE/SUGGESTED REMEDY

Didn't do a SCRATCH A prior to loading the Binary.
Failed to find a spare sector for a sector that failed to verify.
Device power is off, HP-IB cable is disconnected, or the device is in released state (try again).
Information message of a drive powerfail sense. The error message indicates the 9845 has regained control after a failure. Retry.
Re-specify the unit code (0 for disc, 1 for tape).
Specified interface is not an HP-IB, OR card down, OR is not a system controller.
Not a cartridge in the drive OR is not fully loaded.
Indicates a disc/tape drive hardware failure occurred.
Unreliable data in source is written with "best guess" to destination and then reported at end of COPY with block number.

Shared Resource Management Systems

1. 98X29 tests in the troubleshooting section should be run by utilizing the 98X29 test on the access disc. (The 98629A test on the 98036-90030 test pack will only work if the FSK Option is selected during test initiation.)
2. Roll call tests in the troubleshooting section are done by typing in UNIT and pressing ENTER, followed by typing in NODE <a valid node from the unit display> and pressing ENTER. (Alternatively, run the 98X26 EXERCISER.)
3. Disc Utility (98261-90065) Error Messages.

ERROR MESSAGE

DMA card not installed.
 98625 interface at select code 14 is at interrupt level 4
 It should be set to 6.
 NO DISCS FOUND ONLINE

Disc at select code nn, HP-IB address 0 COULD NOT
 PERFORM CANCEL AND WILL NOT BE TESTED
 FURTHER

Disc at select code XX, HP-IB address y COULD NOT
 SET STATUS MASK AND WILL NOT BE TESTED
 FURTHER

BYTE READ = XX SHOULD HAVE BEEN = YY
 FAILED HP-IB READ CHANNEL TEST AND WILL
 NOT BE TESTED FURTHER

FAILED HP-IB WRITE CHANNEL TEST AND WILL
 NOT BE TESTED FURTHER

ROM REV FAILURE

FAILED INTERNAL DIAGNOSTICS AS FOLLOWS:
 MOST SUSPECT PCA : XX
 TEST ERROR 9B

SECOND MOST SUSPECT PCA : YY
 TEST ERROR 9B

DRIVE ERROR LOG
 FAILED TO INITIATE DIAGNOSTIC SEQUENCE

Disc at select code XX, HP-IB addr Y
 COULD NOT CLEAR ERT LOG

Disc at select code XX, HP-IB addr Y
 COULD NOT PERFORM RO_ERT

Disc at select code XX, HP-IB addr Y
 FAILED TO READ ERROR LOG

correctable errors =
 UNCORRECTABLE ERRORS =
 Log Entry

No Error Rate Test will be performed on Tape at select
 code XX, HP-IB addr Y

MEANING/ACTION

Install card.

Configure switches.

Either no 98625, OR no CS/80
 discs.

Disc failure.

Disc failure.

Read Channel test failure.

Read Channel test failure.

Write Channel test failure.

Disc failure.

Disc failure. Replace PCA.

Disc failure. Replace PCA.

Disc failure.

Disc failure.

Disc failure.

Disc failure.

Interpret as per 09826-90080
 error rate testing section.

Do not specify tape-only drives.

Chapter 11

Desktop Disc Service Notes

9835A/B Service Note Summary

9835A/B-8A 98041A disc interface requires new I/O cable, and I/O backplane Rev C or later.
 9835A/B-9 98331B Mass Storage ROM #1 and #2 info.
 9835A/B-16 Mainframe ROM #11 Rev C COPY bugs.
 9835A/B-16A Disc anomalies with mainframe ROM #11 Rev C and Rev E.

9845A Service Note Summary

9845A-8 Files larger than 128K byte problems, (PPU #3 rev C problems).
 9845A-8A Exact filling of media space, overwrites next record (LPU #1 rev C problems).
 9845A-21 Rev E I/O backplane required for 98041.

9845B/C Service Note Summary

9845B/C-3 Option ROM file types change, COPY does not checkread.
 9845B/C-5 Copy does not checkread. Modulo 64K destroys directory and data on large discs, a SPARE DIRECTORY ACCESS hangs the system.
 9845B/C-5A A COPY causes DSET, ROOT, or BKUP to change to OPRM.
 9845B/C-7 Rev E I/O backplane required for 98041A.
 9845B/C-8 Data lost during transfer with 9885.
 9845B/C-10 System hang or lost data during hard disc initialization. Error 57 on initialization of a 9895.
 9845B/C-10A User disc space shrinks.

98041A Service Note Summary

98041-1 Error 90 on initialize if RPS jumper left enabled on 7906.
 98041-2 New PHI chip.
 98041-3 Error 71 due to short connector fingers on 98041-66502 Rev A boards.

