HEWLETT PACKARD

HP 3000 Series 920 Family and HP 9000 Model 822S Family Computer Systems

CE Handbook

HP 3000 and HP 9000 PA-RISC Computer Systems

CE Handbook

Series 920 Family and Model 822S Family

(920, 922, 922LX, 922RX, 932, 948, 958)

(822S, 832S, 842S, 852S)

HEWLETT
PACKARD

HP Part No. A1027-90008
Printed in U.S.A. 1991

Edition - E0891
For HP Internal Use Only

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Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

First Edition ..... January 1990
Second Edition ..... January 1991
Third Edition ..... August 1991

List of Effective Pages

The List of Effective Pages gives the date of the current edition and of any pages changed in updates to that edition. Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. No information is incorporated into a reprinting unless it appears as a prior update.

All ..... August 1991

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The United States Federal Communications Commission (in Subpart J, of Part 15, Docket 20780) has specified that the following notice be brought to the attention of the users of this product:

Warning **This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested for compliance with the limits of Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference.**

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Japanese Radio Frequency Notice

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Herstellerbescheinigung

Hiermit wird bescheinigt, daß dieses System in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

United Kingdom Telecom Statement (For the United Kingdom Only)

Warning	**Interconnection of ports marked "UNITED KINGDOM TELECOM WARNING. Connect only apparatus complying with BS 6301 to these ports", with ports not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.**
	Connect only apparatus complying with BS 6301 to the ports marked with the above warning.

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.

Indicates hazardous voltages.

Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

Warning **The WARNING sign denotes a hazard. It calls attention to a procedure, practice, of the like, which if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

Caution The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, of the like, which if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Preface

This edition of the *CE Handbook* contains technical information about HP 3000 Series 920 Family and HP 9000 Model 822S Family Computer Systems. At the time of publication, this family included the following models:

HP 3000	HP 9000
Series 920	Model 822S
Series 922	Model 832S
Series 922LX	Model 842S
Series 922RX	Model 852S
Series 932	
Series 948	
Series 958	

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1

Product Information

General Description

The HP 3000 Series 920 Family and the HP 9000 Model 822S Family computer systems (Figure 1-1) use an HP Precision Bus (HP-PB) standard (also known as NIO) to connect the CPU, main memory, and I/O. The physical specifications, functional description, and troubleshooting are similar for all models. These computers are fully integrated systems with one to four embedded disk drives and one embedded digital data storage (DDS) cassette tape drive.

HP 3000 models use the MPE XL operating system and connect CIO devices through a channel adapter. HP 3000 Series 948/958 systems also connect CIO devices through a Precision Bus Adapter (PBA). Each PBA card is a high-performance CIO bus adapter, which provides a CIO connection for one HP-IB or HP-FL card.

HP 9000 models use the HP-UX operating system and connect peripherals through the HP-PB backplane. The only PBA supported on HP-UX systems is the PBA-FL, which provides a CIO connection to HP-FL devices.

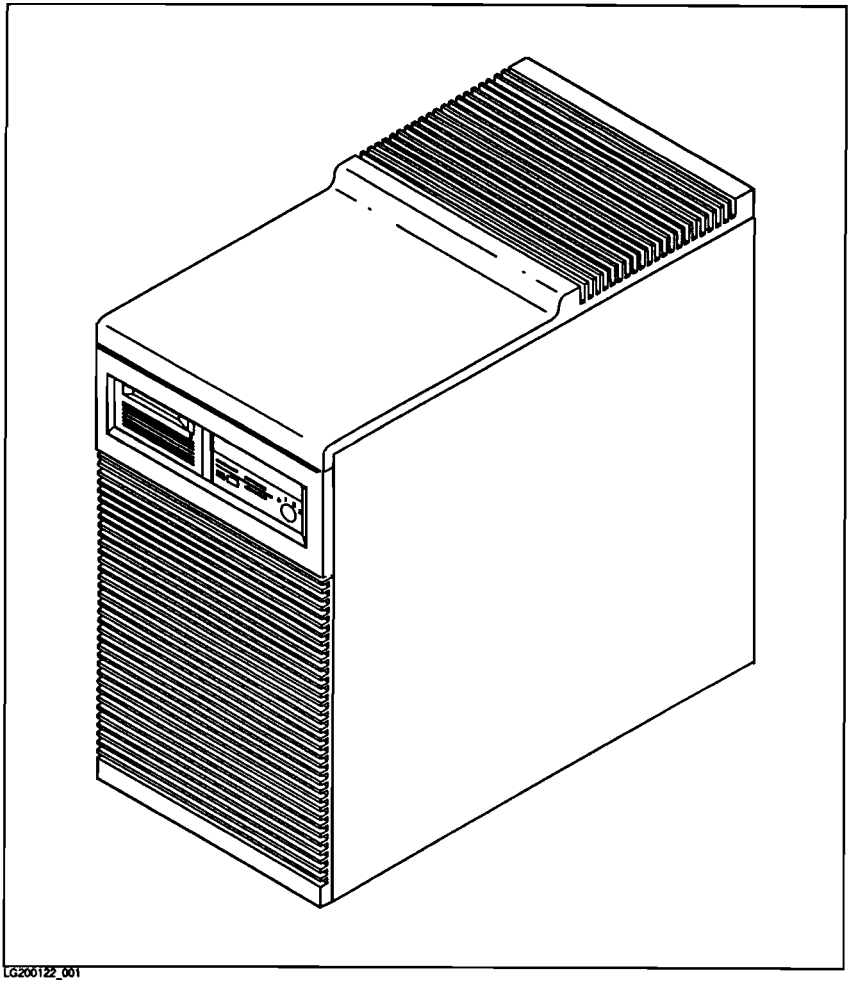

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Figure 1-1. HP 3000 Series 920 Family and HP 9000 Model 822S Family Computer System

HP 3000 Series 920 Computer Systems

HP 3000 Series 920 computer systems are low-end, integrated systems that consist of the following:

- CPU.
- 24 MB main memory.
- 1 embedded 670 MB disk drive.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 CIO Channel Adapter.
- 1 HP-IB PCA.
- 1 LAN 802.3 PCA.
- 1 Access Port PCA.
- 1 Console MUX.

The CIO Channel Adapter provides the interconnect between the Precision Bus (PB) and the CIO bus so that six slots in the backplane are designated as CIO compatible.

The LAN PCA is used for connecting to a local area network, from which the Distributed Terminal Subsystem can connect to terminals, local printers, and plotters. The HP 3000 Series 920 supports from 1 to 32 workstations.

For system upgrade information, refer to Table 3-1.

HP 3000 Series 922LX/922RX Computer Systems

HP 3000 Series 922LX/922RX computer systems are low-end, integrated systems that consist of the following:

- CPU - standard (25 MHz)
- Main memory:
  Series 922LX - 24 MB.
  Series 922RX - 32 MB.
- Embedded 670 MB disk drives:
  Series 922LX - 1.
  Series 922RX - 2.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 CIO Channel Adapter.
- 1 HP-IB PCA.
- 1 LAN 802.3 PCA.
- 1 Access Port PCA.
- 1 Console MUX.

The CIO Channel Adapter provides the interconnect between the Precision Bus (PB) and the CIO bus so that six slots in the backplane are designated as CIO compatible.

The LAN PCA is used for connecting to a local area network, from which the Distributed Terminal Subsystem can connect to terminals, local printers, and plotters.

The HP 3000 Series 922LX supports from 1 to 32 workstations; the Series 922RX supports from 1 to 64 workstations.

For system upgrade information, refer to Table 3-2.

HP 3000 Series 922/932 Computer Systems

The HP 3000 Series 922 computer system is a medium-range system; the Series 932 is a higher performance version. Series 922/932 systems consist of the following:

- CPU:
  Series 922 - standard (25 MHz).
  Series 932 - standard high (30 MHz).
- 32 MB main memory.
- 2 embedded 670 MB disk drives.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 CIO Channel Adapter.
- 1 HP-IB PCA (Series 922).
- 2 HP-IB PCAs (Series 932).
- 1 LAN PCA.
- 1 Access Port PCA.
- 1 Console MUX.

The CIO Channel Adapter provides the interconnect between the Precision Bus (PB) and the CIO bus so that six slots in the backplane are designated as CIO compatible.

The LAN PCA is used for connecting to a local area network, from which the Distributed Terminal Subsystem can connect to a maximum of 152 (Series 922) or 240 (Series 932) workstations. The system supports up to four (Series 922) or six (Series 932) external HP-IB printers.

For Series 922 system upgrade information, refer to Table 3-2.

For Series 932 upgrade information, refer to Table 3-3.

HP 3000 Series 948/958 Computer Systems

HP 3000 Series 948/958 computer systems consist of the following:

- CPU:
  Series 948 - standard (28 MHz).
  Series 958 - high standard (50 MHz).
- Main Memory:
  Series 948 - 64 MB (two 32 MB ECC memory PCAs).
  Series 958 - 96 MB (three 32 MB ECC memory PCAs).
- 2 embedded 670 MB disk drives.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 CIO Channel Adapter PCA.
- 1 PBA-IB PCA.
- 2 HP-IB PCAs.
- 1 LAN PCA.
- 1 Access Port PCA.
- 1 Console MUX.

The CIO Channel Adapter PCA is the Precision Bus (PB) to CIO Channel Adapter. The PBA PCA is a high performance, single card CIO Bus adapter for HP-IB and HP-FL PCAs on HP 3000 Series 948/958 systems. It is a second Precision Bus to CIO channel adapter dedicated to a single CIO PCA. In Series 948/958 systems, it is used with an HP-IB PCA that connects to the embedded disk drives.

The LAN PCA is used for connecting to a local area network, from which the Distributed Terminal Subsystem can connect to a maximum of 400 (Series 948) or 600 (Series 958) workstations. The system supports up to eight HP-IB external printers.

For system upgrade information, refer to Table 3-4.

HP 9000 Model 822S/832S Computer Systems

HP 9000 Model 822S/832S computer systems consist of the following:

- CPU:
  Model 822S - standard (25 MHz).
  Model 832S - high standard (30 MHz).
- Main memory:
  Model 822S - one 8 MB PCA.
  Model 832S - one 16 MB PCA.
- 1 embedded 335 MB disk drives.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 Precision Bus HP-IB PCA.
- 2 Precision Bus MUX PCAs.

This system comes with an 8-user license, including a C-compiler, symbolic debugger, assembler, and a device I/O library. The user license can be upgraded to unlimited users.

For system upgrade information, refer to Table 3-5.

HP 9000 Model 842S/852S Computer Systems

HP 9000 Model 842/852 computer systems consist of the following:

- CPU:
  Model 842S - standard (28 MHz).
  Model 852S - high standard (50 MHz).
- Main memory:
  Model 842S - one 32 MB PCA.
  Model 852S - two 32 MB PCAs.
- 1 embedded 670 MB disk drive.
- 1 embedded 1.3 GB digital data storage (DDS) cassette tape drive.
- 1 system console.

The system I/O includes the following:

- 1 Precision Bus HP-IB PCA.
- 1 Precision Bus AP MUX PCA.

For system upgrade information, refer to Table 3-6.

System Specifications

Table 1-1. SPU Specifications

Description	Specification
Word Length	32 bits
Virtual Memory Addressing	48 bits
Physical Addressing	29 bits
Cache Size	32 Kbyte (822S, 922) 64 Kbyte (920) 128 Kbyte (832S, 932) 512 Kbyte (842S, 852S, 948, 958)
Translation Lookaside Buffer (TLB) I	2K entries (822, 922, 832, 932) 64K entries (842, 852, 948, 958)
TLB D	2K entries (822, 922, 832, 932) 64K entries (842, 852, 948, 958)
TLB Combined I and D	64K entries (920)

System Variations

One key variation between SPU families is the bus structure. In HP 3000 Series 900 Family computers, I/O is performed by using the Channel I/O (CIO). In HP 9000 Model 822 Family computers, I/O is performed by using the HP Precision Bus (HP-PB).

Figure 1-2 shows the system block diagram for HP 3000 computer systems. Figure 1-3 shows the system block diagram for HP 9000 computer systems.

SPU model variations are listed in Table 1-2.

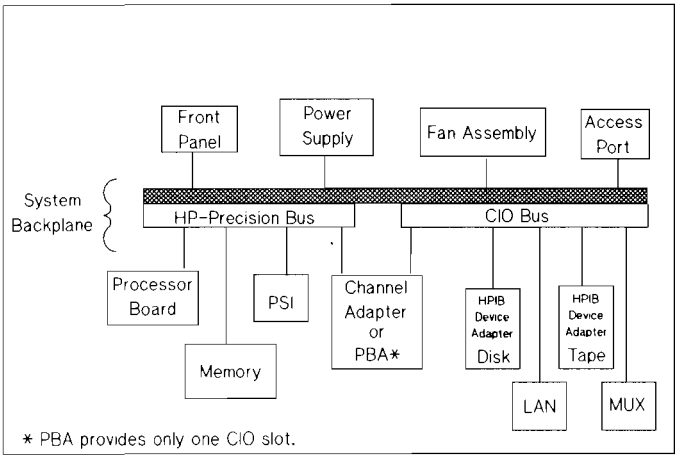

Figure 1-2. HP 3000 System Block Diagram

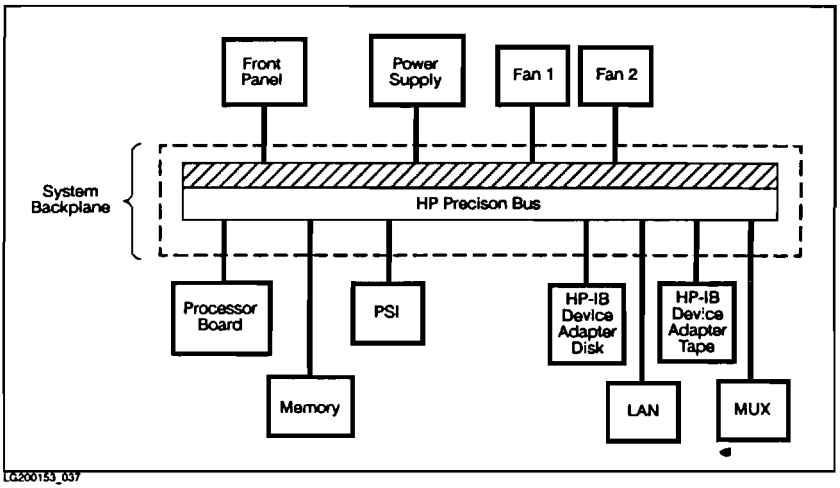

Figure 1-3. HP 9000 System Block Diagram

Table 1-2. Variations Among 832/922 Family SPU Models

Subsystem/ Parameter	822/922	832/932	920	842/52 948/58
CPU				
CPU Chip:	NMOS III	NMOS III	CMOS34	CMOS26
Cache				
Controller Chip:	NMOS III	NMOS III	CMOS34	CMOS26
Set Size:	2 sets	2 sets	1 set	2 sets
Set Type:	Combined Instruction/Data	Combined Instruction/Data	Combined Instruction/Data	Separate Instruction/Data
Total Size:	32KB	128KB	64KB	1024KB
RAM Speed:	20ns Tag RAMs 20ns Data RAMs	20ns Tag RAMs 20ns Data RAMs	20ns Tag RAMs 25ns Data RAMs	12ns Tag RAMs 15ns Data RAMs
TLB				
Controller Chip:	NMOS III	NMOS III	CMOS34	CMOS26 (w/internal RAM)
TLB (I) Size:	2K entries	2K entries	Combined I/D 64 entries	64K entries
TLB (D) Size:	2K entries	2K entries	(see line above)	64K entries
RAM Speed:	25ns	20ns	(Internal RAM)	15ns
Clock Frequency	25 MHz	30 MHz	16 MHz	28 MHz (842/948) 50 MHz (852/958)
Processor Bd. Technology:	Surface Mount	Surface Mount	Surface Mount	Surface Mount
PDC	On CPU	On CPU	On CPU	On CPU
Stable Storage:	Yes	Yes	Yes	Yes
NVM:	Yes	Yes	Yes	Yes

Front Display Panel

Figure 1-4 shows the front display panel and identifies the control and indicators.

General Information Label

The General Information Label (see Figure 1-5) contains the product and serial number of the SPU. It also contains the serial numbers of all the peripherals embedded in the cabinet.

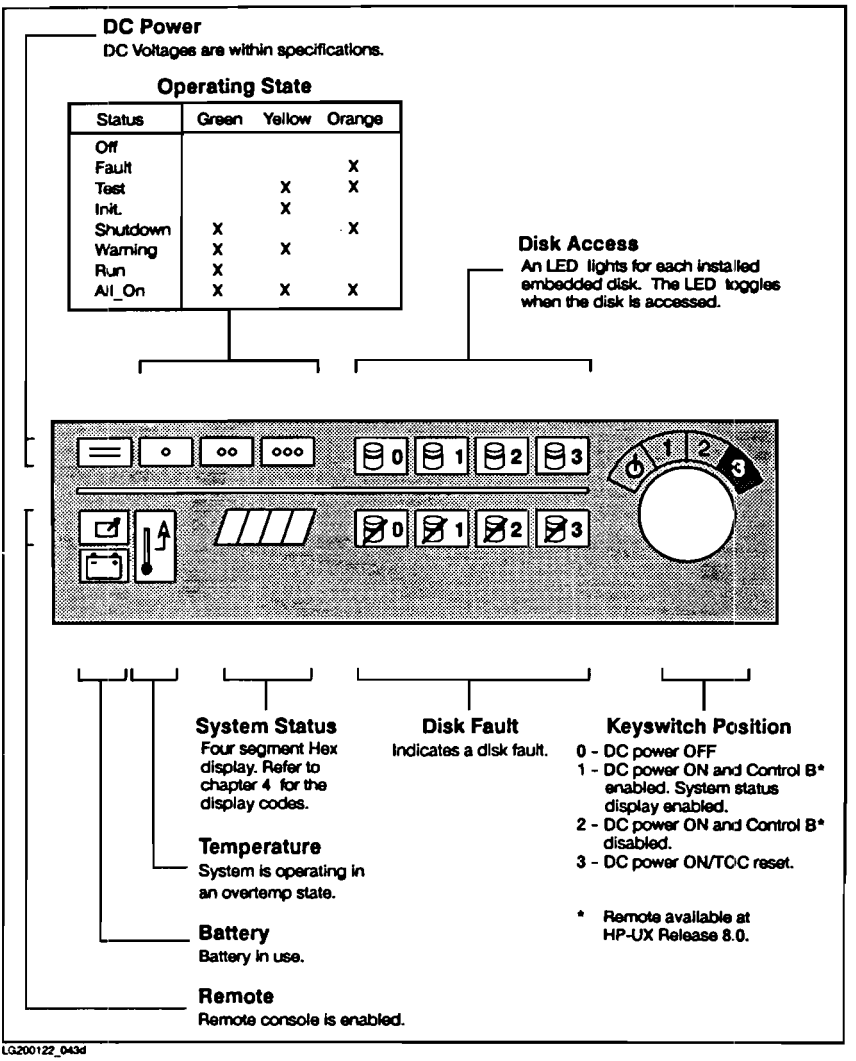

Figure 1-4. Front Display Panel

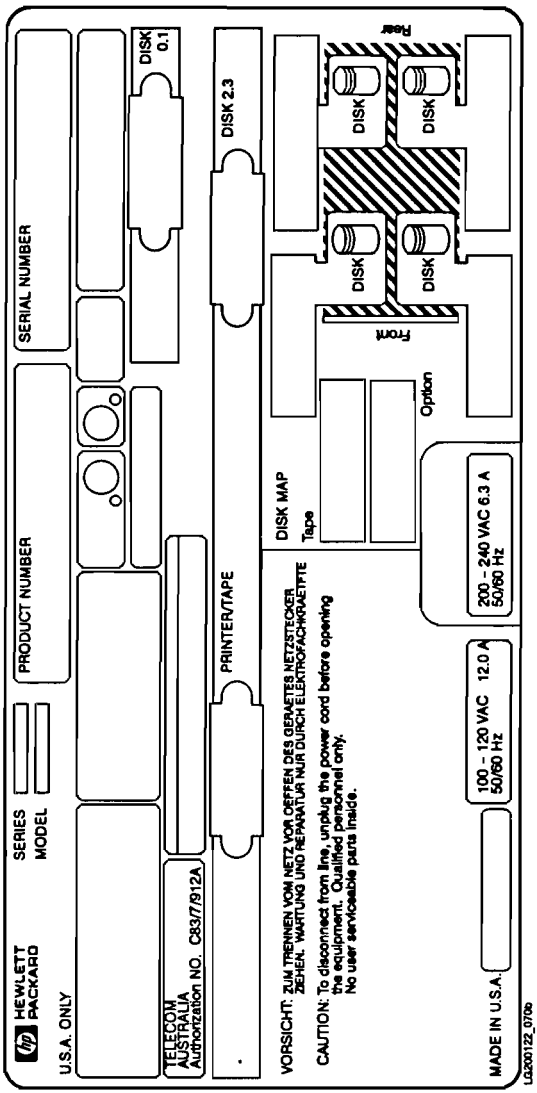

Figure 1-5. General Information Label

Digital Data Storage (DDS) Indicators

Figure 1-6 gives the status light displays and their meanings for the DDS.

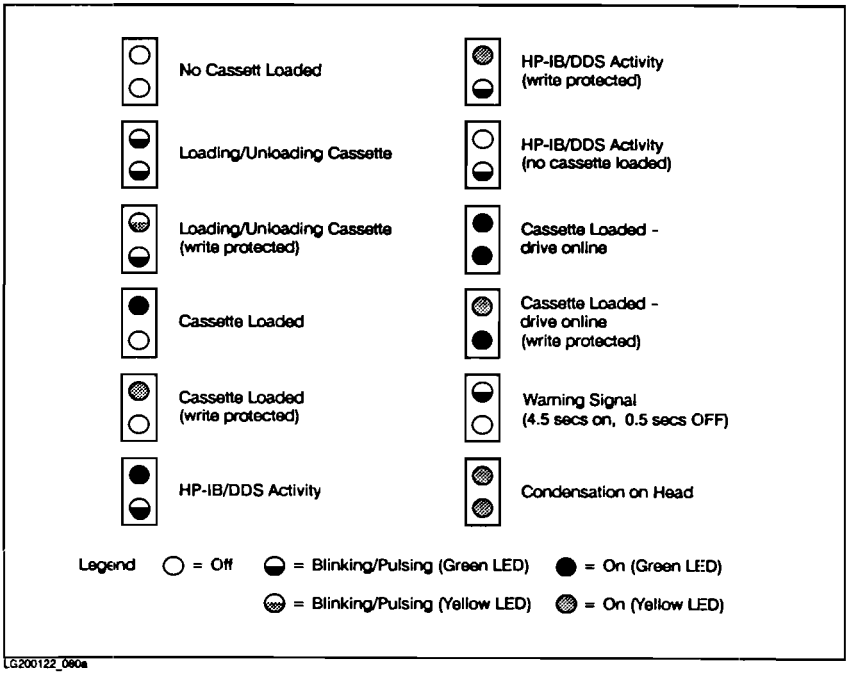

Figure 1-6. DDS Status Indicators

Integrated Access Port

This section provides a general description of the integrated Access Port supported on Model 822S Family systems, and points out differences from the Access Port currently used in CIO-based systems, including the Series 920 Family. The Integrated Access Port, which is contained on the AP MUX (HP product number 40299B), combines Access Port functionality with eight-port MUX functions.

General Description

The integrated Access Port is designed for use with PA-RISC HP-PB I/O-based systems to provide a minimal level of remote supportability for the systems. It is supported on HP-UX Release 8.0 and later.

The Access Port gives the console operator the ability to read system status and to generate system resets through the console terminal instead of through the system front panel display and switches.

It also provides the ability to connect a second console in parallel with the local console terminal. This "mirrored" console port is connected to a modem through which the second or remote console is attached. This provides the same system support functionality to a remote terminal as is available to a console operator sitting next to the system.

Figure 1-7 shows a block diagram of connections that use an HP 40299B MUX card to provide local/remote console operation and Access Port functions.

AP Upgrade Kits

Model 822S Family systems shipped prior to November 1990 did not have the AP MUX and the other hardware required for remote support installed on the system. Upgrade kits are available for those systems.

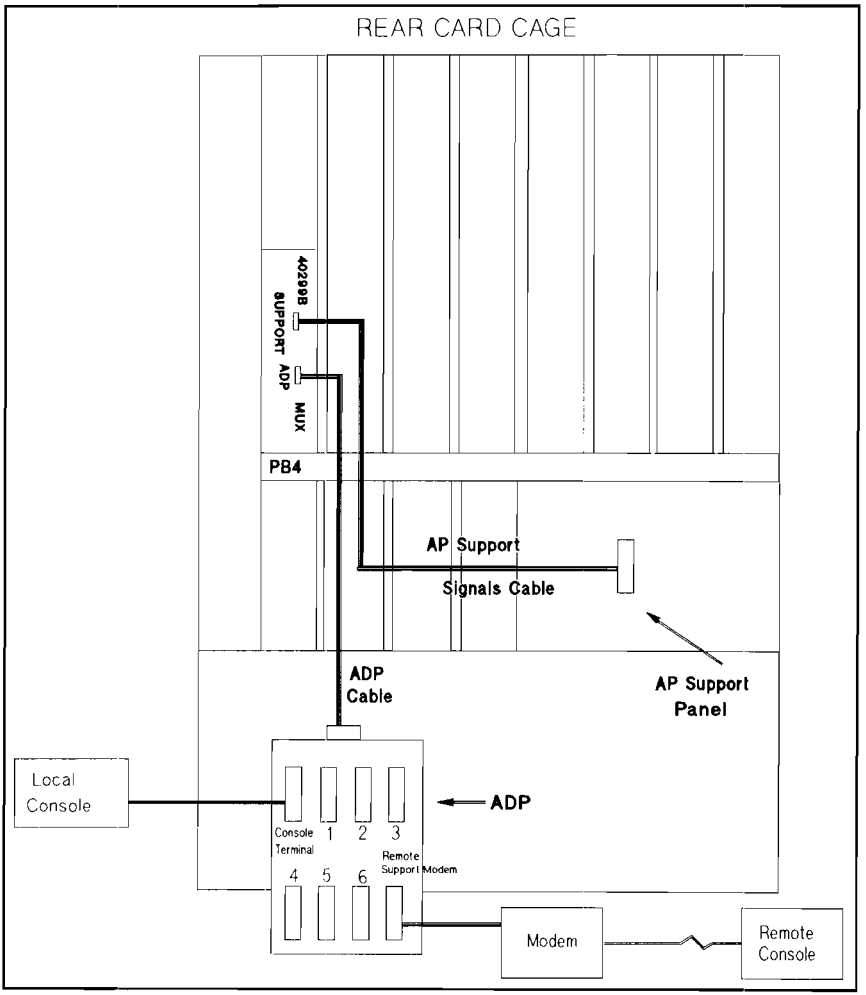

Figure 1-7. Local/Remote Console Connections

Note The local console is connected to the Console Terminal port, and the remote console to the Remote Support Modem port on the Access Data Port (ADP).

Integrated Access Port Features

Besides providing a local and a remote console connection, the Integrated Access Port provides the following features:

Display

- Mirrored Local and Remote Console Terminals
- Front Panel LED and HEX display available on console terminal(s)
- System fault or warning condition received through the front panel LED data path forces the fault or warning information and Hex code to be displayed on the console terminal(s)

Security

- Access to control mode on local console controlled by *Secured/Control Enable* key switch
- Key switch on the host front panel must be turned to *control enable* to enable control mode on the local console as well as console or control mode on the remote terminal

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Note A host may not have a keyswitch; in this case the control mode on the local console will always be enabled.

- Remote console access can be enabled only by the local console operator using the **ER** command
- Remote console user must correctly enter a password to gain access to console operator Access Port functions
- **Lock Remote** and **Unlock Remote** commands used for increased remote modem port security

Commands

- Use of all CIO-based Access Port commands plus three additional commands: Lock Remote, Unlock Remote, and Copy Screen
- Hard System Reset from the local and remote console terminals
- Soft System Reset (TOC) from the local and remote console terminals

Miscellaneous

- Support Cable to connect special AP related signals to the host system
- ROM-based Firmware for full functionality at initial power up
- Downloadable firmware after OS boot for future code enhancements
- CCITT and Bell mode modem control
- HP 700/92 and 2392 terminals supported as the local console
- Remote Console Port compatible with HP 50759A Support Link Modem
- Local console and modem ports may operate at different baud rates

Integrated and CIO-Based Access Port Commands

Commands for the integrated Access Port are the same as those for the Access Port used in CIO-based systems, plus three additional commands. Table 1-3 lists the available commands, which can be entered in uppercase or lowercase letters.

Table 1-3. Access Port Commands

Control Mode Commands			Valid At	
Command	**Mnemonic**	**Function**	**LC**	**RC**
CA	Configure AP	Configure remote support modem port	Y	Y
CO	COnsole	Return to console mode	Y	Y
CS[1]	Copy Screen[2]	Copy display memory of local console to remote console	Y	Y
DI	DIsconnect	Disconnect remote console	N	Y
DR	Disable Remote	Disable remote operator access	Y	Y
DS	Disable Status	Disable SPU status display	Y	Y
ER	Enable Remote	Enable remote operator access	Y	N
ES	Enable Status	Enable SPU status display	Y	Y
HE	HElp	Display help menu	Y	Y
LR[1]	Lock Remote	Lock remote support modem access	Y	Y
RS	ReSet	Reset SPU	Y	Y
SE	SEssion	Enter session mode on remote port	N	Y
TA	Test AP	Initiate AP selftest	Y	Y
TC	Transfer of Control	Initiate SPU Transfer of Control (TOC)	Y	Y
TE	TEll	Send a message to other console	Y	Y
UR[1]	Unlock Remote	Unlock Remote Support Modem Access	Y	N

LC = Local Console
RC = Remote Console

Note

[1] Command used only with the Integrated Access Port.

[2] The *Copy Screen* command is useful if error messages or a tombstone display are still in display memory. Service personnel at the remote console can read this information with the CS command even if the information has scrolled off the screen at the local console.

Additional HP Manuals

The following manuals provide additional information for the computer systems.

Table 1-4. Additional HP Manuals

Document	HP Part Number
Site Preparation and Requirements Guide	A1027-90001
HP 3000 Series 920 Family Installation and Configuration Guide	A1027-90003
HP 9000 Model 822S Family Installation and Configuration Guide	A1044-90003
Online Diagnostics Subsystem Utilities Manual	09740-90021
Online Diagnostics Subsystem Vol I: SPU	09740-90028
Online Diagnostics Subsystem Vol II: Device Adapters	09740-90031
Online Diagnostics Subsystem Vol III. LAN/SCSI/MUX	09740-90034
Online Diagnostics Subsystem Vol IV. Disks/Printers	09740-90040
Online Diagnostics Subsystem Vol V. Tapes	09740-90042
Offline Diagnostics System Manual	30190-90010
Support Tape User's Guide	92453-90010
System Support Log	09740-90013

2

Environment, Installation, Preventive Maintenance

SPU Specifications

Table 2-1. Environmental Specifications

Operating Temperature	5°C to 40°C (41°F to 104°F)
Recommended Operating Temperature	20°C to 30°C (68°F to 86°F)
Nonoperating Temperature	-40°C to 65°C (-40°F to 149°F) (without embedded DDS-format drive) -40°C to 45 °C (-40°F to 113°F) (with embedded DDS-format drive-tape media limit)
Maximum Rate of Temperature Change	20°C (36°F)/hour (without tape media) 10°C (18°F)/hour (with/tape media)
High Speed Fan (Activated)	30°C to 34°C (86°F to 93.2°F)
Overtemp Warning	34°C to 38°C (93.2°F to 100.4°F)
Overtemp Software Flag	40°C to 45°C (104°F to 113°F)
Overtemp Hardware Shutdown	44°C to 49°C (111.2°F to 120.2°F)
Operating Humidity	20% to 80% RH max wet bulb = 26°C, non-condensing
Nonoperating Humidity	5% to 80% RH, non-condensing, less than 30% RH/hr rate of change
Operating Altitude	0 to 3048 meters (10,000 ft)
Nonoperating Altitude	0 to 15,240 meters (50,000 ft)
Heat Dissipation (maximum load)	3410 BTU/hr
Operating Vibration (sine)	0.25g (peak), 5 to 500 Hz
Operating Vibration (random)	0.0001 g^2/Hz, 5 to 350 Hz -6dB/Octave, 350-500 Hz 0.00005 g^2/Hz, 500 Hz (≈ 0.21 G_{rms}
Nonoperating Vibration (sine)	0.5g (peak), 5 to 500 Hz
Shock (nonoperating)	One edge drop from 4 in. above floor
Sound Power	5.8 Bels (A weighted) @ < 30°C

Table 2-2. Electromagnetic Susceptibility Specifications

Radiated	3V/m, 14 kHz to 1 GHz
Conducted	1V rms, 30 Hz to 50 kHz 0.7V rms, 50 kHz to 400 MHz
Radiated Magnetic Field Immunity	1 gauss p-p, 48 Hz to 198 kHz
Electrostatic Discharge	10 kV - no effect 20 kV - no hardware failure

Table 2-3. Power Specifications

Description	Specification
Input Voltage	100 to 120 Vac or 200 to 240 Vac
Input Voltage Range	90 to 132 Vac or 180 to 264 Vac
Input Current (maximum load)	13.2 amperes @ 100 Vac 6.3 amperes @ 220 Vac
Input Power (maximum)	1 kw
Input Line Frequency	47 to 63 Hz
Transient Tolerance Low Energy High Energy	 3000 volts, 10μs, 500 ns rise/fall 1000 volts, 1.2μs rise
Powerfail Exclusion	20 ms @ 50 Hz (1 cycle) 16 ms @ 60 Hz (1 cycle)
Powerfail Recovery	15 minutes

Table 2-4. Physical Specifications

Description	Specification
Width	375 mm (14.76 in)
Height	750 mm (29.5 in)
Depth	710 mm (27.95 in)
Weight	110 kg (243 lb)

DC Power Specifications

Table 2-5. DC Power Specifications

Nominal Voltage	Minimum Current	Maximum Current	Minimum Voltage	Maximum Voltage	P-P Ripple
+5V	10A	87A	+4.90V	+5.25V	50 mV
+5V_S	0.05A	12A	+4.90V	+5.25	100 mV
+12V	0.05A	5.5A	+11.69V	+12.36V	100 mV
+12M	0.05A	11.5A	+11.45V	+12.60V	100 mV
-12V	0.05A	3.8A	-11.69	-12.60V	100 mV

Installation

The installation tasks include:

- SPU Installation
- External Peripherals Installation
- System Console Installation
- Distributed Terminal Controller (DTC) Installation (optional for HP 9000)

SPU Installation

Note Refer to the Removal and Replacement section of chapter 8 for information on the following removal and replacement requirements.

Caution There is no ac power switch on the SPU. To disconnect ac power, unplug the unit from the power source with the power cord. The keyswitch must be in position 0 to avoid going into battery backup.

1. Remove front panel as follows:
   a. Remove the top cover.
   b. Remove the top front plastic bezel.
   c. Slide the front plastic bezel upward to release it from the chassis.
2. Verify that the Power Configuration Selection switch is set for the proper voltage and ensure the the Power Distribution cable is securely connected.
3. Replace front bezels after checking the Power Configuration Selection switch.
4. Remove rear panel by pulling out top part of panel at slot, then lift up and out.
5. Verify that all PCAs that were ordered are included in this shipment.
6. When the SPU is installed, ensure that leveler feet are put in place to relieve tension on the casters.

Note When the cabinet is in place or is to be stored for any length of time, the leveling feet must be lowered to relieve tension on the casters. If the system rests on the casters for prolonged periods of time, the casters tend to flatten on the bottom side.

External Peripherals Installation

Install all external peripherals as described in the associated support manuals.

Caution Do not place external peripherals on top of the SPU. Doing so blocks the system air vents.

System Console Installation

HP 3000 System Console Installation

1. Connect the system console cable to Port 0 of the console mux panel.
2. Connect the DTC PORT 0 cable to port S1 of the console mux panel.
3. If using a remote console, connect modem cable to port T1 of the console mux.

HP 9000 System Console Installation

1. Connect the system console cable to Port 0 or Console Terminal port of the ADP.
2. If using a remote console, connect modem cable to port 7 or Remote Support Modem of the ADP.

Distributed Terminal Controller (DTC) Installation

The DTC is part of the Distributed Terminal Subsystem (DTS). It includes a LAN link, the DTC, and terminals and printers. To fully implement a system with a DTC, the components of this subsystem must be installed and the subsystem must be configured, validated, and cross-validated. It is more efficient to perform these steps at the time of initial installation, rather than perform them as a separate process.

To install the DTC and associated components, proceed as follows:

1. Connect the IEEE 802.3 or 802.4 LAN cable to the LAN card installed in the SPU.
2. Connect the DTC to the LAN cable.
3. Connect terminals and printers to the DTC in accordance with the installation instructions provided in the associated peripheral documentation.
4. Connect the DTC and peripherals to sources of ac power.

CIO Card Installation

This section provides instructions for upgrading HP 3000 Series 920 Family computer systems to include additional CIO device adapters for additional I/O capability.

Caution Follow ESD procedures. Always use an ESD grounding wrist strap during service.

Access the Rear of the System

To access the rear of the system, proceed as follows:

1. Ensure that the system is shut down and power is off.
2. Disconnect the power cord from the back of the cabinet.
3. Remove the rear panel by pulling the top out (at the slot) and lift out.

Select the Card Slot Location

Card slot selection is limited to slots labeled CIO1 through CIO6. (Refer to the I/O configuration labels located on the cabinet frame just inside the front and rear panel assembly.) For recommended slot positions, refer to chapter 3.

Remove Slot Covers and Slot Divider

The slot covers to be removed are the single-high type. To remove the slot covers and slot divider, proceed as follows:

1. Remove two slotted screws from each slot cover and lift out.
2. Pull out slot divider. The slot divider is seated by its clip-end.

Install the Device Adapter With the Connector Assembly

To install the device adapter with connector assembly, proceed as follows:

1. Insert the rear of the device adapter into its mating connector on the connector assembly. Ensure that the card is seated firmly.
2. Insert the mated assemblies into the desired slot.
3. Secure the assembly with the slotted screw at the bottom of the connector assembly.
4. Attach the external cable to the device adapter and route it down to the bottom of the connector assembly.
5. Secure the CIO-PB connector slot covers over the device adapter with the #10 TORX screwdriver.
6. Replace the rear panel.
7. Restore ac power to the system.
8. This completes the hardware configuration procedure.

Configure the Device Adapter into the System

To configure the device adapter and connected peripherals into the operating system, refer to the *Guide for the New System Operator*, HP part number 32650-90137.

Precision Bus Adapter Installation

The Precision Bus Adapter (PBA) contains the HP-PB to CIO channel adapter circuitry (same circuitry as on the CIO Channel Adapter). The PBA provides only a single CIO card slot. It is available with either an HP-FL or HP-IB PCA.

The default configuration in HP 3000 Series 948/958 systems includes a PBA-IB PCA installed in PB slot 8. One additional PBA-IB or PBA-FL PCA can be installed in PB slot 6. Up to four PBA-FL PCAs can be installed in HP 9000 Model 842S/852S systems.

This section provides instructions for upgrading these systems to include additional PBA-IB or PBA-FL PCAs for additional I/O capability.

Caution Follow ESD procedures. Always use an ESD grounding wrist strap during service.

Access the Rear of the System

To access the rear of the system, proceed as follows:

1. Ensure that the system is shut down and power is off.
2. Disconnect the power cord from the back of the cabinet.
3. Remove the rear panel by pulling the top out (at the slot) and lift out.

Select the Card Slot Location

Card slot selection for the PBA-IB in HP 3000 Series 948/958 is limited to the available PB slots. For HP 9000 842S/852S, choose any available slot(s) (for recommended slot positions, refer to chapter 3).

Remove Slot Covers and Slot Divider

The slot covers to be removed are the single-high type. To remove the slot covers and slot divider, proceed as follows:

1. Remove two slotted screws from each slot cover and lift out.
2. Pull out slot divider. The slot divider is seated by its clip-end.

Install the PBA PCA Assembly

To install the PBA PCA assembly, proceed as follows:

1. Insert the rear of the device adapter (HP-IB or HP-FL) into its mating connector on the PBA PCA. Ensure that the card is seated firmly.
2. Insert the entire assembly into the desired slot.
3. Secure the assembly with the slotted screw at the bottom of the connector assembly.
4. Attach the external cable to the device adapter and route it down to the bottom of the connector assembly.
5. Secure the single-high slot cover over the device adapter with the #10 TORX screwdriver.
6. Replace the rear panel.
7. Restore ac power to the system.

This completes the hardware configuration procedure.

Configure the PBA into the System

The CIO slot number on the PBA is hardwired to zero. Therefore, the path for a peripheral device connected through a PBA is:

```
path= (4 x slot # of PBA) . CIO slot (0) . device address
```

For example, if the PBA-IB (i.e., PBA with CIO HP-IB card) is installed in HP-PB slot 8 (PB8) and the disk HP-IB address is 1, then the path for the disk device is:

```
path= (4 x 8).0.1 = 32.0.1
```

To configure the PBA and connected peripherals into the operating system, refer to the *Guide for the New System Operator*, HP part number 32650-90137.

Disk Upgrade Installation

This section provides instructions for upgrading the HP 3000 Series 920 Family and HP 9000 Model 822 Family computer systems to include additional embedded disk drives, or to replace existing disk drives. The computer systems have space available for up to four embedded disk drives (see Figure 2-1). The disk drives are designated disk 0 through disk 3. Disk 0 is always the system disk and contains the operating system and other software. It is the primary boot device.

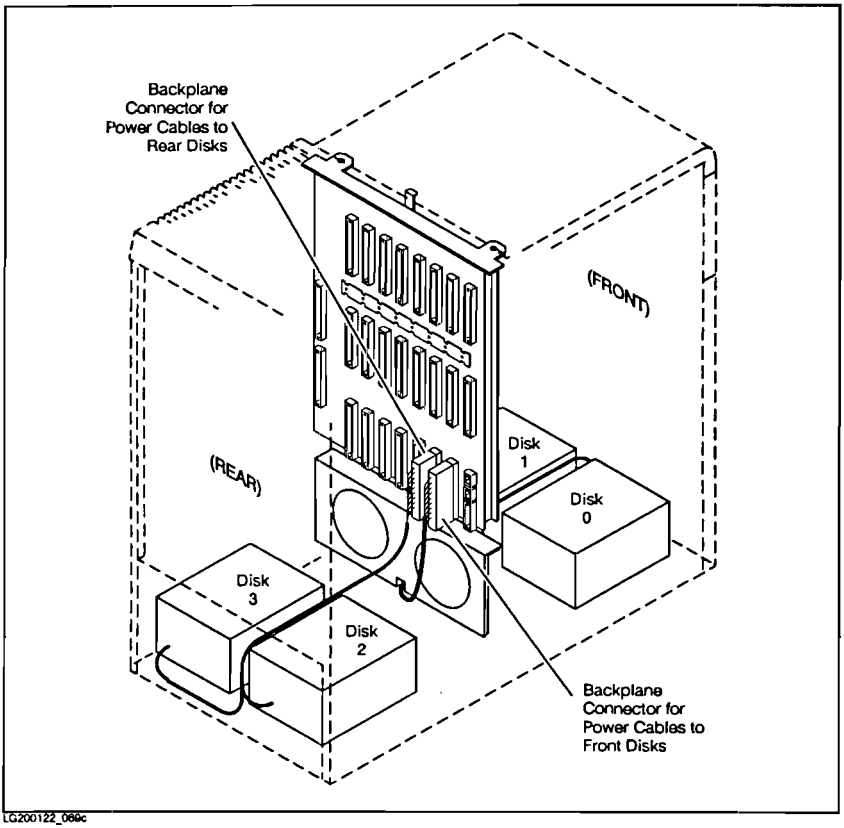


Figure 2-1. Disk Drive Locations and Power Cabling

Disk Drive HP-IB Addresses

The embedded disk drives are hardwired to HP-IB addresses 0, 1, 2, and 3 to correspond with the disk drive locations; that is, the disk drive in location 0 has an HP-IB address of 0, the disk drive in location 1 has an HP-IB address of 1, and so forth.

Note that the HP-IB address on the DDS-format drive is configurable. On HP 9000 Model 822 Family systems, it is set to 7. On HP 3000 Series 920 Family systems, it is set to 3. When 4 disk drives are installed on a Series 920 Family computer, a second HP-IB card is required because the HP-IB address of the DDS-format drive conflicts with that of the fourth disk drive.

Disk Drive Location

To determine the drive location, proceed as follows:

1. On the back of the cabinet, read the label to determine the next empty disk position. Disk drives must be installed in sequential order (0 through 3).
2. If the installation position is in the front of the system cabinet (disk 0 or 1), proceed to the procedure for "Accessing the Front of the System Cabinet."
3. If the installation position is in the rear of the system cabinet (disk 2 or 3), proceed to the procedure for "Accessing the Rear of the System Cabinet."

Accessing the Front of the System Cabinet

To access the front of the system cabinet, proceed as follows:

1. Ensure that a full system backup has been completed and shut down the system.
2. Turn the system keyswitch to position 0 and remove the ac power connector from the rear of the cabinet.
3. Remove the top cover by lifting up the rear and sliding forward and off.
4. Remove the front plastic bezels by removing the two TORX screws on the top plastic bezel. Then pull the top bezel out and remove the bottom bezel by lifting up and out.
5. Disconnect the ac line cable from the power module.
6. Loosen the seven TORX screws on the bottom EMI shield and lift out the shield.
7. Proceed to the "Front Disk Installation" section.

Front Disk Installation

To install disk drive 0 or 1, proceed as follows:

1. Cut the cable ties that secure the previously unused power and ribbon cables to the cabinet.
2. Ensure that the front internal HP-IB ribbon cables are flat across the bottom of the cabinet. (See Figure 2-2.)

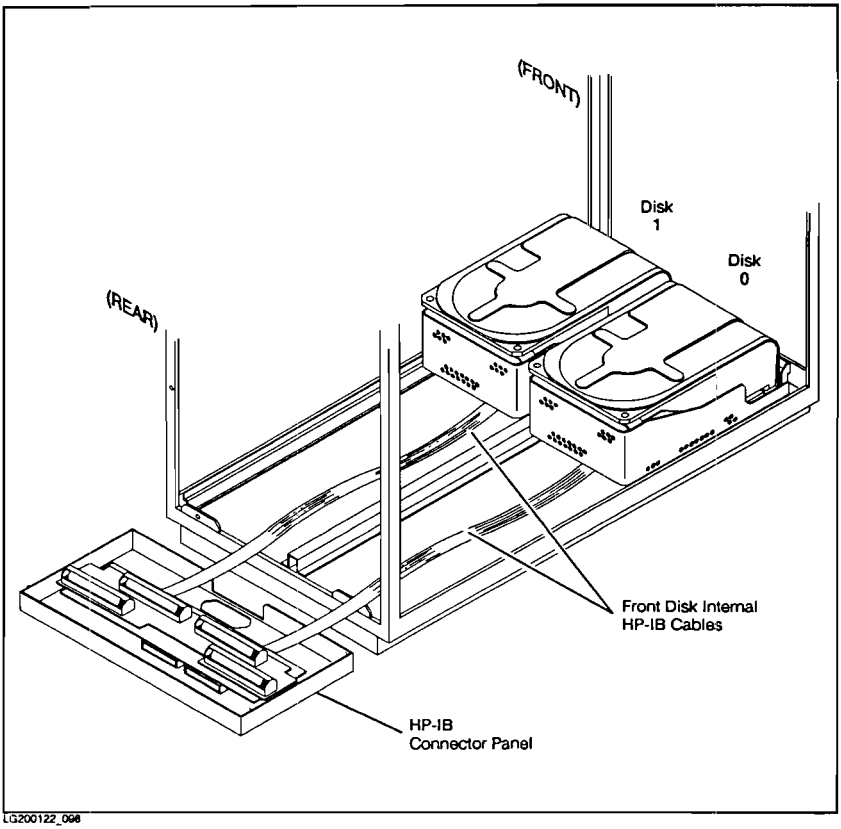
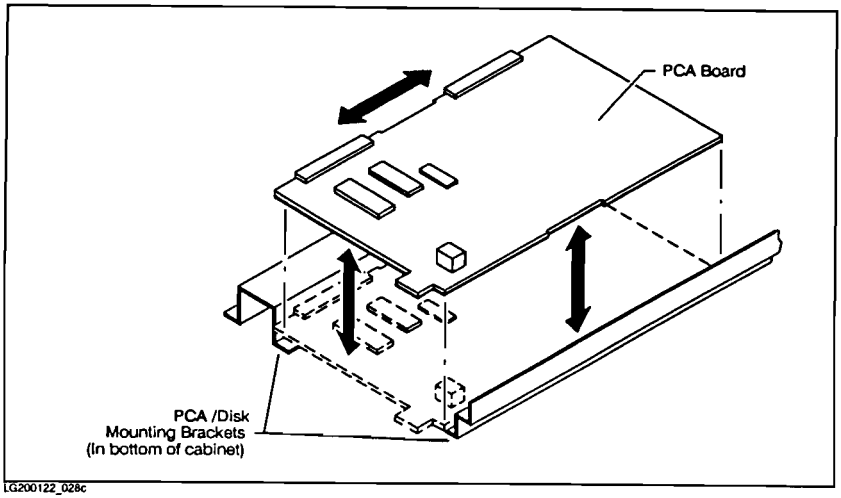


Figure 2-2. Internal HP-IB Cabling for Front Embedded Disk Drives

3. Position the disk controller PCA over the mounting guides and slightly to the rear of the brackets as shown in Figure 2-3.
4. Set the PCA into the mounting guides and slide forward.
5. Plug the front internal HP-IB ribbon cable into the disk HP-IB controller PCA (left corner).
6. Secure the PCA by inserting the retainer snap in the position shown in Figure 2-3.



Disk Controller PCA Installation

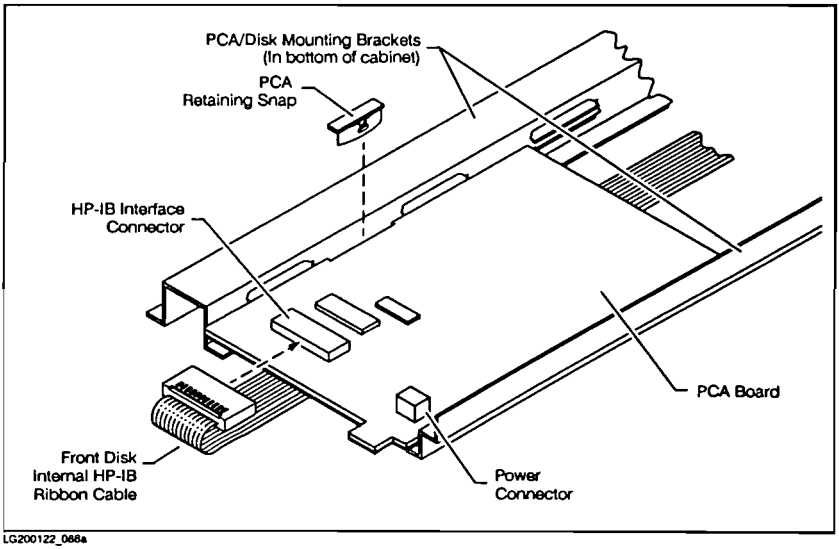


Figure 2-3. Disk Controller PCA Installation

7. Slide the disk drive into the mounting bracket and secure with two TORX screws. (See Figure 2-4.)

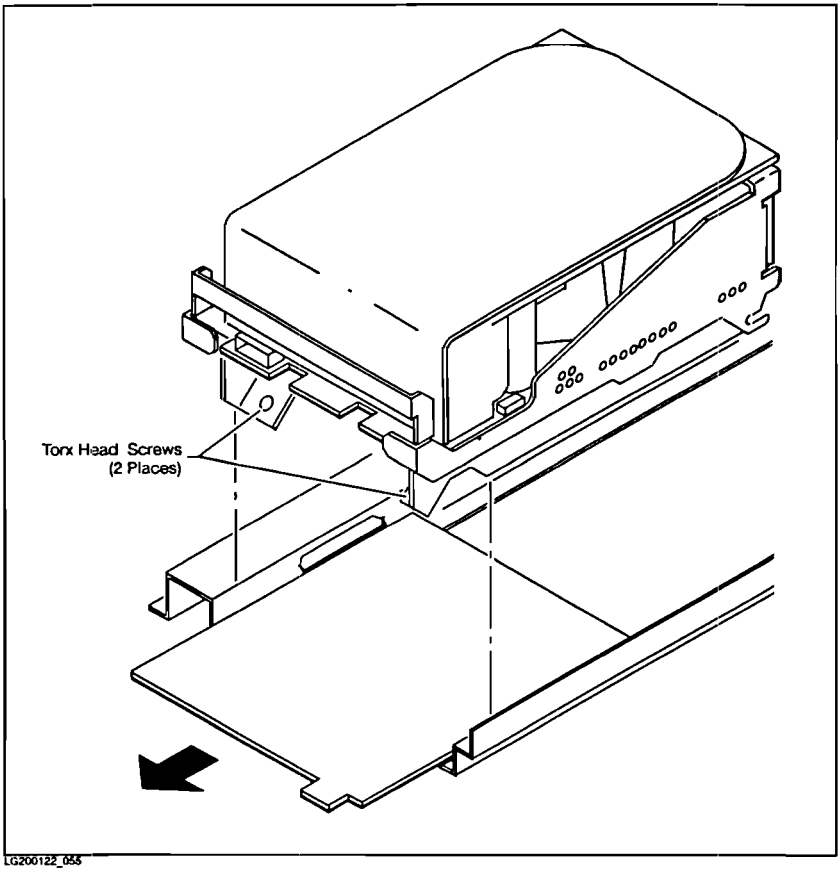


Figure 2-4. Disk Installation

8. Connect the disk controller power cable at the right front edge of the controller PCA. (See Figure 2-5.)
9. Connect the ribbon cables to their respective edge connectors on the drive electronics and controller PCAs.
10. Connect the disk drive power cable to drive electronics PCA.
11. Replace covers and bezels in the reverse order in which they were removed. (If the lower front EMI shield was removed, be sure to connect the ac power cable to the power module.)
12. Apply power to the system and confirm proper installation by checking the disk icons on the system display panel. For example, if disk 1 was installed, the disk 1 icon should be lit.
13. Confirm that the new disk can pass its internal self-test; then proceed to the section "Configuring the Disk Drive into the System."
14. This completes the hardware procedure for installing the front disk(s).

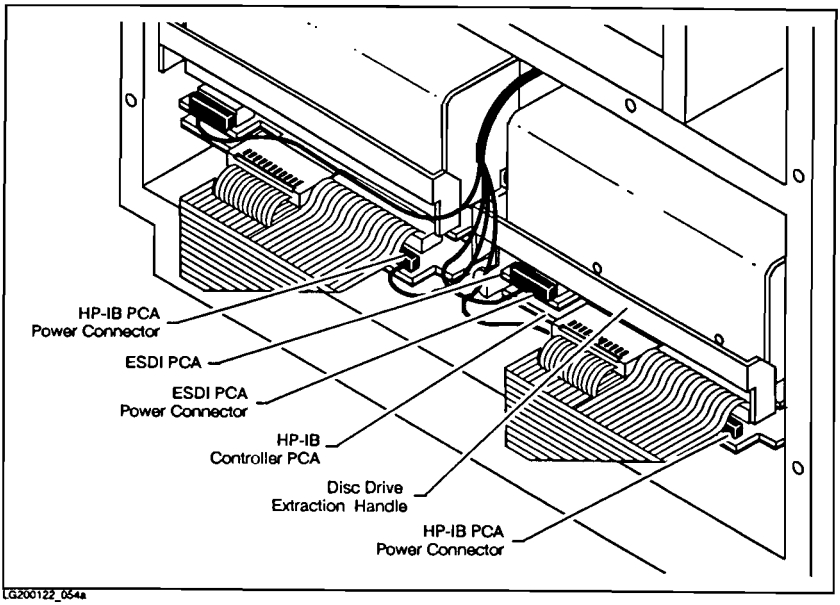


Figure 2-5. Disk Cabling

Accessing the Rear of the System Cabinet

To access the rear of the system cabinet, proceed as follows:

1. Ensure that a full system backup has been completed and shut the system down.
2. Turn the system keyswitch to position 0 and remove the ac power connector from the rear of the cabinet.
3. Disconnect the external HP-IB cables from the rear HP-IB connector panel.
4. Loosen the five TORX screws on the HP-IB connector panel and lift it out. Proceed to the "Rear Disk Installation" section.

Rear Disk Installation

To install disk drive 2 or 3, proceed as follows:

1. Disconnect the internal HP-IB ribbon cable for the DDS-format drive from inside the rear panel. (See Figure 2-6.)
2. Cut the cable ties that secure the previously unused power cables to the cabinet.
3. Unclamp the appropriate rear internal HP-IB ribbon cable from inside the rear HP-IB panel.
4. Plug the rear internal HP-IB ribbon cable into the disk HP-IB controller PCA (left corner). (See Figure 2-3 and Figure 2-6.)
5. Position the disk controller PCA over the mounting guides and slightly to the rear of the brackets as shown in Figure 2-3.
6. Set the PCA into the mounting guides and slide forward.
7. Secure the PCA by inserting the retainer snap in the position shown in Figure 2-3.
8. Slide the disk drive into the mounting bracket and secure with two TORX screws. (See Figure 2-4.)
9. Connect the disk controller power cable at the right front edge of the controller PCA. (See Figure 2-5.)
10. Connect the disk drive ribbon cables to their respective edge connectors on the drive electronics and controller PCAs.
11. Connect the disk drive power cable to drive electronics PCA.
12. Reconnect the internal HP-IB cable for the DDS-format drive to the inside of the HP-IB panel.

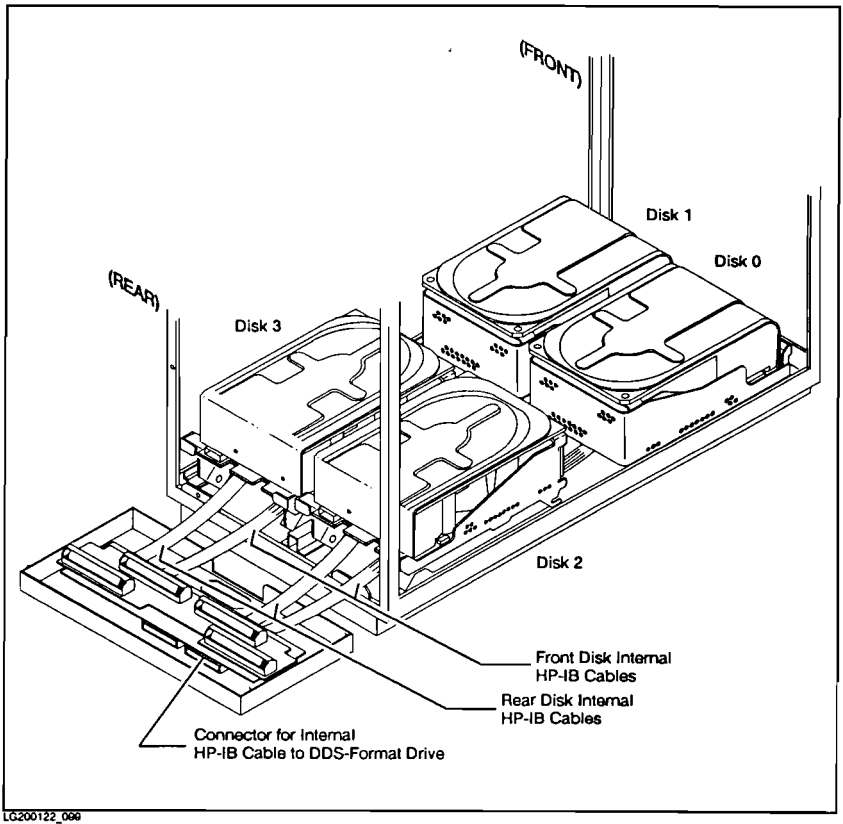


Figure 2-6. Internal HP-IB Cabling for Rear Embedded Disk Drives

13. Replace covers and bezels in the reverse order in which they were removed.
14. Apply power to the system and confirm proper installation by checking the disk icons on the system display panel. For example, if disk 2 was installed, the disk 2 icon should be lit.
15. Confirm that the new disk can pass its internal self-test; then proceed to the section "Configuring the Disk Drive into the System."
16. This completes the hardware procedure for installing the rear disk(s).

Configuring the Disk Drive Into the System

To configure the disk drive into the system, refer to the *Guide for the New System Operator*, HP part number 32650-90137.

Preventive Maintenance

There is no preventive maintenance necessary on the SPU. However, there is regular maintenance for the embedded DDS-format drive. **This is the responsibility of the customer.**

DDS-Format Drive Preventive Maintenance

The DDS-format drive tape heads require cleaning every 25 hours of use. The following procedure is recommended for cleaning the tape heads:

Note Use only the HP Cleaning Cassette, part number 92283K.

- Insert cleaning cassette into the tape drive. The tape drive will automatically load the tape and clean the heads.
- At the end of the cleaning cycle, the tape drive will unload and eject the cleaning cassette.
- After each use, note the date of use on the label provided on the front of the cassette.
- After 25 uses, discard the cleaning cassette.

3 Configuration

This chapter contains configuration data for HP 3000 Series 920 Family and HP 9000 Model 822S Family Computer Systems.

Table 3-1. HP 3000 Series 920 System Configuration Data

Peripheral/Device	Min.	Max.
SPU		
Processor	1	1
CIO Channel Adapter	1	1
ECC memory	24 MB	56 MB
PSI	0	3
CIO HP-IB	1	3
CIO LAN (802.3/802.4)	1	1
CIO HP-FL	0	2
CIO MUX	1	1
CIO SCSI HA[1]	0	3
Access Port	1	1
DISK DRIVES		
Embedded	1	4[2]
External (HP-IB)	0	9
External (HP-FL)	0	0
Total	1	10
Disk Capacity		12 GB
TAPE DRIVES		
Embedded	0	1
External	0	4
Total	1	4
PRINTERS		
Line printer (HP-IB)	0	4
Page printer (HP-IB)	0	4
Remote printer (RS-232-C)	0	16
Total (HP-IB)	0	4
WORKSTATIONS		
Terminals	1	20
PCs in Terminal Mode	1	20
LAN-connected PCs	0	Note[3]
DTCs	0	4
Virtual Terminal Sessions	0	20
Total	1	20
OPTICAL DISK LIBRARY SYSTEMS		
Total[4]	0	3

Note

[1] The CIO SCSI Host Adapter (HA) is available on MPE XL Release 3.0 and higher. On MPE XL 3.0, the HA only supports the HP Series 6300 Model 20GB/A optical disk library system.

[2] Systems with 4 embedded disk drives require at least 2 CIO HP-IB Device Adapters: 1 for all the internal disk drives and 1 for the DDS tape drive and external devices.

[3] PCs connected directly to a LAN require a minimum of 2 Virtual Terminal (VT) sessions each. Therefore, a maximum of 10 PCs is allowed.

[4] The HP Series 6300 Model 20GB/A optical disk library system is available on MPE XL Release 3.0 and higher. Each optical disk library system requires a dedicated CIO SCSI HA.

Table 3-2. HP 3000 Series 922/922LX/922RX System Configuration Data

Peripheral/Device	Series 922		Series 922LX		Series 922RX	
	Min.	Max.	Min.	Max.	Min.	Max.
SPU						
Processor	1	1	1	1	1	1
CIO Channel Adapter	1	1	1	1	1	1
ECC memory	32 MB	128 MB	24 MB	128 MB	32 MB	128 MB
PSI	0	3	0	3	0	3
CIO HP-IB	1	3	1	3	1	3
CIO LAN (802.3/802.4)[1]	1	1	1	1	1	1
CIO HP-FL	0	2	0	2	0	2
CIO MUX	1	1	1	1	1	1
CIO SCSI HA[2]	0	3	0	3	0	3
Access Port	1	1	1	1	1	1
DISK DRIVES						
Embedded[3]	2	4	1	4	2	4
External (HP-FL)[4]	0	8	0	9	0	8
External (HP-IB)	0	8	0	9	0	8
Total	2	10	1	10	2	10
Disk Capacity		12 GB		12 GB		12 GB
TAPE DRIVES						
Embedded	0	1	0	1	0	1
External	0	4	0	4	0	4
Total	0	4	0	4	0	4
PRINTERS						
Line printer (HP-IB)	0	4	0	4	0	4
Page printer (HP-IB)	0	4	0	4	0	4
Remote printer (RS-232-C)	0	16	0	16	0	16
Total (HP-IB)	0	4	0	4	0	4
WORKSTATIONS						
Terminals	1	152	1	32	1	64
PCs in Terminal Mode	0	152	0	32	0	64
LAN-connected PCs	0	Note[5]	0	Note[5]	0	Note[5]
DTCs	0	6	0	6	0	6
Virtual Terminal Sessions	0	120	0	120	0	120
Total	1	152	1	32	1	64[6]
OPTICAL DISK LIBRARY SYSTEMS						
Total[7]	0	3	0	3	0	3

Note

[1] DTCs and system-to-system networks must be connected to the same LAN interface PCA.

[2] The CIO SCSI Host Adapter (HA) is available on MPE XL Release 3.0 and higher. On MPE XL 3.0, the HA only supports the HP Series 6300 Model 20GB/A optical disk library system.

[3] Systems with 4 embedded disk drives require at least 2 CIO HP-IB Device Adapters: 1 for all the internal disk drives and 1 for the DDS tape drive and external devices.

[4] The system disk (Disk 0) cannot be connected to HP-FL.

[5] PCs connected directly to a LAN require a minimum of two Virtual Terminal (VT) sessions each. Therefore, a maximum of 60 PCs is allowed.

[6] System configuration for the Series 922RX is the same as for the Series 922, except the software license limits the number of users to 64.

[7] The HP Series 6300 Model 20GB/A optical disk library system is available on MPE XL Release 3.0 and higher. Each optical disk library system requires a dedicated CIO SCSI HA.

Table 3-3. HP 3000 Series 932 System Configuration Data

Peripheral/Device	Min.	Max.
SPU		
Processor	1	1
CIO Channel Adapter	1	1
ECC memory	32 MB	128 MB
PSI	0	3
CIO HP-IB	2	3
CIO LAN (802.3/802.4)[1]	1	1
CIO HP-FL	0	2
CIO MUX	1	1
CIO SCSI HA[2]	0	3
Access Port	1	1
DISK DRIVES		
Embedded	2	4
External (HP-FL)[3]	0	16
External (HP-IB)	0	16
Total	2	18
Disk Capacity		22 GB
TAPE DRIVES		
Embedded	0	1
External	0	4
Total	0	4
PRINTERS		
Line printer (HP-IB)	0	6
Page printer (HP-IB)	0	4
Remote printer (RS-232-C)	0	28
Total (HP-IB)	0	6
WORKSTATIONS		
Terminals	1	240
PCs in Terminal Mode	0	240
LAN-connected PCs	0	Note[4]
DTCs	0	12
Virtual Terminal Sessions	0	240
Total	1	240
OPTICAL DISK LIBRARY SYSTEMS		
Total[5]	0	3

Note

[1] DTCs and system-to-system networks must be connected to the same LAN interface PCA.

[2] The CIO SCSI Host Adapter (HA) is available on MPE XL Release 3.0 and higher. On MPE XL 3.0, the HA only supports the HP Series 6300 Model 20GB/A optical disk library system.

[3] The system disk (Disk 0) cannot be connected to HP-FL.

[4] PCs connected directly to a LAN require a minimum of two Virtual Terminal (VT) sessions each. Therefore, a maximum of 120 PCs is allowed.

[5] The HP Series 6300 Model 20GB/A optical disk library system is available on MPE XL Release 3.0 and higher. Each optical disk library system requires a dedicated CIO SCSI HA.

Table 3-4. HP 3000 Series 948/958 System Configuration Data

Peripheral/Device	HP 3000 Series 948			HP 3000 Series 958		
	Minimum	Maximum	Typical	Minimum	Maximum	Typical
SPU						
Processor	1	1	1	1	1	1
ECC memory[1]	64 MB	256 MB	128 MB	96 MB	256 MB	128 MB
PSI	0	5	1	0	5	1
Precision Bus Adapter[2]	1	2	1	1	2	2
PBA-IB	1	2	1	1	2	1
PBA-FL	0	1	0	0	1	1
AFL-CIO Channel Adapter	1	1	1	1	1	1
CIO HP-IB	1	4	1	1	4	1
CIO LAN (802.3)	1	2	2	1	2	2
CIO HP-FL	0	2	1	0	2	1
CIO MUX	1	1	1	1	1	1
CIO SCSI HA[3]	0	3	0	0	3	0
Access Port	1	1	1	1	1	1
DISK DRIVES						
Embedded (HP-IB)	1	4	4	1	4	4
External (HP-IB)	0	12	4	0	12	8
External (HP-FL)	0	24	0	0	24	0
Total	1	28	8	1	28	12
Disk Capacity		34.8 GB			34.8 GB	
TAPE DRIVES						
Embedded	1	1	1	1	1	1
External	1	5	1	1	5	1
Total	1	5	2	1	5	2
PRINTERS						
Line (256X)	0	8	1	0	8	1
Page (268X)	0	4	0	0	4	0
Remote (RS-232-C)	0	48	8	0	48	8
Total (HP-IB)	0	8	1	0	8	1
WORKSTATIONS						
Terminals (includes console)	1	400	150	1	600	150
PCs as Terminals (via DTC)	0	400	50	0	600	50
LAN PCs	0	Note[4]	-	0	Note[4]	-
DTCs	0	16	6	0	24	6
Virtual Terminal Sessions	-	300	-	0	300	0
Total	1	400	200	1	600	200
OPTICAL DISK LIBRARY SYSTEMS						
Total[5]	0	3	0	3	0	3

Note

[1] If memory exceeds 64 MB, then total memory boards cannot exceed 7 and the sum of the memory boards plus the PSI boards cannot exceed 8.

[2] A maximum of two Precision Bus Adapters (PBAs) are allowed in the system. The PBA-IB is a combination of PBA and HP-IB card; the PBA-FL is a combination of PBA and HP-FL card. These PBAs can be used to support either two CIO HP-IB channels or a combination of one CIO HP-IB and one CIO HP-FL. On 948/958 systems, PBAs only support disk drives. For performance reasons, Ldev 1 must be configured using a PBA.

[3] The CIO SCSI Host Adapter (HA) is available on MPE XL Release 3.0 and higher. On MPE XL 3.0, the HA only supports the HP Series 6300 Model 20GB/A optical disk library system.

[4] PCs on a LAN may create multiple virtual terminal sessions to a Series 948/958, depending on the applications in use. The maximum number of LAN PCs which can concurrently access a Series 948/958 equals the maximum virtual terminal sessions divided by the number of virtual terminal sessions per PC.

[5] The HP Series 6300 Model 20GB/A optical disk library system is available on MPE XL Release 3.0 and higher. Each optical disk library system requires a dedicated CIO SCSI HA.

Table 3-5. HP 9000 Series 822/832 System Configuration Data

Peripheral/Device	HP 9000 Model 822		HP 9000 Model 832	
	Minimum	Maximum	Minimum	Maximum
SPU				
Processor	1	1	1	1
ECC Memory[1]	8 MB	128 MB	16 MB	128 MB
PB PSI[1]	0	2	0	2
PBA-FL[2]	0	2	0	2
PB HP-IB[3]	1	3	1	3
PB LAN (802.3)	0	2	0	2
PB MAP (802.4)[1]	0	1	0	1
PB GPIO	0	2	0	2
PB MUX	1	6	2	8
PB AP MUX[4]	1	6	2	8
PB SCSI/Parallel Adapter[5,7]	0	4[6]	0	4[6]
DISK DRIVES				
Embedded	1	4	1	4
Total HP-IB	1	12	1	12
Total HP-FL	0	16	0	16
Total SCSI[5]	0	16[8]	0	16[8]
HP-IB Disk Capacity	335 MB	8.0 GB	335 MB	8.0 GB
HP-FL Disk Capacity*	0	21.4 GB	0	21.4 GB
SCSI Disk Capacity	0	10.6 GB	0	10.6 GB
Total Disk Capacity	335 MB	24.1 GB	335 MB	24.1 GB
TAPE DRIVES				
Embedded	1	1	1	1
External	1	4	1	4
Total	1	4	1	4
Total SCSI[5]	0	8	0	8
PRINTERS				
Total (HP-IB)	0	0	0	0
Total (RS-232-C)	0	20	0	20
Total (Parallel/Centronics)[7]	0	4	0	4
WORKSTATIONS				
Console	1	1	1	1
Session Connects, including console	1	96	1	128
DTCs	0	1	0	2
TS8s	0	2	0	2
OPTICAL DISK LIBRARY SYSTEMS[5]	0	4[9]	0	4[9]

Note

* Includes 4 internal HP-IB disks.

[1] If memory exceeds 64 MB, then the total number of memory and PSI cards cannot exceed 8. There can be no more than a total of 9 memory cards + MAP with MODEM sets (note that MAP with MODEM is two cards and equals one set).

[2] Each PBA-FL supports a maximum of 8 disk devices.

[3] Each HP-IB supports a maximum of 4 disk/tape devices.

[4] AP functionality, including remote support, is provided on HP-UX Release 8.0 and higher.

[5] Only external SCSI peripheral devices are supported. Support is provided on HP-UX Release 8.0 and higher.

[6] A maximum of 7 SCSI peripheral devices are supported on each SCSI/Parallel Adapter. Each SCSI/Parallel Adapter has 7 available SCSI device addresses. Most SCSI peripheral devices use only 1 SCSI address. The HP Series 6300 Model 20GB/A optical disk library system uses 3 SCSI addresses (one for each MO disk drive and one for the AutoChanger).

SCSI peripherals (disks and tapes) can be mixed and matched in any combination on the same SCSI bus, as long as the total number of SCSI addresses does not exceed seven.

[7] Each SCSI/Parallel Adapter supports 1 parallel printer.

[8] The HP Series 6300 Model 20GB/A optical disk library system counts as 2 disk drives.

[9] Each SCSI/Parallel Adapter supports a maximum of 2 HP Series 6300 Model 20GB/A optical disk library systems. If 2 optical disk library systems are racked on the same cabinet, they count as 4 disks and 2 optical disk library systems, requiring 6 SCSI device addresses.

Table 3-6. HP 9000 Model 842/852 System Configuration Data

	HP 9000 Model 842			HP 9000 Model 852		
	Minimum	Maximum	Typical	Minimum	Maximum	Typical
SPU						
Processor	1	1	1	1	1	1
ECC memory[1]	32 MB	256 MB	48 MB	64 MB	256 MB	64 MB
PSI[1]	0	5	0	0	5	0
PBA-FL[2]	0	4	0	0	4	0
PB HP-IB[3]	1	3	2	1	3	2
PB LAN (802.3)[2]	0	4	0	0	4	0
PB MAP (802.4)[1]	0	2	0	0	2	0
PB GPIO	0	4	0	0	4	0
PB AP MUX[4]	1	10	3	1	10	6
PB SCSI/Parallel Adapter[5,7]	0	6[6]		0	6[6]	
DISK DRIVES						
Embedded (HP-IB)	1	4	4	1	4	4
Total HP-IB	1	12		1	12	
External (HP-FL)	0	32	0	0	32	4
Total SCSI[5]	0	32[8]		0	32[8]	
HP-IB Disk Capacity	670 MB	8.0 GB		670 MB	8.0 GB	
HP-FL Disk Capacity*	0	42.8 GB		0	42.8 GB	
SCSI Disk Capacity	0	21.2 GB		0	21.2 GB	
Total Disk Capacity	670 MB	45.6 GB		670 MB	45.6 GB	
TAPE DRIVES						
Embedded	0	1	1	0	1	1
External	0	8	0	0	8	0
Total	0	8	1	0	8	1
Total SCSI[5]	0	8		0	8	
PRINTERS						
Total (HP-IB)	0	0	0	0	0	0
Total (RS-232-C)	0	20		0	20	
Total (Parallel/Centronics)[5]	0	6	2	0	6	2
WORKSTATIONS[9] (Connected)						
System console	1	1	1	1	1	1
Session connects, incl. console	1	400	80	1	400	128
Avesta DTCs 48/16	0/0	-	0/0	0/0	-	0/0
TS8s	0	2	1	0	2	1
OPTICAL DISK LIBRARY SYSTEMS[5]						
Total	0	4[10]	0	0	4[10]	0
CDROM						
Total	0	2	0	0	2	0

Note

* Includes 4 internal HP-IB disks.

[1] If memory exceeds 64 MB, then the total number of memory and PSI cards cannot exceed 8. There can be no more than a total of 9 memory cards + MAP with MODEM sets (note that MAP with MODEM is two cards and equals one set).

At maximum memory, there can be no PSI cards and only one MAP with MODEM (LAN 802.4 with either modem) card set.

[2] The system can have no more than a total of 6 PBA-FL + LAN cards, no more than 4 PBA-FL cards, and no more than 4 LAN cards. Each PBA-FL supports a maximum of 8 disk devices.

[3] Each HP-IB supports a maximum of 4 disk/tape devices.

[4] AP functionality, including remote support, is provided on HP-UX Release 8.0 and higher.

[5] External SCSI peripheral devices are supported on HP-UX Release 8.0 and higher.

[6] A maximum of 7 SCSI peripheral devices are supported on each SCSI/Parallel Adapter. Each SCSI/Parallel Adapter has 7 available SCSI device addresses. Most SCSI peripheral devices use only 1 SCSI address. The HP Series 6300 Model 20GB/A optical disk library system uses 3 SCSI addresses (one for each MO disk drive and one for the AutoChanger).

SCSI peripherals (disks and tapes) can be mixed and matched in any combination on the same SCSI bus, as long as the total number of SCSI addresses does not exceed seven.

[7] Each SCSI/Parallel Adapter supports 1 parallel printer.

[8] The HP Series 6300 Model 20GB/A optical disk library system counts as 2 disk drives.

[9] The system can have up to 400 session connects. There is no limit on the number of DTCs; the limit is on actual connections. Up to 2 TS8s (8-port Terminal Servers) are allowed.

[10] Each SCSI/Parallel Adapter supports a maximum of 2 HP Series 6300 Model 20GB/A optical disk library systems. If 2 optical disk library systems are racked on the same cabinet, they count as 4 disks and 2 optical disk library systems, requiring 6 SCSI device addresses.

Cardcage Configurations

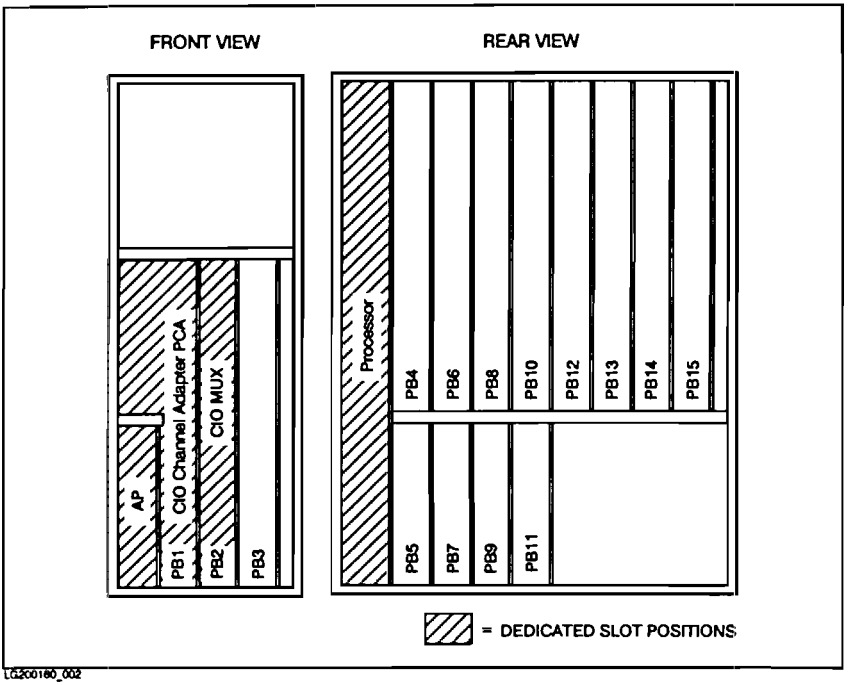


Figure 3-1. HP 3000 Dedicated Slot Positions

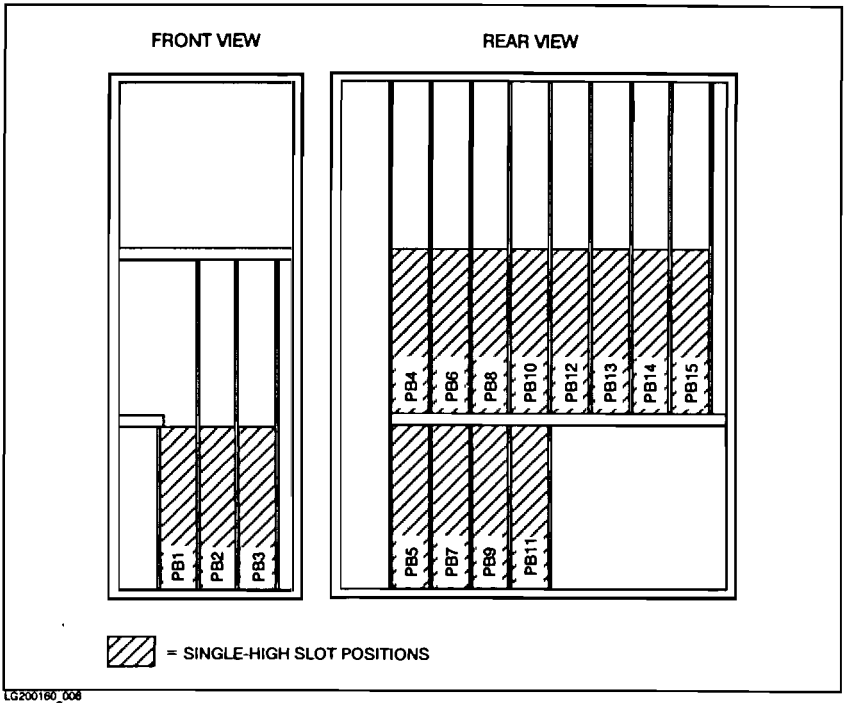


Figure 3-2. HP 3000 Single-High Slot Positions

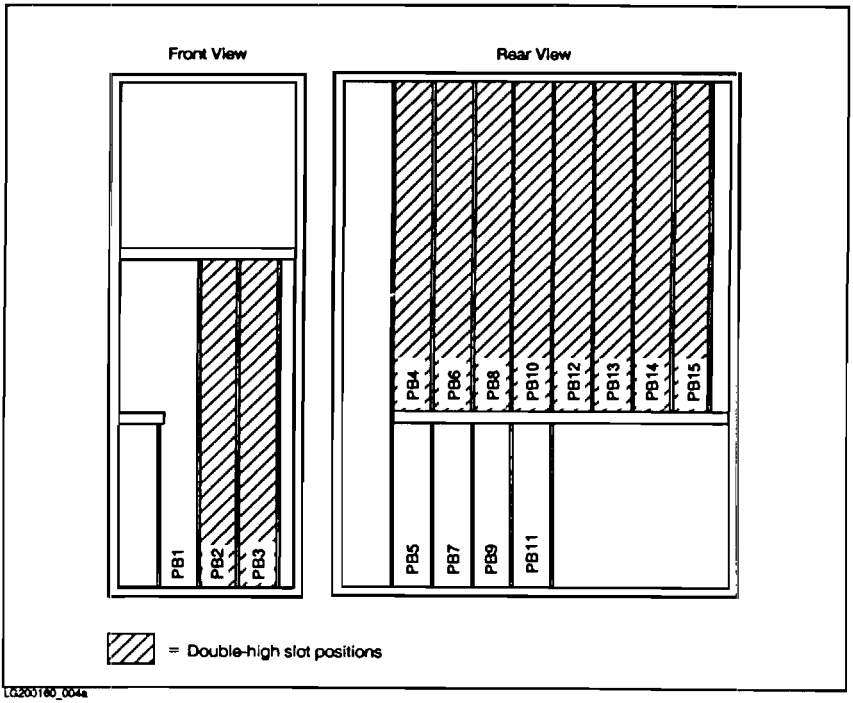


Figure 3-3. HP 3000 Double-High Slot Positions

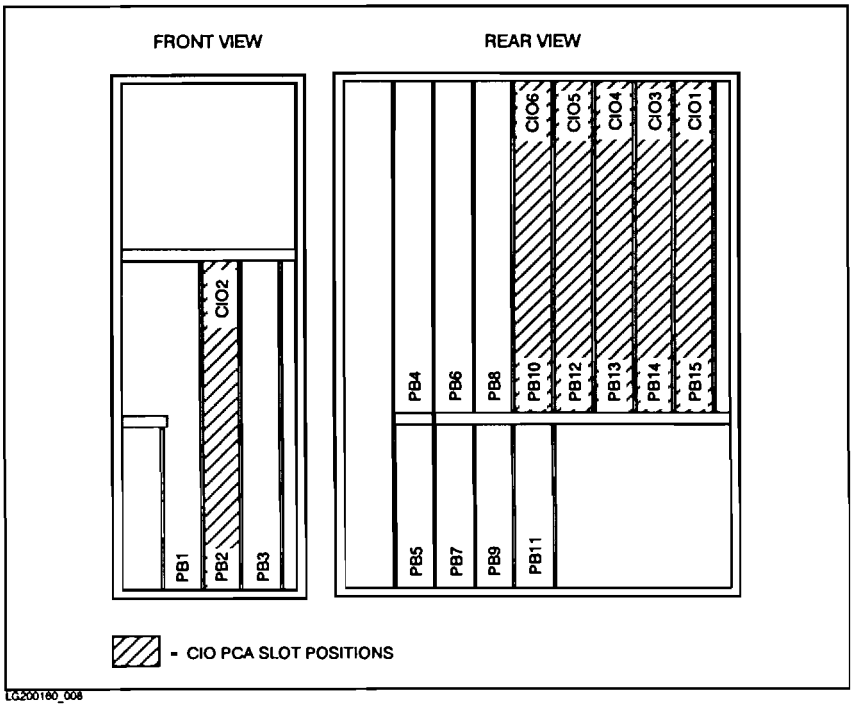


Figure 3-4. HP 3000 Series 920/922/932 CIO PCA Slot Positions

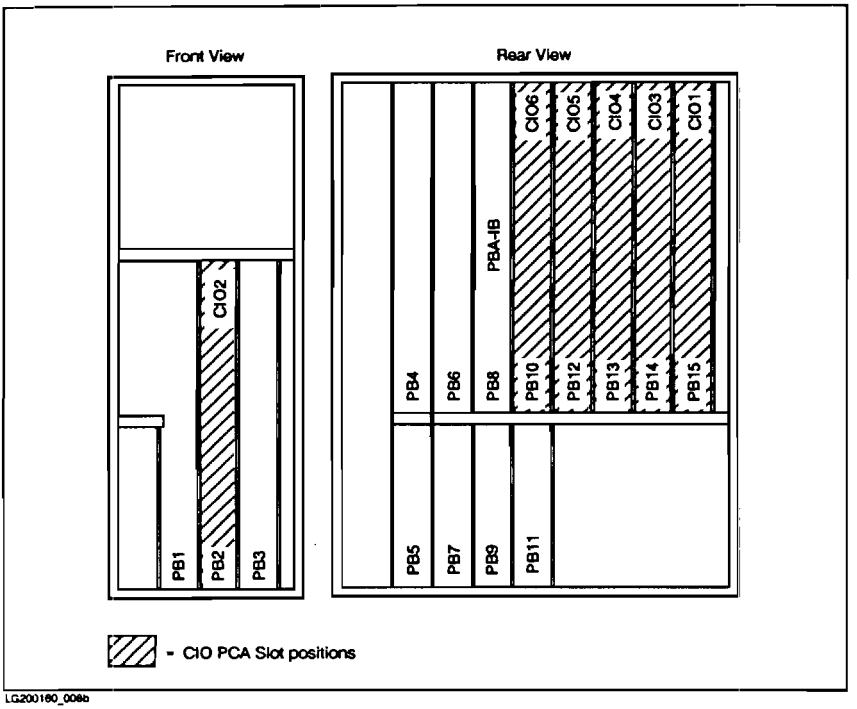


Figure 3-5. HP 3000 Series 948/958 CIO PCA Slot Positions

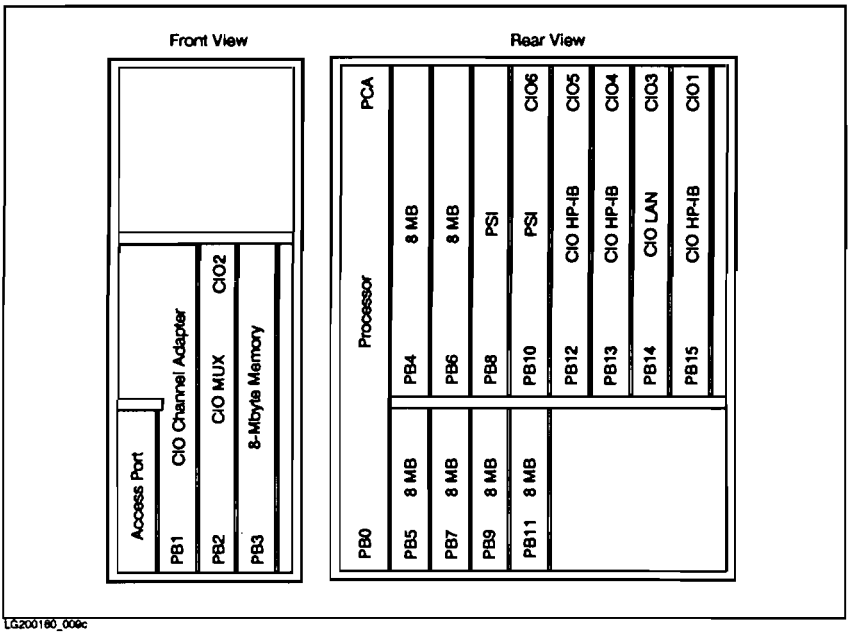


Figure 3-6. HP 3000 Series 922/932 Sample Configuration with HP-IB

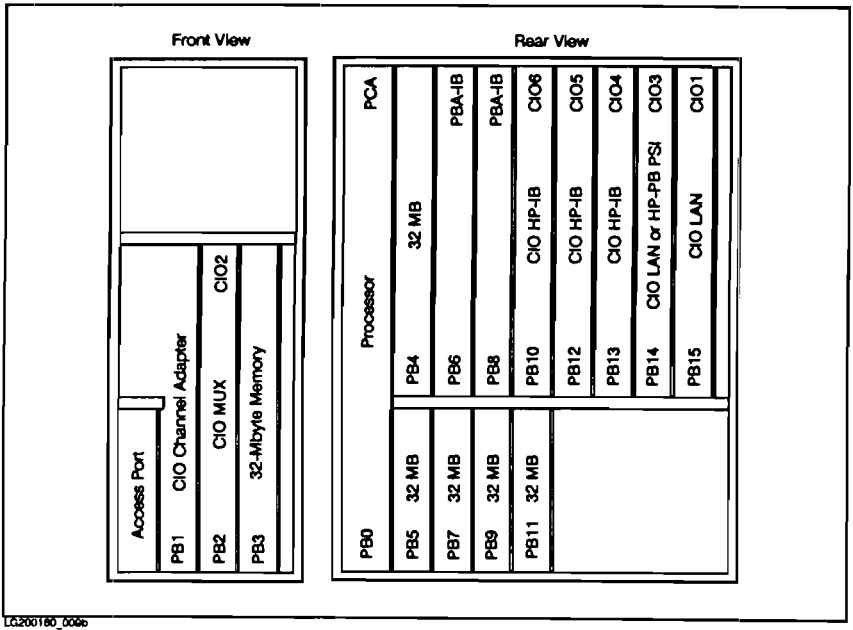


Figure 3-7. HP 3000 Series 948/958 Sample Configuration with HP-IB

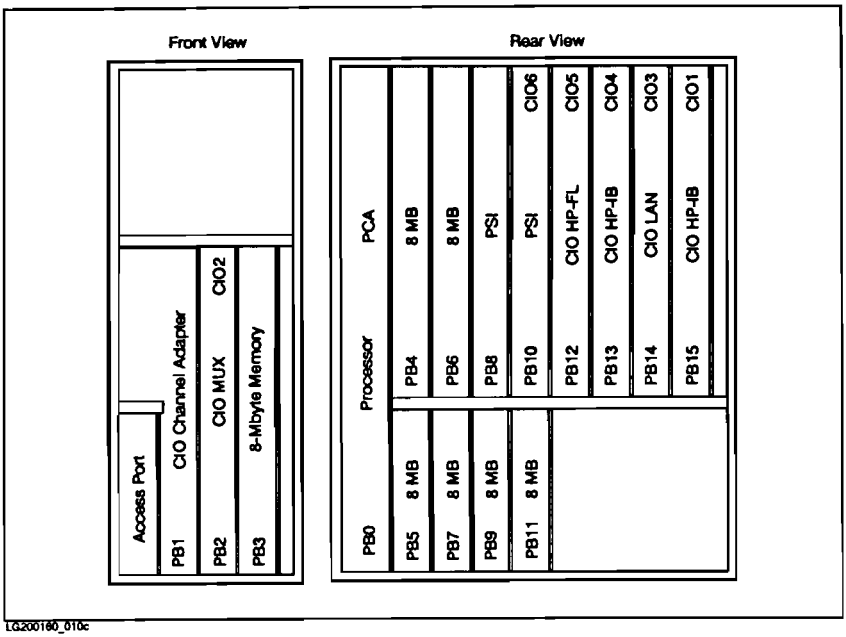


Figure 3-8. HP 3000 Series 922/932 Sample Configuration with HP-FL

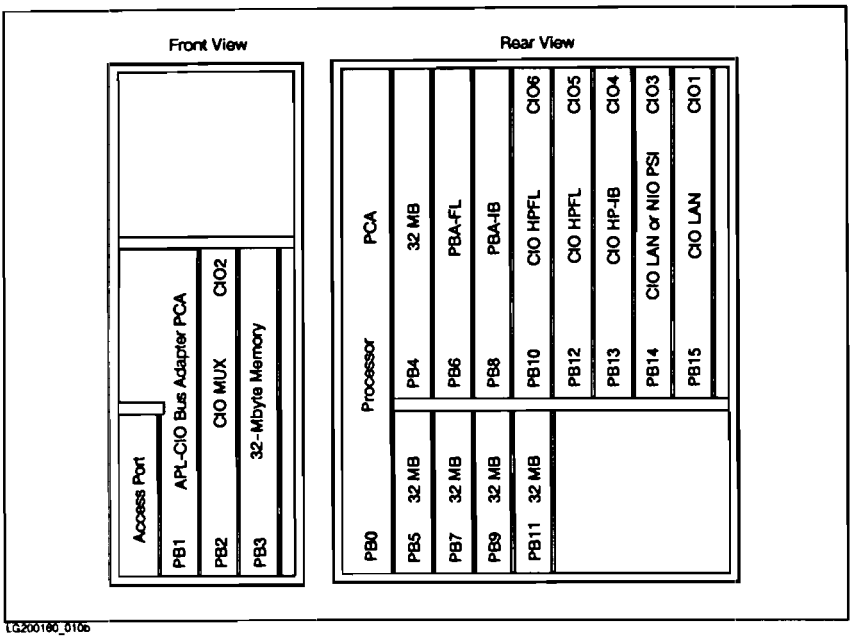


Figure 3-9. HP 3000 Series 948/958 Sample Configuration with HP-FL

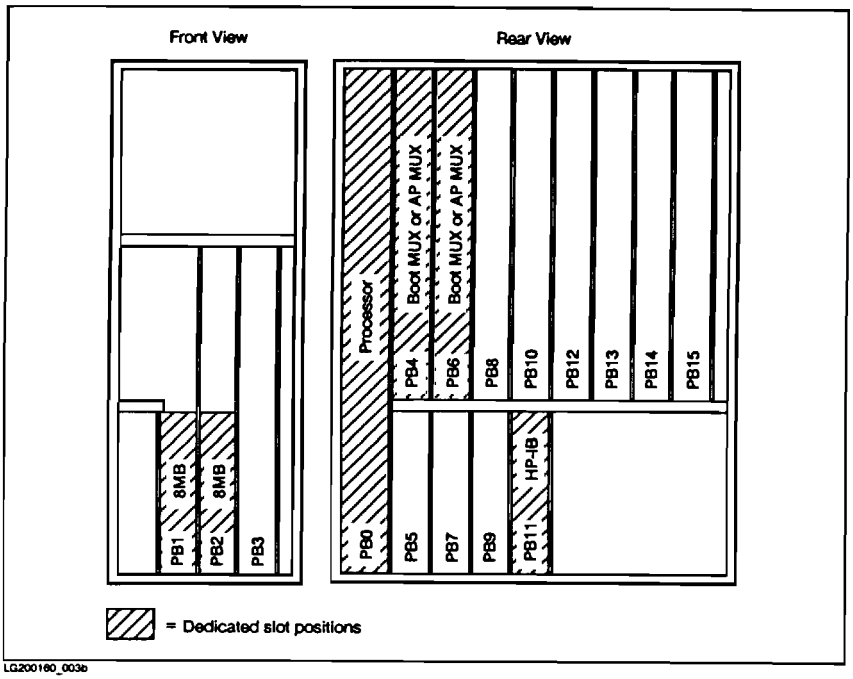


Figure 3-10. HP 9000 Model 822S/832S Dedicated Slot Positions

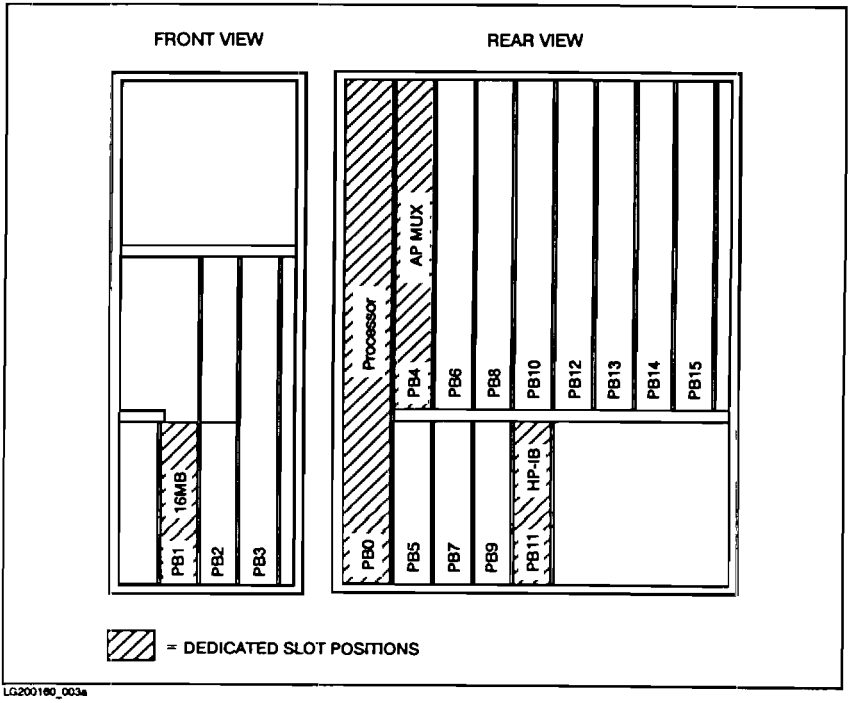


Figure 3-11. HP 9000 Model 842S/852S Dedicated Slot Positions

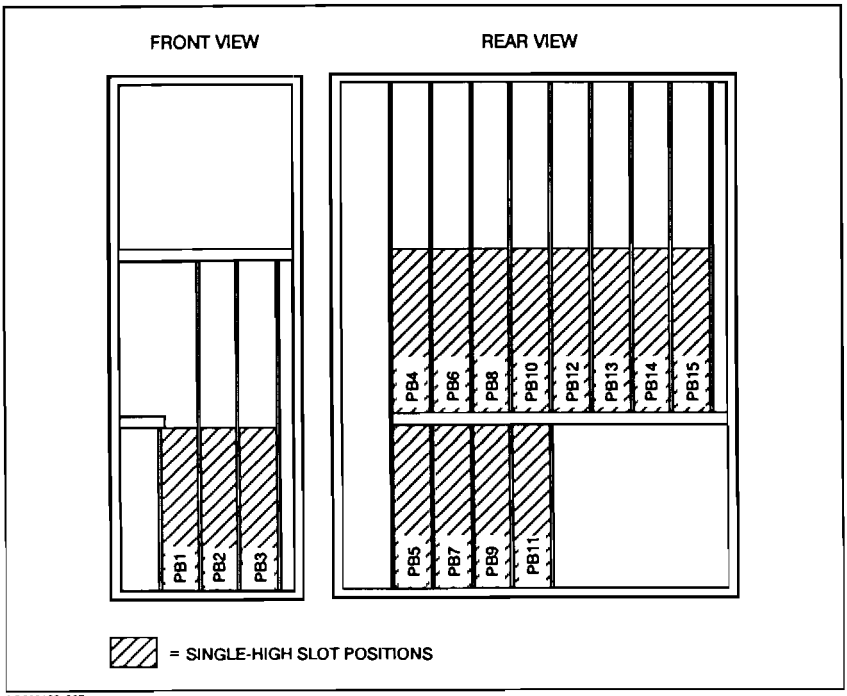


Figure 3-12. HP 9000 Single-High Slot Positions

Single-high PCAs for Model 822S Family systems include:

- 8 or 16 channel MUX
- Memory
- HP-IB
- SCSI/Parallel HA
- PSI
- GPIO

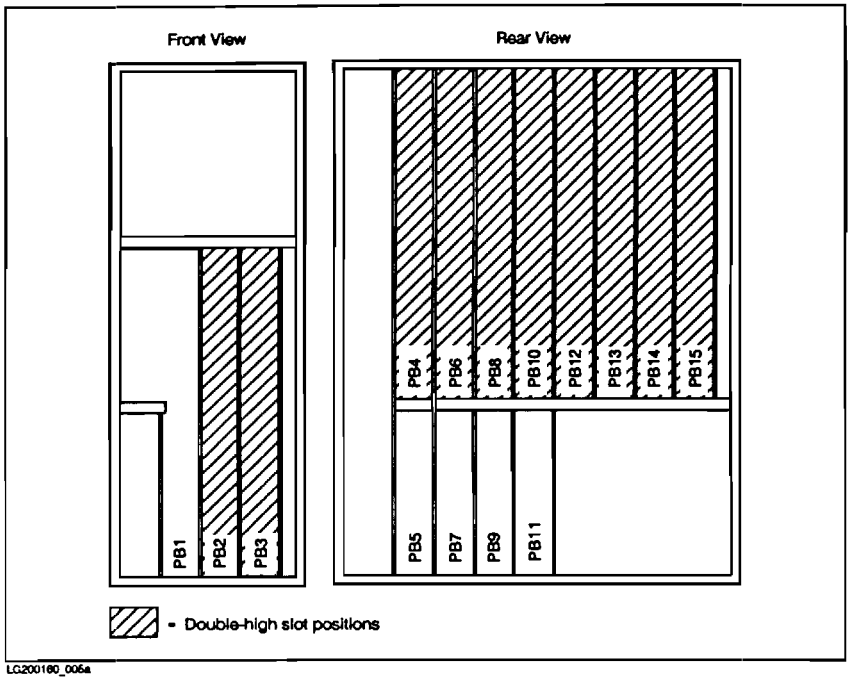


Figure 3-13. HP 9000 Double-High Slot Positions

Double-high PCAs for Model 822S Family systems include:

- LAN
- MAP
- PBA-FL

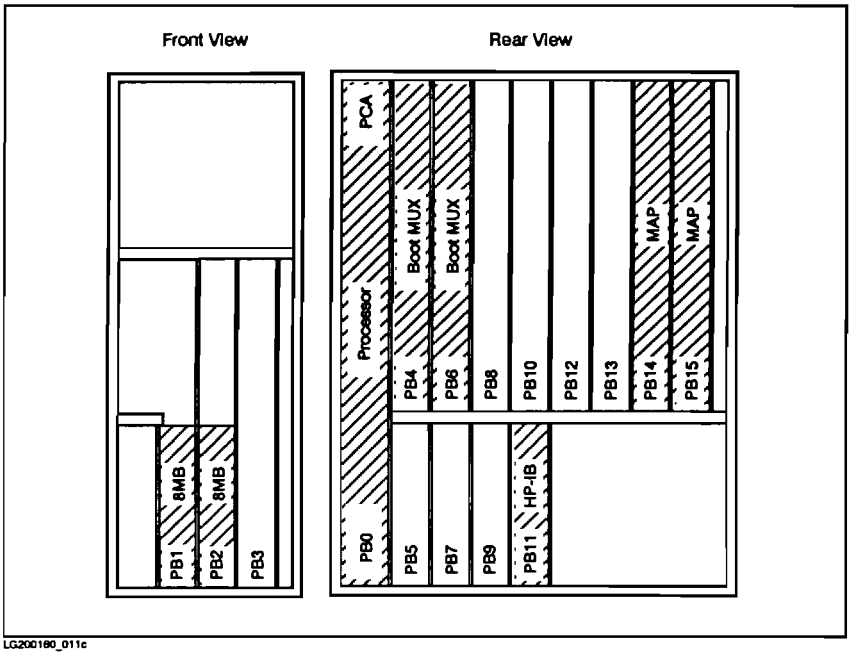


Figure 3-14.
HP 9000 Model 822S/832S Default Configuration and Dedicated MAP Slot Positions

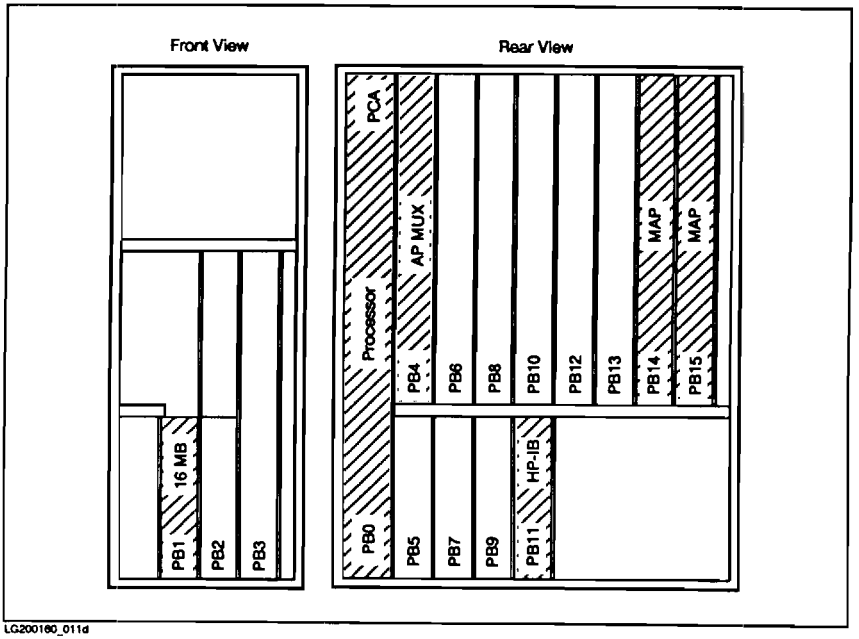


Figure 3-15.
HP 9000 Model 842S/852S Default Configuration and Dedicated MAP Slot Positions

Remote Support Configuration

U.S. Remote Support Kit

In the United States, the Remote Support Kit used for PA-RISC systems is HP part number 5062-7107. The kit contains the Remote Support modem (HP 50759A) and the cables for connecting the modem to the system. The modem can be ordered without cables by ordering HP 50759A.

HP 50759A Modem Configuration

The HP 50759A modem is configured by setting the two banks of dip switches that are located on the bottom of the modem. There is one bank of 8 dip switches (S1-S8), and one bank of 4 dip switches (X1-X4). Each dip switch is numbered and can be in either the down or up position.

The two banks of dip switches are accessible without having to open the modem case. The sticker on the bottom of the modem describes the function of each of the possible switch settings.

HP 9000 Model 800 Systems

- S1-S8 all up.
- X1, X2, X4 down, all others up.

HP 3000 Series 900 Systems

Table 3-7 lists the modem switch settings for MPE XL systems.

Table 3-7. HP 50759A Modem Switch Configuration

System	Switch Setting
Systems without HP Predictive Support	X1, X2, X4 set to Down All others set to Up
Systems with HP Predictive Support	
Configuration Type 1 (Manual Dial)	X1, X2, X4 set to Down All others set to Up
Configuration Type 2 (Auto Dial)	X1, X4, S4, S8 set to Down All others set to Up

4

Troubleshooting

This chapter provides the error codes that are displayed on the hexadecimal display on the SPU front panel when a fault occurs. It also provides Access Port self-test codes and troubleshooting flowcharts to aid in locating faults to the FRU.

The troubleshooting flowcharts consist of the following:

- System Troubleshooting
- Power Troubleshooting
- Bus Fault Troubleshooting
- Memory Troubleshooting
- Embedded Disk Troubleshooting
- Embedded Tape Troubleshooting
- Boot Path Troubleshooting
- Console Path Troubleshooting
- MPE XL Operating System Fault Troubleshooting

Testboot

TESTBOOT is a special mode of booting that was built into PDC to aid the manufacturing process. TESTBOOT speeds the boot process by skipping some of the steps normally performed during self-test and initialization. TESTBOOT was never intended to be enabled outside the manufacturing environment. It is possible to unknowingly enable TESTBOOT when attempting to do a transfer-of-control by entering TC at the `Enter boot path, command, or ?>` prompt instead of the `CM>` prompt.

A characteristic display can appear on the console while attempting to boot with TESTBOOT enabled. It looks similar to the following message:

```
Processor Dependent Code (PDC)
    received an unexpected trap #1 at address 0x00011AB4

Halted (in tight loop) -- Time to Reboot.
```

TESTBOOT can be disabled again by following a three-step process:

1. Disconnect or disable all bootable devices connected to the computer so that the boot attempt will fail.
2. Enter the following commands:

```
Enter boot path, command, or ?> T

Should the test boot sequence be enabled (Y or N)? N
```

3. Reset the computer.

Hex Display Codes, Except Series 920

The following tables list the hex display codes for all systems except the HP 3000 Series 920. Processor self-test test/error codes are listed separately for the various processors. Memory RAM/Controller self-test and boot sequence codes are the same for all systems.

Processor Self-Test Test/Error Codes
HP 3000 922/932 and HP 9000 822S/832S

Table 4-1.
Series 922/932 and Model 822S/832S
Central Processing Unit (CPU) Test/Error Codes

Hex Code	Test Name	Description
1081	REALTEST	Tests the general registers and Branch, LDIL, ADDI, COMB, and COMIB instructions
1082	TEST_ALU	Tests the ALU (ADD, ADDI, AND, ANDCM, BL, COMBF, LDIL, OR, SHADD, SUB, SUBB, UADDCM, UXOR, XOR)
1083	TESTBRLN	Tests the general register link storage during branch and Link instructions (BL, BLR, BV, MFCTL, RSM, SSM, ADDB, MOVB)
1084	TESTSHFT	Tests the shifter during Shift instructions (SHD)
1085	TESTSAR	Tests the SAR Control Register(CR 11) during EXTRU, MTCTL, MFCTL, and OR instructions.
1086	TESTEXDP	Tests the Constant/Variable Extract/Deposit instructions (DEP,DEPI, EXTRU, EXTRS, VDEP, VDEPI, VEXTRU, VEXTRS, VZDEP, VZDEPI, ZDEP, ZDEPI)
1086	TESTBB	Test the Branch on Bit instruction (BB)
1087	TESTARCN	Tests Arithmetic/Logic, Extract/Deposit, and Nullification (ADDIB, DCOR, OR, SUB, and SUBI instructions)
1088	TESTCRBW	Tests the Carry/Borrow bits in the PSW
1088	TESTCRBW	Additional tests of the Carry/Borrow bits in the PSW, verifying the Bypass/Interlock mechanisms
1089	TESTCRS	Tests the Control Registers (BREAK, MTSM, RFI instructions)
108A	TESTMISC	Tests some of the traps and tests the ADDIO, ADDIL, COMCLR, and LDO instructions

Table 4-2.
Series 922/932 and Model 822S/832S
System Interface Unit (SIU) Test/Error Codes

Hex Code	Test Name	Description
10D0	SIU_A	Pattern tests the following SIU registers: CR15(EIEM), CR23 (EIR), CR24 through CR31(TRs), CR16 (ITLIM and ITCNT)
10D1	SIU_CT	Tests for crosstalk between the temporary CRs (CR24 through CR31)
10D2	SIU_FL	Tests access of HP-PB bus I/O registers
10D3	SIU_IN	Tests external interrupt functionality
10D4	SIU_RST	Tests that a command reset to the SIU (processor) signals a hard reset and causes an HPMC
-	SIU_B	Initial set up for SIU_B selftests
10E0	SIU_MID	Tests the following HP-PB bus transactions and their timing: - read cache line (Read32) - purge data cache
10E1	SIU_NM	Tests invalid memory/IO addresses and the SIU_IOCTL register
10E2	SIU_FLH	Tests the flush data cache instruction and its timing
10E3	SIU_CP	Tests copyouts from the SIU to memory (flush) and its timing

Table 4-3.
Series 922/932 and Model 822S/832S
Cache Control Unit (CCU) Test/Error Codes

Hex Code	Test Name	Description
-	CCU_A	Main controller for CCU_A selftest
2X80	CCU_REG	Tests the CCU diagnose registers
2X81	CCU_ADDR	Tests the CCU address lines
2X82	CCU_RAM	Tests the CCU RAM array
2X83	CCU_HPAR	Initializes CCU horizontal parity
2X84	CCU_VPAR	Initializes CCU vertical parity
2X85	CCU_DIR	Tests a store to a valid clean entry and sets dirty=1
2X86	CCU_PDCA	Tests a Purge Data Cache instruction and sets valid=0
2X87	CCU_PAR	Tests the CCU tag/data parity functionality
2X88	CCU_X	Tests code execution from cache
-	CCU_B	Main controller for CCU_B selftest
2X90	CCU_VLD	Tests a load into an invalid entry. Sets valid=1 and dirty=0
2X91	CCU_PDCB	Further tests Purge Data Cache instruction functionality
2X92	CCU_FDC	Tests the Flush Data Cache instruction functionality
2X93	CCU_LOCK	Tests the CCU lock functionality

Hex digit D1 represents the CCU which is being tested. For example:

```
0x2000          0x2100
   ↑               ↑
D1 = CCU0       D1 = CCU1
```

Table 4-4.
Series 922/932 and Model 822S/832S
TLB Control Unit (TCU) Test/Error Codes

Hex Code	Test Name	Description
20D0	TCU_DIAG	Tests the TCU diagnose registers
20D1	TCU_REG	Tests Space/Control registers
20D2	TCU_SQ	Tests the PC space queue (CR17)
20D3	TCU_PAR	Tests parity field in TLB RAM array
20D4	TCU_RPN	Tests RPN/RPN parity fields & IO Device bit in RPN RAM array
20D5	TCU_DISD	Tests SID field in Data TLB RAM array
20D6	TCU_DVPN	Tests VPN field in Data TLB RAM array
20D7	TCU_DPID	Tests PID field in Data TLB RAM array
20D8	TCU_DAR	Tests Access Rights field in Data TLB RAM array
20D9	TCU_DVF	Tests valid/flags fields in Data TLB RAM array
20DA	TCU_ISID	Tests SID field in Instruction TLB RAM array
20DB	TCU_IVPN	Tests VPN field in Instruction TLB RAM array
20DC	TCU_IPID	Tests PID field in Instruction TLB RAM array
20DD	TCU_IAR	Tests Access Rights field in Instruction TLB RAM array
20DE	TCU_IVF	Tests valid/flags fields in Instruction TLB RAM array
20DF	TCU_HASH	Tests hashing functionality for the TCU entry selection
20E0	TCU_PURG	Tests TLB purge functionality
20E1	TCU_LOCK	Tests TCU lock functionality
20E2	TCU_PF	Tests TLB parity functionality
20E3	TCU_RPF	Tests RPN parity functionality
20E4	TCU_VDT	Tests virtual data translation
20E5	TCU_ARF	Further tests the Access Rights/PC space queue functionality

Table 4-5.
Series 922/932 and Model 822S/832S
Floating Point Controller (FPC) Test/Error Codes

Hex Code	Test Name	Description
4080	FPC0	Tests the MIU floating-point registers
4081	FPC1	Tests a variety of floating-point operations
4082	FPC2	Tests convert from float-float double-single
4083	FPC3	Tests convert from float-float single-double
4084	FPC4	Tests convert from float-fixed double-single
4085	FPC5	Tests convert from float-fixed single-single
4086	FPC6	Tests convert from fixed-float single-single
4087	FPC7	Tests compares

Processor Self-Test Test/Error Codes
HP 3000 948/958 and HP 9000 842S/852S

Table 4-6.
Series 948/958 and Model 842S/852S
Early Processor Self-Test

Hex Code	Test Name	Description
1080	cpu14	r/w pattern test of cpu diag registers
1081	cpu1	short branches, adds, combs, mtctl, mfctl
1082	cpu2	pattern test of alu
1083	cpu3	branch link, vectored, and register cmds
1084	cpu4	shifter in the mask merge block
1085	cpu5	shift amount register
1086	cpu6	extract/deposit instructions
1086	cpu7	branch on bit instrnctions
1087	cpu8	arithmetic conditions
1088	cpu9	carry/borrow bits of the psw
1089	cpu10	control registers
108a	cpu11	miscellaneous: ldo, addil, comclr, addo, subo, addit
108b	cpu13	itimer
108c	cpu12	external interrupts
10d0	pmia2	PMI FLEX register test
10d3	pmia3	PMI EIR writes
10d4	pmia4	TOC
10d4	pmia5	PMI HPMC test
2080	cmux1	CMUX diag register pattern test
20b0	t2_ram_tst	TLB2 RAM pattern test
2082	cram_tst	cache RAM test

Table 4-7.
Series 948/958 and Model 842S/852S
Processor Initialization Self-Test

Hex Code	Test Name	Description
20d1	tlb_init	tlb initialization
2083	cache_init	cache initialization
108d	diag_conf	diagnose register initialization

Table 4-8.
Series 948/958 and Model 842S/852S
Late Processor Self-Test

Hex Code	Test Name	Description
none	vm_init	PDIR/HASH table initialization
2090	cr_ext	extended cache RAM test
2091	cram_init	I/D cache RAM init w/good parity
20c0	t2_ram_ext	extended TLB2 RAM test
20c1	t2_ram_init	TLB2 RAM init w/good parity
108d	diag_conf	diagnose register initialization
2092	cmux2	basic D-cache functionality
2093	cmux3	basic I-cache functionality
2094	cmux4	PDC and FDC instructions
2095	cmux5	byte merge / align logic
2096	cerr1	parity errors in I-cache tags test
2097	cerr2	parity errors in D-cache tags test
2098	cerr3	parity errors in I-cache data test
2099	cerr4	parity errors in D-cache data test
20c2	cerr5	seed/find TLB2 parity errors in ITLB2
20c3	cerr6	seed/find TLB2 parity errors in DTLB2
20c4	cmux6	basic functionality of TLB2
20c5	cmux7	purge functionality of TLB2
209a	c_hash_tst	cache address hashing test
20c6	t_hash_tst	TLB2 address hashing test
20e0	tlb1_2	PID control register pattern test
20e1	tlb1_3	SR control register pattern test
20e2	tlb1_4	test lock bits in TLB1 RAMS
20e3	tlb1_5	test RPN portions of TLB1 RAMS
20e4	tlb1_6	test VPN portions of TLB1 RAMS
20e5	tlb1_7	test protection portions of TLB1 RAMS
20e6	tlb1_10	test lockout functionality of TLB1
20e7	tlb1_1	TLB1 RAMs init w/lock bits off & good parity
209b	buff1	store buffer addr/data pattern test
209c	buff2	test store bypass capabilities of wr buffer
209d	buff3	test load bypass capabilities of wr buffer
209e	buff4	test flush/purge bypass caps of wr buffer
209f	buff5	test store-through/interlock caps of wr buff
10e0	pmib1	PMIN flush buffer test
10e1	pmib2	PMIN semaphore (ldcw) test
108d	diag_conf	configure diagnose registers for selftest

Memory RAM/Controller Test/Error Codes

Hex digit D1 represents HP-PB bus slot number of memory board being tested. For example:

```
0x7400          0x7700
  ↑               ↑
D1 = Slot 4    D1 = Slot 7
```

Table 4-9. Memory Array Test/Error Codes

Hex Code	Test Name	Description
7080	-	Initial search for MCs
7081	-	No MCs were found on the HP-PB bus
7X90	MEM_ATEST	Include file and initial setup of SPA register and parameters for the tests that follow
7X94	M_RAM_ND	Tests RAM array for parity errors (non-destructive)
7X96	M_RAM_D	Tests the RAM array (destructive)
-	M_RAM_RTN	Returns signaling success
-	BAD_MA	Returns signaling failure

Table 4-10. Architected Memory Controller Test/Error Codes

Hex Code	Test Name	Description
7XB0	ENTRY_TEST	Sets up parameters, downloads Entry_Test code into card being tested, executes Entry_Test code, and returns results

Table 4-11. Memory Controller Test/Error Codes

Hex Code	Test Name	Description
7X90	MEMINIT	Include file and initial setup for the tests and tests the MC registers
7X91	M_WRITE	Tests write/read/load and clear to RAM (destructive)
7X92	M_TSBE	Tests ECC by causing single-bit errors (destructive)
7X93	M_M_TDBE	Tests that a double-bit error can be detected (destructive)
7X97	M_CLEAR	Initializes RAM to zeros (destructive)
-	M_RETURN	Returns signaling success
-	M_WAIT	Waits for an expected HPMC
-	BAD_MC	Returns signaling failure

Boot Sequence Codes

This section lists the sequence of hex codes that will be displayed to the front display panel hex LEDs during bootup.

Hex digit D0 describes the type of function being performed.
Hex digit D1 represents the HP-PB bus slot number of a board being tested.
Hex digit D2 represents either a test descriptor when a test is being performed, or the CIO bus slot number of a board in the console/boot path.
Hex digit D3 further describes the function/test being performed. For example:

```
0x7C16                  0x9120 or 0xA110
  ↑                       ↑
  D0 = Memory             D0 = Console
   D1 = HP-PB slot C       D1 = HP-PB slot 1
    D2 = Mem Array          D2 = CIO slot 2
     D3 = Dest Test          D3 = Search
```

Note Due to the short duration that some of the following codes are displayed, you will not be able to see them unless the system fails while displaying that code. Also, hex codes that are preceeded by a "*" will only be displayed when the described error occurs.

Table 4-12. Power Fail Recovery

Hex Codes	Test Name	Description
108X	CPU and CPU_A	The CPU register and instruction execution tests
10DX	SIU_A TEST	The SIU tests that do not require memory
2X8X	CCU_A TEST	The CCU tests that do not require memory
7080	MEM SEARCH	The HP-PB bus is being searched for memory boards
*7081	NO MEMORY	No memory boards were fonnd on the HP-PB bus
7X90	INIT IMM	Initialize the Initial Memory Module
7x94	MEM READ	The first 32K of the IMM is tested nondestructively

Table 4-13. Hard Boot

Hex Code	Test	Description
108X	CPU and CPU_A	The CPU register and instruction execution tests
10DX	SIU_A TEST	The SIU tests that do not require memory
2X8X	CCU_A TEST	The CCU tests that do not require memory
7080	MEM SEARCH	The HP-PB bus is being searched for memory boards
*7081	NO MEMORY	No memory boards were found on the HP-PB bus
7X90	INIT MEM	Initialize a Memory Module
7X96	DEST MEM	Destructively test a Memory Module's RAM array
7XB0	ENTRY TEST	The IODC ENTRY_TEST for an architected Memory Module
(7X9X)	MCF TEST	MC tests for those systems with Zorro memory boards
*40FF	FPC REV	Retrieve the FPC revision
2X9X	CCU_B TEST	The CCU tests that require memory
10EX	SIU_B TEST	The SIU tests that require memory
20DX	TCU_A TEST	The TCU tests that require memory
20EX	TCU_A TEST	Also the TCU tests that require memory
9XX0	CON SEARCH	The console path attempted
*9XX1	CON IODC ERR	Console IODC ENTRY_IO error occurred (i.e. write/read)
*9XX3	PDC_IODC ERR	Error reading IODC from the physical module
*9XX4	PHYS MOD ERR	Error initializing or testing the physical module
*9XX5	LOG MOG ERR	Error initializing the logical module
*9XX6	ENTRY_I/O ERR	Error executing ENTRY_I/O to the console
*9XX7	E_TEST ERR	Error executing the physical module's ENTRY_TEST code
AXX0	BOOT SEARCH	The boot path attempted
*AXX3	PDC_IODC ERR	Error reading IODC from the physical module
*AXX4	PHYS MOD ERR	Error initializing or testing the physical module
*AXX5	LOG MOD ERR	Error initializing the logical module
*AXX6	ENTRY_I/O ERR	Error executing ENTRY_I/O to the boot device
*AXX7	E_TEST ERR	Error executing the physical module's ENTRY_TEST code
*AXX8	DEVICE TIMER	Boot Device unavailable, retrying until timer expires

Table 4-14. Soft Boot (Failed TOC)

Hex Code	Test Name	Description
3FFF	TOC start	Start of TOC debounce loop
108X	CPU_A TEST	The CPU register and instruction execution tests
10DX	SIU_A TEST	The SIU tests that do not require memory
2X8X	CCU_A TEST	The CCU tests that do not require memory
7080	MEM SEARCH	Searching for memory boards on the HP-PB bus
*7081	NO MEMORY	No memory boards were found on the HP-PB bus
7X90	INIT MEM	Initialize a Memory Module
7X94	NONDEST MEM	Nondestructively test a Memory Module's RAM array
*40FF	FPC REV	Retrieve the FPC revision
9XX0	CON SEARCH	The console path attempted
*9XX1	CON IODC ERR	Console IODC ENTRY_IO error occurred (i.e. write/read)
*9XX3	PDC_IODC ERR	Error reading IODC from the physical module
*9XX4	PHYS MOD ERR	Error initializing or testing the physical module
*9XX5	LOG MOD ERR	Error initializing the logical module
*9XX6	ENTRY_I/O ERR	Error executing ENTRY_I/O to the console
*9XX7	E_TEST ERR	Error executing the physical module's ENTRY_TEST code
AXX0	BOOT SEARCH	The boot path attempted
*AXX3	PDC_IODC ERR	Error reading IODC from the physical module
*AXX4	PHYS MOD ERR	Error initializing or testing the physical module
*AXX5	LOG MOD ERR	Error initializing the logical module
*AXX6	ENTRY_I/O ERR	Error executing ENTRY_I/O to the boot device
*AXX7	E_TEST ERR	Error executing tbe physical module's ENTRY_TEST code
*AXX8	DEVICE TIMER	Boot Device unavailable, retrying until timer expires

Table 4-15. Nonsequential Error Codes

Hex Code	Test Name	
*10XX	UNEXP TRAP	The boot trap handler received an unexpected trap (XX = the trap number in hex)
*2050	TCU HPMC	Signal that a TCU HPMC occurred
*20C5	LPMC TEST	Testing CCUs due to an LPMC
*20C8	PF ERR	A power fail interrupt occurred during self tests
408X	FPC TEST	Floating Point Coprocessor test (OS->PDC_COPROC->FPC)
*503F	HPMC?	Unknown HPMC when appears alone
*503F	NIO BUS HPMC	HP-PB bus HPMC when followed by 0x7XYY and/or 0x8XYY.
*7XYY	MEM MOD HPMC	7=HPMC on mem mod, X=slot #, YY=estat of mod with err
*8XYY	I/O MOD HPMC	8= HPMC on I/O mod, X=slot #, YY=estat of mod with err

Series 920 Hex Display Codes

The information in the Hex Display for the Series 920 SPU can come from a variety of sources.

- During self-test, codes are put into the Hex display to indicate errors and forward progress of the test. These codes, which are non-flashing, are listed and described in Table 4-16. Note that HPMCs and TRAPS can occur during self-test also (see below).
- HPMCs (High Priority Machine Checks) or traps can occur during self-test, ISL boot, diagnostics, or Operating System operation. These codes will flash on-and-off either singly or in groups. Codes starting with "B000" and "DEAD" are handled by the MPE XL trap handler, and are not specific to the Series 920 (see the section "MPE XL Operating System Halts" in this chapter). Codes specific to the 920 are listed and described in Table 4-18.
- During the boot process, certain error conditions can be encountered which will cause error codes of the form "9XXX" and "AXXX". These error codes are listed and described in Table 4-17.
- Codes of the form "CXXX" occur during ISL or during programs that run under ISL (e.g., IOMAP). These codes are not unique to the Series 920, and hence can be found in either the Operating System documentation or the documentation for the utility being run. (Also see Table 4-19.)
- While the operating system is running, the display may show information about system performance. See the operating system documentation for information. (Also see Table 4-19.)

Note For information about using the special-purpose Boot Console Handler program, including commands and a list of self-test subtest numbers, refer to the section *Boot Console Handler Program* located at the end of chapter 5.

Table 4-16. Series 920 Self-Test (non-flashing) Hex Codes

HEX CODE	FAILING SELFTEST
CPU TESTS	
10C0	CPU General Register Test
10C1	CPU Branch Test
10C2	CPU ALU Test
10C3	CPU CCR Test
10C4	CPU SAR Test
10C5	CPU EIEM Test
10C6	CPU Timer Test
10C7	CPU Temp Test
HPMC TEST	
10C8	HPMC Test
CACHE TESTS	
20C0	Cache Execute Test
20C1	Cache Address Uniqueness Test
20C2	Cache Pattern Test
20C3	Cache Transaction Test
20C4	Cache Floating Point Transaction Test
20C5	Cache Parity Error Test
PDH TESTS	
30C0	PBI[1] Power-on State Test
30C1	ROM Checksum Test
30C2	Real Time Clock Register Test
30C3	Real Time Clock Tic Test

Table 4-16. Series 920 Self-Test (non-flashing) Hex Codes (continued)

HEX CODE	FAILING SELFTEST
PDH TESTS (Continued)	
30C4	Stable Storage Checksum Test
30C5	Non-Volatile Checksum Test
30C6	Non-Volatile Pattern Test
30C7	PBI[1] Register Test
30C8	PBI[1] Broadcast Interrupt Test
30C9	PBI[1] Processor Interrupt Test
30CA	PBI[1] HPMC Test
30CB	PBI[1] Address Loopback Test
30CC	PBI[1] Tag Loopback Test
30CD	PBI[1] Semaphore Test
30CE	PBI[1] Hit-Miss Test
30D4	Battery Backup Preparation Test
30D5	Battery Backup Check Test
Floating Point Coprocessor Tests	
(Reference Only) Does not apply to S/920	
40C1	Floating Point Status Test
40C2	Floating Point Load/Store Test
40C3	Floating Point Absolute Single Test
40C4	Floating Point Absolute Double Test
40C5	Floating Point Compare Test
40C6	Floating Point Add/Subtract Test
40C7	Floating Point Multiply/Divide Test
40C8	Floating Point Convert Test
40C9	Floating Point Exception Test
40CF	Floating Point Unknown Error

Table 4-16. Series 920 Self-Test (non-flashing) Hex Codes (continued)

HEX CODE	FAILING SELFTEST
Memory Self-Tests	
"S" indicates HP-PB slot number of memory card under test.	
7010	No Initial Memory Module Found
7SC0	Memory Extended Self-test, Slot=S
7SC1	Memory Address Uniqueness Self-test, Slot=S
7SC2	Memory Complement Address Uniqueness Self-test, Slot=S
7SC3	Memory Pattern Self-test, Slot=S
70C4	Memory Refresh Self-test, Slot=S
7SC5	Memory Initial Memory Controller Self-test, Slot=S
7SC6	Not used on the S/920
7SF0	Memory Module running Entry_test, Slot=S

Note [1]Precision Bus Interface

Table 4-17. Series 920 Boot (non-flashing) Error Codes

ERROR CODE	FAILING SELFTEST
CONSOLE PATH CONDITIONS	
9000	Could not Retrieve/Determine Primary Console Path
9001	Could not Retrieve/Determine Default Console Path
9S00	Could not Initialize Primary Console Device in Slot SX
9S01	Could not Initialize Default Console Path
9088	No Console Available
BOOT PATH CONDITIONS	
A000	Could not Retrieve Primary Bootpath from Stable Storage
A001	Could not Retrieve Alternate Bootpath from Stable Storage
AS00	Could not Initialize Primary Boot Device in Slot S
AS01	Could not Initialize Alternate Boot Device in Slot S

Table 4-18. Series 920 HPMC/TRAP (flashing) Error Codes

ERROR CODE	CONDITION
	PROCESSOR-RELATED CODES
1002	Unexpected Power Failure Interrupt
1003	Unexpected Recovery Counter Trap
1004	Unexpected External Interrupt
1005	Unexpected Low Priority Machine Check
1006	Unexpected Instruction TLB Miss Fault/Instruction Page Fault
1007	Unexpected Instruction Memory Protection Trap
1008	Unexpected Illegal Instruction Trap
1009	Unexpected Break Instruction Trap
100A	Unexpected Privileged Operation Trap
100B	Unexpected Privileged Register Trap
100C	Unexpected Overflow Trap
100D	Unexpected Conditional Trap
100E	Unexpected Assists Execution Trap
100F	Unexpected Data TLB Miss Fault/Data Page Fault
1010	Unexpected Non-access Instruction TLB Miss Fault
1011	Unexpected Non-access Data TLB Miss Fault/Non-access Data Page Fault
1012	Unexpected Data Memory Protection Trap/Unaligned Data Reference Trap
1013	Unexpected Data Memory Break Trap
1014	Unexpected TLB Dirty Bit Trap
1015	Unexpected Page Reference Trap
1016	Unexpected Assist Emulation Trap
1017	Unexpected Higher-Privilege Transfer Trap
1018	Unexpected Lower-Privilege Transfer Trap
1019	Unexpected Taken Branch Trap
2040	Cache Error Generated HPMC
2050	TLB Error Generated HPMC

Table 4-18. Series 920 HPMC/TRAP (flashing) Error Codes (continued)

ERROR CODE	CONDITION
BUS ERROR HPMCS	
5004	ERR_ERROR_M (Slave asserted ERROR_L line)
5006	ERR_PROTOCOL_M (Master detected protocol error, timeout)
5007	ERR_ADDRESS (No slave acknowledge)
500D	ERR_STPARITY (Parity error in status phase of transaction)
5035	ERR_DPARITY_M (Parity error in data phase of Read/Clear transaction)
503F	ERR_UNKNOWN (Unknown HPMC detected, probably bus related)
MEMORY ERRORS (SLOT=S)	
(Memory Card in Slot S logged the following in addition to 50XX code:)	
7S01	ERR_SPA
7S02	ERR_INTERNAL
7S03	ERR_MODE
7S04	ERR_ERROR_M
7S05	ERR_DPARITY_S
7S06	ERR_PROTOCOL_M
7S07	ERR_ADDRESS
7S08	ERR_MORE
7S09	ERR_LESS
7S0A	ERR_SA_PARITY
7S0B	ERR_MAPERITY
7S0C	ERR_MDPARITY
7S0D	ERR_STPARITY
7S0E	ERR_CMD
7S0F	ERR_BUS
Non-bus Errors (HPMC) from Memory Card	
7S19	UNCORRECTED ERROR IN ARRAY, SLOT=S
7S18	CORRECTED ERROR IN ARRAY, SLOT=S

Table 4-18. Series 920 HPMC/TRAP (flashing) Error Codes (continued)

ERROR CODE	CONDITION
Other Memory-Detected Errors(HPMC), SLOT=S	
7S34	ERR_ERROR_S
7S35	ERR_DPARITY_M
7S36	ERR_PROTOCOL_S
7S3A	ERR_SELFTEST
7S3A	ERR_BUSY
7S3B	ERR_RETRY
7S3C	ERR_ACCESS
7S3D	ERR_IMPROP
7S3F	ERR_UNKNOWN
I/O Card logged Errors, SLOT=S	
(These should be in addition to a 50XX code)	
8S01	ERR_SPA
8S02	ERR_INTERNAL
8S03	ERR_MODE
8S04	ERR_ERROR_M
8S05	ERR_DPARITY_S
8S06	ERR_PROTOCOL_M
8S07	ERR_ADDRESS
8S08	ERR_MORE
8S09	ERR_LESS
8S0A	ERR_SA_PARITY
8S0B	ERR_MAPARITY
8S0C	ERR_MDPARITY
8S0D	ERR_STPARITY
8S0E	ERR_CMD
8S0F	ERR_BUS
8S34	ERR_ERROR_S

Table 4-18. Series 920 HPMC/TRAP (flashing) Error Codes (continued)

ERROR CODE	CONDITION
8S35	ERR_DPARITY_M
8S36	ERR_PROTOCOL_S
8S3A	ERR_SELFTEST
8S3B	ERR_BUSY
8S3C	ERR_RETRY
8S3D	ERR_ACCESS
8S3E	ERR_IMPROP
8S3F	ERR_UNKNOWN

Operating System Hex Display Codes

Table 4-19 lists operating system-related hexadecimal codes that appear on the SPU front panel. These codes fall into the following general categories:

- Bxxx - MPE XL operating system halts or HP-UX system panics; includes HPMCs
- Cxxx - Initialization and loading codes
- Dxxx - Shutdown codes
- Exxx - Warning codes
- Fxxx - Normal operating codes

Table 4-19. Operating System Hex Display Codes

Code	Type	Cause	Action
B000-BFFF	Info	Operating System dependent	See the section *MPE XL Operating System Halts* or *HP-UX Operating System Errors.*
C000-CFFF		Reserved, except as described below	No Action
C100	Info	Beginning Processor Arbitration	No Action
C109	Info	Initialized SMB Modules	No Action
C2AB	Info	Initializing Memory Arrays (A = slot # of MC; B = value of testing 0 thru F in progress)	No Action
C300	Info	Testing PDH	No Action
C301	Info	Testing NVM	No Action
C302	Info	Testing stable storage	No Action
C400	Info	Initializing direct port as console	No Action
C4x0	Info	Initializing Primary Console Device	No Action
C50x	Info	Locating Primary Boot Device	No Action
C54x	Info	Initializing Primary Boot Device	No Action
C58x	Info	Loading IPL from Primary Boot Device	No Action
C5F0	Info	Boot media not in LIF format	No Action
C5F1	Info	IPL not on Primary Boot Device	No Action
C5F8	Info	IPL fails checksum on Primary Boot Device	No Action
C5FF	Info	IPL launched from Primary Boot Device	No Action
C600	Info	Initializing Default Console	No Action
C70x	Info	Locating Alternate Boot Device	No Action

Table 4-19. Operating System Hex Display Codes (continued)

Code	Type	Cause	Action
C74x	Info	Initializing Alternate Boot Device	No Action
C78x	Info	Loading IPL from Alternate Device	No Action
C7F0	Info	Boot media not in LIF format	No Action
C7F1	Info	IPL not on Alternate Boot Device	No Action
C7F8	Info	IPL fails checksum on Alternate Boot Device	No Action
C7FF	Info	IPL launched from Alternate Boot Device	No Action
CA00	Warning	Powerfail recovery software aborted	Call Response Center
CA01	Info	Powerfail recovery software launched	No Action
CB00	Warning	Transfer of Control (TOC) aborted—Softboot launched	Call Response Center
CB01	Info	Transfer of Control (TOC) Software launched	No Action
CE00-CEFF	Info	Software initialization and ISL Diagnostic Information	No Action
CE00	Info	ISL is executing	No Action
CE01	Info	ISL is autobooting from the autoexecute file	No Action
CE02	Info	Cannot find an autoexecute file; Autoboot aborted.	No Action
CE03	Info	No console found, ISL can only autoboot	No Action
CE05	Info	Directory of utilities is too big, ISL reads only 2K bytes	No Action
CE06	Info	Autoexec file is inconsistent: SOM values invalid	No Action
CE07	Info	Autoexecute file input string exceeds 2048 characters; Autoboot aborted	No Action
CE08	Info	ISL command or utility name exceed ten characters	No Action
CE09	Info	ISL has transferred control to the utility	No Action
CE0F	Info		No Action

Table 4-19. Operating System Hex Display Codes (continued)

Code	Type	Cause	Action
CE10	Info	Internal inconsistency: Volume label - FATAL	No Action
CE11	Info	Internal inconsistency: Directory - FATAL	No Action
CE12	Fatal	Error reading autoexecute file	Call Response Center
CE13	Fatal	Error reading console - FATAL	Call Response Center
CE14	Fatal	Error writing to console - FATAL	Call Response Center
CE15	Info	Not an ISL command or utility	No Action
CE16	Info	Utility file header inconsistent: Invalid System ID	No Action
CE17	Info	Error reading utility file header	No Action
CE18	Info	Utility file header inconsistent	No Action
CE19	Info	Utility would overlay ISL in memory	No Action
CE1A	Info	Utility requires more memory than is configured	Check FAST size; call Response Center
CE1B	Info	Error reading utility into memory	Call Response Center
CE1C	Info	Incorrect checksum: Reading utility into memory	Call Response Center
CE1D	Fatal	Console needed - FATAL	Call Response Center
CE1E	Fatal	Internal inconsistency: Boot device class - FATAL	Call Response Center
CE21	Fatal	Destination memory address of utility is invalid	Call Response Center
CE22	Fatal	Utility file header inconsistent: PDC CACHE ENTRY	Call Response Center
CE23	Fatal	Internal inconsistency: IODC ENTRY INIT - console - FATAL	Call Response Center
CE24	Fatal	Internal inconsistency: IODC ENTRY INIT - FATAL	Call Response Center
CE25	Fatal	Internal inconsistency: IODC ENTRY INIT - boot device - FATAL	Call Response Center
CE26	Info	Utility file header inconsistent: Bad AUX_ID	Call Response Center
CE27	Info	Bad utility file type	Call Response Center
CE80	Info	ISL Based diagnostic	Call Response Center

Table 4-19. Operating System Hex Display Codes (continued)

Code	Type	Cause	Action
CE81	Info	ISL Based diagnostic console read error	Call Response Center
CE82	Info	ISL Based diagnostic console write error	Call Response Center
CEC0	Info	HPUXBOOT has been loaded and initialization begun	Call Response Center
CED0	Info	HPUXBOOT initialization in process	Call Response Center
CED2	Info	HPUXBOOT is about to configure I/O system	Call Response Center
CED4	Info	HPUXBOOT is about to mount the root file system	Call Response Center
CEDA	Info	HPUXBOOT is about to list the contents of a directory	No Action
CEDB	Info	HPUXBOOT is about to load the kernel into memory	No Action
CEDC	Info	HPUXBOOT is about to start a copy operation	No Action
CEDD	Info	HPUXBOOT is about to stop (return to rdb)	No Action
CEDE	Info	HPUXBOOT is about to return to ISL	No Action
CEDF	Info	HPUXBOOT is about to launch the kernel	No Action
CEE0	Info	HPUXBOOT kernel has been loaded and initialization has begun	No Action
CEF0	Info	HPUXBOOT kernel has entered main	No Action
CEF2	Info	HPUXBOOT kernel is about to configure the I/O system	No Action
CEF4	Info	HPUXBOOT kernel is about to mount the root file system	No Action
CEF6	Info	HPUXBOOT kernel is about to set up the page-out deamon	No Action
CEF8	Info	HPUXBOOT kernel is about to start the initialization process	No Action
CF00	Info	MPE-XL entering launch	No Action

Table 4-19. Operating System Hex Display Codes (continued)

Code	Type	Cause	Action
CF02	Info	MPE-XL completed mapping of system state	No Action
CF04	Info	MPE-XL allocating memory	No Action
CF08	Info	MPE-XL backing out into genesis	No Action
CF0A	Info	MPE-XL entering genesis	No Action
CF30	Info	MPE-XL initializing of genesis completed	No Action
CF40	Info	MPE-XL initializing of resident kernel completed	No Action
CF50	Info	MPE-XL initializing of non-resident kernel completed	No Action
CF60	Info	MPE-XL CM SL binding completed	No Action
CF70	Info	MPE-XL configuring of system I/O completed	No Action
CF80	Info	MPE-XL system volume initialized and mounted	No Action
CF90	Info	MPE-XL initializing of CM OS completed	No Action
D000-DFFF	Info	Software shutdown in progress (as described below).	No Action
D000	Info	Shutdown begun (Boot has been entered)	No Action
D400	Info	Shutdown in progress (returned from update, buffers to be flushed)	No Action
D600	Info	Shutdown in progress (busy-wait after update has completed)	No Action
D900	Info	Shutdown completed (discs not fully in sync)	No Action
DA00	Info	Shutdown completed (discs fully in sync)	No action
D004	Info	Transfer of Control (TOC) core dump begun	No Action
D904	Info	TOC dump completed (discs not in sync)	No Action
D010	Info	HPMC core dump begun	No Action
D910	Info	HPMC dump completed (discs not in sync)	No Action

Table 4-19. Operating System Hex Display Codes (continued)

Code	Type	Cause	Action
E000-EFFF	Info	Software running, hardware in degraded mode, except as described below	No Action
Ex10*	Warning	High overtemperature	Determine cause for overtemperature and repair
Ex20*	Warning	Low overtemperature	Determine cause for overtemperature and repair
Ex40*	Warning	Battery low	Allow time for battery to recharge
F000-FFFF	Info	Reserved, except as described below	No Action
FxFF*	Info	Normal operation	No Action
Fx1F*	Info	Normal operation HP-UX 8.0 and later	No Action

* For this display code, "x" denotes system activity level (range is 0 through A).

MPE XL Operating System Halts

Factors contributing to system halts can be isolated by referring to the hex display on the SPU control panel. In the hex display, a series of four-character codes will be sequentially displayed; the number of codes in a sequence can vary from one to four.

The first four-character number displayed identifies the source of the halt. When the monitor is the source of the halt (Halt 0 error), the first number is Bx00; a system abort (Halt 7 error) is identified as Bx07 (where x = the processor module number).

Subsequent display numbers identify the reason for the halt. The subsequent numbers are displayed in the form 0xnn, where "x" is a sequence number that begins at 1 and increments, and "nn" is an informational number. The reason for the halt can be interpreted by stringing all the informational ("nn") numbers together to form the hexadecimal error code.

Description of Display Sequence:

```
B800                MONITOR HALT 03A1 (Hex) - Non-functional TLB
0103
02A1
DNZZ
```

```
First Number Displayed:          B 8 0 0
                                 /  | \ \
                     B = OS Fault   |   \-\ Halt Number
                                    |
                                Processor Module Number
```

```
Subsequent Numbers:               0 1 0 3
                                 /  |  \ \
                  0 = Continuation  |    \-\ Informational Number
                                    |
                               Sequence Number

                                  0 2 A 1
                                 /  |  \ \
                  0 = Continuation  |    \-\ Informational Number
                                    |
                               Sequence Number

                                  D N Z Z
                                 /  |  \ \
              D = System Shutdown   |    \-\ Informational Number
                                    |
                        Forced Shutdown (140% complete)
```

Examples of Display Sequences:

```
B000                MONITOR HALT 0300 (Hex) - A "critical" HPMC occurred.
0103
0200
DEAD


B007                SYSTEM ABORT 0003 (Hex) - Genesis Module Error
0103
DEAD


B000                MONITOR HALT 008F (Hex) - Data page fault without
018F                                          RDB, MPE XL not ready.
DEAD


B007                SYSTEM ABORT 0315 (Hex) - NM Ports Module Error
0103
0215
DEAD
```

Note Leading zeroes are assumed when only a single sequence (01xx) information number is displayed, as shown in the two middle examples above (0003 and 008F). The error codes listed in Table 4-20 and Table 4-21 include these leading zeroes, where applicable.

Table 4-20. MPE XL Halt 0 Operating System Error Codes

Code	Type	Cause	Action
0001 thru 0019	Info	The breaker handler to (RDB) was re-entered. The last two digits represent the hex number from Section 5 of the processor ACD.	Unless otherwise noted, for all Halt 0 error codes: Take memory dump; then call Response Center.
0020	Info	A breaker 0 instruction was encountered without R.	
0021	Info	An unknown HPMC occurred.	
0022	Info	A non-recoverable LPMC occurred.	
0028	Info	Reinit_idoc failed to read entry_init.	
0029	Info	Reinit_idoc failed to read entry_io.	
0030	Info	Image larger than first memory controller.	
0031	Info	Series 800 processor will not function in Series 900 system.	Call Response Center.
003E	Info	A non-recoverable branch taken or break trap occurred.	
003F	Info	A bad instruction received from RDB.	
0040	Info	A configured module was lost on power fail.	
0041	Info	A bus converter was lost on power fail.	
0042	Info	A bus converter was added on power fail.	
0043	Info	Memory was added on power fail.	
0044	Info	A module was added on power fail and generated an address conflict.	
0045	Info	Memory self-test failed in map_system_state.	
0046 thru 004E	Info	Error on call to entry_init in reinit_IODC (error return number is 0x50).	

Table 4-20. MPE XL Halt 0 Operating System Error Codes (continued)

Code	Type	Cause	Action
005B thru 005F	Info	The parallel card driver (RDB communications) encountered something that it could not interpret.	Unless otherwise noted, for all Halt 0 error codes: Take memory dump; then call Response Center.
0066 thru 006E	Info	Error on call to entry_io in CONSOLE_READ or CONSOLE_WRITE (error return number is 0x50).	
0080 thru 0099	Info	A trap that neither RDB or MPE XL could interpret occurred (080n is the hex trap number from Section 5 of the processor ACD.	
00F1	Info	Non-recoverable instruction TLB error.	Take memory dump. Replace CPU. May be OS bug.
00F2	Info	Non-recoverable data TLB error.	Take memory dump. Replace CPU. May be OS bug.
00F3	Info	Non-recoverable bus address error.	Take memory dump. Replace CPU. May be OS bug.
00F4	Info	Non-recoverable bus error on I/O space read.	Follow OS Troubleshooting Flowchart Figure 4-9.
00F5	Info	Non-recoverable bus error on memory read or write.	Follow OS Troubleshooting Flowchart Figure 4-9.
00F6	Info	Non-recoverable bus error on I/O space write.	Follow OS Troubleshooting Flowchart Figure 4-9.
00F7	Info	Non-recoverable bus error with processor slave.	Follow OS Troubleshooting Flowchart Figure 4-9.
00F8	Info	Non-recoverable cache tag error.	Take memory dump. Replace CPU. May be OS bug.
00F9	Info	Non-recoverable data cache error.	Take memory dump. Replace CPU. May be OS bug.
00FA	Info	Non-recoverable assist coprocessor error.	Take memory dump. Replace CPU. May be OS bug.
00FB	Info	Non-recoverable instruction cache error.	Take memory dump. Replace CPU. May be OS bug.

Table 4-20. MPE XL Halt 0 Operating System Error Codes (continued)

Code	Type	Cause	Action
0300	Info	A "critical" HPMC occurred.	Unless otherwise noted, for all Halt 0 error codes: Take memory dump; then call Response Center.
0301	Info	Bad state prevented HPMC recovery.	Follow OS Troubleshooting Flowchart Figure 4-9.
0302	Info	Bad reserved bits prevented HPMC recovery.	Follow OS Troubleshooting Flowchart Figure 4-9.
0303	Info	HPMC handling corrupted the real mode stack.	Follow OS Troubleshooting Flowchart Figure 4-9.
0321	Info	Cache data was corrupted and cannot be located.	Replace CPU.
0322	Info	Cache data for a known address was corrupted.	Replace CPU.
0340	Info	A bus error resulted in an HPMC.	Follow OS Troubleshooting Flowchart Figure 4-9.
0361	Info	A coprocessor other than 0 asserted HPMC.	Follow OS Troubleshooting Flowchart Figure 4-9.
0362	Info	An SFU asserted HPMC.	Follow OS Troubleshooting Flowchart Figure 4-9.
03A1	Info	The TLB is non-functional.	Follow OS Troubleshooting Flowchart Figure 4-9.

Table 4-21. MPE XL Halt 7 Operating System Error Codes

Hex Code Range	Decimal Range	OS Module Error	Action
0000 - 0013	0 - 19	Genesis	All Halt 7 error codes: Perform memory dump, then call Response Center.
0032 - 0045	50 - 69	Configuration for Genesis	
0046 - 0063	70 - 99	Softdump	
0064 - 00C7	100 - 199	Start	
00C8 - 018F	200 - 399	Update/Install	
01C2 - 01D5	450 - 469	Job/Session	
01F4 - 0212	500 - 530	Storage Management	
0258 - 02BB	600 - 699	File System	
02BC - 0383	700 - 899	NM Ports	
0384 - 03B5	900 - 949	High Level I/O	
03E8 - 0513	1000 - 1299	Memory Manager	
0514 - 0527	1300 - 1319	Switch	
0528 - 053B	1320 - 1339	Clocks	
053C - 054F	1340 - 1359	Traps	
0550 - 0559	1360 - 1369	Support Management and VSM	
0564 - 056D	1380 - 1389	External INT Handler	
0578 - 0581	1400 - 1409	IOSERV	
0582 - 058B	1410 - 1419	System Logging	
058C - 0595	1420 - 1429	Table Management	
05AA - 05DB	1450 - 1499	Process Management	
05DC - 0671	1500 - 1649	Dispatcher	
06A4 - 07CF	1700 - 1999	Virtual Space Management	
07D0 - 0833	2000 - 2099	SEC Storage Management	
0834 - 08C9	2100 - 2249	Transaction Management	
0960 - 09F5	2400 - 2549	CM Ports	
09F6 - 09FE	2550 - 2558	CM Support	
09FF	2559	CM Fatal	
0A00 - 0A13	2560 - 2579	CM Stack Size Management	
0A14 - 0A27	2580 - 2599	CM Object Management	
0A8C - 0A95	2700 - 2709	Command Interpreter	
0AF0 - 0B53	2800 - 2899	Break	
0B54 - 0BB7	2900 - 2999	Turbo Image	
0BB8 - 0BC1	3000 - 3009	QA Testing	
0BCC - 0BD5	3020 - 3029	Network Interface	

Table 4-21. MPE XL Halt 7 Operating System Error Codes (continued)

Hex Code Range	Decimal Range	OS Module Error	Action
0BE0 - 0BE9	3040 - 3049	Internet Protocol	
0BF4 - 0BFD	3060 - 3069	Mapping Table	
0C08 - 0C11	3080 - 3089	Transmission Protocol	
0C12 - 0C1B	3090 - 3099	Buffer Manager	
0FA0 - 1387	4000 - 4999	NS Transport Modules	
1388 - 13EC	5000 - 5100	Bug Cache	

HP-UX Operating System Errors

When HP-UX detects a panic or HPMC, it will automatically execute a Transfer-of-Control (TOC) and save memory contents to the swap area of the disk. Immediately after this memory dump, the system automatically reboots.

The memory contents stored in the swap area are put into a file and directory (usually `/tmp/savecore`), as specified by the `savecore` command, in the `etc/rc` script.

HP-UX System Panic Codes

The system will display a panic code if the kernel panics, in the following format:

```
B800
||||_____________Panic_types: 0 = General purpose panic
||||                          9 = Dump completed, disks not fully sync'ed
||||                          A = Dump completed, disks fully sync'ed
|||
|||
|||_________________Panic_code: 0 = Not known
||                             1 = Transfer-of-Control
||                             2 = High Priority Machine Check
||
||
||_____Processor Module Number: 0-F
|
|
|
|______Operating System Fault Code
```

Refer to Table 4-22 on the next page for examples of HP-UX system panic codes.

Note Regardless of the processor module number or the panic_code (the two middle positions in the four-character system panic code), the "Action" in Table 4-22 will always be to analyze the memory dump or panic tombstone to find the cause of the panic. An exception is when an HPMC is indicated. Use the HPMC Error-Log Table in Non-Volatile Memory. (See the section, *Non-Volatile Memory* in this chapter.)

Table 4-22. Examples of HP-UX System Panic Codes

Code	Type	Cause	Action
B000	Fatal	Kernel panic	Analyze memory dump or panic tombstone to find cause of panic
B009	Fatal	Panic dump completed (disks not fully sync'ed)	Analyze memory dump or panic tombstone to find cause of panic
B00A	Fatal	Panic dump completed (disks fully sync'ed)	Analyze memory dump or panic tombstone to find cause of panic

Access Port Self-Test Messages

The Access Port (AP) provides two classes of messages. Those that indicate errors are labeled with the mnemonic **APERRXX**, where **XX** is the error number. Those that are informative or indicate undetermined AP errors, are labeled with the mnemonic **APMSGXX**, where **XX** is the message number. Numbers are duplicated; for example, both **APERR05** and **APMSG05** exist.

Messages for the CIO-based AP are listed in Table 4-23. Messages for the Integrated AP are listed in Table 4-24 and Table 4-25.

Table 4-23. CIO-Based Access Port Error Codes and Messages

Code	Type	Cause	Action
03	Error	PPON not reasserted by SPU after RESET_SYS deassertion (APERR 03).	Replace PSM
04	Error	Unable to verify assertion of TOC_SYS backplane signal (APERR 04).	Replace AP
05	Error	AP selftest failed subtest XX (APERR 05).	Replace AP
06	Error	AP failed subtest XX of idle selftest (APERR 06).	Replace AP
07	Error	AP failed subtest XX of prior idle selftest (APERR 07).	Replace AP
08	Error	Permitted accesses to NVM exceeded (APERR 08).	Replace AP
09	Error	CRC error on NVM (APERR 09).	Replace AP
10	Error	Illegal command, type HE for help (APERR 10).	None
11	Error	Expecting "Y" or "N" (APERR 11).	None
12	Error	Expecting "H" or "L" (APERR 12).	None
13	Error	Command may not be executed by a remote user (APERR 13).	None
14	Error	Your selection is outside of the legal range (APERR 14).	None
15	Error	Command may not be executed by a local user (APERR 15).	None
16	Error	Expecting "S" or "M" (APERR 16).	None
17	Error	Syntax error (APERR 17).	None
18	Error	Illegal hexadecimal entry (APERR 18).	None
19	Error	Illegal address or address range (APERR 19).	None
01	Info	AP self-test passed (APMSG 01).	None
02	Info	SPU hardware was successfully reset (APMSG 02).	None
03	Info	Console terminal not set to 9600 bits per second. Console port will operate at XXXX bits per second (APMSG 03).	None
04	Info	String was truncated to 24 characters (APMSG 04).	None
05	Info	AP configuration lost. Use CA and ER commands to recover (APMSG 05).	None

Table 4-24. Integrated Access Port Error Codes

Code	Message and Cause
02	`Cannot verify de-assertion of POW_ON signal. (APERR 02)` The AP did its best to de-assert the POW_ON signal, but doesn't see it de-asserted when reading it back. The circuitry that pulls on the line might be broken, or the circuitry used to read back the line might be broken. In any case, this is a major failure. Call your HP representative . . .
05	`AP failed selftest number xx (APERR 05).` This message is emitted when a failure occurs during the execution of a selftest launched from the command interpreter. XX gives the decimal number of the failing selftest.
08	`Permitted accesses to AP NVM exceeded. (APERR 08)` This message is emitted each time that the AP writes NVM after the counter in the NVM indicates that the permitted number of accesses to the last block if NVM have been exhausted. The AP should be replaced at the next visit by HP service personnel. The NVM may survive for up to 20,000 more writes after this message begins to occur, or it may fail almost immediately.
10	`Illegal command, type HE for help. (APERR 10)` The first 2 characters entered in a command line for the AP command interpreter are not the mnemonic for an AP command. Help gives the mnemonics for all legal commands.
11	`Expecting "Y" or "N" (APERR11)` The AP is expecting one of the letters Y or N, in either upper or lower case, as the reply to the query displayed on the screen. Y stands for Yes. N stands for No.
12	`Expecting "H" or "L" (APERR 12)` The AP is expecting one of the letters H or L, in either upper or lower case, as the reply to the query displayed on the screen. H stands for High, and if chosen, will cause the specified signal to be set to the high the voltage level, which is nominally +9 Volts referenced to ground. L stands for Low, and if chosen will cause the specified signal to be set to the low voltage level which is nominally -9 Volts referenced to ground.
13	`Command may not be executed by a remote user. (APERR 13)` This command is a valid AP command, but is intended for use from the local console port (port 0) only. No action has been taken.
14	`Your selection is outside of the legal range. (APERR 14)` Either numeric data has been entered when alphabetic input is expected, alphabetic input has been entered when numeric input is expected, or the value of numeric data entered is outside of the permissible range of values.

Table 4-24. Integrated Access Port Error Codes (continued)

Code	Message and Cause
15	**Command may not be executed by a local user. (APERR 15)** This command is a valid AP command, but is intended for use from the remote support modem port (port 7) only. No action has been taken.
16	**Expecting "S" or "M" (APERR 16)** The only permissible input at this time is the single letter S for Single, or the single letter M for Multiple. They may be entered either in upper or lower case.
20	**SE failed: OS did not respond (check OS vs. AP configurations). (APERR 20)** No modem connection was successfully established by the host after the user typed SE. Likely causes are: 1) the OS isn't booted yet; 2) no getty is running on port 7; 3) the device special file attached to port 7 does not match the AP configuration (e.g., the OS considers the port as a simple protocol/BELL port, while the AP has it configured as a CCITT port).
21	**Fatal error: POW_ON never came back. Waiting until it's reasserted ... (APERR 21)** The AP did its best to de-assert the POW_ON signal, but doesn't see it de-asserted when reading it back. The circuitry that pulls on the line might be broken, or the circuitry used to read back the line might be broken. In any case, this is a major failure. Call your HP representative ...
22	**Timeout error on NVM. (APERR 22)** The NVM chip did not become ready within the specified time period. It is most likely broken. The write was probably not successful. Call your HP representative.

Table 4-25. Integrated Access Port Information Codes

Code	Message and Cause
01	`All tests passed. (APMSG 01)` The AP has executed all tests in the test list, and none have terminated with a fatal error.
02	`SPU hardware was successfully reset. (APMSG 02)` Well . . .
04	`String was truncated to 23 characters. (APMSG 04)` Only 23 displayable characters are permitted in the answer to the query on the screen. All characters past the twenty-third were discarded. No action is necessary if the resulting truncated string is acceptable and the answer to the query. If the resulting sting is not acceptable, re-execute the command and change it at the appropriate prompt.
05	`AP configuration lost. Use CA and ER commands to recover. (APMSG 05)` If this message reoccurs after each reset or power on, then the AP is defective.
06	`SE terminated: returning to console/control mode. (APMSG 06)` The remote console operator just terminated the connection it had initiated with the SE command. The AP is reconnecting the port as a remote console. Note that this message can also appear spuriously after SE is typed if the previous SE session was not cleanly terminated (e.g., the modem hung up before the remote console operator had time to type 'exit' at the shell prompt). In this latter case, just hit break and type SE again.

Troubleshooting Flowcharts

The following pages contain troubleshooting flowcharts for isolating faults to the FRU. Procedures that are unique to the Series 920 system are noted.

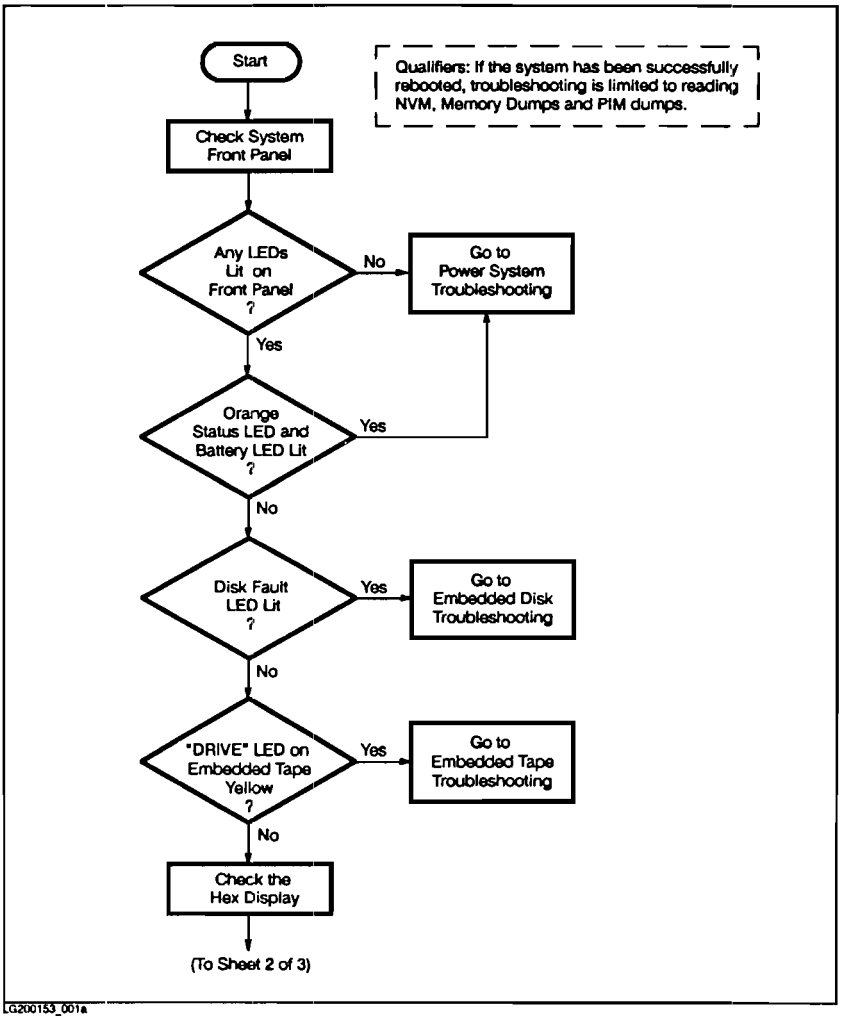


Figure 4-1. System Troubleshooting (Sheet 1 of 3)

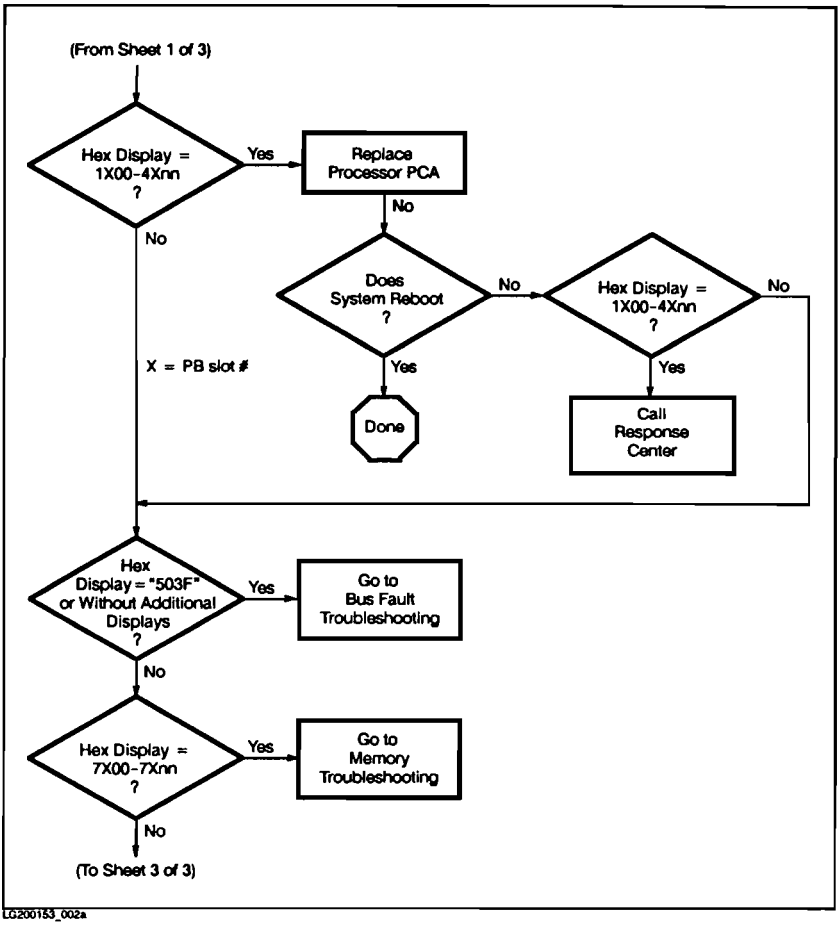


Figure 4-1. System Troubleshooting (Sheet 2 of 3)

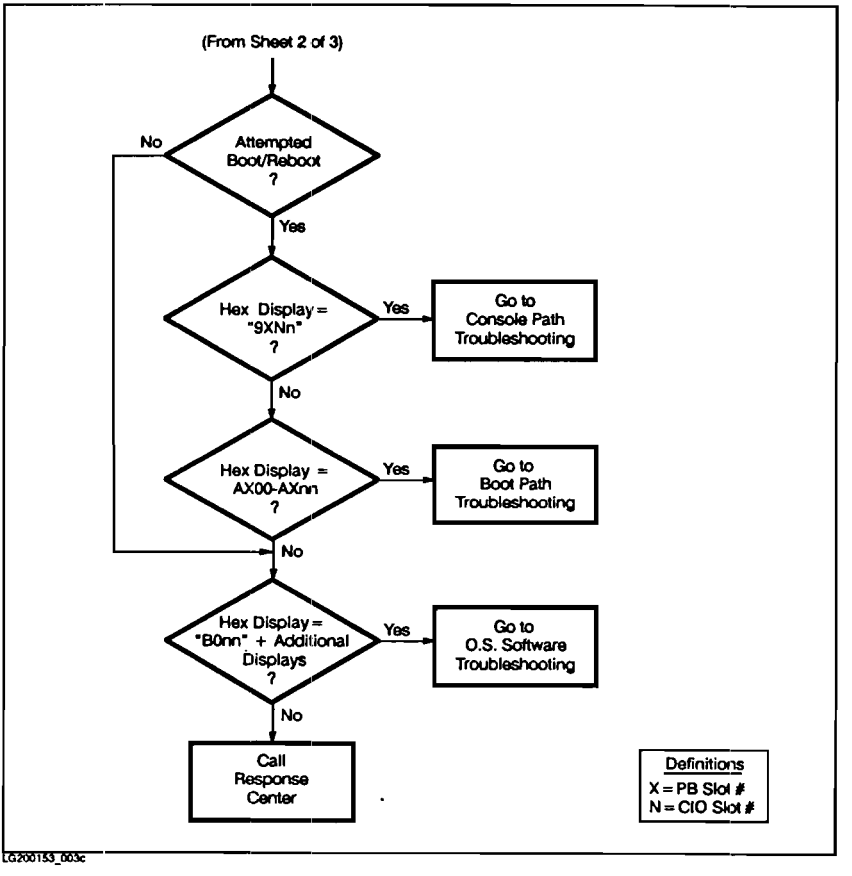


Figure 4-1. System Troubleshooting (Sheet 3 of 3)

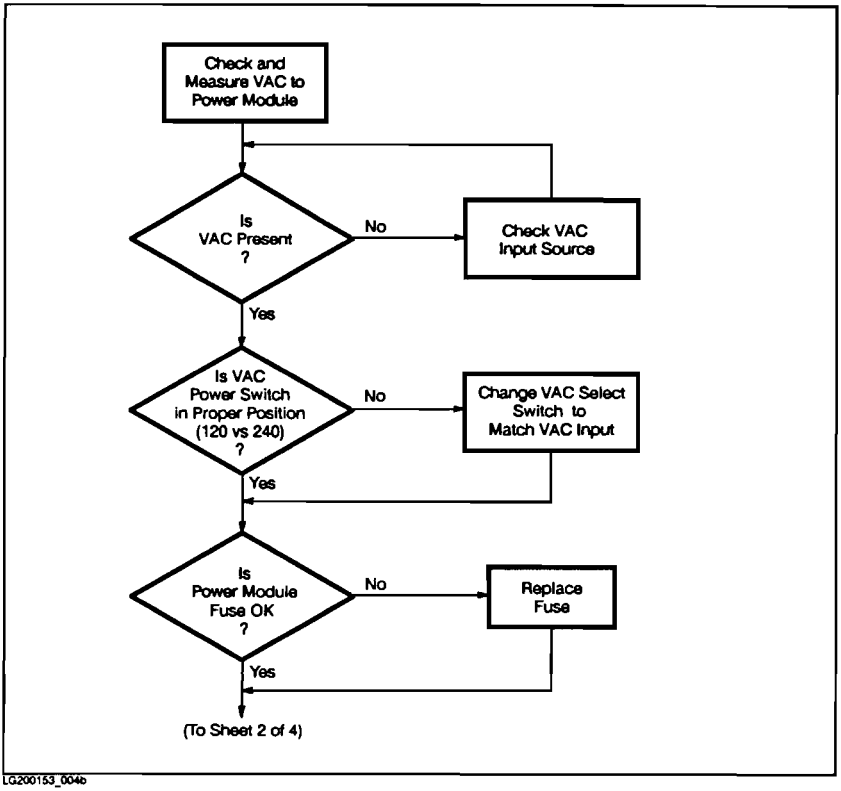


Figure 4-2. Power Troubleshooting (Sheet 1 of 4)

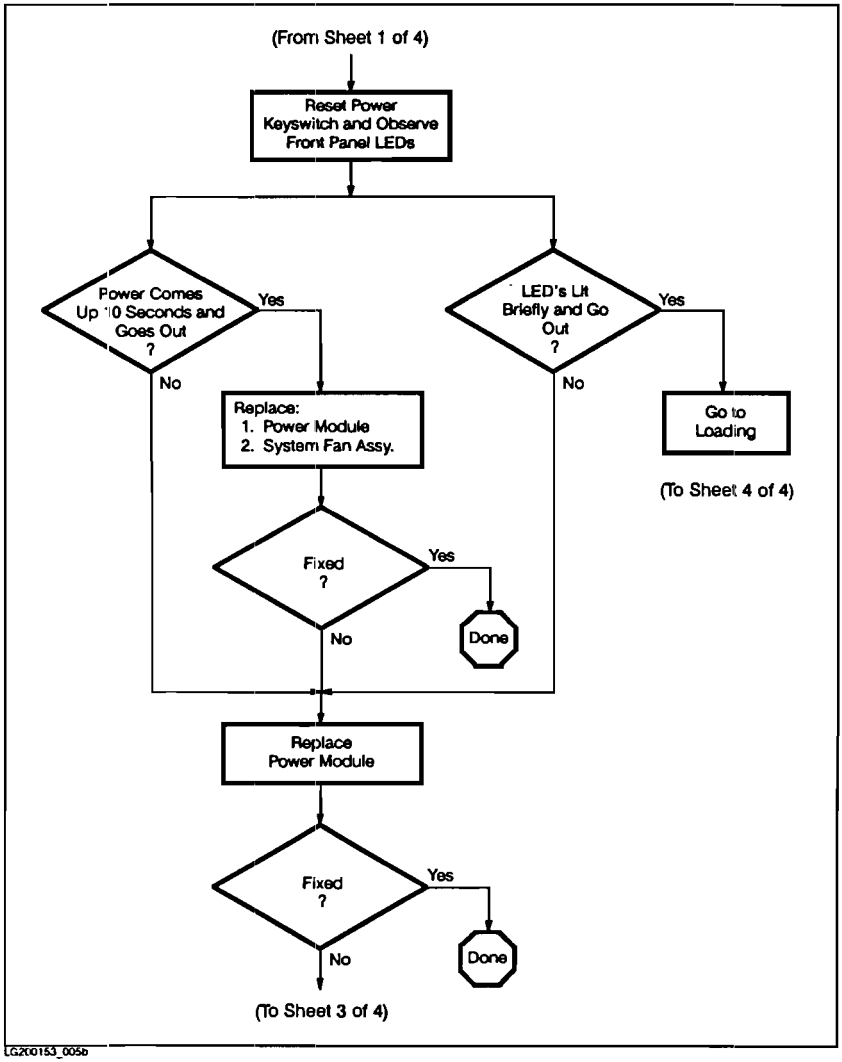


Figure 4-2. Power Troubleshooting (Sheet 2 of 4)

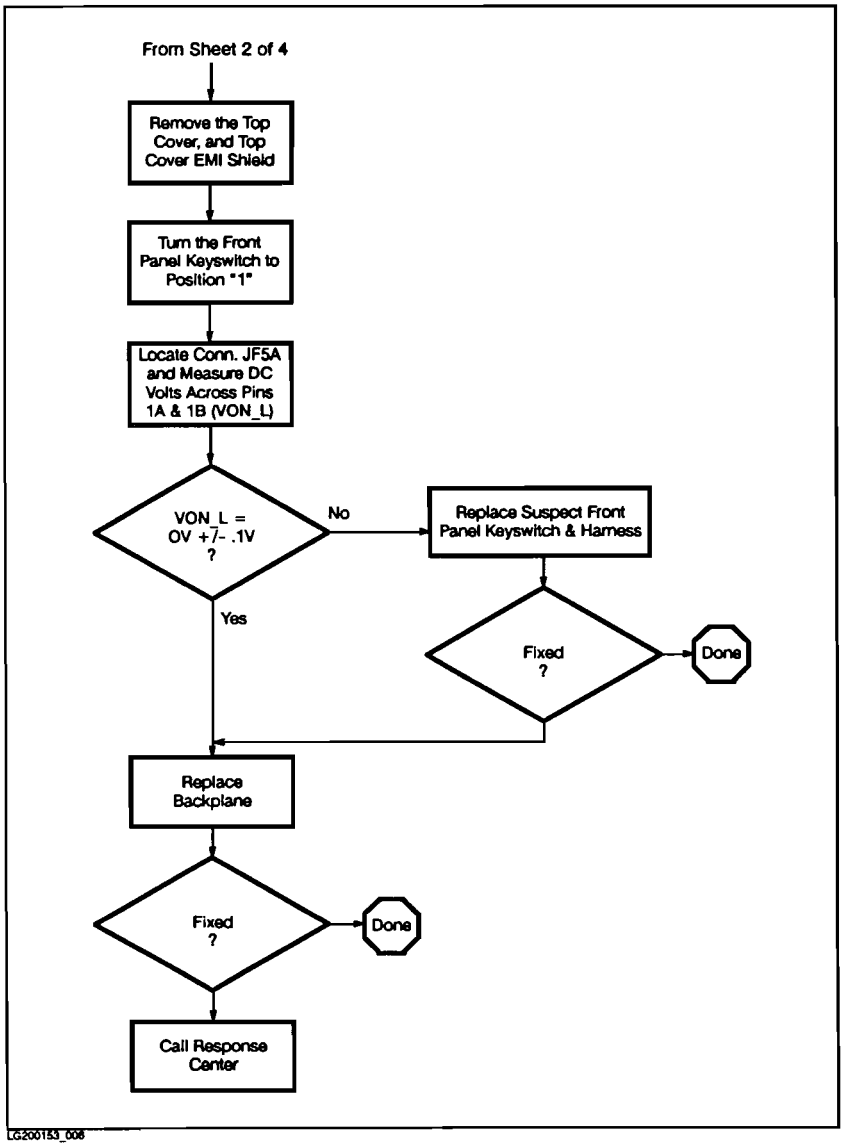


Figure 4-2. Power Troubleshooting (Sheet 3 of 4)

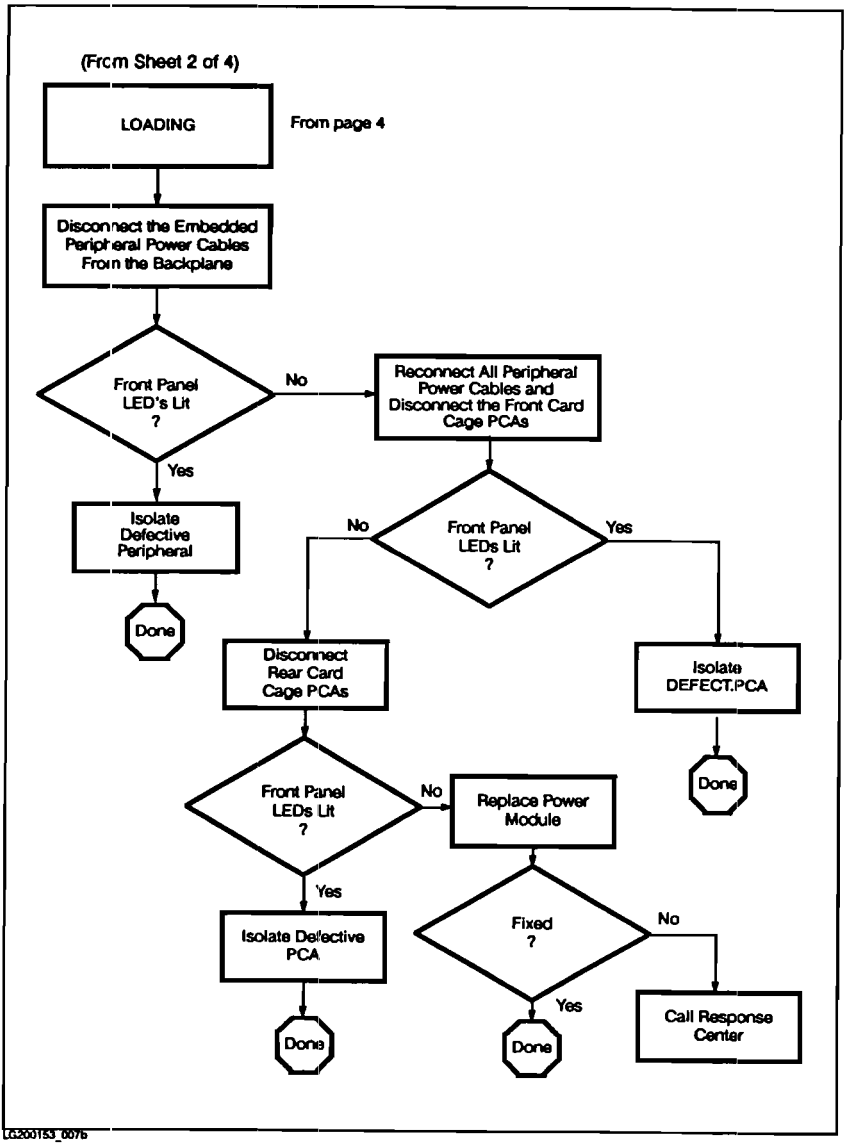


Figure 4-2. Power Troubleshooting (Sheet 4 of 4)

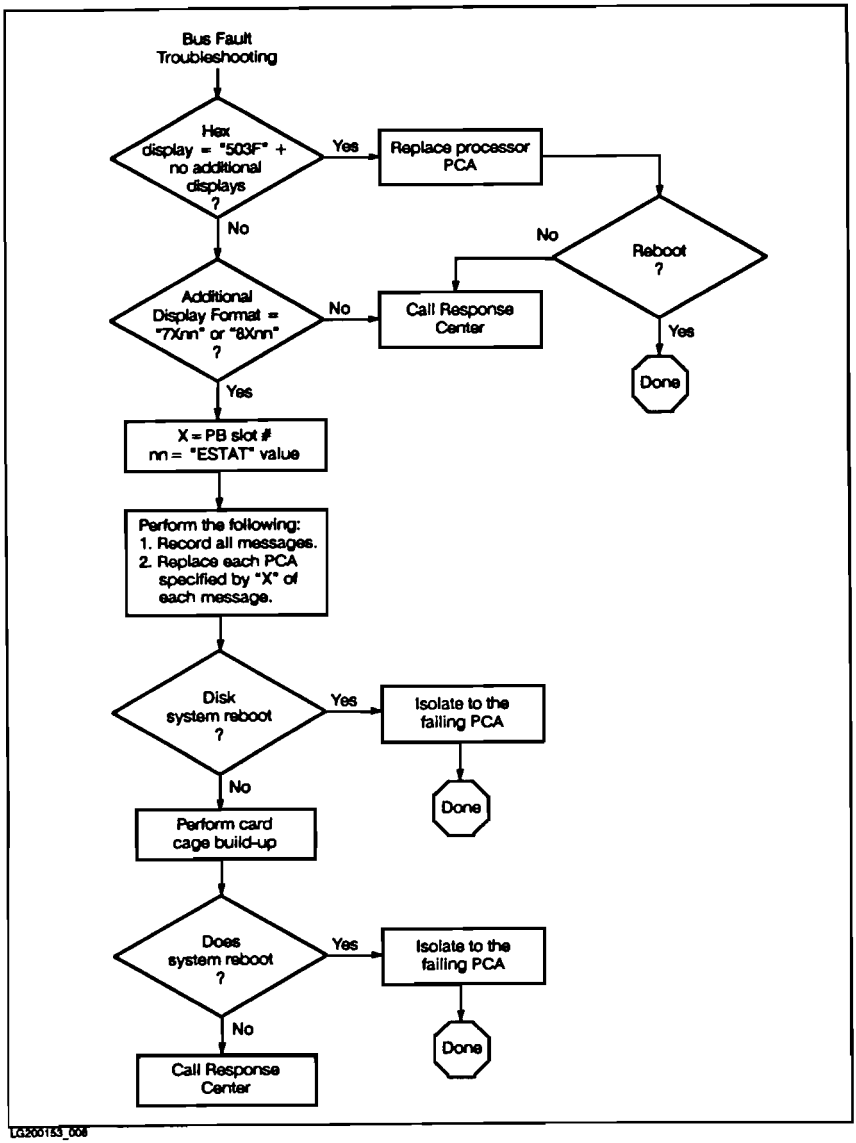


Figure 4-3. Bus Fault Troubleshooting

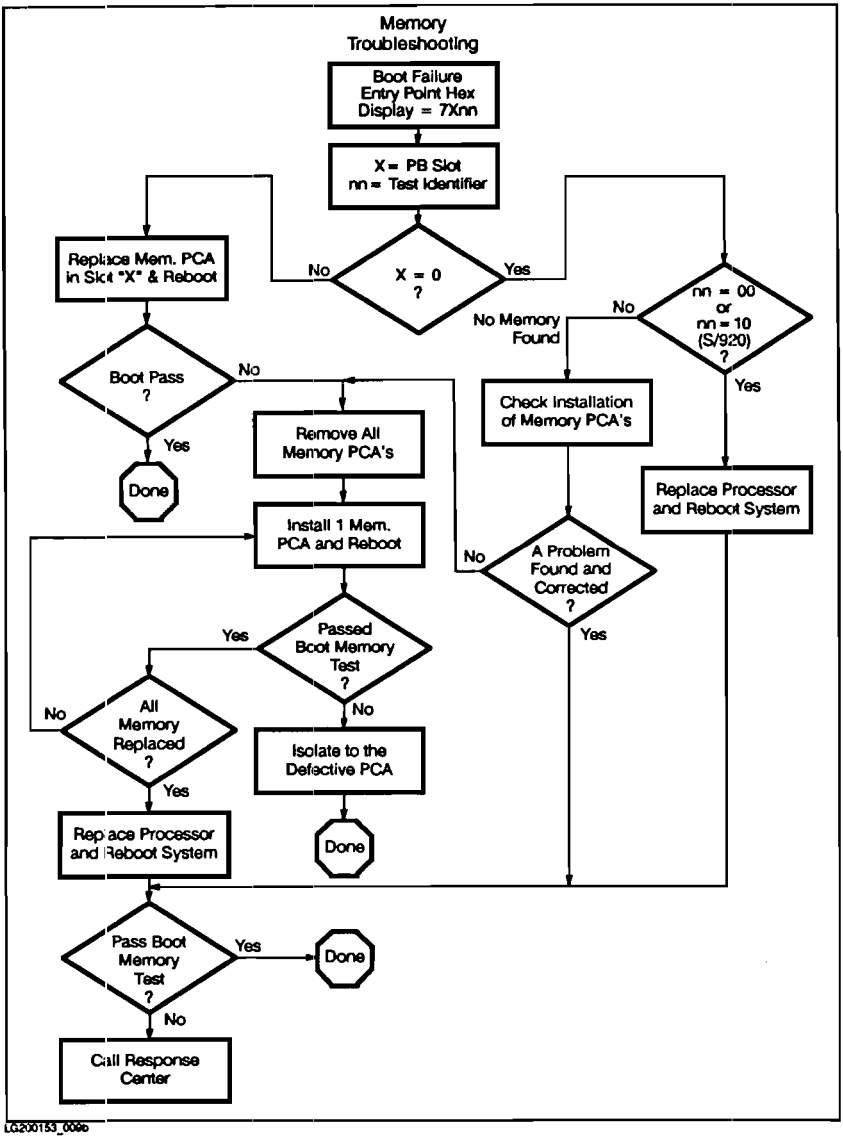


Figure 4-4. Memory Troubleshooting

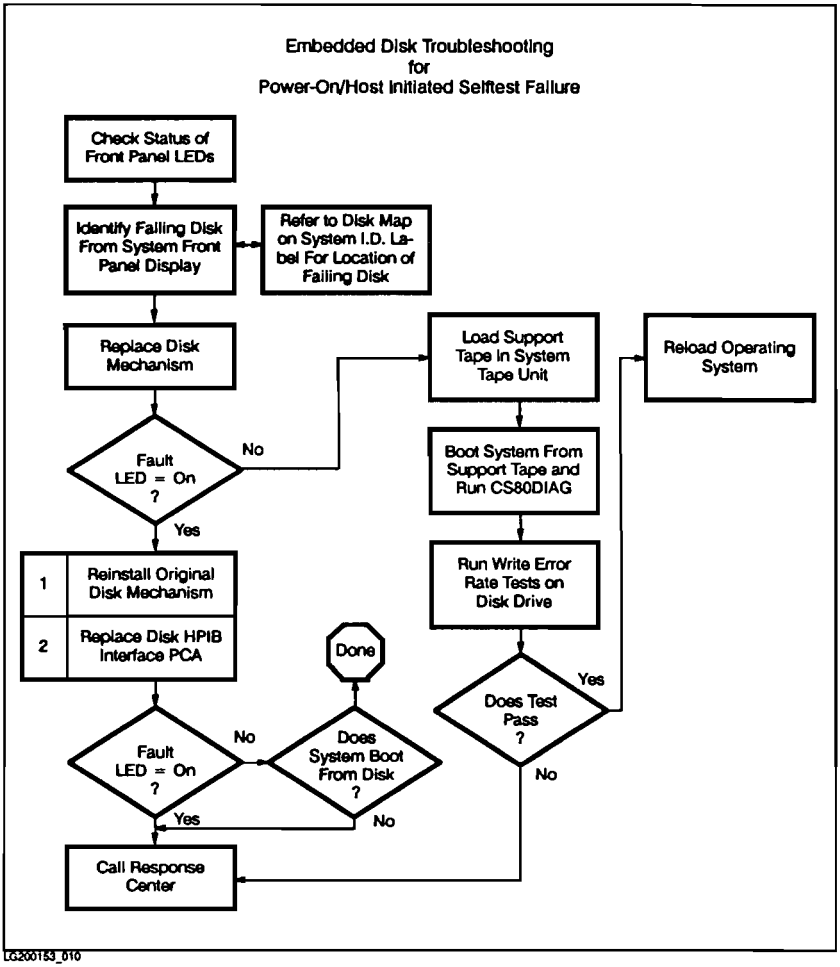


Figure 4-5. Embedded Disk Troubleshooting

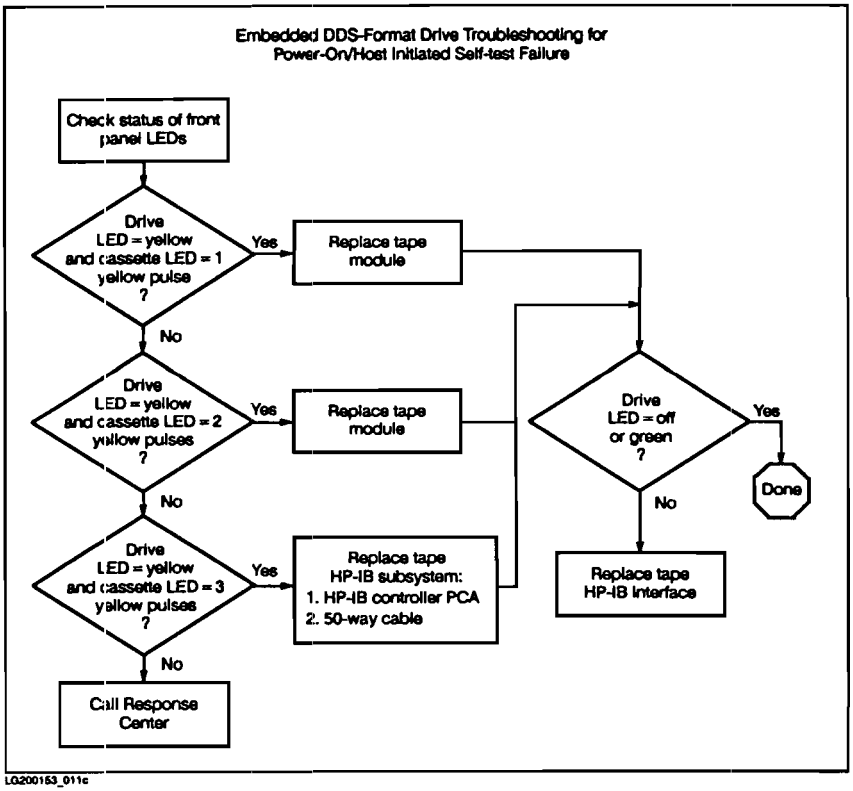


Figure 4-6. Embedded DDS-Format Drive Troubleshooting

DDS-Format Tape Drive Problems

Tape Cassette Operation

The following is a list of possible problems that may be experienced during tape operation. Corrective action follows the problem description.

Problem

After powering-up the system, lights on the tape drive remain lit.

What to do

1. Press the unload button on the tape drive front panel. A cassette tape may already be inserted.
2. If a cassette tape does not eject, DO NOT insert another cassette tape. Contact the Response Center (RC).

Problem

A cassette tape inserted into the tape drive immediately ejects again.

What to do

1. Use the cleaning cassette on the tape unit, then re-insert the cassette tape.
2. If the cassette tape ejects, replace the cassette tape and try again.
3. If the cassette tape continues to eject, call for RC assistance.

Problem

Unload button will not eject the cassette tape.

What to do

1. Observe the lights on the tape drive front panel.
2. If both lights are yellow, a over-humidity condition exists and the cassette tape will not eject until the condition is corrected.
3. For all other conditions, document the light pattern in the system log book and call for RC assistance.

Problem

Tape store and restore operations are taking longer and longer to complete.

What to do

1. Use the cleaning cassette and retry the tape operation.
2. Use a new cassette tape.

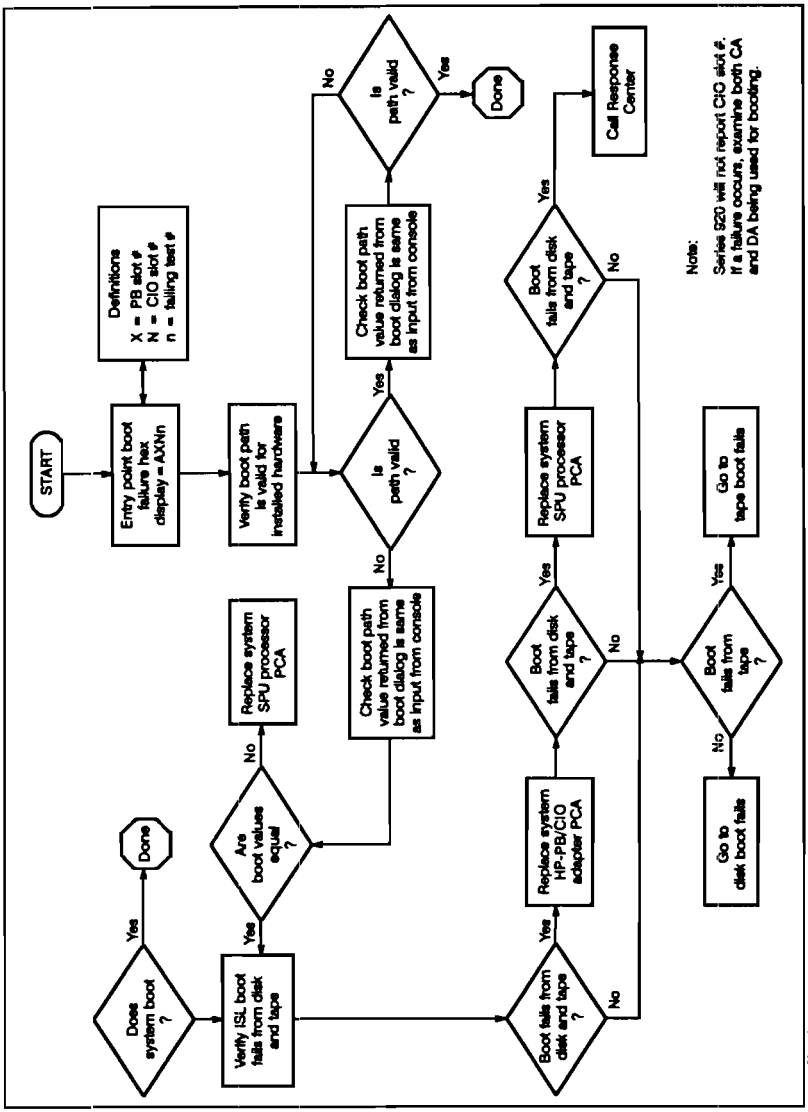


Figure 4-7. Boot Path Troubleshooting (Sheet 1 of 3)

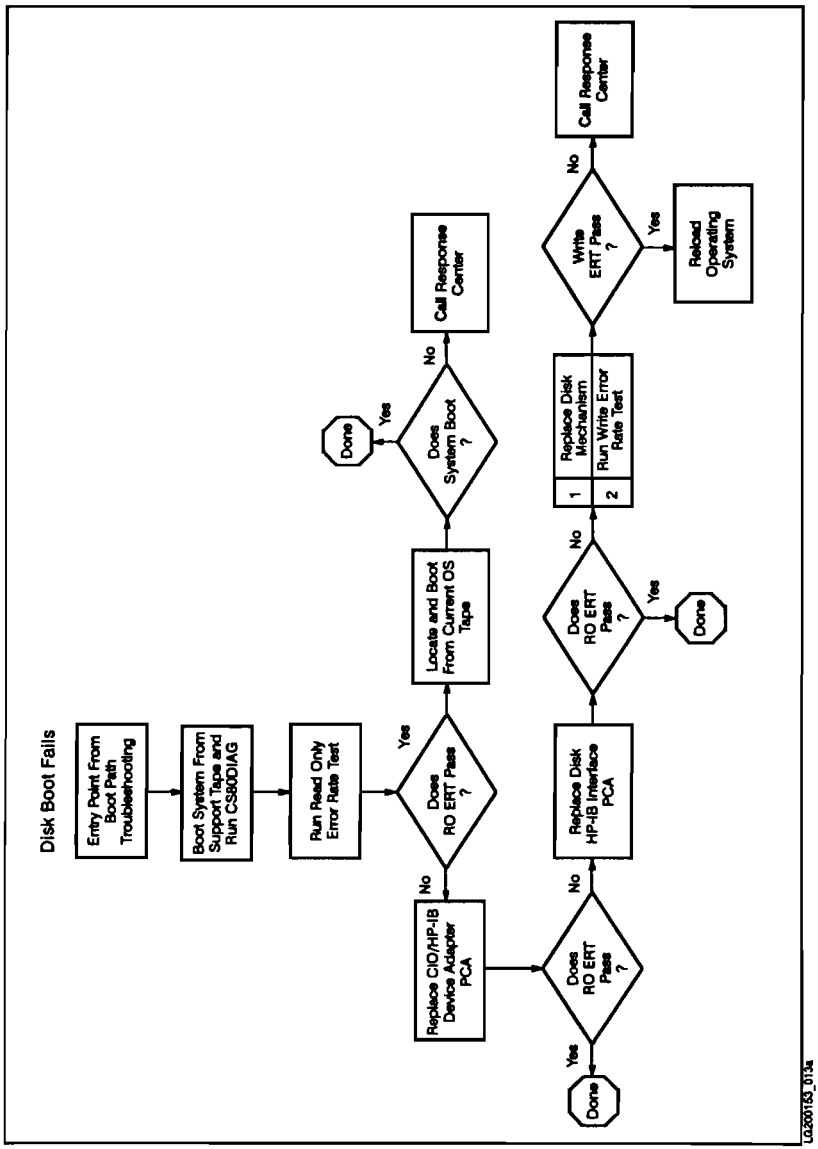


Figure 4-7. Boot Path Troubleshooting (Sheet 2 of 3)

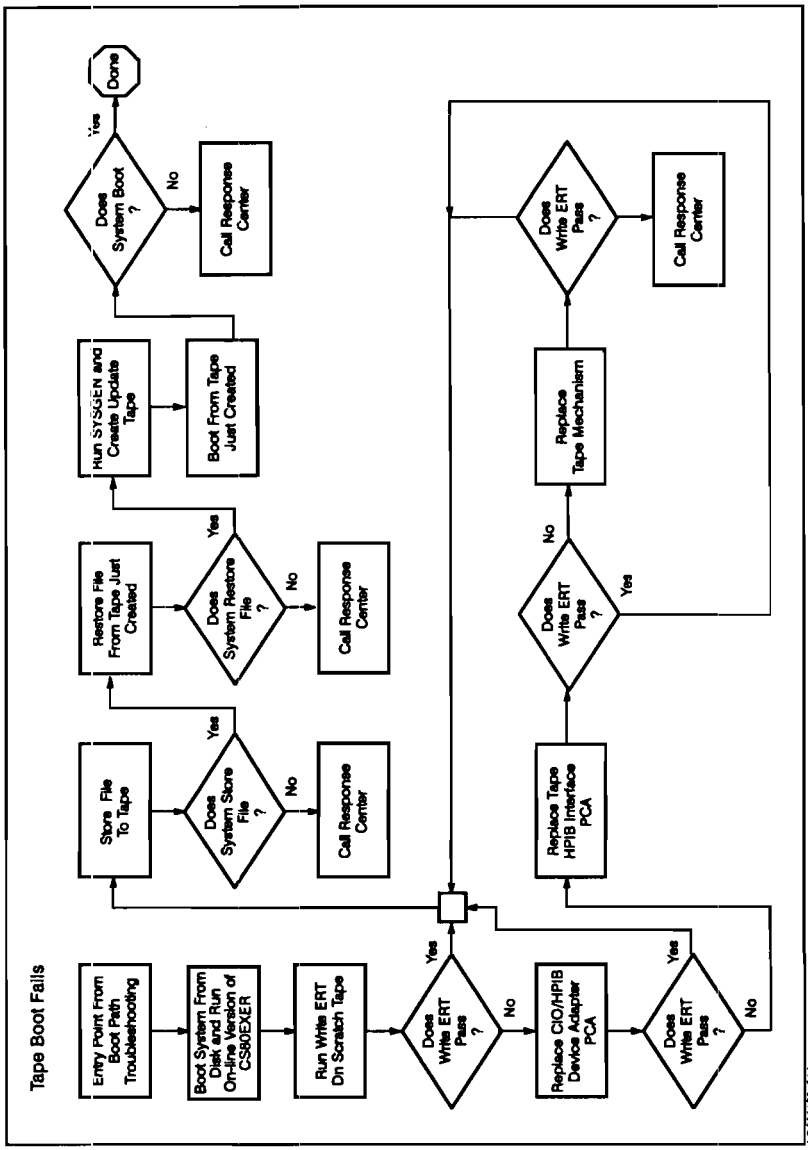


Figure 4-7. Boot Path Troubleshooting (Sheet 3 of 3)

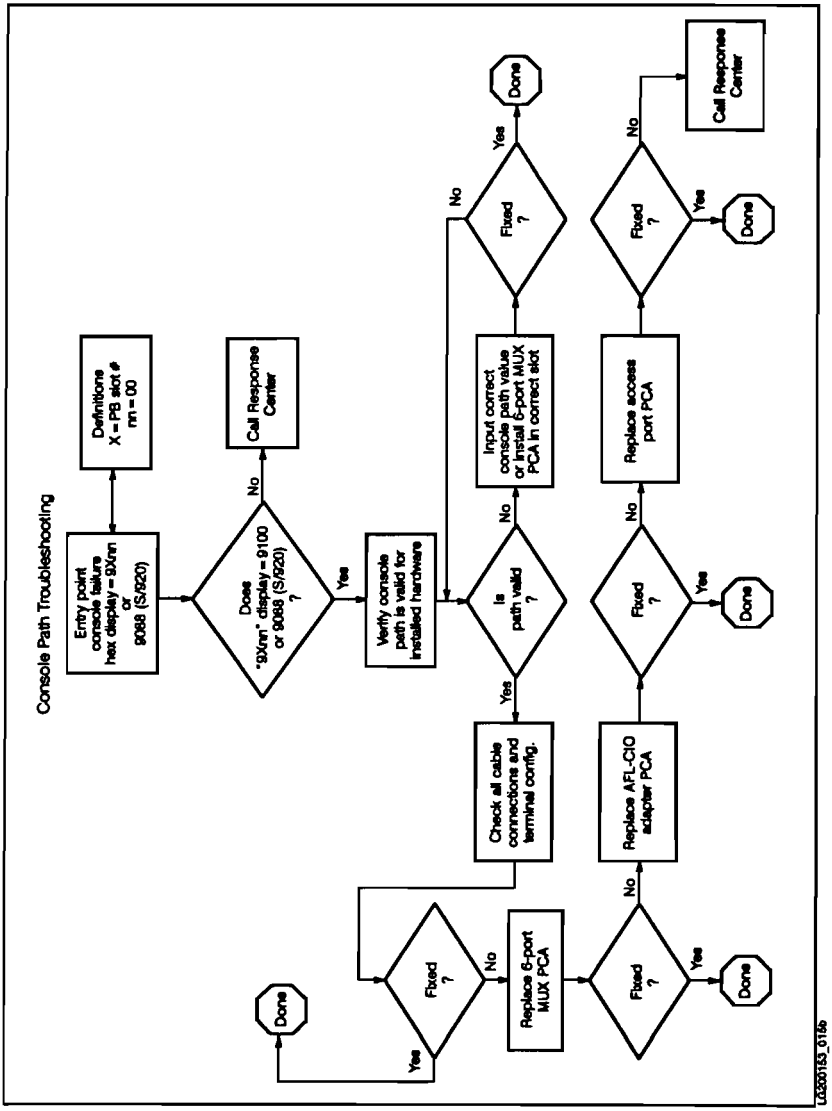


Figure 4-8. Console Path Troubleshooting

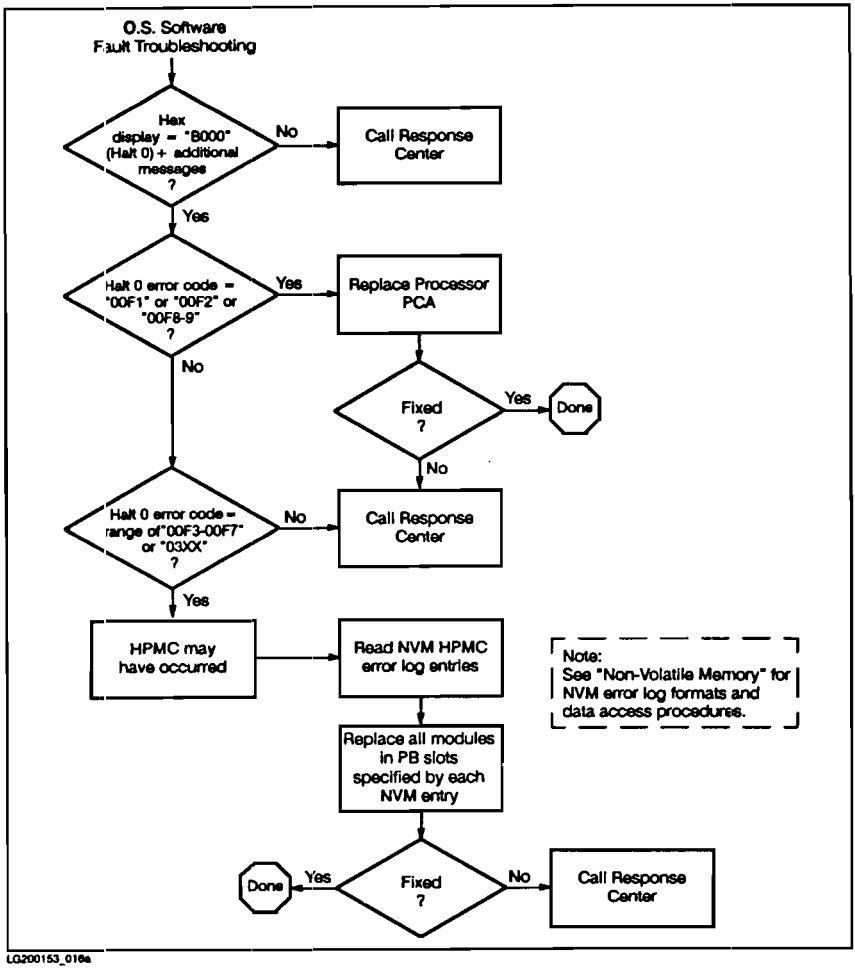


Figure 4-9. MPE XL Operating System Fault Troubleshooting

Note See the section "MPE XL Operating System Halts" to decode Halt 0 error codes.

Non-Volatile Memory

All SPUs in the HP 3000 920 Family and the HP 9000 822S Family write configuration and HPMC error information into tables in Non-Volatile Memory (NVM). NVM is accessed differently in the various SPUs, as indicated in Table 4-26.

Table 4-26. Commands for Accessing Non-Volatile Memory

SPU	Command
920, 922, 932, 822, 832	`ISL> readnvm 0x540`
948, 958, 842, 852	`PDC> i`

HPMC Error-Log Table (920/922/932/822/832 SPUs)

Use the following procedure to decode the HPMC Error-Log Table in NVM (920/922/932/822/832 SPUs only):

1. Verify that the system has Version A.00.08 of ISL or above (used with HP-UX 7.0 and MPE/XL 2.0 and later).
2. Get to the ISL prompt (for example, by shutting down the system).
3. At the ISL prompt, enter `readnvm 0x540`; the system responds with a word of data.
4. Decode this word as if it were an error code on the hex display; refer to the appropriate "Hex Display Error Codes Table" in this chapter.
5. To obtain additional entries in the HPMC error log, enter `readnvm 0x544`, `readnvm 0x548`, `readnvm 0x54c`, etc. When the system returns a word with all zeros, you have reached the end of the table. (For further information, refer to the section *Using READNVM*.)

Figure 4-10 shows the format of the HPMC error-log table in NVM. The first entry contains an HPMC-type word identifying the HPMC detected by the processor (see Table 4-27). On HPMCs caused by bus errors, additional entries are made for each module found in error (see Table 4-28).

Format of the HPMC Error-Log Table

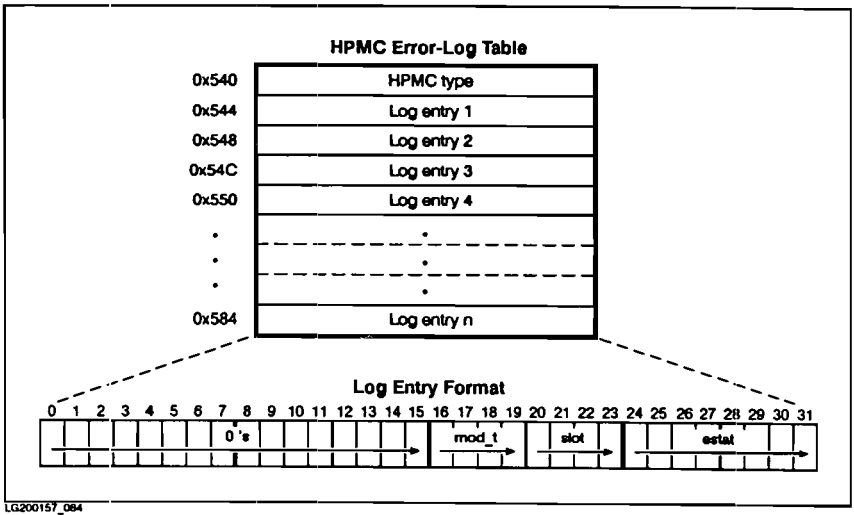


Figure 4-10. Format of the HPMC Error-Log Table in NVM

Table 4-27. Interpreting the HPMC-Type Entry

HPMC Type	Meaning	Action
0x00002040	Cache (tag) error	Replace CPU card.
0x00002041	Data cache error	
0x00002042	Instruction cache error	
0x00002050	General TLB error	Replace CPU card.
0x00002051	Data TLB error	
0x00002052	Instruction TLB error	
0x000050xx	CPU detected bus or unknown error; xx = *pimstat* (refer to Table 4-29)	Look at the next entry (refer to Table 4-28).

Table 4-28. Subsequent Log Entries in the HPMC Error-Log Table

Label	Name	Meaning	Action
mod_t	Module type	mod_t = 7 : Memory module mod_t = 8 : I/O module	Replace the appropriate card.
slot	Slot number	HP-PB slot number of the module in error	
estat	Error status	Refer to Table 4-30.	

Table 4-29. Pimstat Values

Dec	Hex	Name	Description
4	4	ERR_ERROR_RQ	Requestor detected PATH_ERROR
6	6	ERR_PROTOCOL_RQ	Requestor detected protocol error
7	7	ERR_ADDRESS	No slave acknowledgement in a transaction
13	D	ERR_CPARITY_RQ	Requestor control signal parity error
53	35	ERR_DPARITY_RQ	Requestor detected parity error on data phase
63	3F	ERR_UNKNOWN	Unknown type of error

RS = Responder (Slave); RQ = Requestor (Master)

Table 4-30. Estat Values

Dec	Hex	Name	Description
0	0	ERR_DEPEND	Undetermined error
2	2	ERR_INTERNAL	Internal module error
5	5	ERR_DPARITY_RS	Parity error on data phase of write or broadcast
9	9	ERR_LESS	Device transferred less data than requested
14	E	ERR_CMD	Unimplemented direct I/O command
15	F	ERR_BUS_RQ	Requestor bus error
24	18	ERR_CORR	Correctable RAM error (memory module only)
25	19	ERR_UNCORR	Uncorrectable RAM error (memory module only)
52	34	ERR_ERROR_RS	Responder detected PATH_ERROR
54	36	ERR_PROTOCOL_RS	Responder detected protocol error
58	3A	ERR_SELFTEST	Module selftest error
63	3F	ERR_UNKNOWN	Unknown type of error

RS = Responder (Slave); RQ = Requestor (Master)

Using READNVM

The following example demonstrates the ISL READNVM command for reading the HPMC error-log table:

```
ISL Revision A.00.08  June 22, 1989

ISL> readnvm 0x540

      Address 0x540 contains  0x00002040

ISL> readnvm 0x544

      Address 0x544 contains  0x00000000
```

Location 0x540 contains the HPMC type. In this case the value is 0x00002040. This represents a cache (tag) error, according to Table 4-27.

Location 0x54C contains 0x00000000, which means that there are no more log entries.

Displaying Non-Volatile Memory on 948/958/842/852 SPUs

On 948/958/842/852 SPUs, the INFO command reports the mapping of all the HP-PB modules. If the HPMC log stored in NVM is empty, it will be indicated. If there is data in the log, it will be displayed along with the HPMC type and the slot number of the modules that detected the error.

Enter the INFO command as shown in the following example:

```
Enter boot path, command, or ?> i
      .
      .
      .
HPMC LOGS

* LOGS EMPTY *
     or
    503F
    7319
```

5

Diagnostics

Introduction

This chapter provides information about the online and offline diagnostics and utilities for MPE XL and HP-UX operating systems. Also included is information about using the HP-UX Support Tape to boot both
MPE XL and HP-UX systems and the Boot Console Handler (BCH) program, which applies exclusively to the Series 920 SPU.

Table 5-1 lists the online diagnostics, and Table 5-2 lists the online utilities available on MPE XL and HP-UX operating systems. Offline diagnostics are discussed later in this chapter.

Note The diagnostics in Table 5-1 and the online diagnostics descriptions in this section are arranged in alphabetical order by the diagnostic command name.

In display examples, user input is shown underlined.

Online Diagnostics and Utilities

Table 5-1. Online Diagnostics

Command	Diagnostic	System
CADIAG	CIO Channel Adapter Diagnostic	MPE XL
CARTDIAG	Cartridge Tape Drive and Autochanger Diagnostic	MPE XL, HP-UX
CENTPBA	HP-PB Type A Centronics/Parallel Module Diagnostic	HP-UX
CIPERLPD	Ciper Line Printer Diagnostic	MPE XL, HP-UX
CS80DIAG	CS/80 Disc Diagnostic	MPE XL, HP-UX
DASSDIAG	Direct Access Secondary Storage Diagnostic	MPE XL, HP-UX
DIAG7478	HP 7974A/7978 Magnetic Tape Drive Diagnostic	MPE XL, HP-UX
FLEXDIAG	HP 7936/7937FL Disk Drives and Alink Controller Diagnostic	MPE XL, HP-UX
GPIODAD	General Purpose I/O Device Adapter Diagnostic	HP-UX
HPFLDIAG	CIO Fiber Link Device Adapter Diagnostic	MPE XL, HP-UX
HPIBDAD	HP-PB HP-IB Device Adapter Diagnostic	HP-UX
HPIBDDS	DDS-Format Tape Diagnostic HP C1501A or Model 1300H	MPE XL, HP-UX
HPIBDIAG	CIO HP-IB Device Adapter Diagnostic	MPE XL, HP-UX
LANDAD	LAN Diagnostic	MPE XL, HP-UX
MEMDIAG	Memory Diagnostic	MPE XL, HP-UX
MUXDIAG	CIO Asynchronous Port Multiplexer Diagnostic	MPE XL, HP-UX

Table 5-1. Online Diagnostics (continued)

Command	Diagnostic	System
OSI4DAD	HP OSI Express 802.4 Diagnostic	HP-UX
PMUXDIAG	HP-PB Asynchronous 8-Channel Multiplexer Diagnostic	HP-UX
PPDIAG	Page Printer Diagnostic	MPE XL
PSIDAD	PSI Device Adapter Diagnostic	MPE XL, HP-UX
REELDIAG	HP 7979/7980 Magnetic Tape Drive Diagnostic	MPE XL, HP-UX
SCSICD	SCSI Compact Disk Diagnostic	HP-UX
SCSICIO	SCSI CIO Device Adapter Diagnostic	MPE XL, HP-UX
SCSIDDS	SCSI Digital Data Storage Tape Drive Diagnostic	HP-UX
SCSIDISK	SCSI Disk Diagnostic	HP-UX
SCSIPBA	HP-PB Type A SCSI Module Diagnostic	HP-UX
SCSIREEL	SCSI Magnetic Reel Tape Diagnostic	HP-UX
SS80DIAG	SS80 Disk Diagnostic	HP-UX

Table 5-2. Online Utilities

Command	Name	System
IOTT	I/O Test Tool	MPE XL
LOGTOOL	System and Memory Log Analysis Tool	MPE XL, HP-UX 8.0 and later
SYSMAP	System Map	MPE XL, HP-UX 8.0 and later
TERMDSM	Terminal Diagnostic System Monitor	MPE XL

For detailed information on the diagnostic subsystems and diagnostic utilities, refer to:

- *Online Diagnostics Subsystem Manual, Volume I: SPU* (HP p/n 09740-90028)
- *Online Diagnostics Subsystem Manual, Volume II: Device Adapters* (HP p/n 09740-90031)
- *Online Diagnostics Subsystem Manual Volume III: LAN/SCSI/MUX* (HP p/n 09740-90034)
- *Online Diagnostics Subsystem Manual Volume IV: Disks/Printers* (HP p/n 09740-90040)
- *Online Diagnostics Subsystem Manual Volume V: Tapes* (HP p/n 09740-90042)
- *Online Diagnostics Subsystem Utilities Manual* (HP p/n 09740-90021)

Using the Online Diagnostics

The implementation of the Online Diagnostic Subsystem is slightly different for the HP-UX and MPE XL operating systems.

Use the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* to look up information concerning HP-UX Online Diagnostics Subsystem security, the Online Diagnostic Subsystem directory tree, diagnostic special files, and DUI permissions.

Use the *MPE XL System Configuration Manual* (HP part number 32650-90042) to look up information concerning MPE XL system tables and configuration.

Diagnostic User Interface (DUI)

The Diagnostic User Interface (DUI) provides access to all programs in the Online Diagnostic System.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

   The diagnostic responds with the following header and welcome message indicating that access has been gained to the Online Diagnostic Subsystem:

```
ONLINE DIAGNOSTIC SUBSYSTEM

(C) Copyright Hewlett Packard Corp. 1988
        All Rights Reserved.
 DUI version xx.yy   Monitor version xx.yy


Type "HELP" for assistance.
```

2. Enter HELP to the DUI prompt for the following list of available commands to appear:

```
DUI> HELP

COMMAND              DESCRIPTION

ABORT          Terminates active diagnostic programs.
CI or !        Provides access to operating system interpreter
               (shell).
EXIT/QUIT      Exit from the diagnostic system.
HARDCOPY       Echo data displayed on terminal to printer or
               file.
HELP or ?      Provide help information for DUI or diagnostic
               programs.
INSTALL        Add/update programs that are part of the
               diagnostics (HP-UX only).
LIST           List the programs that are part of the
               diagnostics.
MODE           Display/change current system user access mode.
PURGE          Delete programs from the diagnostic system (HP-UX only).
REDO           Display and edit last DUI command.
RESUME         Allow a suspended program to resume processing.
RUN            Load and execute the specified program. (Table 5-4 lists
               run command parameters.)
SHOWACTIVE     Display programs running in diagnostic system.
SUSPEND        Suspend the processing of the specified program.
TEST           Provides the ability to test a diagnostic
               program (MPE XL only).
UNLOCK         Releases specified device from lock status (MPE XL only).
USE            Causes DUI commands to be read from a file.
WAIT           Wait for background programs to terminate.
```

The commands INSTALL and PURGE are applicable for HP-UX only. The commands TEST and UNLOCK are applicable for MPE XL only.

MPE XL: Installation, modification, and removal of Online Diagnostics Programs on MPE XL operating systems is accomplished by using the MPE XL Online Installer (DIAGINST) facility. Refer to the *Online Diagnostics Subsystem Manuals* for detailed information regarding MPE XL.

HP-UX: Installation, modification, and removal of Online Diagnostics Programs on HP-UX operating systems is accomplished by using the HP-UX Online Installer facility. Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* for detailed information regarding HP-UX.

Run Command

For software releases prior to HP-UX 8.0 and MPE XL 3.0, the following syntax is required to run diagnostics:

```
DUI> RUN <diagnostic name> <RUN command Options>
```

Starting with HP-UX Release 8.0 and MPE XL Release 3.0, the word RUN is optional. The syntax can be as follows:

```
DUI> <diagnostic name> <run command Options>
```

For example, to run the diagnostic *CADIAG*, enter:

```
DUI> CADIAG <run command Options>
```

Run Command Options

Table 5-3 lists the options (also referred to as parameters) for the RUN command.

Table 5-3. RUN Command Options

Option	Abbrev.	Default Value	Description
BACKGROUND	BG	off	Causes the diagnostic program to be run in the background. Output will appear on the user's terminal unless redirected by use of the **OUTFILE** modifier.
DEBUG	DB	off	Causes the program to run within a debugger. If the user does not specify which debugger to use, the diagnostic system will invoke a default debugger, such as *nmdebug* on MPE XL or *xdb* on HP-UX.
ERRCOUNT n	EC	Unlimited number of errors.	Sets the number (n) of errors to tolerate before aborting the diagnostic program. The number must be equal to or less than maxint.
ERRONLY	EO	off	When set to *ON*, only error messages will be printed; most informational messages will not be displayed. Place ERRONLY on by entering **ERRONLY ON** or **ERRONLY**. Three asterisks usually precede error messages. Error messages are in all capital letters; non-error messages have some lower case letters.
ERRPAUSE	EPS	off	When **ERRPAUSE** is on and an error occurs, the user will be queried as to whether to continue executing the program. If the user responds **yes**, the program continues. If the user responds **no**, the program will be aborted. If **ERRCOUNT** has been set and the maximum number of errors has been reached, the program will abort without querying the user.

Table 5-3. RUN Command Options (continued)

Option	Abbrev.	Default Value	Description
ERRPRINT	EPR	on, long	Used to control the number of messages printed when an error occurs. When the **long** modifier is in effect, all error messages will be printed. When the **short** modifier is in effect, the error message only states what the diagnostic was trying to do. In the online diagnostics subsystem, **ERRPRINT** cannot be turned off.
HARDCOPY	HC	off	Causes all input and output messages to be printed on a hardcopy device. All I/O will also appear on the terminal unless a modifier such as **INFILE** or **OUTFILE** has also been used. The user can specify which hardcopy device to use by **ldev** or **pdev**, but usually the diagnostic system recognizes a default hardcopy device.
INFILE	IN	Data is received via the user's terminal.	Causes all input data expected by a diagnostic program to be read from the specified **infile** rather than from the standard input device (the user's terminal).
LDEV	none	none	Represents the logical name of a device to be tested or used by a diagnostic. On MPE XL systems, the **LDEV** is a number; on HP-UX systems, the **LDEV** is the name of a special device file.
LOOP n	none	If **LOOP** is not set, the diagnostic completes one iteration before terminating.	Specifies the number (n) of times the sections and steps are to be repeated before the diagnostic terminates. If **loop** is specified without a number, the sections and steps will be repeated until an interrupt is given. If the **ERRPAUSE** or **ERRCOUNT** modifiers are also set, they will take precedence over **LOOP**.
OUTFILE	OUT	Output is displayed on the standard output device, usually the user's terminal.	Causes all output from a diagnostic program to be placed into the named file rather than be displayed on the user's terminal.
PDEV	none	none	Represents the physical path to a device. Composed of numbers corresponding to hardware slot numbers with machine-dependent punctuation separating the numbers. If a device is needed for a diagnostic program to run, that device must be specified using either its **PDEV** or **LDEV**.

Table 5-3. RUN Command Options (continued)

Option	Abbrev.	Default Value	Description
SECTIONS	SC	Sections and steps named by diagnostic developer as defaults. This differs for every diagnostic program.	Specifies sections of the diagnostic program to be run if the user does not specifically invoke one or more sections. If a section is named, but the steps are not specified, the default steps will be run automatically. Sections and steps are invoked in numerical order. Mnemonics that can be substituted for section and step numbers are listed below this table.
TRACE	TR	off	Enables/disables software tracing messages.
Diagnostic Specific Parameters	none	null	Parameters, modifiers, or other information unique to a particular diagnostic program can be specified within the run command. Such information is placed in double quotes.

The following mnemonics can be substituted for section or step numbers when using the `SECTIONS` parameter for the `RUN` command:

ALL	Run all sections, default and non-default alike.
AUTO	Run all sections designated as autodiagnosable.
CLEAR	Run whatever section(s) clear or reset the device being diagnosed.
DEFAULT	Run the default sections.
ERRLOG	Run whatever sections read and decode error logs.
FAST	Run the sections that will quickly test a large part of the device.
HWSTATUS	Run sections that read and decode the hardware status of a device.
ID	Run the sections that identify the device.
LOOPBACK	Run whichever sections perform a loopback of the device(s).
NON-DESTRUCTIVE	Run only non-destructive sections or steps.
SELFTEST	Run the sections that perform self-tests on the device(s).
INTERACTIVE	Run the diagnostic's interactive sections.

CADIAG (Channel Adapter Diagnostic)

The Channel Adapter Diagnostic (CADIAG) is a Diagnostics Subsystem program providing the capability to test the online functionality of the CIO Channel Adapter, which is itself a Field Replaceable Unit (FRU). This diagnostic runs only on HP 3000 Series 900 computer systems (MPE XL).

Mini-Operating Instructions:

1. Enter the following command to the MPE XL prompt:

   ```
   :SYSDIAG
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN CADIAG  <RUN Command Options>
   ```

3. The diagnostic responds with a header and welcome message.

   If the sections and steps to be run are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 3 Identify
   Section 5 Self-test
   Section 6 Status
   Section 8 Description

   Additional Sections:

   Section 9 Rollcall
   Section 10 Subchannel Status

   Enter `HELP` to provide a summary of the DUI commands to be printed.

4. Type `EXIT` to exit CADIAG and control returns to the Online Diagnostics Subsystem.

CARTDIAG (Cartridge Tape Drive and Autochanger Diagnostic)

The CARTDIAG diagnostic program tests 1/4-inch cartridge tape drives and autochangers that use the CS/80 protocol. This diagnostic detects failures down to a field replaceable unit (FRU).

Minimum Configuration:

To run the CARTDIAG diagnostic program, a 1/4-inch cartridge tape drive, and the hardware necessary to communicate with the tape drive, must exist on the host system.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   `DUI> RUN CARTDIAG <RUN Command Options>`

   All parameters associated with the RUN command will be accepted by CARTDIAG. Enter `HELP` to display a summary of the available RUN commands.

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 5 Selftest
   Section 6 Request and Decode Status
   Section 7 Error Logs
   Section 8 Common System Operations
   Section 9 Status Tests
   Section 10 Verification Trouble Tree
   Section 11 Hardware Trouble Tree

   Additional Sections:

   Section 12 Media Trouble Tree (Non-Destructive)
   Section 13 Media Trouble Tree (Destructive)
   Section 17 External Exerciser

4. To exit CARTDIAG, type EXIT. Control returns to the DUI upon completion of the current section and step.

CENTPBA (HP-PB Type A Centronics/Parallel Module Diagnostic)

CENTPBA tests the parallel module on the HP-PB SCSI/Parallel Adapter.

Mini-Operating Instructions:

1. Enter the appropriate command at the system prompt:

   `sysdiag` *HP-UX 8.0 and later*

2. Type `help centpba` at the DUI prompt to obtain information about the diagnostic.
3. Enter the following to the DUI prompt:

   `DUI> RUN CENTPBA <RUN Command Options>`

4. The diagnostic responds with a header and welcome message.

   If sections and steps are not specified, the default section and steps are executed.

   Default Sections:

   Section 1 Trouble-Trees (Default steps are 11 through 13.)
   Step 11 - Test Adapter FRU
   Step 12 - Test IODC ROM FRU
   Step 13 - Check Peripheral Status

   Section 1 diagnoses a fault to the failing FRU. FRUs are the SCSI/Parallel Adapter card and the IODC ROM.

Note The IODC ROM is shared between the parallel module and the SCSI module. If you replace the ROM, run the SCSIPBA diagnostic to verify the SCSI portion of the new ROM.

Additional Sections:

Section 2 Reset
Step 21 - Reset Parallel Module (default step)
Step 22 - Reset Peripheral Device
Section 3 Identify
Section 5 Hardware Test
Step 51 - Reset Test (default step)
Step 52 - IODC Test (default step)
Step 53 - Internal Loopback Test (default step)
Step 54 - Data FIFO Test (default step)
Step 55 - Interrupts Test (default step)
Step 56 - Peripheral Reset Test (default step)

Section 6	Status
Section 9	Multi-Module Interference Test (not implemented on HP-UX 8.0)
Section 10	Register Level Input/Output
Section 11	Data Transaction

Note When running Section 10, exercise CAUTION when sending information over the parallel interface.

5. Type `EXIT` to exit CENTPBA and return control to the Online Diagnostic System.

CIPERLPD (Ciper Line Printer Diagnostic)

The Control Messages for Intelligent Peripherals (CIPER) Line Printer Diagnostic tests HP 2563A/64B/65A/66A/66B or HP 2567B Line Printers to detect failures of a Field Replaceable Unit (FRU). The CE can:

- Specify which sections and steps are to be run.
- Set test parameters to control the handling of error messages.
- Select the number of test executions and the particular CIPER Line Printer unit to be tested.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN CIPERLPD <RUN Command Options>
   ```

   Enter `HELP` to display a summary of the available RUN commands.

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default sections and steps are executed:

Note The CIPER device to be tested must be powered up and put online to ensure proper completion of all sections and steps.

Default Sections:

Section 2 Reset
Section 3 Clear/Identify
Section 5 Self-test
Section 6 Request Device Status (all steps)

Additional Sections:

Section 10 Ripple Print
Section 12 Request and Decode Environmental Status
Section 14 Request and Decode Job Status

4. To exit CIPERLPD, type `EXIT` and control returns to the DUI upon completion of the current section and step.

CS80DIAG (CS/80 Disk Diagnostic)

CS80DIAG tests the following disk drives:

- HP 7907A
- HP 7911, 7912, 7914
- HP 7933H, 7933XP, 7935H, 7935XP, 7936H, 7936XP, 7937H, 7937XP
- HP 7957A, 7957B, 7958A, 7958B, 7959B
- HP 7961E, 7962B, 7963B
- HP C2200A, C2202A, C2203A

Note This diagnostic does not test the HP 9122D, 9122S, and 9127A SS/80 Disk Drives. Refer to the SS/80 Disk Diagnostic (SS80DIAG) in this manual for information about testing those drives.

Also, this diagnostic does not test the HP C2201A, HP C2204A, HP 7936FL, or HP 7937FL Flex Disk Drives. Refer to the Fiber Link Exchange (FLEX) Disk Diagnostic (FLEXDISK) in this manual for information about testing those drives.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN CS80DIAG <RUN Command Options>
   ```

   Typing `HELP` causes a summary of the DUI function and its commands to appear on the screen.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default section is executed.

   Execution of the default is dependent on the test mode that has been granted by the system.

   Default Sections:

   Section 10 Diagnostic Trouble Tree

   Additional Sections:

   Section 17 CS/80 External Exerciser (Interactive Section)

4. If Section 17 is selected, the CS/80 diagnostic prompt appears.

```
CS80DIAG>
```

Entering HELP at the prompt displays a list of the available CS/80 External Exerciser commands.

```
CS80DIAG> HELP
```

The following table describes the commands available to the CS/80 External Exerciser.

Table 5-4. CS/80 External Exerciser Commands

Command	Description
ADDRESS	Allows the user to convert block addresses to 3-vector addresses and vice versa.
AHA	Issues a PRESET command, followed by a Read-Only Error-Rate.
CACHE LOG	Allows the user to access the Cache Memory Error Test Log.
CACHEOFF	Allows the user to disable the disk controller cache memory.
CACHEON	Allows the user to enable the disk controller cache memory.
CACHE SIZE	Allows the host to change the read cache page size.
CACHE STATS	Allows the user to access the Cache Statistic Table.
CLEAR COMMAND	Performs a CLEAR operation on the disk.
CLEAR LOGS	Clears the Run-Time Data Error Log, the Error-Rate Test Data Log and the Drive Fault Log.
DESCRIBE	Obtains a CS/80 describe message from the device being tested and displays the contents to the user in text form.
DIAG	Initiates internal diagnostic tests which reside in the disk drive.
ERRSUM	Lists all test errors that have occurred in the device.
ERT LOG	Allows the user to access the Error-Rate Test Data Error Log.
EXIT	Terminates the External Exerciser.
FAULT LOG	Allows the user to access the Drive Fault Log.
HELP	Provides access to information concerning the commands that are available in the external exerciser.
INIT MEDIA	Allows the user to format the disk media.
LOOPBACK	Performs a write loopback of 256 bytes of data.
MEDIA TEST	Enables the user to test the hardware/data path of the drive.
PRESET	Forces errors stored in the drives RAM to be logged to the maintenance track.
PRINT PHYSICAL	Enables the printing of *physical* addresses in the FAULT logs.
READ	Allows the user to access any data block on the selected device.

Table 5-4. CS/80 External Exerciser Commands (continued)

Command	Description
READCACHEOFF	Allows the user to disable the disk controller read cache memory.
READCACHEON	Allows the user to enable the disk controller read cache memory.
RESET STATS	Resets the Cache Statistics Table.
REV	Allows the user to read the revision numbers of the ROMs.
RFSECTOR	Allows the user to read a full sector of data from the disk starting at any valid address.
RO ERT	Initiates a read only error-rate test.
RUN LOG	Allows the user to access the Run-Time Data Error Log.
SENSE	Allows the user to read the Hardware and Read/Write Fault registers.
SERVO TEST	Executes the drives internal butterfly seek routine.
SET PATTERN	Allows the user to define and edit a pattern to be used in the write-then-read error-rate tests.
SPARE	Allows the user to spare a block or sector to an address which is reserved for sparing.
SUSPEND	Suspends CS80DIAG and returns to the DUI.
TABLES	Provides access to information tables which reside in the drive.
UNIT	Allows the user to set the unit number within the drive.
WRITECACHEOFF	Allows the user to disable disk controller write cache memory.
WRITECACHEON	Allows the user to enable disk controller write cache memory.
WTR ERT	Initiates a write then read error-rate test.

5. Type EXIT to exit Section 17 and control returns to the Online Diagnostics Subsystem.

DASSDIAG (Direct Access Secondary Storage Diagnostic)

DASSDIAG executes diagnostics on Direct Access Secondary Storage (DASS) devices. DASSDIAG also allows you to read log files and decode the device status. DASSDIAG is used for both the HP 1700A Autochanger (AC) and the HP 1701A Magneto-Optical (MO) Disk Drives that make up the HP Series 6300 Model 20GB/A Optical Disk Library System. The MO disk drives use a SCSI device adapter.

Note On MPE XL Release 3.0, DASSDIAG requires that the optical disk library system be unlocked via MOUTIL and that there be no media in the mailslot. If these conditions are not met, DASSDIAG fails with the error message `*** THE I/O REQUEST FAILED (DASERR 154).`

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   ```
   sysdiag
   ```

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN DASSDIAG <RUN Command Options>
   ```

   Type `HELP` to display a summary of the DUI function and its commands.

3. The diagnostic responds with a header and welcome message.

4. At this point, the diagnostic tests the I/O path to the device. If the the test fails, the following message appears:

   ```
   *** WARNING -- THE I/O PATH TO THE DISK MAY NOT BE FUNCTIONING PROPERLY
   (DASSERR 127)
   ```

   Otherwise, the diagnostic tries to determine whether the device is an autochanger or magneto-optical disk. If the device does not respond, the following message appears:

   ```
   *** FAILED ATTEMPTING TO IDENTIFY DEVICE (DASSERR 129)
   ```

5. Once the device is identified, the sections specified by the user are executed. If the user does not specify sections to be run, the default section will be executed.

   Default Sections:

   Section 10 Trouble Tree

   Additional Sections:

   Section 17 External Exerciser (interactive program)

Three sets of commands are available for DASSDIAG:

General commands that apply to all devices—the AC and both MO drives.

Autochanger commands

Optical drive controller commands

6. Enter **HELP** at the prompt to display a list of the available DASSDIAG commands.

```
DASSDIAG> HELP
```

Commands can be entered in either uppercase or lowercase letters. Commands can be abbreviated as long as the abbreviation is distinctive. The following table describes the three command sets.

Table 5-5. DASSDIAG Commands

Command	Description
General Commands	
ACCESS	Allows the user to select which of the three devices to direct commands.
ACTIVE	Allows the user to determine which of the three devices is active and ready to accept commands. (Three asterisks will appear next to the name of the active drive.)
TREE	Allows the user to invoke the trouble tree section for the active device.
Autochanger Commands	
EXCHANGE MEDIUM	Used to exchange the medium at the source element address with the medium at the destination element address.
INITIALIZE ELEMENT STATUS	Checks all elements for medium and other status relevant to that element.
INQUIRE	Used to request information describing the type of device and Vital Product Data of the library.
LOG SENSE	Provides a means to retrieve statistical information maintained by the library about the autochanger. Select appropriate log from the menu selection. Table 5-6 describes the available error logs.
MODE SENSE	Allows the user to obtain information pertaining to the element address assignment.
MOVE MEDIUM	Used to move medium between autochanger elements.
POSITION TO ELEMENT	Used to position the medium transport element in front of the destination element address.
PREVENT/ALLOW MEDIUM REMOVAL	Provides a means of preventing or allowing the manual insertion or removal of medium into or out of the autochanger I/O element.
READ ELEMENT STATUS	Provides a means of determining the exact status of the various elements—storage slots, I/O station, MO drives and transport element—within the autochanger.

Table 5-5. DASSDIAG Commands (continued)

Command	Description
RECEIVE DIAGNOSTIC RESULTS	Used to get the results of the test performed as a result of the **Send Diagnostic** command.
RELEASE	Performs the opposite function from the **Reserve** command.
REQUEST SENSE	Used to determine specific error conditions when the autochanger fails to successfully execute a command.
RESERVE	Used to reserve the autochanger elements for use by a single initiator.
REZERO UNIT	Sets the autochanger to a specific pre-defined state after recalibrating the mechanical system.
SEND DIAGNOSTIC	Causes the autochanger to perform certain pre-defined diagnostic test/exercise routines. The **Request Sense** and the **Receive Diagnostic Results** commands can be used to get the results of a test.
TEST UNIT READY	Used to determine the ready state of the autochanger. If the autochanger is in a ready state when it receives this command DASSDIAG will indicate that the unit is ready.
Optical Drive Controller Commands	
ERASE	Executes an erase operation from the specified logical block address for the number of blocks specified.
FORMAT UNIT	Initializes the medium.
INQUIRE	Requests that information describing the controller and the drive be given to the user.
MODE SELECT	Sets the medium, drive unit, or controller unit.
MODE SENSE	Reads parameter information pertaining to the controller, medium, and tape drive.
PREVENT/ALLOW MEDIUM REMOVAL	Provides a means of preventing or allowing the removal of medium in the drive unit.
READ	Reads one data block starting from the specified logical block address.
READ BUFFER	Reads data from the data buffer of the MO controller. Normally used in conjunction with the **Write Buffer** command to test the data buffer memory of the MO controller and the SCSI bus integrity.
READ CAPACITY	Reads the capacity of the medium. Returns the last logical block address and its length.
READ DEFECT DATA	Reads the medium defect information.
READ LONG	Reads data from the specified logical block address with ECC data. May be used to read and inspect data that has been somehow corrupted (bad ECC).

Table 5-5. DASSDIAG Commands (continued)

Command	Description
REASSIGN BLOCKS	Reassigns defective sectors to the nearest side band. Only valid for medium that has been formatted in format mode 2 or 3.
RELEASE	Performs the opposite function from the **Reserve** command. Releases a specified drive unit from the reservation system.
REQUEST SENSE	Used to determine specific error conditions when the MO controller fails to successfully execute a command.
RESERVE	Used to reserve the drive unit for use by a single initiator.
REZERO UNIT	Sets the autochanger to a specific pre-defined state after recalibrating the mechanical system. Moves the optical head to physical track 0.
SEEK	Moves the optical head to the physical track where the specified logical block exists.
SEND DIAGNOSTIC	Causes the MO controller to perform diagnostic tests on itself, on the attached drive unit, or on both.
START/STOP UNIT	Used to start or stop rotating the medium and/or eject the medium from the drive unit.
TEST UNIT READY	Used to determine the ready state of the autochanger. If the autochanger is in a ready state when it receives this command, DASSDIAG will indicate that the unit is ready.
VERIFY	Causes the verificatiou of the written data by checking the error correction code.
WRITE	Writes data to the specified logical block address. Data may optionally be verified by reading ECC information after the write has completed.
WRITE BUFFER	Writes data to the data buffer of the MO controller. Normally used in conjunction with the READ BUFFER command to test the data buffer memory of the MO controller and the SCSI bus integrity.

The following table describes the autochanger logs. To access the logs, use the autochanger command, **Log Sense**.

Table 5-6. Autochanger Error Logs

Command	Description
ERROR LOG	Logs all past diagnostic test errors within the autochanger. Includes an error time stamp.
MOVE SUCCESS LOG	Logs cumulative number of move recoveries and a total move count. Marks the last 10 hard errors by indicating how many good moves occurred since the last hard error.
RECOVERY LOG	Logs recoverable soft errors.
DRIVE LOG	Logs each time an error occurs that requires any form of recovery.
ODOMETER	Logs power on hours. Indicates the total number of moves executed since the non-volatile RAM was first initialized.

7. Type `exit` to terminate DASSDIAG. Control returns to the Online Diagnostic System.

DIAG7478 (HP 7974A and 7978A/B Magnetic Tape Drive Diagnostic)

The HP 7974A and 7978A/B Magnetic Tape Drive Diagnostic (DIAG7478) tests an HP 7974A or HP 7978A/B Magnetic Tape Drive online and offline. Specify which sections and steps are to be run.

Mini-Operating Instructions:

1. Ensure the tape drive to be tested is powered on. Ensure that a scratch tape has been mounted and the tape drive is placed online for sections which tape movement and write/read operations are to be run.
2. Enter the following command at the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

3. Enter the following command at the DUI prompt:

   ```
   DUI> RUN DIAG7478 <RUN Command Options>
   ```

   Type HELP for a summary of the available RUN commands.

4. The diagnostic responds with a header and welcome message. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

Section 2	Clear
Section 3	Identify
Section 4	Loopback
Section 6	Hardware Status
Section 40	Firmware Utilities
Section 50	Image Utilities
Section 55	Display Logs

   For the HP 7974A Only:

Section 34	HP 7974A Selftests

   For the HP 7978A/B Only:

Section 38	HP 7978A/B Selftests

Additional Sections:

Section 10	Set Tape Density Commands
Section 15	Write/Read Comparison Check (NRZI or GCR)
Section 16	Write/Read Comparison Check (PE)
Section 20	Selectable Tape Movement Commands
Section 23	Selectable Tape Read Data Commands
Section 25	Paces
Section 45	Download Diagnostics
Section 60	Interactive Section
Section 62	Do All Tests

Note For MPE XL, the default magtape LDEV parameter is 7. For HP-UX, no default magtape device parameter exists.

5. Type `EXIT` and control returns to the Online Diagnostics Subsystem as soon as all requested steps are complete.

FLEXDIAG (Flex Disk Diagnostic)

The Flex Disk Diagnostic (FLEXDIAG) tests the HP-FL fiber link disk drives. This diagnostic can detect failures of one or more Field Replaceable Units (FRUs).

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN FLEXDIAG  <RUN Command Options>
   ```

   Typing `HELP` causes a summary of the DUI function and its commands to appear on the screen.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default section is executed.

   Execution of the default is dependent on the test mode that has been granted by the system.

   Default Sections:

   Section 10 Diagnostic Trouble Tree

   Additional Sections:

   Section 11 Flex Sparing Trouble Tree
   Section 17 External Exerciser (Interactive Section)

4. To exit FLEXDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

GPIODAD (General Purpose I/O Device Adapter Diagnostic)

GPIODAD tests a Precision Bus General Purpose I/O (GPIO) card. The GPIO card is a Field Replaceable Unit (FRU). Type `help gpiodad` at the DUI prompt to obtain general information about the diagnostic.

GPIODAD has two modes:

- Destructive Mode (Test Sections 2, 3, 4, 5, 6, 8, 10, 11)
- Normal Mode (Test Section 1)

Mini-Operating Instructions:

1. Enter the appropriate command at the system prompt:

   `/usr/diag/bin/sysdiag` *HP-UX 7.0*

   or

   `sysdiag` *HP-UX 8.0 and later*

2. Enter the following command to the DUI prompt:

   `DUI> RUN GPIODAD <RUN Command Options>`

3. The diagnostic responds with a header and welcome message.

   If sections and steps are not specified, the default sections and steps are executed.

   Default Sections:

   Section 3 Identify
   Section 6 Status (Only Step 61 runs by default.)
   Step 61 - Read PB Interface Chip IO_STATUS Register
   Step 62 - Read PB Interface DIAGNOSTIC_STATUS Register
   Step 63 - Read Device Adapter IO_GPIO_STATUS Register
   Step 64 - Read Device Adapter IO_GPIO_INHI/LO Registers

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 4 Local Loopback from PB Interface Chip
   Section 5 Hardware Test (requires loopback hood)
   Section 8 External Loopback (requires loopback hood)
   Section 10 Register Level Input/Output Transactions
   Section 11 Data Transaction on GPIO

Warning **Exercise EXTREME CAUTION when sending information over the GPIO (GPIODAD section 10). The GPIO card being diagnosed should not be accessed by any process other than GPIODAD. This ensures that any configuration modifications made by the diagnostic are pending for succeeding transactions.**

4. To exit GPIODAD, type `EXIT`. Control returns to the Online Diagnostic System.

HPFLDIAG (CIO HP-FL Device Adapter Diagnostic)

The CIO HP-FL Device Adapter Diagnostic (HPFLDIAG) is a Diagnostics Subsystem program that provides the capability for online testing of the Device Adapter, which is itself a Field Replaceable Unit (FRU).

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN HPFLDIAG < RUN Command Options >
   ```

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default sections and steps are executed. The default sections are Sections 10 and 11.

   Default Sections:

   Section 10 Verification Trouble Tree
   Section 11 Diagnostic Trouble Tree

   Additional Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 6 Status
   Section 12 On-Site Trouble Tree

4. To exit HPFLDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

HPIBDAD (HP-PB HP-IB Device Adapter Diagnostic)

HPIBDAD tests the HP Precision Bus HP-IB Device Adapter, which is a Field Replaceable Unit (FRU). Type `help hpibdad` at the DUI prompt to obtain general information about the diagnostic.

HPIBDAD has two modes:

- Destructive Mode (Test Sections 2, 3, 4, 5, 6, 10, 11)
- Normal Mode (Test Section 1)

Mini-Operating Instructions:

1. Enter the appropriate command at the system prompt:

   `/usr/diag/bin/sysdiag` *HP-UX 7.0*

   or

   `sysdiag` *HP-UX 8.0 and later*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN HPIBDAD  <RUN Command Options>
   ```

3. The diagnostic responds with a header and welcome message.

   If sections and steps are not specified, the default sections and steps are executed.

   Default Sections:

   Section 3 Identify
   Section 6 Status (Steps 61, 66, and 67 run by default; others must be specified.)
   Step 61 - Preliminary Internal State Diagnosis
   Step 62 - Read HP-IB Interface Chip STATUS Register
   Step 63 - Read HP-IB Interface Chip CONTROL Register
   Step 64 - Read HP-IB Interface Chip ADDRESS Register
   Step 65 - Read HP-IB Interface Chip PP/ID_BYTE Registers
   Step 66 - Read HP-IB_STATUS Register
   Step 67 - Read BUS_STATUS Register

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 4 Local Loopback (Steps 42 and 43 run by default.)
   Step 42 - Loopback from PB Interface Chip
   Step 43 - Loopback from HP-IB Interface Chip
   Section 5 Hardware Test
   Section 10 Register Level Input/Output Transactions
   Section 11 Data/Command Transaction on HP-IB

4. To exit HPIBDAD, type `EXIT`. Control returns to the Online Diagnostic System.

HPIBDDS (HP-IB Digital Data Storage Tape Drive Diagnostic)

The HP-IB Digital Data Storage Tape Drive Diagnostic (HPIBDDS) tests a Digital Data Storage (DDS) tape drive with an HP-IB interface. This diagnostic detects failures down to a field replaceable unit (FRU).

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN HPIBDDS pdev=<physical location of device
   to be tested> <RUN command options>
   ```

   The DDS drive to be tested must be powered up. To enter the correct physical location (pdev) of the drive, type the *ldev* number for MPE XL or the *devfile* name for HP-UX.

3. The diagnostic responds with a header and day, date, and time display. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 10 Verification Trouble Tree (non-destructive)
   Section 11 Hardware Trouble Tree (destructive)

   Additional Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 5 Self-test
   Section 6 Obtain and Display Device Status
   Section 7 Display Device Log
   Section 12 Media Trouble Tree (non-destructive)
   Section 13 Media Trouble Tree (destructive)
   Section 50 Interactive External Exerciser

4. Upon completion of all selected sections and steps or when a fatal error condition is encountered, control returns to the DUI program.

HPIBDIAG (CIO HP-IB Device Adapter Diagnostic)

The HP-IB Device Adapter Diagnostic (HPIBDIAG) is a Diagnostics Subsystem program that provides the capability to test the online functionality of the CIO HP-IB Device Adapter, which is itself a Field Replaceable Unit (FRU).

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN HPIBDIAG  <RUN Command Options>
   ```

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the default sections and steps are executed based on the following diagnostic system modes:

   Default Sections:

   Section 3 Identify
   Section 4 Loopback
   Section 5 Self-test

   Additional Sections:

   Section 6 Status
   Section 12 Rollcall

4. To exit HPIBDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

LANDAD (Local Area Network Device Adapter Diagnostic)

LANDAD tests the LAN Link. LANDAD can detect a failure in one or more Field Replaceable Units (FRUs), including the LAN interface card (LANIC), the LANIC connector cable, the attachment unit interface (AUI) cable, the transceiver, and the coaxial tap or BNC tee.

The hardware required to run LANDAD includes:

- SPU
- LANIC card
- An external MAU with an AUI cable or the LANIC's on-card MAU attachment to the network

LANDAD has two modes:

- Destructive Mode (Test Sections 2, 5, 8, 11, 12). If you plan to run these tests, be sure you are the only network user.
- Normal Mode (Test Sections 1, 3, 4, 6, 7, 9, 10)

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. To run the default sections, enter the following command to the DUI prompt:

   ```
   DUI> RUN LANDAD PDEV=<physical module number>
   ```

   Where the physical module number = slot number of the LAN card x 4.

   To specify both a section and a step, enter:

   ```
   DUI> RUN LANDAD PDEV=<physical module number> SECTION=n [step number]
   ```

   Where n = the section number. To specify more than one test section on the command line, type the selected test numbers separated by commas.

3. The diagnostic responds with a header and welcome message.

   The diagnostic requests a routine which allocates the LANIC and displays the following sections which can be run:

   Default Sections:

   Section 3 Identify
   Section 4 Local Loopback (to LANIC and back)
   Section 6 Status

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 5 Selftest (See note.)
   Section 7 Link Statistics (Step 71 is run by default; Step 72 must be specified.)
   Step 71 - Read and Display Link Statistics
   Step 72 - Reset Link Statistics
   Section 8 External Loopback
   Section 9 Remote Node Test
   Section 10 Remote XID Test
   Section 11 AUI Cable Fault Isolation Test
   Section 12 Offline MAU Test
   Step 121 - Two Terminator Test
   Step 122 - One Terminator Test

Note If self-tests (section 5) pass, the LANIC is put into the online state, whether or not it was online when the section was called. If the message **LANDADWARN 6005** is displayed, run section 6 to determine why the LANIC went offline; then run section 5 again to see if the problem persists.

4. To access the HELP facility for LANDAD, enter `HELP` to the DUI prompt.

   LANDAD is not an interactive diagnostic, and contains no user accessible commands.

5. Type `EXIT` to terminate the LANDAD diagnostic. Control returns to the Online Diagnostic System.

MEMDIAG (Memory Array Diagnostic)

MEMDIAG tests and verifies the memory controllers and memory arrays online.

MEMDIAG provides three diagnostic functions and one verifier function. The diagnostic functions consist of a total pattern test of memory, a partial pattern test of memory, and an interactive section.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   `DUI> RUN MEMDIAG <RUN Command Options>`

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default section is executed based on the diagnostic mode which has been selected by the Online Diagnostics Subsystem.

   Default Sections:

   Section 9 Trouble Tree

   Additional Sections:

   Section 1 Initialize Card
   Section 2 Identify
   Section 3 Status
   Section 4 Memory Tests (1 second page wait)
   Section 5 Memory Tests (5 second page wait)
   Section 6 Verify/Sweeper (currently not implemented)
   Section 7 EDC Logic Test (currently not implemented)
   Section 8 User Interactive

4. To exit MEMDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

MUXDIAG (CIO Asynchronous Port Multiplexer Diagnostic)

The CIO Asynchronous Port Multiplexer Diagnostic (MUXDIAG) is a diagnostic subsystem program that checks the functionality of the HP 98196A Asynchronous Six Channel Multiplexer Interface card, which is itself a Field Replaceable Unit (FRU).

Minimum Configuration

The hardware required to run the diagnostic is different for MPE XL and HP-UX operating systems.

When running the HP-UX operating system, ensure that the following hardware is present:

- At least two MUX (6 channel) cards for running the diagnostic from a terminal attached to one card to test the other card.
- A System Console to run diagnostics for the other MUX card.

When running the MPE XL operating system, ensure that the following hardware is present:

- One MUX card (6 channel).
- A configured and functional LAN system.
- A configured and functional Distributed Terminal Control (DTC) system.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

   Typing `HELP` at the prompt displays a summary of the available RUN commands.

2. Enter the following to the DUI prompt:

   ```
   DUI> MODE SUM                    Go into Single User Mode
   Single User Mode (SUM)
   DUI> RUN MUXDIAG                 RUN Command Options
   ```

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the default sections and steps are executed based on the following diagnostic system modes:

   Default Sections:

   Section 1 State
   Section 3 Identify
   Section 4 Loopback

   Additional Sections:

   Section 2 Clear n\Section 5\Self-test
   Section 10 Write/Read

4. To exit MUXDIAG, type `EXIT`.

OSI4DAD (HP OSI Express 802.4 Card Diagnostic)

OSI4DAD tests the HP OSI Express 802.4 card assembly, which is an HP-PB IO architecture-based card capable of executing multiple layers of the OSI/MAP protocol family. Field Replaceable Units (FRUs) include:

- OSI Express 802.4 (HP-PB MAP) card
- Cable to the modem
- Modem

OSI4DAD has two modes:

- Destructive Mode (Test Sections 2, 4, 5, 8, 11, 13, 14 - Step 142, 16)
- Normal Mode (Test Sections 1, 3, 6, 7, 9, 10, 14 - Step 141, 15)

Mini-Operating Instructions:

1. Enter the appropriate command at the system prompt:

   `/usr/diag/bin/sysdiag` *HP-UX 7.0*

   or

   `sysdiag` *HP-UX 8.0 and later*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN OSI4DAD  <RUN Command Options>
   ```

3. The diagnostic responds with a header and welcome message.

   If sections and steps are not specified, the following default sections and steps are executed based on the diagnostic mode that has been selected by the online subsystem.

   Default Sections:

   Section 3 Identify
   Section 6 Status
   Section 7 802.4 Statistics (useful for configuring the network)
   Section 14 802.4 Configuration Parameters (Step 141 only)

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 4 Loopback (tests frontplane and cable/modem combination)
   Section 5 Selftest
   Section 8 Broadband External Loopback
   Section 9 Remote Node Test
   Section 10 Remote XID Test
   Section 11 Internal Hardware
   Step 111 - Hard Reset with Test
   Step 112 - Comprehensive RAM Test (takes approximately 2.5 minutes per megabyte of card memory)

Section 13 EEPROM Test and Address Maintenance
Step 131 - EEPROM Write Test
Step 132 - Recover From EEPROM Error
Step 133 - Return to Default Link Configuration Values
Step 134 - Change the MAC Station Address
Section 15 Failure History
Section 16 Manufacturing Utilities

4. To exit OSI4DAD, type `EXIT`. Control returns to the Online Diagnostic System.

PMUXDIAG (Asynchronous 8-Channel Multiplexer Diagnostic)

PMUXDIAG checks the functionality of the following Field Replaceable Units (FRUs):

- HP 40299A/B 8-channel Multiplexer card
- Active Distribution Panel (ADP)
- MUX card-to-ADP cable

Although the diagnostic does not test peripheral devices connected to the MUX, the diagnostic tests the MUX FRUs more accurately when peripheral devices are connected.

Caution When executing this diagnostic online in a multiuser environment, limit testing to unused HP-PB MUX cards or unused ports associated with the HP-PB MUX card under test.

Mini-Operating Instructions:

1. Enter the appropriate command at the system prompt:

   `/usr/diag/bin/sysdiag` *HP-UX 7.0*

   or

   `sysdiag` *HP-UX 8.0 and later*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN PMUXDIAG dev=<logical MUX specifier>
   ```

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the default sections and steps are executed based on the following diagnostic system modes:

   Default Sections:

   Section 1 State
   Section 3 Identify
   Section 4 Loopback (Default steps are 29, 39, and 49.)

   Additional Sections:

   Section 2 Clear (Step 19 runs by default.)
   Section 5 Selftest
   Section 7 Port Reset (Step 100 runs by default.)
   Section 8 Halt
   Section 9 Dump (Step 109 runs by default.)

4. To exit PMUXDIAG, type `EXIT`. Control returns to the Online Diagnostic System.

PPDIAG (Page Printer Diagnostic)

The Page Printer Diagnostic (PPDIAG) tests the HP 2680A or HP 2688A Page Printer to detect failures of Field Replaceable Units (FRUs). The Page Printer Diagnostic program can be invoked by the I/O system on catastrophic errors for auto-diagnostic purposes. Only MPE XL operating systems have auto-diagnostic capability.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   `DUI> RUN PPDIAG <RUN Command Options>`

3. The diagnostic responds with a header and welcome message.

Note The Page Printer to be tested must be powered up and put online to ensure proper completion of all sections and steps.

If specific sections and steps are not specified, the default sections and steps are executed.

Default Sections:

Section 2 Clear
Section 3 Identify
Section 4 Loopback
Section 5 Self-test
Section 20 Pattern Print

Additional Sections:

Section 6 Display I/O Status
Section 8 Display Environmental Status
Section 50 Simulate Panel (HP 2680 only)

4. To exit PPDIAG, type `EXIT`. Control returns to the DUI upon completion of the current section and step. A description of PPDIAG and all sections contained within are available through the DUI HELP facility.

PSIDAD (PSI Device Adapter Diagnostic)

PSIDAD tests Programmable Serial Interface cards on an PA-RISC computer system which supports the Online Diagnostics Subsystem.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG (for MPE XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN PSIDAD <RUN Command Options>
   ```

3. The diagnostic responds with a header and welcome message.

   If the sections and steps to be run are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 3 Identify
   Section 5 Self-test
   Section 6 Status

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 8 Internal Hardware
   Section 9 External Hardware
   Section 10 Manufacturing Utilities
   Section 15 EEPROM Failure History (HP-PB) only

   Enter HELP to provide a summary of the DUI commands to be printed.

4. Type EXIT to exit CADIAG and control returns to the Online Diagnostics Subsystem.

REELDIAG (Reel Tape Diagnostic)

The Reel Tape Diagnostic (REELDIAG) tests the HP 7979A, HP 7980A, and HP 7980XC Tape Drives. The tape drive under test must contain internal self-tests that are capable of detecting failed Field Replaceable Units (FRUs) in the tape drive.

REELDIAG does the following:

- Sets the selected tape drive to a known condition.
- Identifies the tape drive as one of the listed types.
- Tests the HP-IB communication link between the SPU and the device.
- Requests the tape drive to run certain internal self-tests.
- Obtains and decodes hardware status and self-test results.
- Obtains and decodes device internal logs

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN REELDIAG <RUN command options>
   ```

   Enter `HELP` to display a summary of the available RUN command options.

3. The diagnostic responds with a header and day, date, and time display. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 10 Non-destructive I/O path Trouble Tree
   Section 11 Drive Electronics Trouble Tree

   Additional Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 5 Self-test
   Section 6 Display Device Status
   Section 7 Display Log Information
   Section 12 R/W Function Trouble Tree
   Section 13 Media Trouble Tree
   Section 50 Interactive External Exerciser

4. On completion of all selected sections and steps, control returns to the DUI program.

SCSICD (SCSI Compact Disk Diagnostic)

SCSICD tests SCSI compact disks on PA-RISC systems with either HP-PB or CIO backplanes.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN SCSICD  <RUN Command Options>
   ```

   All standard RUN command parameters are available for SCSICD. Enter `HELP` to display a summary of the RUN command options.

3. The diagnostic responds with a header and welcome message.

   The diagnostic first tests the I/O path to the device. Then the sections specified in the RUN command are executed. If the user does not specify the sections and steps to run, the default sections and steps will be executed.

   Default Sections:

   Section 10 Diagnostic Trouble-Tree

   Additional Sections:

   Section 17 External Exerciser (Interactive program that allows access to internal diagnostics and utilities within a SCSI compact disk to troubleshoot the compact disk to the FRU level.)

4. When the external exerciser is invoked, the following prompt will be displayed:

   ```
   SCSICD>
   ```

5. When this prompt appears, the exerciser is waiting for the user to enter a command. The available commands are listed in Table 5-7.

6. On completion of all selected sections and steps, control returns to the DUI program.

Table 5-7. SCSICD Exerciser Commands

Command	Description
CAPACITY	Used to determine the maximum capacity of the drive, block address of the last addressable block, and the current block size.
DEVICE RESET	Resets the device.
DIAG	Initiates the internal power-on self-test. A loop option allows the diagnostic to be repeated a specified number of times. Tests are device dependent and are fully described in the support document for each drive.
EXIT	Terminates execution of the External Exerciser.
HELP	Accesses information about the commands available in the External Exerciser.
INQUIRY	Allows the user to obtain the drive type, media type, and firmware revision.
LDEV	Allows the user to select a new device to be tested. The user can select the new device by LDEV or PDEV.
READ	Allows access to any data block on the selected device. Due to potential security compromise, the user will need to possess Level 0 security to use this command.
RO MT	Initiates a read only media test. Two types of tests are available. The first type allows the user to specify the address at which the test is to sequentially start reading data to detect read errors. The second type uses random addresses and lengths of reads to detect any read errors.
SEEK	Causes the drive to seek to a specified address or series of addresses. This command is useful for testing the servo circuitry. Three types of seeks can be performed: random seeks to a random address, alternate seeks between two specified addresses, and butterfly seeks for a series of seeks over the entire disk surface.
SUSPEND	Allows the user to suspend SCSICD and return to the DUI. The user enters `RESUME` at the DUI prompt to return to SCSICD.

SCSICIO (SCSI CIO Device Adapter Diagnostic)

SCSICIO tests HP 27147A (HP-UX) and HP 27251A (MPE XL) SCSI Host Adapter cards in PA-RISC systems that have CIO busses.

Note This online diagnostic contains tests that require exclusive access and cannot be run on boot path devices. Run this diagnostic from the Support Tape if you need to execute tests that require exclusive access.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN SCSICIO pdev = x.y section = n
   ```

   where,

   pdev = physical device number
   x = system dependent channel address
   y = CIO slot number
   n = section number (if no sections are specified, the default section will be run)

   All standard RUN command parameters are available for SCSICIO. Enter `HELP` to display a summary of the RUN command options.

3. The diagnostic responds with a header and welcome message. If the user does not specify the sections and steps to run, the default sections and steps will be executed.

   Default Sections:

   Section 1 Trouble-Tree (Default steps are 11 and 13 through 15)
   Step 11 - DA (Device Adapter) Selftest
   Step 12 - Reserved For Future Use
   Step 13 - SCSI Termination Power Test
   Step 14 - SCSI Roll Call
   Step 15 - SCSI Host Adapter Configuration

   Additional Sections:

   Section 2 Reset
   Step 21 - Reset SCSI DA (default step)
   Step 22 - Reset SCSI Bus
   Section 3 Identify (used to determine firmware revision)
   Section 4 Loopback
   Step 41 - Loopback through DA Memory (default step)
   Step 42 - Loopback through SCSI Interface Chip
   Step 43 - Loopback through Loopback Hood (Requires loopback hood, HP part number 5061-6565)

Section 5	Hardware Test
	Step 51 - DA Selftest (default step)
	Step 52 - Loopback through SCSI Interface Chip
	Step 53 - SCSI Termination Power Test
Section 6	Status
	Step 61 - Read CIO Information (default step)
	Step 62 - Read SCSI Status Information
	Step 63 - Read SCSI Interface Chip Registers
Section 10	Register Level Input/Output Transactions
Section 11	SCSI Bus Roll Call

Note Before running the external loopback test (Section 4, Step 43), shut down the system to avoid blowing the TERMPWR fuse, power off the peripheral device (assuming the card is not in the boot path, the path of a mounted file system, or swap) and disconnect the SCSI host adapter cable from the peripheral device. Attach the loopback hood to the disconnected peripheral end of the cable. Leave the cable connected to the SCSI host adapter card.

Caution Section 10 is not used for testing the device adapter when it is installed in the system. Users of this section must exercise extreme caution.

4. Type `EXIT` to terminate SCSICIO. Control returns to the Online Diagnostics Subsystem.

SCSIDDS (SCSI Digital Data Storage Tape Drive Diagnostic)

SCSIDDS tests Digital Data Storage (DDS) tape drives that have SCSI interfaces. SCSIDDS is supported on PA-RISC systems with either CIO or HP-PB backplanes.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   `DUI> RUN SCSIDDS <RUN Command Options>`

   Enter `HELP` to display a summary of the available RUN command options.

   The diagnostic responds with a header and welcome message.

   If the user does not specify sections and steps to run, the default sections and steps will be executed. The default sections will be performed whether the drive is online or offline.

   Default Sections:

   Section 10 Non-exclusive & Non-disruptive Hardware Trouble Tree
   Section 12 Non-destructive Media Trouble Tree

   Additional Sections:

   Section 11 Disruptive Hardware Trouble Tree
   Section 13 Destructive Media Trouble Tree
   Section 50 External Exerciser

3. On completion of all selected sections and steps or when a fatal error condition is encountered, control returns to the DUI program.

SCSIDISK (SCSI Disk Diagnostic)

SCSIDISK tests SCSI disk drives on PA-RISC systems with either CIO or HP-PB backplanes.

Note This online diagnostic contains tests that require exclusive access and cannot be run on boot path devices. Run this diagnostic from the Support Tape if you need to execute tests that require exclusive access.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN SCSIDISK <RUN Command Options>
   ```

   All standard RUN command parameters are available for SCSIDISK. Enter `HELP` to display a summary of the RUN command options.

3. The diagnostic responds with a header and welcome message.

   The diagnostic first tests the I/O path to the device. Then the sections specified in the RUN command are executed. If the user does not specify the sections and steps to run, the default sections and steps will be executed.

   Default Sections:

   Section 10 Diagnostic Trouble-Tree

   Additional Sections:

   Section 17 External Exerciser (Interactive program that allows access to internal diagnostics, logs, and utilities within a SCSI disk drive to troubleshoot the drive to the FRU level.

4. When the external exerciser is invoked, the following prompt will be displayed:

   ```
   SCSIDISK>
   ```

5. When this prompt appears, the exerciser is waiting for the user to enter a command. The available commands are listed in Table 5-8.

6. Upon completion of all selected sections and steps, control returns to the DUI program.

Table 5-8. SCSIDISK Exerciser Commands

Command	Description
ACCESS LOG	Retrieves information from the drive's maintenance log. The maintenance log is used by the drive to record the occurrence of various events.
ADDRESS	Allows user to convert block addresses to three-vector addresses and vice-versa. This conversion will be made using the maximum address for the device that is currently selected. This maximum address will be obtained via the SCSI READ CAPACITY command. The ADDRESS command is also used to set a global program flag to either three-vector or block addressing mode.
CAPACITY	Used to determine the maximum capacity of the drive, block address of the last addressable block, and the current block size.
CLEAR LOGS	Clears the drive's maintenance log, which consists of the data log and hardware error log.
DEFECT LIST	Displays the drive's primary defect list and/or the growing defect list. The DEFECT LIST command is similar to the CS/80 SPARE TABLE command. The primary defect list contains the permanent flaws detected on the media by the original manufacturer. The growing defect list includes all defects identified after the drive leaves the manufacturer.
DEVICE RESET	Resets the device. Performs the following: finishes any logical block write in progress; aborts any command in progress; initializes the controller, spare table, saved pages information, and logs.
DIAG	Initiates the internal power-on self-test. A loop option allows the diagnostic to be repeated a specified number of times. Tests are device dependent and are fully described in the support document for each drive.
EXIT	Terminates execution of the External Exerciser.
FORMAT UNIT	Allows user to format the disk's media. Provides the option to retain all spares that have been made on the disk or retain only factory spares. All data on the disk will be destroyed. It is essential that extensive media testing be performed and all questionable blocks reassigned after executing this command.
HELP	Accesses information about the commands available in the External Exerciser.
INQUIRY	Allows user to obtain the drive type, media type, and firmware revision.
LDEV	Allows user to select a new device to be tested. The user can select the new device by LDEV or PDEV.
PRINT PHYSICAL	Enables the printing of PHYSICAL addresses in the DATA LOG and HARDWARE ERROR LOG.
READ	Allows access to any data block on the selected device. The user needs to possess Level 0 security to use this command.
RFBLOCK	Allows user to request all available information fields for the specified logical or physical block. This information includes header, data, and ECC field contents. The drive returns a complete image of one physical block. The user needs to possess Level 0 security to use this command.

Table 5-8. SCSIDISK Exerciser Commands (continued)

Command	Description
REASSIGN BLOCK	Allows user to reassign a block to an address reserved for sparing. Do not use this command unless the block being reassigned is known to be defective. This implies that media tests have been run on the suspected area and it consistently generates errors.
RO MT	Initiates a read only media test. Two types of tests are available. The first type allows the user to specify the address at which the test is to sequentially start reading data to detect read errors. The second type uses random addresses and lengths of reads to detect any read errors.
SEEK	Causes the drive to seek to a specified address or series of addresses. This command is useful for testing the servo circuitry. Three types of seeks can be performed: random seeks to a random address, alternate seeks between two specified addresses, and butterfly seeks for a series of seeks over the entire disk surface.
SUSPEND	Allows user to suspend SCSIDISK and return to the DUI. Enter **RESUME** at the DUI prompt to return to SCSIDISK.
VERIFY	Requests that data on the selected or random area of the drive's media be verified by ECC check only. A compare is not performed. The logs can be cleared before performing the verify.
WTR MT	Initiates a write-then-read media test. Two types of tests are available. The write-then-read media test tests the data channel to the device. The other type only tests the device media. Two options are available for each type of test. The first option performs incremental writes followed by reads across a data area specified by the user, with the pattern either user-specified or random. The second option is a random write-then-read media test that does random length writes followed by reads at random locations on the disk. These tests will destroy data on the disk.

SCSIPBA (HP-PB Type A SCSI Module Diagnostic)

SCSIPBA tests the SCSI portion of a HP-PB SCSI/Parallel Adapter. A SCSI loopback hood (HP part number 5061-6565) is required to fully test the card. The loopback head is connected to the low-density end of the adapter's SCSI cable. This allows the frontplane drivers and receivers to be tested.

Note This online diagnostic contains tests that require exclusive access and cannot be run on boot path devices. Run this diagnostic from the Support Tape if you need to execute tests that require exclusive access.

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   `sysdiag` *HP-UX 8.0 and later*

2. Enter the following to the DUI prompt:

   `DUI> RUN SCSIPBA <RUN Command Options>`

   Type `HELP` for a summary of the DUI functions and commands.

3. The diagnostic responds with a header and welcome message.

Caution Use caution when running this diagnostic with the file system mounted.

a. Tape I/Os will be aborted.

b. Log messages will appear in the log file because of the driver-card processes used to restore the system.

If sections and steps are not specified, the default section and steps are executed.

Default Sections:

Section 1 Trouble-Trees (Default steps are 11 through 15.)
Step 11 - Test Adapter FRU
Step 12 - Test IODC ROM FRU
Step 13 - Test Termination Power FRU
Step 14 - SCSI Bus Rollcall
Step 15 - SCSI Host Adapter Configuration (displays parity setting and SCSI address of the host adapter)

Section 1 diagnoses a fault to the failing FRU. FRUs are the SCSI/Parallel Adapter card, the IODC ROM, and the termination power fuse.

Note The IODC ROM is shared between the SCSI module and the parallel module. If you replace the ROM, run the CENTPBA diagnostic to verify the parallel portion of the new ROM.

Additional Sections:

Section 2	Reset
	Step 21 - Reset SCSI Host Adapter (default step)
	Step 22 - Reset SCSI Bus
Section 3	Identify
Section 4	Loopback Tests
	Step 41 - Loopback to Backplane
	Step 42 - Loopback to Frontplane (default step)
	Step 43 - Loopback to Cable
Section 5	Hardware Test
	Step 51 - Reset Test (default step)
	Step 52 - IODC Test (default step)
	Step 53 - Loopback to Backplane Test (default step)
	Step 54 - Loopback to Frontplane Test (default step)
	Step 55 - DMA Outbound Test (default step)
	Step 56 - DMA Inbound Test (default step)
	Step 57 - Interrupts Test (default step)
	Step 58 - Termination Power Test (default step)
Section 6	Status
	Step 61 - SCSI Status Information
	Step 62 - SCSI Register Dump
	Step 63 - Read IO_STATUS Register (default step)
	Step 64 - Read DIAGNOSTIC_STATUS Register (default step)
Section 9	Multi-Module Interference Test (not implemented on HP-UX 8.0)
Section 10	Register Level Input/Output Transactions
Section 11	SCSI Bus Rollcall

Caution Use *EXTREME CAUTION* when running Section 10.

4. Type `EXIT` to exit SCSIPBA and return control to the Online Diagnostic System.

SCSIREEL (SCSI Magnetic Reel Tape Diagnostic)

SCSIREEL tests the HP 7980S Tape Drive hardware and firmware on all PA-RISC systems that have a SCSI device adapter. The test routines are essentially a subset of the test routines that can be run manually from the front panel of the tape drive.

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for HP-UX (Release 8.0 and after)*

2. Enter the following to the DUI prompt:

   `DUI> RUN SCSIREEL <RUN Command Options>`

   Typing `HELP` causes a summary of the DUI function and its commands to appear on the screen.

3. The diagnostic responds with a header and welcome message.

4. The diagnostic first requests access to the device from the diagnostic subsystem. If access is not obtained, error messages will appear and the program will terminate. If access is obtained, SCSIREEL automatically invokes a routine to test the I/O path to the tape drive and asks the drive to identify itself. Then the sections and steps specified by the user will be executed. If the sections and steps to be run are not specified, the default sections are executed.

   Default Sections:

   Section 10 Non-destructive I/O Path Trouble Tree
   Section 11 Drive Electronics Trouble Tree

   Additional Sections:

   Section 2 Clear
   Section 3 Inquiry (Requests specified tape drive to identify itself.)
   Section 4 Loopback (Tests communication link between host and selected drive.)
   Section 5 Selftest (Requests drive to run its own built-in self-tests.)
   Section 6 Display Device Status (Obtains, decodes, and displays request sense data and mode sense data returned by the Request Sense and Mode Sense commands.)
   Section 7 Display Device Log (Obtains, decodes, and displays pertinent information from the logs maintained by the tape drive.)
   Section 12 R/W Function Trouble Tree (Diagnoses major tape transport and read/write problems in a short period of time. Destructive.)
   Section 13 Media Trouble Tree (Distinguishes defective media from drive read/write hardware problems.)
   Section 50 Interactive External Exerciser (Interactive program that provides access to a set of internal diagnostics and utilities within the drive.)

5. On completion of all sections and steps selected by the user or upon a fatal error condition, control returns to the Diagnostic User Interface.

SS80DIAG (SS/80 Disk Diagnostic)

The SS/80 Disk Diagnostic (SS80DIAG) tests the HP 9122D, 9122S, and the 9127A SS/80 disk drives. This diagnostic can detect failures of one or more Field Replaceable Units (FRUs).

Mini-Operating Instructions:

1. Enter the appropriate command to the system prompt:

   `sysdiag` *for MPE XL and HP-UX (Release 8.0 and after)*

   `/usr/diag/bin/sysdiag` *for HP-UX (Releases prior to 8.0)*

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN SS80DIAG <RUN Command Options>
   ```

   Typing **HELP** causes a summary of the DUI function and its commands to appear on the screen.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default sections and steps are executed. The default sections are Sections 2, 3, 4, 5, 8, and 9. Default steps are all steps within sections.

   Execution of these defaults is dependent on the test mode that has been granted by the system.

   Default Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback (all steps)
   Section 5 Self-test
   Section 8 Common System Operations (all steps)
   Section 9 Status Tests (all steps)

   Additional Sections:

   Section 6 Status
   Section 7 Error Logs
   Section 17 SS/80 External Exerciser (Interactive Section)

4. If Section 17 is selected, the SS/80 diagnostic prompt appears.

```
SS80DIAG>
```

Entering **HELP** at the prompt displays a list of the available SS/80 External Exerciser commands.

```
SS80DIAG> HELP
```

The following table describes the commands available to the SS/80 External Exerciser.

Table 5-9. SS/80 External Exerciser Commands

Command	Description
ADDRESS	Allows the user to convert block addresses to 3-vector addresses and vice versa.
CICLEAR	Clears the selected device.
DESCRIBE	Obtains a CS/80 describe message from the device being tested and displays the contents to the user in text form.
DIAG	Initiates internal diagnostic tests which reside in the disk drive.
EXIT	Terminates the External Exerciser.
HELP	Provides access to information concerning the commands that are available in the external exerciser.
INIT MEDIA	Allows the user to format the disk media.
READ	Allows the user to access any data block on the selected device.
SDCLEAR	Clears the device to its power-on state.
UNIT	Allows the user to set the unit number within the drive.

5. Type **EXIT** to exit Section 17. Control returns to the Online Diagnostics Subsystem.

IOTT (I/O Test Tool)

The I/O Test Tool (IOTT) is intended for online diagnosis of I/O related problems from any system terminal. Numerous commands, instructions, and program statements are available as inputs through I/O Test Tool.

Mini-Operating Instructions:

Before attempting to run the utility, ensure that the user has diagnostic level 0 security.

1. Enter the following command to the MPE XL prompt:

   ```
   :SYSDIAG
   ```

2. Enter the following command at the DUI prompt:

   ```
   DUI> RUN IOTT  <RUN Command Options>
   ```

   Refer to the Section on DUI for details concerning the RUN command options and the detailed IOTT command options in this section.

3. The diagnostic responds with a header and welcome message.

   Once the I/O Test Tool is invoked, the following message are displayed indicating an input request:

   ```
   IOTT>
   ```

   The four categories of input commands and the five categories of input Buffer Manipulation Instructions available for I/O Test Tool are provided in this section.

4. To exit IOTT type EXIT. Control returns to the Online Diagnostic System as shown by the appearance of the DUI prompt:

   ```
   DUI>
   ```

Command Summary

The four categories of input commands available with IOTT are listed as follows:

1. **Control Commands (CC)**

   The following commands are used to control the current execution mode of I/O Test Tool:

   ```
   ABORT
   EXIT
   RESUME
   RUN[count]
   SUSPEND
   ```

2. **User Program File Commands (UPFC)**

   The following commands are available to utilize user program files:

```
LOAD (filename)
PURGE (filename)
SAVE (filename)
SHOWFILE [file specifier string]
```

3. **Program Editing Commands (PEC)**

   The following commands can be used to manipulate the contents of the Program Storage Area:

```
DELETE [linenumber]
DELETE [linenumber]/[linenumber]
DELETE ALL
LIST [linenumber]
MODIFY [linenumber]
MOVE [linenumber]/[linenumber] TO [linenumber]
MOVE [linenumber] TO [linenumber]
RENUMBER [value]
```

4. **Miscellaneous Commands (MC)**

   The following commands are available for general use:

```
HELP [command, instruction, or statement name][:SYNTAX]
REDO
```

Instruction Summary

The five categories of input Buffer Manipulation Instructions available for IOTT are as follows:

1. **Test Environment Instructions (TEI)**

   The following instructions are used to set the environment for the use of I/O Test Tool:

```
ERRPAUSE ON
ERRPAUSE OFF
RELDEVICE LDEV=[ldev]
RELDEVICE PDEV=[pdev]
SETDEVICE LDEV=[logical device number]
SETDEVICE PDEV=[CA#][.DA#[.Device#[.Unit#]]
SETTIMER {value}
SHOWDEV
```

2. **Buffer Manipulation Instructions (BMI)**

Buffer function instructions provide the availability to fill, modify, and display data which was used for the I/O request. The two types of buffers used are integer buffers (32 bit entities) and byte buffers (8 bit entities). For functions which involve two buffers, both buffers must be of the same type. The available instructions are:

```
ADJBUFF [buffer name]([index]),[value],[count]
ALTBUFF [buffer name]([index]),[value],[value]
ALTBUFF [buffer name]([index]),"ascii text"
COMPBUFF [buffer](index]),[buffer]([index]),[length],[count]
         [diff   ]:[display mode]
          similar
COPYBUFF {buffer}({index}),{buffer}({index}),{length},[count]
DBUFF {buffer name} [:display mode]
DBUFF {buffer name} [index] [:display mode]
DBUFF {buffer name} [index/index] [:display mode]
DEFBUFF {buffer name},{length},{BYTE} [:STATUS]
DEFBUFF {buffer name},{length},{WORD} [:STATUS]
FILLBUFF [buffer]([index]),[value],[count]
FINCBUFF {buffer name}({index}),{start},{end}[,inc]
RELBUFF {buffer name}
SHOWBUFF
```

3. **Predefined I/O Request Instructions (PIORI)**

The following instructions give all information needed for the predefined I/O request:

```
FDABORTIO
EINCADDR {value}
EXECUTE {function}[,count][: UNBLOCK]
DSTATUS
INCADDR {value}
RESETIO
SETADDR CLY={cylinder};HEAD={head};SECT={sect}
SETADDR {value}
SETDATA {buffer},{length}
SETOPTION {option}[,option]
SHOWPARM
```

4. **HP-IB Device Adapter Program Instructions (HPIBPI)**

   I/O Test Tool provides instructions for creating unique HP-IB device adapter programs. This allows more control over the protocol between the HP-IB device adapter and a peripheral device. The instructions available are as follows:

```
{line number} CASEJUMP {value},{line number}[,line number]
CLEAR {value}
{line number} CRCCOMP {line number}
CRCINIT
CRCWRITE
{line number} DSJ {sindex},{line number},[line number],[line number]
ENDHPIB
HALT {status length},{hstat}
IDENTIFY {sindex}
{line number} JUMP {line number}
ONTIMEOUT [timeout],[sindex],[line number]
PINDEX {value}
RBURST {secondary},{buffer name},{length},{#burst},{burstlen}
RDATA {secondary},{sindex},{length}
RDMA {secondary},{buffer name},{length}
SETHPIB
SHOWHPIB [:display mode]
TIMEOUTOFF
TIMESTAMP {sindex}
UNLOCK
WAITPOLL [:nobreak]
WBURST {secondary},{buffer name},{length},{#burst}[:eoi]
WDATA {secondary},{buffer name},{length}[:eoi]
WDMA {secondary},{buffer name},{length} [:eoi]
WINTERF {buffer name},{length}
```

5. **HP-CIO DMA Chain Instructions (HPCIOI)**

   I/O Test Tool provides the following instructions to control the protocol across the HP-CIO:

```
ADDQUAD {order ID},{buffer name},{length}[:hpcio optional]
ADDQUAD {cmd value},{buffer name},{length}
ENDHPCIO
SETHPCIO
SHOWHPCIO [:display mode]
```

Program Statement Summary

The following are program command statements available in IOTT:

```
COMMENT
DO-LOOPTO
GOTO
IF-THEN/IFN-THEN
PAUSE
PRINT
STOP
```

LOGTOOL (System and Memory Log Analysis Tool)

The system and memory log analysis tool (LOGTOOL) provides capability to perform various operations on the system log files. Error logs may be identified, deleted, and created. Timing intervals for background log analysis may be displayed and reset. This utility runs on MPE XL (all releases) and HP-UX (Release 8.0 and later).

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :sysdiag
   ```

2. Enter the following command at the DUI prompt:

   ```
   DUI> RUN LOGTOOL
   ```

3. The utility responds with a header and welcome message.

   Once LOGTOOL has been invoked the following prompt is displayed indicating an input request:

   ```
   LOGTOOL>
   ```

4. Respond by entering a logtool command along with any necessary data, parameter(s), or options. Entering HELP accesses the LOGTOOL HELP facility and displays a complete list of LOGTOOL commands.

   The three categories of input commands available are:

   - System Log File Commands (SFL).
   - Memory Log File Commands (MLF).
   - Miscellaneous Commands (MC).

   The following commands listed with their command category are available in LOGTOOL:

   ```
   DISPLAYLOG (MC)        PURGESYSLOG (SLF)
   EXIT (MC)              PURGEWORK (SLF)
   HELP (MC)              REDO (MC)
   LAYOUT (SLF)           SELECT (SLF)
   LIST (SLF)             STATUS (SLF)
   MEMCLR (MLF)           SUSPEND (MC)
   MEMRPT (MLF)           SWITCHLOG (SLF)
   MEMTIMER (MLF)         TYPES (SLF)
   ```

5. Type EXIT to leave the HELP facility or to terminate any current LOGTOOL process.

SYSMAP (System Map)

The System Map (SYSMAP) utility provides information about four areas of the PA-RISC system: Input/Output System (IOMAP), System Bus Modules (MODULEMAP), Central Processing Unit(s) (CPUMAP), and System Memory (MEMMAP). Maps of these four areas are available only on the host system. This utility runs on all MPE XL Series 900 computer systems and on Series 800 computer systems running HP-UX 8.0 and later.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   sysdiag
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN SYSMAP
   ```

3. The utility responds with a header and welcome message.

   SYSMAP has no RUN command options. Once SYSMAP has been invoked the following prompt is displayed indicating an input request:

   ```
   ENTER MAP>
   ```

4. Typing HELP causes SYSMAP to list a menu of the following global SYSMAP commands:

   ```
   IOMAP
   CPUMAP
   MEMMAP
   MODULEMAP
   MAPALL
   CONFIRM (ON/OFF)
   TIMEOUT
   SHOWSETTINGS
   SUPPRESS (ON/OFF)
   SUSPEND
   EXIT
   ```

   Respond with one of the commands above.

5. Type EXIT to terminate any current mapping process or to leave the HELP facility.

TERMDSM (Terminal Diagnostic Support Monitor)

The Terminal Diagnostic Support Monitor (TERMDSM) provides diagnostic services for terminal and serial printer connections on HP 3000 900 Series (MPE XL) systems. The utility is used when a hardware or software problem is suspected with one or more asynchronous devices. TERMDSM gathers information on ASC software problems and troubleshoots the DTC hardware. TERMDSM can also be used to test hardware connections between devices and the DTC.

Minimum Configuration:

- Properly functioning MPE XL operating system.
- Minimum mainframe hardware configuration.
- System and each DTC connected as nodes on the LAN.
- At least one pair of serial interface/connector cards installed on each DTC, with at least one port of each connector card connected to an asynchronous device.
- The following loopback connectors, supplied with each DTC:

  25-pin connectors for modem cards (HP part number 30146-60002)

  3-pin connectors for RS-232-C direct-connect cards (HP part number 30148-60002)

  5-pin connectors for RS-422 direct-connect cards (HP part number 30147-60002)

Note TERMSDSM checks the user's capability list to determine if the user is authorized to use commands at that security level. Users without SM, DI, OP, or AM capabilities at security levels 0, 1, and 2 will not be permitted to use TERMDSM.

Mini-Operating Instructions:

1. Enter the following command to the MPE XL prompt:

   ```
   :SYSDIAG
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN TERMDSM
   ```

   TERMDSM does not require parameters.

3. The utility responds with a header, a welcome message, and a list of commands that can be used with the utility.
4. The following prompt is displayed indicating aii input request:

   ```
   TERMDSM>
   ```

5. To stop the looping of a diagnostic function, enter `CTRL Y`.
6. To exit TERMDSM, type `EXIT`. The DUI prompt will then be displayed.

Command Summary:

The capital letters indicate the abbreviations for each command.

Comment	Allows user to type in informational comments for reference. Security level = 2.
Dlag	Allows several diagnostic functions to be run on a port. Allows user to initiate a DTC selftest. DTC selftest = security level 0; Port tests = security level 1.
DTc	Lists each DTC on the system, its descriptive name, and the IEEE 802.3 station address. Security level = 2.
DUmp	Allows data area of a port to be copied to a disk file for troubleshooting by HP factory personnel. Security level = 1.
Help	Displays information about TERMDSM and its commands. Security level = 2.
Reset	Allows single port, several ports, or a DTC to accept new sessions. Security level for resetting ports = 1; security level for resetting DTC = 0.
STatus	Lists node name of a specific device's DTC. Security level = 2.

Caution Some TERMDSM commands abort sessions and cause the loss of data connected with those sessions. If used incorrectly, the commands can unnecessarily disrupt or abort user sessions that are not having problems.

Offline Diagnostics and Utilities

The Offline Diagnostics System provides a means of testing System Processor Unit (SPU) hardware Field Replaceable Units (FRUs) and interrogating low-level hardware register contents. It includes a standard operating environment complete with a library of common procedures, program macros, and command set/feature functionality. For more information about the Offline Diagnostics, read the *Offline Diagnostics System Manual* (HP part number 30190-90010).

Note The ISL-based Offline Diagnostics and Utilities are implemented via the Support Tape on either an open reel or cartridge tape format. You must boot from the support tape to implement the complete set of ISL-based Offline Diagnostics and Utilities described below. Refer to the procedure "Booting from the Support Tape" in this chapter for information about using the support tape.

Diagnostic Programs

The Diagnostic Programs are a comprehensive set of software to test FRUs for Processor, Memory, and I/O functionality on 922/822S (except 920), 925/825S, and 950/850S Family systems. These diagnostics determine which FRUs need replacement.

Utility Programs

Offline Utility programs cannot isolate defective FRUs, but can verify which functions of a device are operating correctly. Input/Output Map (IOMAP) and Channel Exerciser (CAEXR) help determine the cause of device failure by providing stress simulation and diagnostic information.

Refer to Table 5-10 for a list of available offline diagnostics.

Table 5-10. Available Offline Diagnostics and Utilities

Command Name	Systems	Description
A1002AI	822/922/832/932	SPU I/O Diagnostic
A1002AP	822/922/832/932	SPU Processor Diagnostic
CAEXR	922/932/948/958	Channel Exerciser Utility
CLKUTIL	All PA-RISC systems	PDC time-of-day Utility
IOMAP	All PA-RISC systems	Input/Output Map Utility
UNIPROC	842/852/948/958	Single-Processor Diagnostic

Note In display examples, user input is shown underlined.

To find out what offline diagnostics are available, boot the system to the ISL prompt. Ask the program for a description of the commands by typing HELP:

```
ISL> help

?            Help Facility
HELP         Help Facility
LISTF        List ISL Utilities
LS           List ISL Utilities
AUTOBOOT     Set or clear autoboot flag in stable storage
AUTOSEARCH   Set or clear autosearch flag in stable storage
PRIMPATH     Modify primary boot path in stable storage
ALTPATH      Modify alternate boot path in stable storage
CONSPATH     Modify system console path in stable storage
DISPLAY      Display boot and console paths in stable storage
LSAUTOFL     Lists contents of autoboot file
LISTAUTOFL   Lists contents of autoboot file
READNVM      Displays contents of one word of NVM
READSS       Displays contents of one word of stable storage


Utilities on this system are:

HPUX
IOMAP
CAEXR
A1002AI
A1002AM
A1002AP
A1100AI
A1100AM
A1100AP
UNIPROC
MPROC

ISL>
```

Minimum Performance

To run any offline diagnostics, the system must first be able to pass the PDC self-test and boot ISL.

Offline Diagnostics Command Summary

Diagnostic Execution Control Commands

SECTION	Used to specify a diagnostic section other than the default section. Syntax: section 4/8 9 12
LOOP	Defines the number of times a section is to be executed. For example: `loop 100` causes the section to execute 100 times; `loop (blank)` causes independent execution; and `loop 0` causes the diagnostic to stop.
RUN	Causes the diagnostic to restart at the beginning.
RESUME	Resumes the diagnostic after a pause, or starts the diagnostic after parameter selection.
RESET	Returns diagnostic parameters to the default values.
EEPS	Enables a pause after an error.
SEPS	Suppresses a pause after an error.
ENPS	Enables a non-error pause to allow diagnostic command input.
SNPS	Suppresses non-error pause.
EIPS	Enables an isolation pause after detection of an isolation error.
SIPS	Suppresses isolation pause.
ERRPAUSE	Selects the following: EEPS, SIPS, and SNPS.

Diagnostic Output Control Commands

EEPR	Enables error printout.
SEPR	Suppresses error printout.
ENPR	Enables non-error printout.
SNPR	Suppresses non-error printout.
EIPR	Enables isolation printout.
SIPR	Suppresses isolation printout.
ERRONLY	Selects EEPR, SIPR, and SNPR.
HARDCOPY	Not supported.

Diagnostic System Control Commands

STOP	Upon exiting the diagnostic, this command stops ISL from continuing the Auto-Boot sequence.
LISTIO	Lists the I/O path to the primary and secondary boot devices, the console path, and the printer path.
CHANGEIO	Changes the console, the printer, and the Units Under Test (UUTs) displayed by the LISTIO command. This command changes only the memory buffer; to permanently change the boot and console values found in stable storage, you must return to ISL. Syntax: {path name}[C,P,1,2] - where C is the console, P is the printer, and 1 and 2 are the UUTs.
STATE	Displays diagnostic state variables.
EXIT	Exits the diagnostic to ISL.
HELP	Displays detailed information about the diagnostic command. For example; `help section`.
INFORMATION	Displays detailed information about unique diagnostic commands.
Control-Y	Breaks the execution of the diagnostic between steps, similar to the MPE XL Control-Y function, the RTE Break function, and the HP-UX Control-X (or Control-Y) function. (The Model 825 Family SPU also uses the Control-C function.) Any console command is valid after a Control-Y; the I/O associated with console commands is not suppressible.

A1002AI, A1100AI (SPU I/O Diagnostic)

The SPU I/O diagnostics test the internal SPU I/O hardware of the CPU to detect and isolate FRU failures.

The A1002AI diagnostic tests 822/832/922/932 systems and the 825/925 Family. The A1100AI diagnostic tests the 850S/950 Family.

Note After entering the command, the `I/O>` prompt appears:

- Type `help` at the `I/O>` prompt to list all commands available.
- Type `info` at the `I/O>` prompt for information unique to the diagnostic.

Limitations

The tests conducted by the I/O diagnostic are functional only. Intermittent errors require the use of the ISL-based Channel Exerciser utility (CAEXR) to reveal stress-related faults.

Unique Commands

The following command information applies to this diagnostic only. Some examples are Bus Converter dependent while others relate to a specific SPU I/O hardware implementation. Refer to Table 5-11.

Table 5-11. SPU I/O Diagnostics Unique Commands

Command	Description

path (A1100AI only)	{SMB fixed field}/{MID_BUS ff}.{HP-CIO slot}. {HP-IB addr.} "path" elements right of MID_BUS fixed field are currently ignored.
	`Example = '2' : SMB MODULE 2`
	`Example = '2/' : BC-X`
	`Example = '2/4' : MID_BUS-X, SLOT 1`
	`Example = '2/8' : MID_BUS-X, SLOT 2`
	`Example = '2/4.1.0' : Same as 2/4.`

EVPR	Enables the verbose report.
SVPR	Suppresses the verbose report.
IORE[GISTERS]{ path}	Displays SMB and MID_BUS device registers.
IODC{ path}	Displays SMB and MID_BUS IODC headers. Displays and decodes the first 16 bytes of the module's IODC.
HPAM[AP]	Displays PROCESSOR's, BC's & CA's pertinent I/O address.

FILL[BUFR]{ function}{ pattern} (A1100AI only)	Fills the Write buffer(W_buf) with a sequence of 256 32 bit data patterns.
	`{function} :`
	`{ ALLO[ S ]}: Fills buffer with all zeros.`
	`{ ALL1[ S ]}: Fills buffer with all ones.`
	`{ ALLS[AME]}{ pat}: Fills buffer with all ones {pat}.`
	`{ RAND[OM]}{ seed}: Fills buffer with a sequence of pseudo random patterns.`
	`{ SEQU[ENCE]}{ [pats=n]{ pat1, .patn}{ [fill]=pat}:}`

COMP[AREBUF] (A1100AI only)	Compares the Read buffer(R_buf) to the Write buffer(W_buf).

Test Sections

The I/O Diagnostic consists of 126 test sections (refer to Table 5-12).

Table 5-12. SPU I/O Diagnostic Test Sets

Sections	Name of Test
1	Bus Converter Reset test
2	Channel Adapter initialization test
3	Channel Adapter register test
4	Channel Adapter RAM stack test
5	Channel Adapter flex field addressing and DIO loopback test
6	Channel Adapter SRQ test
7	Channel Adapter ARQ test
8	Channel Adapter flex field addressing and DMA loopback test
9	Channel Adapter error status test
10	Terminal Mux self-test
11	AP self-test through Terminal Mux (S0) test
12	AP self-test through PDH Direct Port (DP) test
13	Read HEX DISPLAY from AP, through Terminal Mux
14	Read HEX DISPLAY from AP, through PDH Direct Port
15	AP loopback: DP to console to S0
16	AP loopback: S0 to console to DP
17	Logical Module Self-test
123	SPA WRITE scope loop
124	SPA READ scope loop
125	Direct I/O scope loop
126	DMA scope loop

Test Sequence

At the ISL prompt, enter the appropriate SPU I/O Diagnostic name. The system displays:

```
ISL> diagnostic name   A1002AI or A1100AI
  :
text
  :
I/O>
```

Type **resume** after the **I/O>** prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-13.

Table 5-13. SPU I/O Diagnostic Default Parameters

Parameter	State
sections (822/922/922/932 and 925/825S Family)	1/8
sections (950/850S Family)	1/126
activity indicators	enabled
error and isolation messages	enabled
pause after error and isolation messages	enabled
looping or hardcopy	no

A1002AP, A1100AP (SPU Processor Diagnostic)

The SPU Processor Diagnostics test the VLSI chip set of the Central Processing Unit (CPU) for FRU failures.

The A1002AP diagnostic tests 822/832/922/932 systems and the 825/925 Family. The A1100AP diagnostic tests the 850S/950 Family.

Note

After entering the command, the PROC> prompt appears:

- Type `help` at the PROC> prompt to list all commands available.
- Type `info` at the PROC> prompt for information unique to the diagnostic.

Unique Commands

Three additional commands are available to determine diagnostic information. Refer to Table 5-14.

Table 5-14. Unique SPU Diagnostic Commands

Command	Description
PSTAT	Displays the chip revision number and cache line lockout status.
CREGISTER	Displays the contents of the control registers as of the end of the previously executed test section.
PROCn	Selects 1 to 4 processes to test (A1100AP only)

Test Sections

The processor diagnostic consists of 126 test sections and a control program (refer to Table 5-15). The control program manages execution order and interfacing of common procedures provided by the user interface (UI).

Table 5-15. SPU Processor Diagnostic Test Sets

Sections	Name of Test
1/6	CPU Data Path
7/10	SIU Data Path
11/18	CCU0 Data Path
19/26	CCU1 Data Path
27/40	TCU Data Path
41/93	CPU Instruction
94/102	CPU Extended
103/126	Floating Point

Test Sequence

At the ISL prompt, enter the Processor diagnostic name. The system displays:

```
ISL> diagnostic name A1002AP or A1100AP
  :
text
  :
PROC>
```

Type **resume** after the **PROC>** prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-16.

Table 5-16. SPU Processor Diagnostic Default Parameters

Parameter	State
test sections	all sections
activity indicators	enabled
error and isolation messages	enabled
pause after isolation message	enabled
looping or hardcopy	no

CAEXR (Channel Exerciser Utility)

The Channel Exerciser Utility (CAEXR) is a diagnostic that exercises the 19744A Channel Adapter (CA), and the DMA function of an HP-PB system. CAEXR will not work on the Series 920 SPU.

Testing is achieved by sending data from memory to an HP-IB DA, then returning the data to memory through a second DA. As a test for validity, return data is compared to resident data.

Caution Before running this test, disconnect any HP-IB devices to avoid possible data corruption.

Commands and Syntax

The default run command is shown below:

```
ISL> caexr  <optional parameters/keywords>
```

Default parameters are listed in Table 5-17.

Table 5-17. CAEXR Default Parameters

Parameter	State
busy	8.3 16.3 24.3
debug	not enabled
defaults	false
errcount	infinite (0)
erronly	false
expert	false
help	false
loop	indefinitely (0)
memory	3MB and up
mpx	all
noerrpause	false
noswap	false
pair	8.0,8.2;16.0,16.2;24.0,24.2
silent	false

Break Mode

The user can break the program at certain points by using Control C or Control Y. These user interrupts are detected after each loop completes, and for one second after any error message completes.

Note Break mode is not entered by using the console Break key.

Caution The read and write commands represent a true debug facility, which can easily destroy the state of the machine and cause a High Priority Machine Check. These debug commands should only be used by someone with a detailed knowledge of CAEXR and system internals.

With explicit instructions (followed exactly), these commands are useful for examining the state of the DMA data buffers.

Hex/LED Display

Hex codes must appear within the range of CE80 - CEBF, using defined and undefined codes, to meet the specifications in the HP Precision Architecture Chassis I/O standard. Hex/LED codes are followed by descriptive "parameter" values. The "class" code (CE80 - CEBF) is displayed for three seconds, followed by the stated number of "parameter" values displayed for two seconds each.

On the Series 925/Model 825 Family SPU, hex display numbers may only be accessible through the AP. These codes are displayed at different times during the execution of CAEXR.

Table 5-18. CAEXR Hex Codes

Display	Source	Meaning
C580	PDC/IODC	ISL is waiting for the boot media to become ready
CE00	ISL	CAEXR (or any ISL utility) is loading.
CE01	ISL	CAEXR (or another ISL utility) is being loaded automatically, under the control of the autoboot file.
CE13	ISL	Console input error.
CE14	ISL	Console output error.
CE15	ISL	ISL cannot find the specified utility (possibly misspelled).
CE80	CAEXR	CAEXR has begun execution.
CE81 - CE8F	CAEXR	Reserved.
CE90	CAEXR	PDC call error.
CE91 - CEB8, CEBC - CEBD	CAEXR	CAEXR configuration and operation errors. See the Configuration Dialog Error message section for more detailed information.
CEB9	CAEXR	Data compare error. See the Data Compare Error Message section for more detailed information.
CEBA - CEBB	CAEXR	DMA execution errors. See the Execution Error Messages section for more detailed information.

IOMAP (Input/Output Map Utility)

IOMAP displays the configuration of all devices (modules and adapters) attached to any PA-RISC SPU. This utility runs on both the MPE XL and HP-UX versions of these SPUs. IOMAP provides identification, self-test, and loopback tests on each component capable of such tests.

Test Modes

Test modes are defined in Table 5-19 below.

Table 5-19. IOMAP Test Modes

Mode	Description
Identify	This test attempts to identify each component in every I/O path to the component, component name, component ID number, component software model number(if applicable), firmware revision (if applicable), hardware revision (if applicable), and an indication of which test modes are available for the component. Configuration data is determined by PDC calls. Path information is obtained from PDC calls, direct I/O (DIO), and DMA transactions.
Loopback	This test performs component dependent loopback tests where feasible. The result of this test is reported as a pass, fail, unimplemented or untestable status.
Self-Test	This test initiates the internal self-test of each component where feasible. The result of this test is reported as a pass, fail, unimplemented or untestable status.
View	This test examines the version code of each board on the system (950/850S families only). The display appears on the console only, not the hex display. When running IOMAP in "Silent Mode", no output appears.

Default Tests

The default IOMAP test consists of the following:

1. Display the current configuration of the processor, including the presence of co-processor boards and analyzer cards, cache size, TLB, processor model number, PDC firmware revision, and main memory size.
2. Check all possible I/O paths to determine and identify all components and peripherals present. IOMAP then displays a table showing all components.

Self-Test or loopback diagnostic tests can be specified for all testable components and are performed after mapping. Error messages are printed for any component that fails a test. The user may also limit the identify, self-test, loopback and view tests to a specified path(s).

User Input

While running IOMAP, a user can enter "Break Mode", which suspends program operation. The Break Mode "debug" facility permits trained support personnel to examine and modify status and registers.

Caution While Break Mode can allow the user to harmlessly display IOMAP internal variables, it also invokes a powerful debug facility. If inadvertently used, it may hang the SPU and cause an HPMC.

Commands and Syntax

The default run command is shown below:

```
ISL> iomap <optional parameters/keywords>
```

Default parameters are listed in Table 5-20.

Table 5-20. IOMAP Default Test Settings

Command	State
debug	not enabled
defaults	no (see note below)
errcount	infinite (0)
erronly	false
help	false
loop	once
noerrpause	false
path	all
silent	false
tests	identify only

Note The defaults listed above are *only* enabled if `defaults` is entered on the command line. If one or more commands (other than `defaults`) are input to configure specific settings, the remaining settings take on default values. If no parameter commands are entered, IOMAP automatically invokes the interactive mode.

UNIPROC (Single-Processor Diagnostic)

The UNIPROC diagnostic is designed as a tool for quickly testing and diagnosing the functionality of the 842, 852, 948, or 958 processor card.

Note

After entering the command, the `UNIPROC>` prompt appears:

- Type `help` at the `UNIPROC>` prompt to list all commands available.
- Type `info` at the `UNIPROC>` prompt for information unique to the diagnostic.

Minimum Configuration

The minimum configuration required for running the UNIPROC diagnostic is:

- An SPU
- A system console
- A boot disk or tape
- MPE XL 2.2 (or later), or HP-UX 7.06 (or later) operating system software

Unique Commands

Table 5-21. Unique UNIPROC Diagnostic Commands

Command	Description
CREG	Displays the contents of the control registers as of the end of the previously executed test section.
FREG	Displays the contents of the floating point control registers as of the end of the previously executed test section.
PROCn	Selects number of processors to run diagnostic.
PSTAT	Displays the chip revision number and cache line lockout status.

Test Sections

The UNIPROC diagnostic consists of 122 test sections (refer to Table 5-22).

Table 5-22. UNIPROC Processor Diagnostic Test Sets

Sections	Name of Test
1/6	CPU Data Path
7/10	SPI Data Path
11/17	ICMUX Data Path
18/21	ITLB Data Path
22/29	DCMUX Data Path
30/33	DTLB Data Path
34/38	CPU On-Chip TLB
39/89	CPU Instruction
90/98	CPU Extended
99/122	Floating Point

Test Sequence

At the ISL prompt, enter the diagnostic name (UNIPROC). The system displays:

```
ISL> uniproc
  :
text
  :
UNIPROC>
```

Type **resume** after the UNIPROC> prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-23.

Table 5-23. UNIPROC Processor Diagnostic Default Parameters

Parameter	State
test sections	all sections
activity indicators	enabled
error and isolation messages	enabled
pause after isolation message	enabled
looping or hardcopy	no
number of processors tested	all

Note that typing **run uniproc** will also work; run will always start from the beginning of the tests selected.

The UNIPROC diagnostic will automatically test all processors if there is more than one processor installed. If you want to test only one processor, use the **proc n** command to select which one to test. Typing **resume** will then cause that processor to run the diagnostic.

Support Tape (HP-UX Release 8.0)

The support tape is based on the latest release of the HP-UX operating system. It can, however, be used on both MPE XL and HP-UX systems.

The support tape is used to diagnose problems when the operating system cannot be booted from the system disk. It is also used to recover an unbootable HP-UX system and to implement the complete set of ISL-based offline diagnostics and utilities described earlier in this chapter.

The support tape is distributed on three types of media:

- Two 1/2-inch 1600 BPI Open Reel Tapes
- One 1/4-inch Cartridge Tape
- Digital Data Storage (DDS or DAT)

Note Due to the memory requirements of 8.0, the Support tape functionality is implemented on two 1/2-inch 1600 BPI tape reels (the 1/4-inch cartridge tape and the DAT versions of the Support Tape continue to be implemented on single tapes). Open reel tape #1 includes the Offline Diagnostics and HP-UX; tape #2 includes the Online Diagnostics (in Section 5), and the Recovery Utility.

The minimum hardware configuration to load and use the support tape is:

- Minimum memory required by the system (see note)
- System console
- Tape drive
- Input/output paths to the console and tape drive (or equivalent device)

Note The online diagnostic subsystem will not run from the support tape, unless the system has 16 Mbytes or more of memory.

This section covers the use of the support tape for running the online diagnostic subsystem. For complete information on use of the support tape, refer to the *Support Tape Users Manual* (HP part number 92453-90010).

Booting from the Support Tape

Use the following procedure to boot from the support tape.

1. Load the support tape (reel #1 if you are using the open reel version)
2. Power up the SPU.

3. Observe the power-up message on the system console screen. In the generic example below, the console, primary, and alternate boot path numbers are represented by n.

```
Processor Dependent Code (PDC) revision X.X

Console path          = n.n.n.n.n.n.n
Primary boot path     = n.n.n.n.n.n.n
Alternate boot path   = n.n.n.n.n.n.n

Autoboot from primary boot path enabled.
To override, press any key within 10 seconds.
```

4. Override autoboot by pressing any key within 10 seconds.
5. Respond to the first boot query as indicated:

```
Boot from primary boot path (Y or N)?> n
```

6. The console will display the following:

```
Boot from alternate boot path (Y or N)?>
```

If the alternate boot path is the address of the tape device where the support tape is mounted, enter **y**.

If the alternate boot path is not the address of the tape device where the support tape is mounted, enter **n**.

If you enter n, the console will display this message:

```
Enter boot path or ?>
```

Enter the address of the tape device where the support tape is mounted.

7. Respond to the next system console query as indicated:

```
Interact with IPL (Y or N)?> y
```

8. When the tape has booted, the system will issue the ISL> prompt:

```
ISL>
```

9. At the ISL prompt, you can recover an unbootable HP-UX operating system as described in the *Support Tape User's Manual*, run the offline diagnostics and utilities, or boot the support tape kernel to run online diagnostics.

Type **help** for a list of the available commands, including the names of the offline diagnostics and utilities. To run the offline diagnostics and utilities, refer back to the section *Offline Diagnostics and Utilities*.

Loading the Online Diagnostics

Use this procedure to load the online diagnostics from the support tape:

Note If you are using the open reel 1600 BPI tapes, you must mount tape #2 and place the drive online before performing the following procedure.

1. After obtaining the ISL prompt, enter the command:

   ```
   ISL> support
   ```

2. The console will display a series of load messages, followed by the support tape banner.
3. Press (Return) to obtain the Support Tape Main Menu:

```
s. Search for a file
b. Reboot
l. Load a file
d. On-line diagnostics
   Note: only for systems with 16 or more Megabytes of memory
m. Display Manual page for a specific command
r. Recover an HP-UX unbootable system (a contributed utility)
u. Utilities
x. Exit to shell

This menu is for listing and loading the tools contained on the support tape.
Once a tool is loaded, it may be run from the shell.

Select one of the above:
```

To select from the menu, type the letter preceding your selection (s, b, l, d, m, r, u, x), followed by a carriage return. For example, to reboot, press b, then (Return).

Following is a description of the various options:

l	Loads a file into the memory-based file system. The system will prompt for the name of the file you want to load.
d	Goes to the On Line Diagnostics Menu.
m	Displays the man pages for either **analyze** or **disked**, depending on which you specify.
r	Goes to the HP-UX Recovery Main Menu.
u	Goes to the Support Tape Utilities Menu.
x	Exits the menu system to the Bourne shell.

4. Select the **On-line diagnostics** option from the menu as indicated:

   ```
   Select one of the above: d (Return)
   ```

After a series of messages, the On Line Diagnostics Menu appears. The following example is from the HP-UX Release 8.0 Support Tape.

```
ON LINE DIAGNOSTICS MENU (TAPE SECTION 5: /usr/diag)

(Note: Any program with X won't run from the Support Tape Environment.)

 0. AFIDAD        1. CARTDIAG     2. CENTPBA       3. CIPERLPD(X)
 4. CS80DIAG      5. DASSDIAG     6. DIAG7478      7. FLEXDIAG
 8. GPIODAD       9. HPFLDIAG    10. HPIBDAD(X)   11. HPIBDDS
12. HPIBDIAG(X)  13. LANDAD(X)   14. MEMDIAG(X)   15. MUXDIAG
16. OPDIAG       17. OSI4DAD     18. PMUXDIAG     19. PSIDAD
20. REELDIAG     21. SCSICD      22. SCSICIO      23. SCSIDDS
24. SCSIDISK     25. SCSIPBA     26. SCSIREEL     27. SS80DIAG
28. SYSMAP       D. Run DUI
a. Report available space        p. Purge diags from memory
r. Return previous menu          x. Exit to shell

The diagnostic user interface "DUI" is loaded automatically with each
diagnostic.  Select one of the above:
```

The following options are selectable from the menu:

a Makes it convenient to determine how much space is left in the file system.

p Allows you to purge all files associated with a particular diagnostic from the memory-based file system so you can obtain space for running other diagnostics.

D Runs the DUI. You must select this option after loading a diagnostic from the Support Tape Main Menu so the diagnostic you have selected can be executed.

5. To select a diagnostic, enter the number preceding the diagnostic name. For example, to run the CS80DIAG, type:

   ```
   Select one of the above: 4 (Return)
   ```

6. This time, select the Run DUI option from the menu as indicated:

   ```
   Select one of the above: D (Return)
   ```

   The system will respond by displaying the DUI> prompt. At this point you can enter the run command, followed by the name of the diagnostic, and any run command options you wish to use.

7. After running each diagnostic, type exit to return to the On Line Diagnostics Menu. Due to limited space, you can only load one diagnostic at a time.

8. Before running another diagnostic, purge the previous diagnostic from memory to ensure enough memory to load the DUI and the next diagnostic. Enter:

   ```
   Select one of the above: p (Return)
   ```

9. Once you have finished running diagnostics, return to the Support Tape Main Menu by selecting the r option from the On Line Diagnostics Menu. Enter:

   ```
   Select one of the above: r (Return)
   ```

10. Exit the Support Tape Main Menu by selecting x.

Boot Console Handler Program (Series 920 SPU Only)

The Boot Console Handler (BCH) is a resident program in Processor Dependent Code (PDC). This section describes how to access the program, execute extended self-tests, and use some of the other boot console commands.

Accessing the Boot Console Handler Program

Upon successful execution of the power-on self-tests, the console module is selected and initialized using the path parameters from Stable Storage. If a console device is located, the Boot Console Handler prints a series of messages on the system console.

To access the Boot Console Handler program, do the following:

1. Power up the SPU.
2. Observe the power-up message on the system console screen:

```
Processor Dependent Code (PDC) revision X.X

Console path         = 4.2.0.0.0.0.0
Primary boot path    = 4.1.0.0.0.0.0
Alternate boot path = 4.1.3.0.0.0.0

xx MB of memory configured and tested.

Autoboot from primary boot path enabled.
To override, press any key within 10 seconds.
```

3. Override autoboot by pressing any key within 10 seconds.
4. Respond to the boot queries as indicated:

```
Boot from primary boot path (Y or N)?> n

Boot from alternate boot path (Y or N)?> n
```

5. The next prompt appears:

```
Enter boot path, command or ?>
```

   This prompt allows you to enter boot console commands. After you enter a command, a ?, or a (return), the PDC> prompt appears.

   Commands can be entered in either uppercase or lowercase letters. Follow each command with a (return).

6. For a menu of boot console commands, enter h or ? and depress the return key as shown:

```
Enter boot path, command or ?> h (return)
```

The Boot Command Handler Menu appears on the screen:

```
Use 1.2.3 format for boot path
The following commands are available

B                    Boot from Primary, Alternate or Specified Boot Path
C                    Display/Configure RS232C Port parameters
D                    Initialize and Configure Stable Storage to Default Values
E <tests>            Execute self-tests
F                    Display FASTSIZE parameter
H or ?               Print this menu
H <command>          Print Help information for <command>
I                    Display I/O Map, Memory, and Revision Information
L <tests>            Loop on a series of self-tests
O                    Output Stable Storage contents
P                    Display/Modify Stable Storage Path Information
R                    Reset the System
T                    Read the Real-Time Clock
U                    Unlock Stable Storage
W<offset:data>       Write to Stable Storage from offset.

PDC>
```

7. To obtain additional information about the commands listed above, type h or H, followed by the command name and (return).

Executing the Extended Self-Tests

The BCH provides a number of extended self-tests for hardware verification. Test results are displayed on the system console and error codes are reported on the front panel LEDs (see chapter 4 for the hex display error codes).

The E (execute) command allows you to run one extended self-test, a default series of extended self-tests, or a series of selected extended self-tests. The tests are listed in Table 5-24.

1. To execute a particular test, enter:

   ```
   PDC> E<selftest #>
   ```

2. To execute the default series of self-tests, enter:

   ```
   PDC E
   ```

3. To run a series of self-tests, separate test numbers with commas, as shown:

   ```
   PDC> E<selftest #>,<selftest #>,.... ,<selftest #>
   ```

   Tests execute in the given order. If any test in the sequence fails, an error message is output, and testing continues until all tests in the series execute once.

4. Type H E for a list of self-tests (see Table 5-24).

5. To loop all tests, enter:

```
PDC> L
```

To loop a series of tests, enter:

```
PDC> L<self-test>,<self-test>,.... ,<self-test>
```

Extended Self-Test Subtests

Table 5-24 is a list of the subtests that can be called with the boot command E(xecute) or L(oop). Note that some of these tests may leave the system improperly initialized to run the operating system, so the system should be RESET prior to booting following any execution of these tests.

Table 5-24. Series 920 Self-Test Subtest Numbers

Subtest Number	Description	Subtest Number	Description
1	CPU Branch Test	19	Non_Volatile Pattern Test
3	CPU ALU Test	20	Realtime Clock Reg. Test
4	CPU CCR Test	21	Realtime Clock TIC Test
5	CPU SAR Test	24	PBI[1] Poweron State Test
6	CPU EIEM Test	25	PBI[1] Register Test
7	CPU TIMER Test	26	PBI[1] Processor Interrupt Test
8	CPU TEMP Test	27	PBI[1] Broadcast Interrupt Test
b	HPMC Test	28	PBI[1] HPMC Test
d	Cache Address Uniqueness Test	2a	PBI[1] Register Loopback Test
f	Cache Pattern Test	2b	PBI[1] Tag Loopback Test
10	Cache Transaction Test	2c	PBI[1] Semaphore Test
11	Cache Execute Test	2d	PBI[1] Hit-Miss Test
12	Cache Parity Error Test	36	Battery Backup Prep. Test
13	Cache Floating Point Test	37	Battery Backup Check Test
14	TLB Pattern Test	38	Floating Point Test (not used)
15	Cache Flush Parity	39	Floating Point Test (not used)
16	ROM Checksum Test	40	Floating Point Test (not used)
18	Non_Volatile Checksum Test	45	Initial Memory Controller Test

Note [1]Precision Bus Interface

Displaying I/O Map, Memory, and Revision Information

On the Series 920, the I command shows all modules connected to the HP-PB. Note that there will always be an I/O module indicated on the processor PBA because of the two RS-232 connections on that card. The following is a partial sample display:

```
PDC> i

PROCESSOR

   Hardware Version:          4144      (0x00001030)
   Software Version:          1025      (0x00000401)
   Hardware ID:         4294967295      (0xffffffff)
   Software ID:         4294967295      (0xffffffff)

CARD INFORMATION

   Slot  0, Module  1:   Type A Direct I/O Adapter

        Hardware Version:            96      (0x00000060)
        Software Version:          3712      (0x00000e80)
        IODC Version:          33554432      (0x02000000)


   Slot  1, Module  0:   HP-CIO Foreign I/O Adapter

        Hardware Version:            80      (0x00000050)
        Software Version:          4096      (0x00001000)
        IODC Version:          67108864      (0x04000000)

   Slot  3, Module  0:   Memory Card,  Size =    8388608   bytes (0x00800000)

        Hardware Version:           192      (0x000000c0)
        Software Version:          2056      (0x00000808)
        IODC Version:            131072      (0x00020000)
```

Unlocking Stable Storage

Transfers of Control are NORMALLY done in order to allow a memory dump to be taken following a system hang. On the HP 3000 Series 920 system, it has one other possible function as follows:

If the console path in stable storage gets set to an erroneous value such that the console cannot be located, a Transfer of Control during boot or ISL can be used to re-establish control at the *default console*; i.e. the console path gets set to a pre-determined location.

If a Transfer of Control is done prior to operating system bootup, that is during or prior to ISL, the contents of stable storage will become "locked" (that is, the checksum is invalidated) resulting in the console going to the "default" console path. On a HP 3000 Series 920 system, this is 4.2.0., which is port 0 on the CIO mux. Note that if the system detected an invalid checksum due to a stable storage error, the console would also go to its default.

If stable storage becomes locked in this way, it will be necessary to *unlock* it before attempting to boot. Invalid stable storage will be indicated by a message as follows on power up:

```
Processor Dependent Code (PDC) Revision x.x
ERROR Reading Stable Storage, Status = -5

Console Path         = ???  (STABLE STORAGE ERROR)
Primary boot path    = ???  (STABLE STORAGE ERROR)
Alternate boot path = ???  (STABLE STORAGE ERROR)
```

In order to re-validate stable storage, you should FIRST check, and correct if necessary, the bootpaths with the P(ATH) command, followed by using the U(NLOCK Stable Storage) command. The U(NLOCK) command re-computes and corrects the checksum, allowing normal boot operations to take place.

Note that customers who do TOCs from the keyswitch or the Access Port during or prior to ISL may run into this condition and need to be advised how to get out of this situation. Note that a problem with stable storage could also cause this condition ... although this is less likely.

6

Adjustments

There are no adjustments required on HP 3000 Series 920 Family or HP 9000 Model 822S Family computers.

7

Supported Peripherals

This section lists the peripherals supported on HP 3000 Series 922 Family and HP 9000 Model 822 Family computer systems. The supported peripherals are disk drives, tape drives, printers, terminals, system consoles, graphics devices, and data communication devices.

The following terms and acronyms for interface standards are used in this chapter:

Cent	Centronics specification for parallel I/O connections
HP-CS	Hewlett-Packard Common SCSI (Small Computer Systems Interface)
HP-FL	Hewlett-Packard Fiber-Optic Link
HP-IB	Hewlett-Packard Interface Bus
LAN	Local Area Network (IEEE 802.3/Ethernet)
RS-232	Standard for Serial Communication Interface (±12V)
RS-422	Standard for Serial Communication Interface (±5V)

Note

Unless otherwise noted, a supported peripheral is supported by all series or models of the system. Exceptions are noted in parentheses next to the peripheral model number. For example, a note such as (822/832) indicates that the peripheral in question is supported only on those two models.

Table columns 5 and 6 designate the operating system on which a peripheral is supported. The following symbols are used:

decimal number	Indicates software release on which a peripheral was first supported (for example, 8.0).
x	Indicates support, but does not specify a minimum software release level.
blank	Indicates a non-supported peripheral.

Disk Drives

Table 7-1. Supported Disk Drives

Disk Drive	Notes	Description	HP-UX	MPE XL	Interface
7914CT	o sd	132 MB Winchester w/ 9144A 1/4in Cartridge Tape	pre 7.0		HP-IB
7914ST	o sd	132 MB Winchester w/ 7974A 1/2in Tape Unit	pre 7.0		HP-IB
7914R/P	o sd	132 MB Winchester w/ 9140 1/4in Cartridge Tape	pre 7.0		HP-1B
7933H/XP	o sd	404 MB Fixed Disk	H only pre 7.0	x	HP-IB
7935H/XP	sd	404 MB Removable Media Disk	H only pre 7.0	x	HP-IB
7936FL	o sd	307 MB Disk with IIP-FL	pre 7.0	x	HP-FL
7937H/XP	sd	571 MB Disk	H only pre 7.0	x	HP-IB
7937FL	sd	571 MB Disk with HP-FL	pre 7.0	x	HP-FL
7957B		81 MB Disk, 5.25in	pre 7.0		HP-IB
7958A	o sd	130 MB Disk, 5.25in OEM	pre 7.0		HP-IB
7958B	sd	152 MB Disk, 5.25in	pre 7.0		HP-IB
7959B	sd	303 MB Disk, 5.25in	pre 7.0		HP-IB
7962B	sd	152 MB Disk, 5.25in Wyle	pre 7.0	x	HP-IB
7963B	sd	303 MB Disk, 5.25in Wyle	pre 7.0	x	HP-IB
9122C		2 MB 3.5in Microfloppy Disk	pre 7.0		HP-IB
9127A		Floppy Single Disk, 5 1/4in	pre 7.0		HP-IB
9153C opt 040		40 MB Disk with Floppy	pre 7.0		HP-IB
9262B	sd	152 MB Removable Disk Drive	3.1		HP-IB
9263B	sd	304 MB Removable Disk Drive	3.1		HP-IB
C1700A opt 1AB		20.8 GB Rewritable Optical Disk Library System (includes 32 optical disks, 2 disk drives, and I autochanger) in desk-side cabinet	8.0	3.0	HP-CS
C1700A opt 1AC		20.8 GB Rewritable Optical Disk Library System in 1.0 meter cabinet w/19 inch rack	8.0	3.0	HP-CS
C1700A opt 133		Add-on Rewritable Optical Disk for 1.0 meter cabinet	8.0	3.0	HP-CS
C1701A	* b	650 MB (325 MB/media side) Rewritable Magneto (MO) Optical Disk	8.0		HP-CS
C2200A	sd	335 MB Disk	7.0	2.0	HP-IB
C2201A	sd	670 MB Disk	7.0	2.0	HP-FL
C2202A		670 BM HP-IB Disk w/ Cache		2.0	HP-IB
C2203A	sd	670 MB Disk	7.0	2.0	HP-IB

Table 7-1. Supported Disk Drives (continued)

Disk Drive	Notes	Description	HP-UX	MPE XL	Interface
C2204A	sd	1.34 GB Disk	7.0	2.0	HP-FL
C2212A	sd b	332 MB Disk Mass Storage System	8.0		HP-CS
C2212A opt 001	sd b	Add-on 332 MB SCSI 5 1/4in Disk Drive	8.0		HP-CS
C2212A opt 003	b i	Add-on 1.3 GB Digital Audio Tape Drive	8.0		HP-CS
C2212A opt 004	b i	Add-on CD ROM (Read-Only) Drive	8.0		HP-CS
C2212A opt 005	sd b	Add-on 650 MB Rewritable Optical Disk Drive	8.0		HP-CS
C2212A opt 024	b i	Two Add-on CD ROM Drives	8.0		HP-CS
C2213A	sd b	664 MB SCSI Disk Mass Storage System	8.0		HP-CS
C2213A opt 001	sd b	Add-on 332 MB SCSI 5 1/2in Disk Drive	8.0		HP-CS
C2213A opt 002	b i	Add-on 664 MB SCSI 5 1/2in Disk Drive	8.0		HP-CS
C2213A opt 003	b i	Add-on 1.3 GB Digital Audio Tape Drive	8.0		HP-CS
C2213A opt 004	b i	Add-on CD ROM Drive	8.0		HP-CS
C2213A opt 005		Add-on 650 MB Rewritable Optical Disk Drive	8.0		HP-CS
C2213A opt 022		Two Add-on 664 MB SCSI 5 1/2in Disk Drive	8.0		HP-CS
C2213A opt 024	b i	Two Add-on CD ROM Drives	8.0		HP-CS
C2290A	sd	330 MB SCSI Disk Upgrade Kit	8.0		HP-CS
C2290B	sd	Upgrade Kit to add a 332 MB SCSI Fixed Disk Drive to a 330XX/660XX	8.0		HP-CS
C2291A	sd	664 MB SCSI Disk Upgrade Kit	8.0		HP-CS
C2291B	sd	Upgrade Kit to add a 664 MB SCSI Fixed Disk Drive to a 330XX/660XX	8.0		HP-CS
C2293A		CD ROM Upgrade Kit	8.0		HP-CS
C2294A	sd	650 MB Rewritable Optical Disk Upgrade	8.0		HP-CS

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

o = Obsolete; listed for reference only.

sd = Supported as the system disk drive.

b = Supported as a boot device on the HP-CS interface.

i = Supported as an install/update media on the HP-CS interface.

* = Can be used as a system disk, but not recommended because it is has slower throughput than a Winchester drive. The best use for optical drives is for online backup or large data archivals.

Tape Units

Table 7-2. Supported Tape Units

Tape Unit	Notes	Description	HP-UX	MPE XL	Interface
7974A	o	1/2in Start/Stop/Streaming; 1600cpi (PE), 800cpi (NRZI) Tape Unit	pre 7.0	x	HP-IB
7978A/B		6250/1600cpi Tape Unit		x	HP-IB
7979A		1/2in Streaming; 1600cpi (PE) Tape Unit	pre 7.0	x	HP-IB
7980A		1/2in Streaming; 6250cpi (GCR), 1600cpi (PE) Tape Unit	pre 7.0	x	HP-IB
7980XC		1/2in 1600/6250 Tape Unit with data compression	pre 7.0	2.0	HP-IB
7980S	b i	1.2in 1600/6250 cpi Tape Drive (Opt 800 adds 800 cpi)	8.0		HP-CS
7980SX	b i	1.2in 1600/6250/6250XC cpi Tape Drive (Opt 800 adds 800 cpi)	8.0		HP-CS
9144A		67MB 1/4in Cartridge Tape Unit	pre 7.0		HP-IB
9145A		134MB 1/4in Cartridge Tape Unit	pre 7.0		HP-IB
C1501A		Embedded Digital Data Storage	8.0	x	HP-IB
C1502A		1.3 GB DDS Cartridge Tape Unit	8.0		HP-CS
C1511A		1.3 GB DDS Cartridge Tape Unit	8.0	2.0	HP-IB
C1512A	b i	SCSI DDS Format Tape Drive	8.0		HP-CS
C2292A		1.3 GB Digital Audio Tape Upgrade Kit	8.0		HP-CS

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

o = Obsolete; listed for reference only.

b = Supported as a boot device on the HP-CS interface.

i = Supported as an install/update media on the HP-CS interface.

Table 7-3. Supported Printers

Printer	Notes	Description	HP-UX	MPE XL	Interface
2225D		ThinkJet	pre 7.0		RS-232
2227A		QuietJet Plus	pre 7.0		RS-232
2227B		QuietJet Plus, US Version	pre 7.0		HP-IB
2228A		QuietJet	pre 7.0		RS-232
2276A		DeskJet Printer, US Version	pre 7.0		RS-232
2277A		DeskJet Plus Printer, US Version	7.0		RS-232
2562C		300/420 lpm Line Impact Printer	7.0	x	RS-232, HP-IB
2563A/B opt 049	o	300 lpm Dot Matrix Line Printer	pre 7.0	x	RS-232
2563A/B opt 050		300 lpm Dot Matrix Line Printer		x	RS-232
2563A opt 290	o	300 lpm Dot Matrix Line Printer	pre 7.0	x	HP-IB
2563A/B opt 393		300 lpm Dot Matrix		x	HP-IB
2563C	*	Dot Matrix Line Printer w/420 lpm	8.0	x	RS 232, HP-IB
2564B opt 290		600 lpm Dot Matrix Line Printer	pre 7.0		HP-IB
2564B opt 393		600 lpm Dot Matrix		x	HP-IB
2564B opt 050		600 lpm Dot Matrix		x	RS-232, CIPER
2564B opt 049		600 lpm Dot Matrix Line Printer	pre 7.0	x	RS-232
2564C	*	Dot Matrix Line Printer w/840 lpm	8.0	x	RS-232, HP-IB
2566B opt 290		900 lpm Dot Matrix Line Printer	pre 7.0		HP-IB, CIPER
2566A/B opt 393		600 lpm Dot Matrix Line Printer		x	HP-IB
2566C	*	1200 lpm Dot Matrix Line Printer	8.0	x	RS-232, HP-IB
2567A/B opt 49		1200 lpm Dot Matrix Line Printer	pre 7.0		RS-232
2567B opt 290		1200 lpm Dot Matrix Line Printer	pre 7.0		HP-IB, CIPER
2567B opt 393		1200 lpm Dot Matrix Line Printer		x	HP-IB
2567C	*	1600 lpm Dot Matrix Line Printer	8.0	x	RS-232, HP-IB
2680A opt 393		Intelligent Page Printer		x	HP-IB
2684A		LaserJet 2000, 20 ppm, 115 VAC 60 Hz	pre 7.0	x	RS-232
2686A	o	LaserJet, 8 ppm, 115 VAC 60 Hz	pre 7.0	x	RS-232
2686D	o	LaserJet 500+, 115 VAC 50 Hz	7.0		RS-232
2688A opt 393		Page Printer		x	HP-IB
293x		Dot Matrix		x	RS-232
2932A	o	Dot-Matrix, 200cps	pre 7.0	x	RS-232, HP-IB
2934A		Dot-Matrix, 200cps Near Letter Quality	pre 7.0	x	RS-232, HP-IB

Table 7-3. Supported Printers (continued)

Printer	Notes	Description	HP-UX	MPE XL	Interface
33440A		Low-Cost Laser Jet	pre 7.0	x	RS-232
33447A		LaserJet IID Dual Tray Duplex Printer	7.0	2.2	RS-232
33449A		LaserJet III 8 ppm Laser Printer	8.0		RS-232
33459A		New LaserJet IIID Printer	8.0		RS-232
33471A		LaserJet IIP 4 ppm Laser Printer	8.0		RS-232
C1202A		220/330 CPS Character Printer (for use in certain Asian countries only)	pre 7.0	x	RS-232, HP-IB
C1602A		PaintJet XL Color Graphics Printer	7.0		RS-232, HP-IB

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

o = Obsolete; listed for reference only.

* = The HP2563C, 2564C, 2566C, and 2567C printers are supported on MPE XL systems, but must be configured as HP256xB printers during the interim between the introduction of the 256xC printers and the 3.0 Release of the MPE XL operating system.

Terminals

Table 7-4. Supported Terminals

Terminal	Notes	Description	HP-UX	MPE XL	Interface
2392A		Alphanumeric, Block Mode, ANSI Compatible		x	RS-232
2393A		Monochrome Vector Graphics		x	RS-232
2394A	o	Data Entry, Local Forms	pre 7.0	x	RS-232
2397A		Color Raster Display w/Vector Graphics		x	RS-232
2622A		Display Terminal			RS-232
2623A		Graphics Terminal			RS-232
2624B		Data Entry Terminal			RS-232
2625A		Dual System Display Terminal			RS-232
2627A		Color Graphics Terminal			RS-232
2628A		Word Processing Terminal			RS-232
3081A		Industrial Data Entry	pre 7.0	x	RS-232
3082A	o	Industrial Terminal	pre 7.0	x	RS-232
3082B		Industrial Terminal	7.0	x	RS-232
45970C	o	Vectra ES/12 Model 20 SPU	8.0		RS-232
C1001A/G/W		HP700/92 Terminal, HP 2392A Compatible	pre 7.0	x	RS-232
C1002A/G/W		HP700/94, HP 2394A Compatible; Input Forms, 16 Page Display Memory	pre 7.0	x	RS-232
C1003A/G		HP700/41, Wyse 30, Televideo 905, Hazeltine 1500, etc. Compatible	pre 7.0		RS-232
C1004A/G/W		HP700/22, VT 220/100/52 Compatible	pre 7.0		RS-232, RS-423
C1006A/G/W		HP700/43, Wyse Wy-50, Televideo 950/ADM, etc. Compatible	pre 7.0		RS-232
C1007A/G/W		HP700/44 PC Terminal, VT 220/100/52 Compatible	pre 7.0		RS-232
C1010C opt AB2		Simplified Chinese HP 700/92A Keyboard	3.1		RS-232
C1010J opt ABJ		Japanese HP 700/92A Keyboard	8.0		RS-232
C1010K opt AB1		Korean HP 700/92A Keyboard Kit	7.0		RS-232
C1010T opt AB0		Traditional Chinese HP 700/92A Keyboard	3.1		RS-232

Table 7-4. Supported Terminals (continued)

Terminal	Notes	Description	HP-UX	MPE XL	Interface
C1064A		HP 700/96 Terminal	8.0		RS-232
C1065A		HP 700/96 Terminal	8.0		RS-232
C2300A		X Window Graphic Terminal (700/X)	8.0		LAN
Emulators		HP 150, 110+, 300, IPC, Vectra	pre 7.0	x	RS-232
HP150B/C		Touchscreen PC	pre 7.0	x	RS-232

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

o = Obsolete; listed for reference only.

System Consoles

Table 7-5. Supported System Consoles

System Console	Notes	Description	HP-UX	MPE XL	Interface
C1001A/G/W		HP2392A Compatible (200/92)	x		RS-232
HP 2392A		8 pages of memory. DEC VT compatible		x	RS-232
HP 700/92		8 pages of memory. DEC VT compatible		x	RS-232
C1010J		Scholar Terminal (Japanese)	x		RS-232
HP 700/96		Lucky Luke	x		RS-232
45970C		Vanilla Terminal	x		RS-232
C2300A		Clr graphic X-Window display terminal	x		LAN

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Data Communication Devices

Table 7-6. Supported Data Communication Devices

Device	Notes	Description	HP-UX	MPE XL	Interface
3400		Racal-Vadic Modem USR Courier Modem 2400	pre 7.0		RS-232
35016A	o	Used for Remote Support Compatible	pre 7.0	x	RS-232
35141A		With Bell 103, 212, and Vadic VA3400 Auto-answer	pre 7.0	x	RS-232
37212A	o	300/1200 Baud, 212/V22, Auto Dial/Answer	pre 7.0		RS-232
92205A/C		Hayes 1200 Smart Modem	pre 7.0		RS-232
92205B		Hayes 1200/2400 Baud Modem	pre 7.0		RS-232
Bell212A	@	Dial-in Modem	pre 7.0		RS-232
Bell103J	@	Dial-up, Auto-answer	pre 7.0		RS-232
MPS1222	@	Racal-Milgo Dial-in Modem	pre 7.0		RS-232
Telebit T2500	@	PEP/V.32 Modem	8.0		RS-232
Trailblazer	@	Telebit 19.2 Modem	7.0		RS-232
USR HST/V/32	@	HST/V.32 Modem	8.0		RS-232
USR2400	@	Courier 2400 Modem	7.0		RS-232
USR9600	@	Courier HST Modem	7.0		RS-232

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

o = Obsolete; listed for reference only.

@ = Third party devices certified with 8.0 software only. HP is not liable to support third party hardware.

Plotters

Table 7-7. Supported Plotters

Plotter	HP-UX	MPE XL	Description	Interface
7550+	x		Upgrade to existing 7550A	RS-232, HP-IB
7550A	x		Color Plotter, 8 Pen, A4/A and A3/B Size	RS-232, HP-IB
7440A	x		Color plotter, 8 pen, A size	RS-232, HP-IB
7475A	x		Color plotter, 6 pen, A/B size	RS-232, HP-IB
7586B	x		Drafting Plotter, 8 Pen, A - E Size, Roll Feeder	RS-232, HP-IB
7595A	x		Draftmaster I Plotter, 8 Pen, A4/A - A0/E Size	RS-232, HP-IB
7595B	x		DraftMaster SX Plotter	RS-232, HP-IB
7596A	x		Draftmaster II Plotter, A4 - A0 Rollfeed	RS-232, HP-IB
7596B	x		DraftMaster RX plotter	RS-232, HP-IB
7599A	x		DraftMaster MX plotter	RS-232, HP-IB
C1600A	x		HP7600 Series Model 240D A1/D size Plotter	HP-IB
C1601A	x		HP7600 Series Model 240E A0/E size Plotter	HP-IB
C1620A	x		D/E Size Color Electrostatic Plotter	RS-232, HP-IB
C1625A	x		HP 7600 Series Model 250 Monochrome Electrostatic D-size Plotter	RS-232, HP-IB
C1627A	x		HP 7600 Series Model 255) Monochrome Electrostatic D-size Plotter	RS-232, HP-IB

8

Replaceable Parts

Introduction

This section provides names and part numbers of Field Replaceable Units (FRUs). The FRUs are divided into two categories, exchange assemblies and non-exchange assemblies.

Ordering Information

To order the service kit or any FRU, address the order to the nearest Hewlett-Packard Sales and Service office. The following information should be included in the order:

- Complete model and serial number
- HP part number of each FRU or kit
- Complete description of each FRU

Exchange Program

A defective PCA or power supply can be exchanged for an operating assembly. For cost and other details contact the nearest HP Sales and Service office.

Return used batteries to:

Hewlett Packard
Environmental Health and Safety Dept.
8000 Foothills Blvd.
Roseville, CA 95678

ATTN: Lithium Battery Disposal Coordinator

Caution Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer.

ADVARSEL

Lithiumbatteri - Eksplosionsfare ved fejlagtig handtering. Udskiftning ma kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandoren.

VARNING

Explosionsfara vid felaktigt batteribyte. Anvand samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera anvant batteri enligt fabrikantens instruktion.

Exchange Assemblies

Table 8-1. Exchange Assemblies Common to HP 3000 and HP 9000 Systems

Description	New Part No.	Exchange Part No.
Processor PCA - High (832/932)	A1027-66520	A1027-69520
Processor PCA - Low (822/922)	A1027-66510	A1027-69510
Processor PCA - 842/948 w/o floating point	A1700-60004	A1700-69003
Processor PCA - 852/958 w/o floating point	A1701-60002	A1700-69003
Processor PCA - 842/948 w/ floating point	A1700-60003	A1700-69003
Processor PCA - 852/958 w/ floating point	A1701-60001	A1700-69003
Memory PCA - 8 MB	A1404A-60001	A1404A-69001
Memory PCA - 16 MB	A1436A-60001	A1436A-69001
Memory PCA - 32 MB	A1437A-60001	A1437A-69001
HP-PB/PSI PCA	28606-60001	28606-69001
Power Module	0950-1988	0957-0050

Table 8-2. HP 3000 Exchange Assemblies

Description	New Part No.	Exchange Part No.
Processor PCA (920)	A1409-60001	A1409-69001
Access Port PCA	5061-2537	5061-2543

Table 8-3. Supported PCAs for HP 9000

Description	New Part No.	Exchange Part No.
HP-PB/HP-IB PCA	28650-60001	28650-69002
HP-PB/8-Port AP MUX PCA (40299B)	40299-60021	40299-69021
HP-PB/GPIO PCA	obsolete	28651-69001
HP-PB/LAN(802.3) PCA	28652-60001	28652-69001
HP-PB/LAN(802.4) PCA	28604-60001	28604-69001
CIO HP-FL PCA	27111-60001	5062-3308
HP-PB SCSI/Parallel PCA	See chapter 12.	

Table 8-4. Supported PCAs for HP 3000

Description	New Part No.	Exchange Part No.
CIO HP-IB PCA	27113-60301	5062-3303
CIO HP-FL PCA	27115-60001	5062-3308
CIO 6-Port MUX PCA	27140-60001	27140-69001
CIO Turbo LAN (802.3) PCA	5062-3313	5062-3331
CIO SCSI PCA	See chapter 12.	

Table 8-5. Embedded Disk Exchange Assemblies

Description	New Part No.	Exchange Part No.
304 MB Disk Mechanism	07963-60051	07963-69051
304 MB Disk HP-IB Controller PCA	07961-60110	07961-69110
335 MB Disk Mechanism	C2200-60051	C2200-69051
335 MB Disk HP-IB Controller PCA	C2200-60037	C2200-69037
670 MB Disk Mechanism	C2201-60051	C2201-69051
670 MB Disk HP-IB Controller PCA	C2200-60037	C2200-69037
ESDI Drive Electronics	97548-60128	97548-69128

Table 8-6. Embedded DDS-Format Drive Exchange Assemblies

Description	New Part No.	Exchange Part No.
DDS-Format Tape Drive Module	C1501-67202	C1501-69202

Non-Exchange Assemblies

Table 8-7.
Non-Exchange Assemblies Common to HP 3000 and HP 9000 Systems

Description	Part No.
Precision Bus Adapter (PBA) PCA (Channel Span)	A1700-60001
LED Display Panel PCA	A1027-66542
Display Panel Assembly	A1027-60013
Battery/Fuse Assembly - recycle batteries	1420-0389
Battery - Processor PCA (922/932/822/832) - recycle batteries	1420-0386
Battery - Processor PCA (948/958/842/852) - recycle batteries	1420-0314
Two Board Adapter Assembly (Slot Divider)	5062-3336
System Fan Assembly	A1027-60003
3-Connector Panel PCA	A1027-66504
Card Cage Chassis Assembly	A1027-60008
Power Supply Fuse	2110-0098
DDS Power Cable	A1027-61601
Disk Power Cable (0,1) (Internal)	A1027-61602
Disk Power Cable (2,3) (Internal)	A1027-61610
Display Panel Cable	A1027-61603
Tape/HP-IB Cable (Internal)	A1027-61604
Disk/HP-IB Rear Cable (Internal)	A1027-61605
Disk/HP-IB Front Cable (Internal)	A1027-61609
Lower Front Bezel	A1027-40001
Upper Front Bezel	A1027-40002
Filler Panel	A1027-40007
Side Panel	5061-3137
Rear Panel	A1027-00041
Top Panel	A1027-60019
Single-High Bulkhead	5062-3343
Peripheral Mounting Bracket (for DDS)	A1027-00034
Battery Bracket (920/922/932/822/832)	A1027-00040
Battery Bracket (948/958/842/852)	1420-1353
EMI Top Shield	A1027-00026[1]
EMI Middle Shield	A1027-00052[1]
EMI Bottom Shield	A1027-60018[1]
EMI Battery Shield	A1027-00053
Processor Bulkhead Assembly (922/932/948/958/822/832/842/852)	A1027-60054

Note [1] The EMI top, middle, and bottom shields cannot be ordered separately. Instead, order the entire kit, HP part number A1027-00119.

Table 8-7. Non-Exchange Assemblies Common to HP 3000 and HP 9000 Systems (continued)

Description	Part No.
System Key	1390-0856
Key Switch Assembly	A1027-60006
PDC ROM (842/948)	A1700-81002
PDC ROM (852/958)	A1701-81002
Clock Crystal (842/948)	1813-0786
Clock Crystal (852/958)	1813-0775
Line Cord, Opt 900 United Kingdom	8120-5334
Line Cord, Opt 901 Australia	8120-5335
Line Cord, Opt 902 Cont. Europe	8120-5336
Line Cord, Opt 903 North America 125V	8120-5337
Line Cord, Opt 904 North American 250V	8120-5338
Line Cord, Opt 906 Switzerland	8120-5339
Line Cord, Opt 912 Danish	8120-5340
Line Cord, Opt 917 South Africa	8120-5341
Line Cord, Opt 918 Japan	8120-5342

Table 8-8. HP 3000 Non-Exchange Assemblies

Description	Part No.
CIO Channel Adapter	A1027-66515
HP-XL Backplane Assembly	A1027-60004
CIO/HP-PB Connector PCA (silverspan)	A1027-60016
CIO Bulkhead	A1027-60017
Card Guide Adapter - 920 only	A1702-00001
Processor Bulkhead - 920 only	A1702-00002
Air Baffle - 920 only	A1702-00004
MPE-XL Console Panel Assembly	A1027-66503
MPE-XL Access Port MUX	A1027-61606
MUX MPE-XL MUX Cable	A1027-61607
Line Cable	A1027-61608
Device Adapter/HP-IB (CIO) Cable	27113-63003
Series 920 Label	A1702-82000
Series 922LX Label	A1027-82000
Series 922RX Label	A1046-82000
Series 922 Label	A1033-82000
Series 932 Label	A1041-82000
Series 948 Label	A1700-82000
Series 958 Label	A1701-82000
Channel Adapter Bulkhead Assembly	A1027-60015

Table 8-9. HP 9000 Non-Exchange Assemblies

Description	Part No.
Device Adapter/HP-IB (HP-PB) Cable, 1 meter	5181-6127
Device Adapter/HP-IB (HP-PB) Cable, 2 meter	5181-6128
Series 822 Label	A1716-82000
Series 832 Label	A1044-82000
Series 842 Label	A1154-82000
Series 852 Label	A1155-82000
HP-UX Backplane Assembly	A1027-60034
Line Cable	A1044-61606
MUX Ribbon Cable (Internal AP Support Signals)	A1044-61604
MUX Shield Cable (External AP Support Signals)	A1044-61605
ADP Overlay Label (AP Connections)	A1044-82001
AP MUX (Support) Panel	A1044-00004

Table 8-10. 304 MB Embedded Disk Non-Exchange Assemblies

Description	Part No.
Control Cable	07961-60002
Mechanism Data Cable	07961-60003
HP-IB PCA Retainer Snap	A1027-40008
Bracket	A1027-60022

Table 8-11. 335 MB and 670 MB Embedded Disk Non-Exchange Assemblies

Description	Part No.
Control Cable	C2200-60013
Mechanism Data Cable	C2200-60012
HP-IB PCA Retainer Snap	A1027-40008
Bracket	A1027-60022

Table 8-12. Embedded DDS-Format Drive Non-Exchange Assemblies

Description	Part No.
HP-IB Controller PCA	C1501-67001
EPROM	C1501-89002
50-way Cable	C1501-61002

Removal and Replacement

Required Tools:

- No. 10 TORX head driver
- Small flat blade screw driver
- Anti-static protective containers
- Grounding wrist strap

Warning **Dangerous voltages or high energy levels are present within the cabinet. To prevent harm to personnel, ensure that the AC power cord is disconnected and that the keyswitch is in position 0.**

Caution Handle all FRUs carefully. Dropping or otherwise jarring the FRUs will cause damage to them.

Follow ESD procedures. Always use an ESD grounding wrist strap during service.

Top Cover and Front Bezel Removal

1. Disconnect AC power cord at the AC outlet.
2. Lift up the rear of the top cover and slide it forward (see Figure 8-1).
3. On the front, remove the two piece, front plastic bezels by removing the two TORX head screws (see Figure 8-2).
4. Remove the top bezel by pulling it forward and up.
5. Remove the bottom bezel by sliding it upwards, releasing it from the slots in the chassis.

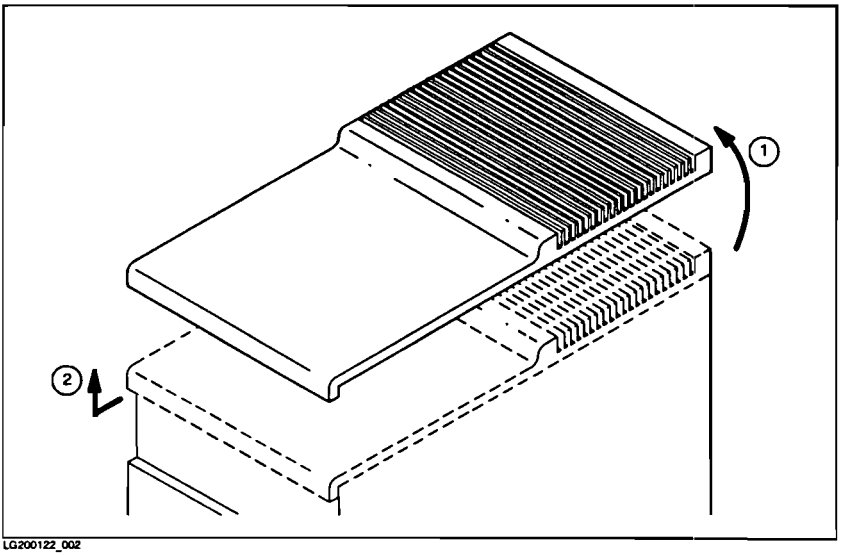


Figure 8-1. Top Cover Removal

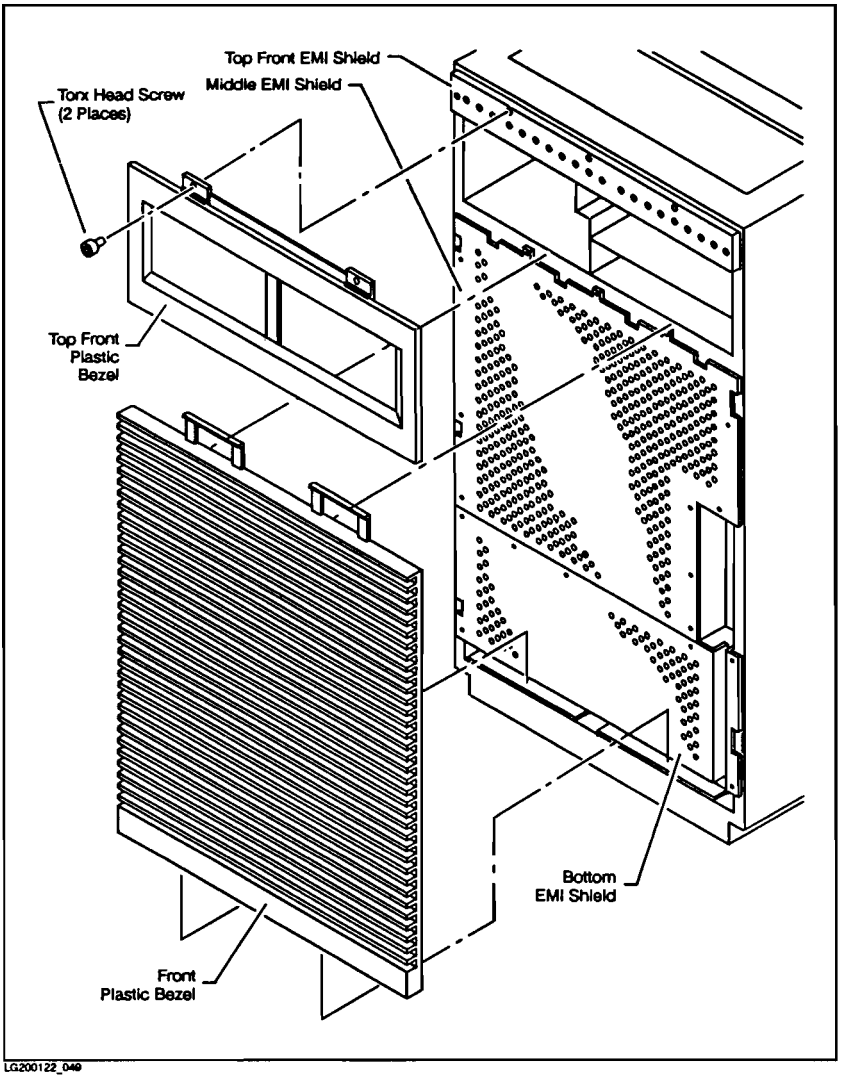


Figure 8-2. Front and Top Bezel Removal

Removing Front EMI Shields

1. Loosen the two captive TORX screws on the top EMI shield and lift the shield off (see Figure 8-3).
2. Loosen 11 TORX screws on the middle EMI shield and lift the shield off.
3. Locate the AC line cable which passes through a recessed channel on the lower EMI shield and disconnect the AC line from the power module.
4. Pull the AC line cable loose from the recessed channel.
5. Loosen the seven TORX screws on the lower EMI shield and lift the shield.

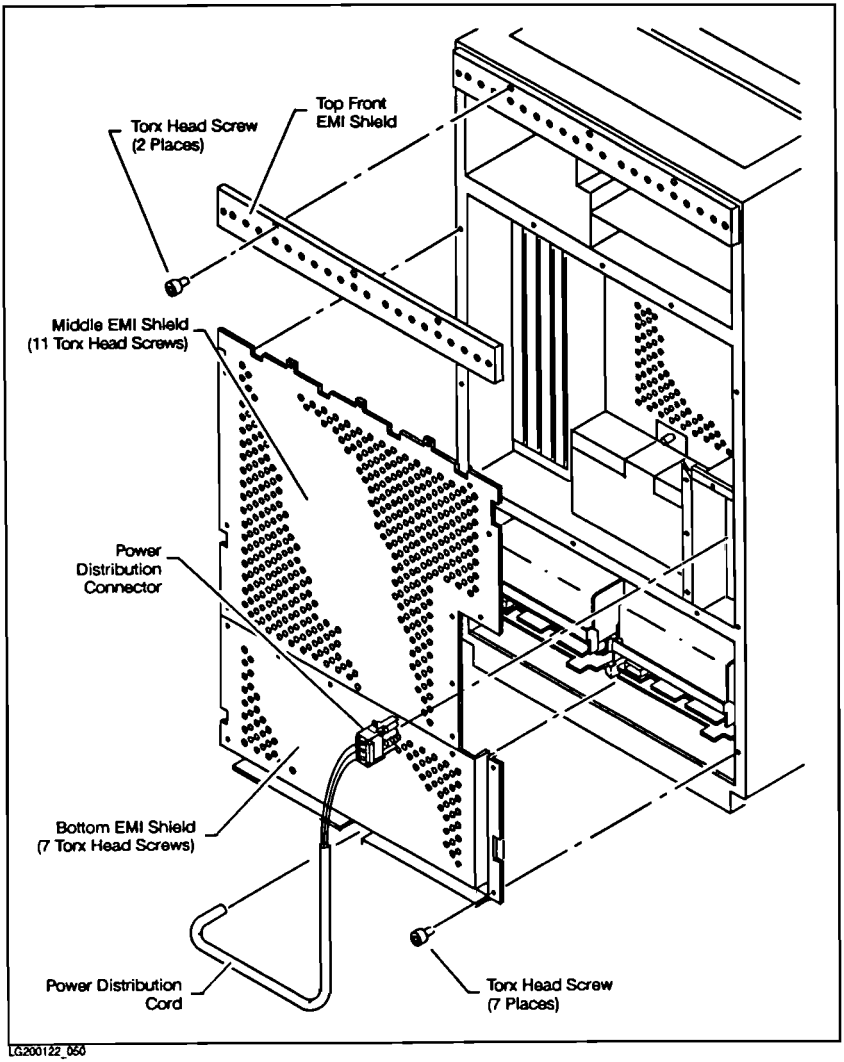


Figure 8-3. EMI Shield Removal

Battery and Power Module Removal

1. Disconnect the battery supply leads at the power module.
2. Unsnap the plastic lock, located just above the battery, and remove the battery assembly.
3. Locate the battery EMI shield, loosen the two TORX screws, and lift the shield off (see Figure 8-4).
4. Loosen the six TORX head screws on the power module.

Caution The power module weighs 21 pounds. Remove carefully to avoid injury.

5. Release the power module from its backplane connection by sliding the module towards the front.
6. Recycle used lead-acid batteries.

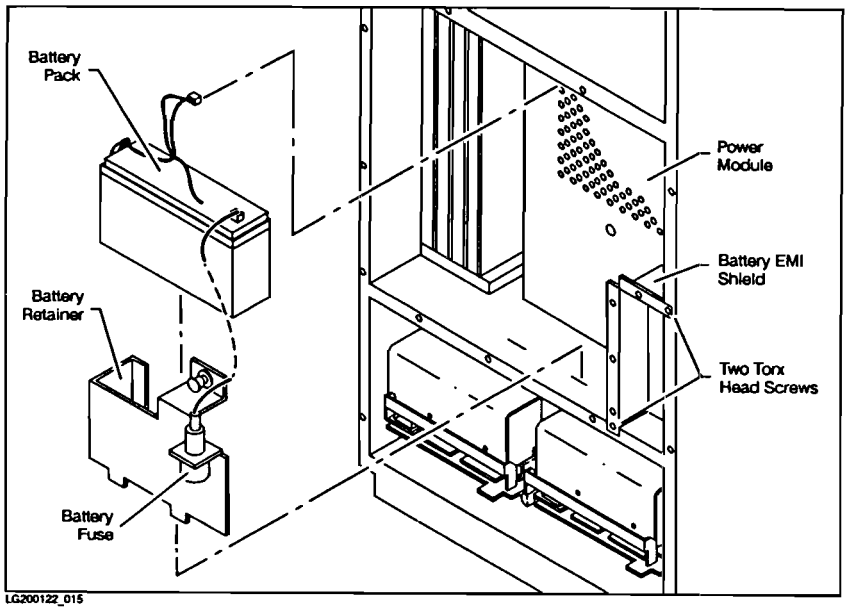


Figure 8-4. Battery and Power Module Removal

Card Cage FRU Removal

Caution After removing a PCA from the system, place the PCA into an individual protective anti-static ESD container to prevent damage to the FRU.

1. Remove the bulkhead that covers the Access Port (AP) PCA and disconnect the AP cable (see Figure 8-5).
2. Disconnect the MUX cable from the 6-Port MUX.
3. Remove the Access Port PCA.
4. Remove the PCA and its CIO-PB adapter assembly by removing the small PCA retainer bracket and then pulling the entire assembly out (see Figure 8-6).
5. Remove any remaining PCA in the card cage.
6. Place the PCA in the anti-static containers and set it aside.

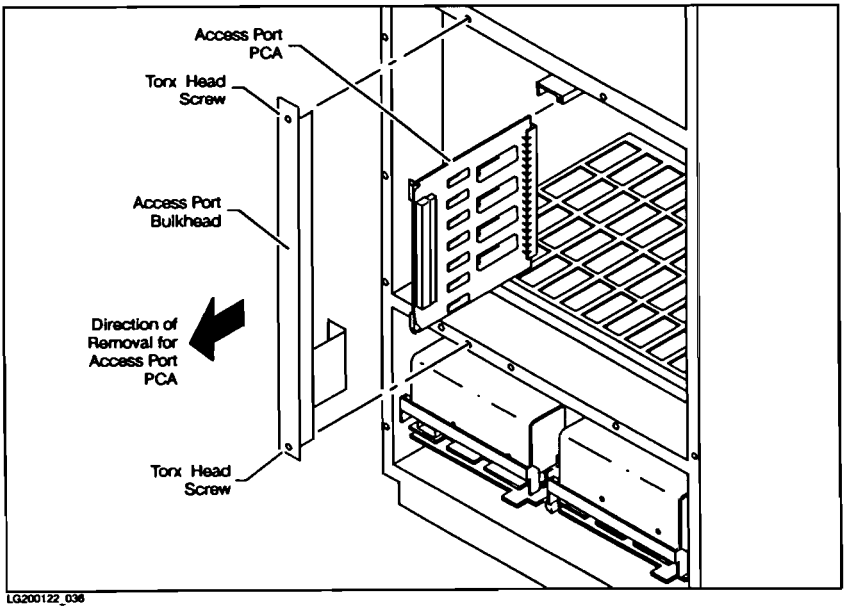


Figure 8-5. Access Port PCA Removal

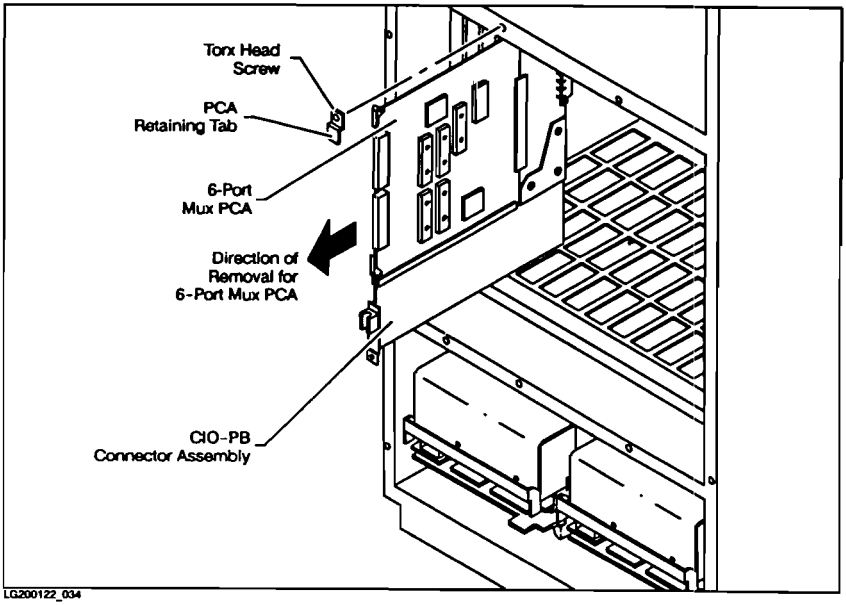


Figure 8-6. Six-Port MUX PCA Removal

HP 9000 Model 842S/852S Console Removal/Replacement

HP 9000 Model 842S/852S system console installation includes remote support hardware, which consists of the following:

- AP MUX
- ADP
- AP Signals Connector Panel
- AP Cable
- External AP Support Signals Cable
- Internal AP Support Signals Cable

Figure 8-7 and Figure 8-8 illustrate the connections for the remote support hardware. These illustrations can be used to assist in removal and replacement of console-related hardware.

Note that, in addition to the standard ADP cable which connects the AP MUX to the ADP, there is an external ADP Support Signals Cable connecting the AP MUX to a SPU connector panel. Inside the SPU, an internal ADP Support Signals Cable extends the AP support signals to the backplane. The backplane distributes the signals to the front panel keyswitch and status display and to the processor.

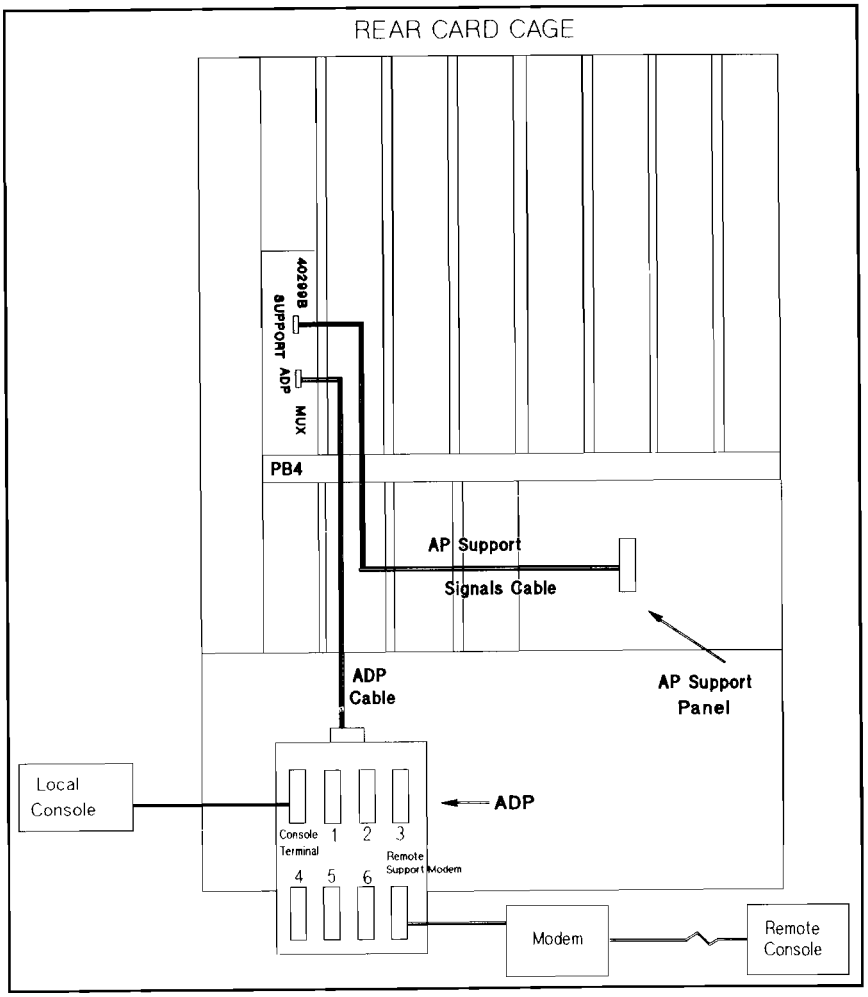


Figure 8-7. HP 9000 Model 842S/852S Console and Access Port Connections

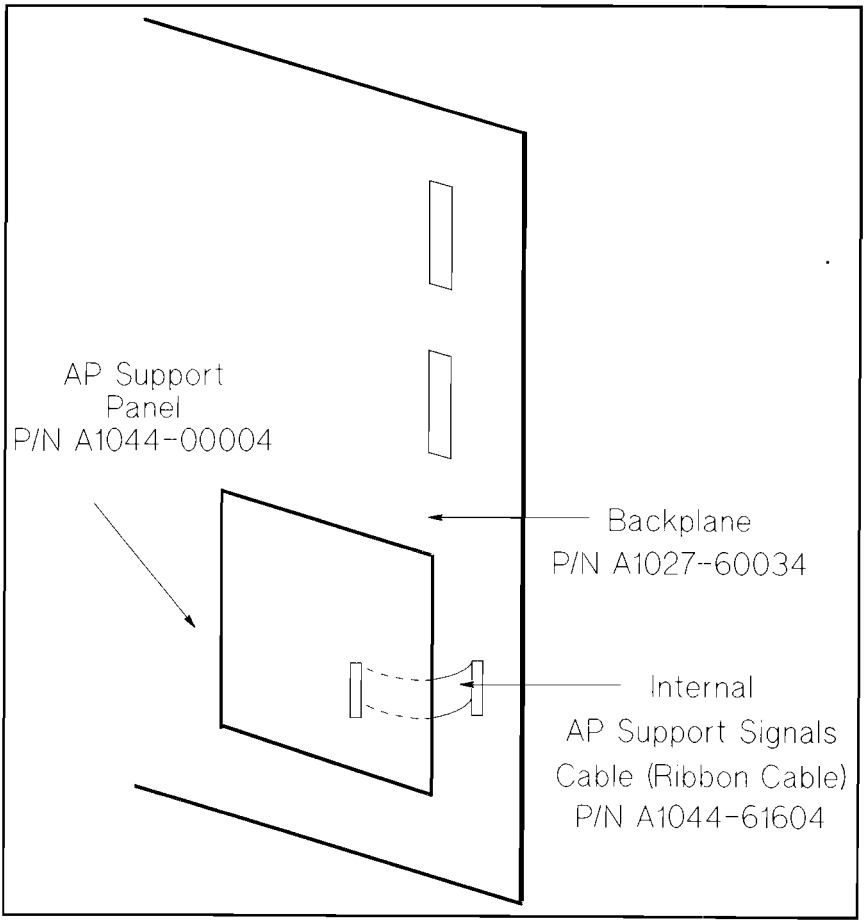


Figure 8-8. HP 9000 Model 842S/852S AP Support Signal Internal Routing

Disk Drive ESDI Cabling

1. Locate the disk to be removed (see Figure 8-9).
2. Disconnect the drive mechanism DC power cable located at the left front edge of the disk drive ESDI PCA.
3. Disconnect the two ribbon cables located at the center and right front edge of the disk drive ESDI PCA.
4. Disconnect the DC power cable located at the right front rear of the HP-IB Controller PCA.

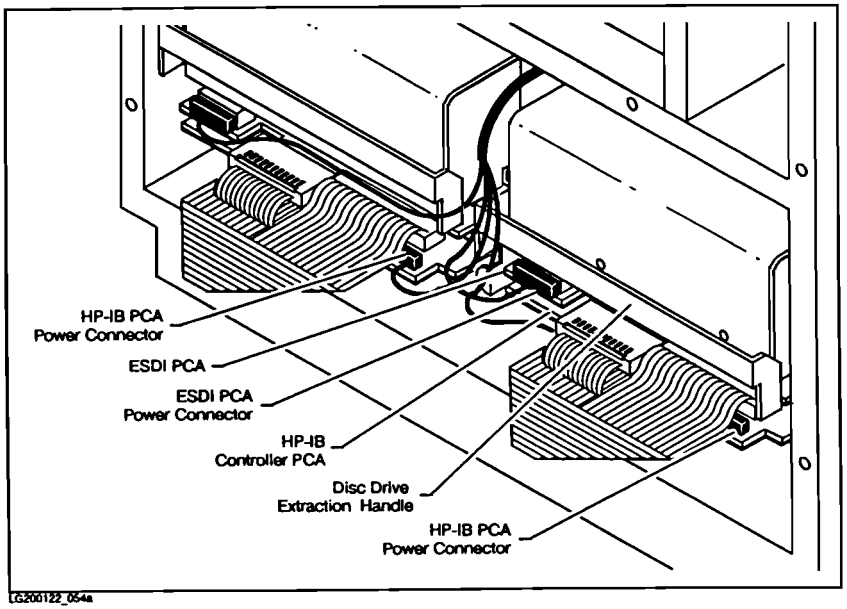


Figure 8-9. Disk Cabling

Disk Drive Removal

1. Remove the two TORX screws that secure the disk drive mounting bracket retaining tab to the system cabinet (see Figure 8-10).
2. Use the handle at the front of the disk mechanism and lift the disk mechanism slightly while pulling the disk drive out of the system cabinet.

Caution Be sure to support the rear of the disk drive when removing it from the cabinet.

---

3. Remove the disk drive from the cabinet and carefully set it aside.

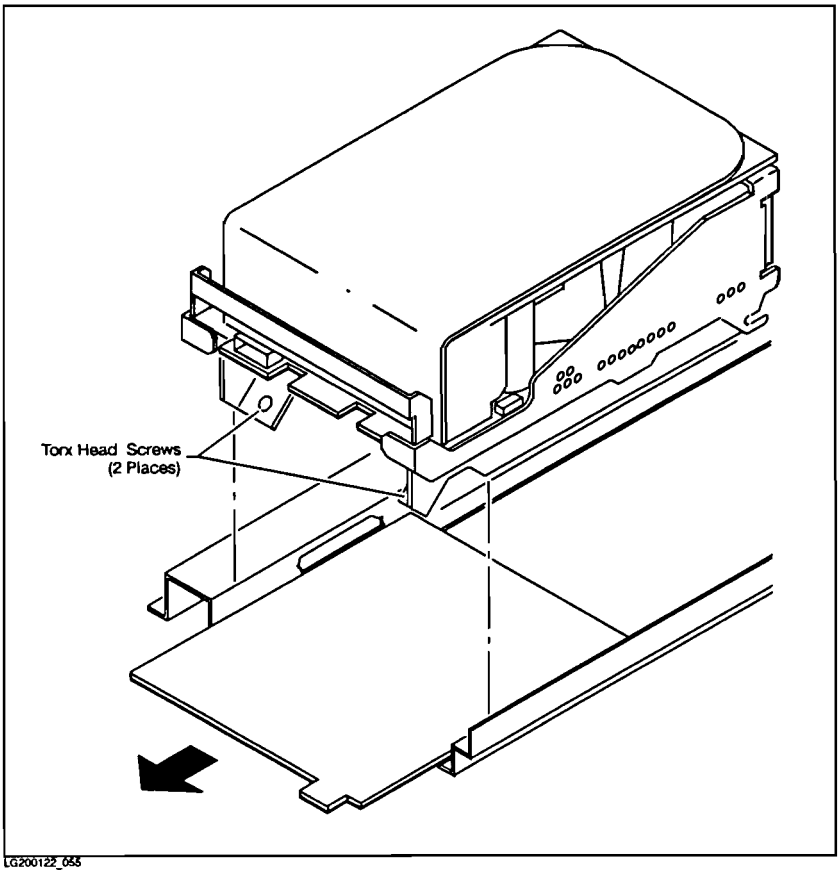
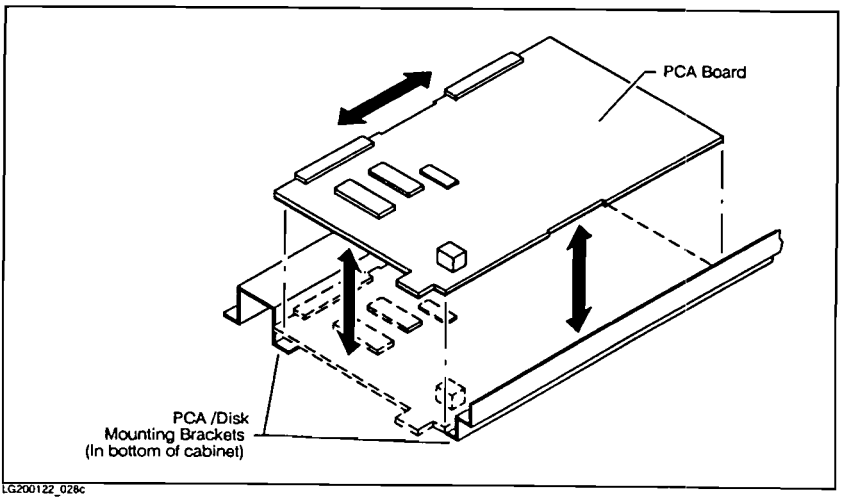


Figure 8-10. Disk Drive Removal

Disk HP-IB Interface PCA Removal

1. Disconnect the HP-IB Interface cable located on the left side of the PCA (see Figure 8-11).
2. Locate the PCA retainer (one per PCA).
3. Lift up one edge of the retainer and pull up and out.
4. After the retainer is removed, slide the PCA backwards and lift it out of the channel guides.



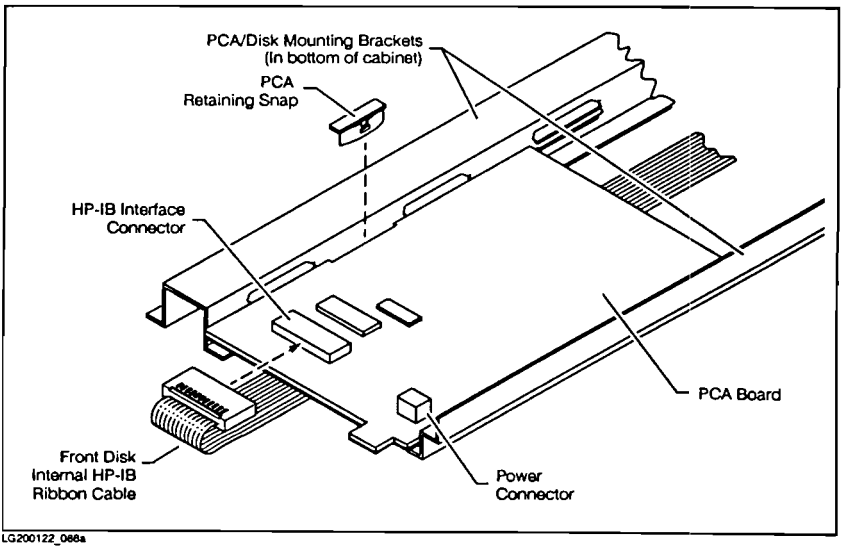
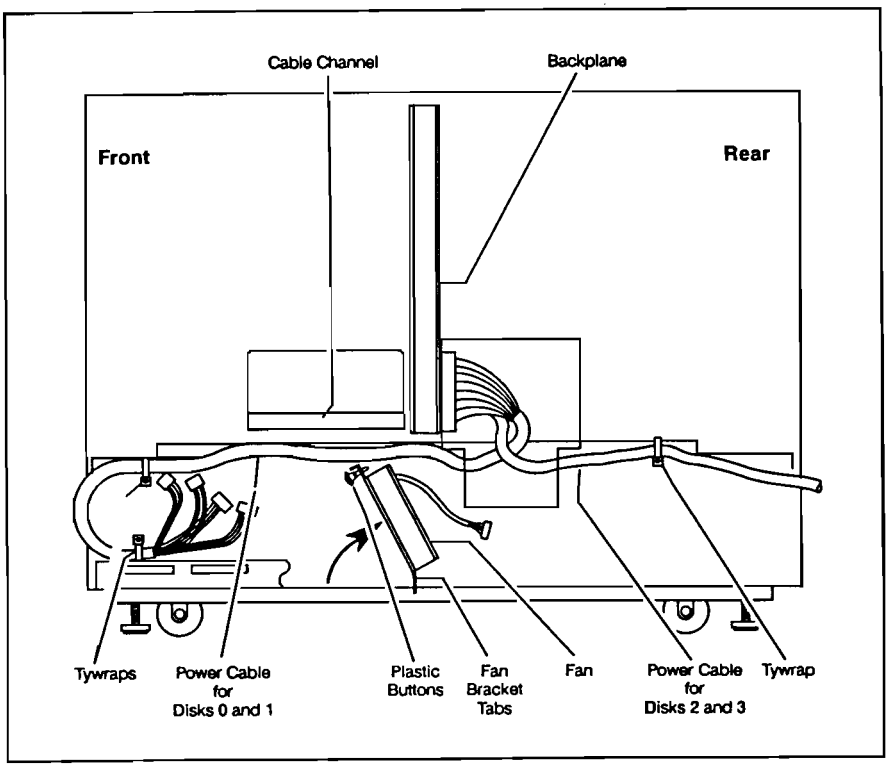


Figure 8-11. Disk HP-IB Interface PCA Layout

Disk Drive Power Cable Replacement

Power Cable for Disks 2 and 3

1. Thread the backplane connector end of the power cable for disks 2 and 3 through the rear of the chassis along the underside of the lower card cage (see Figure 8-12).
2. From the side access door, pull the connector up through the cable feedthrough hole and plug into the inner backplane connector as shown in Figure 8-33.
3. Tywrap the cable into place on the underside of the lower card cage.



LG200122_083

Figure 8-12. Disk Drive Power Cable Replacement

Power Cable for Disks 0 and 1

1. Thread the backplane connector end of the power cable for disks 0 and 1 through the front of the chassis along the underside of the lower card cage (see Figure 8-12).
2. From the side access door, pull the connector up through the cable feedthrough hole and plug into the outer backplane connector as shown in Figure 8-33.
3. Tywrap the cable into place on the underside of the lower card cage. The head of the tywrap must be on the underside of the lower card cage.
4. Secure the connectors on the disk power cable to the chassis center rail by threading another tywrap though the cardguide slots and around the cable as shown in Figure 8-12.

Removing the System Cooling Fans

Note Disk drives 0 and 1 must be removed before proceeding.

1. Remove the two screws which fasten the left side panel to the cabinet (see Figure 8-13).
2. Remove the panel and set it aside. The service access panel should now be visible.
3. Remove the access panel by unscrewing the seven TORX screws.
4. Disconnect the two connectors supplying power to the fans (see Figure 8-14).
5. Clear any cable obstructions by placing the fan power cables directly behind the fan assembly. This may require routing the cables through sheet metal.
6. Locate the three quick release fasteners on the fan assembly (see Figure 8-15).
7. Pull on the fasteners until they release the assembly from the chassis.
8. Lean the fan assembly forward, pull up and then out.
9. Remove the assembly from the cabinet and set it aside.

Replacing the System Cooling Fans

1. Install the fan assembly from the front side of the chassis. Tilt the fan assembly back as shown in Figure 8-12 while inserting the fan bracket tabs into the slots on the chassis floor.
2. Rotate the fan assembly to a vertical position and secure the assembly by pressing in the heads of the plastic buttons.

Note The power cable for front disk drives 0 and 1 should fit into the notch on top of the fan bracket.

3. Reconnect the two connectors supplying power to the fans (see Figure 8-14).

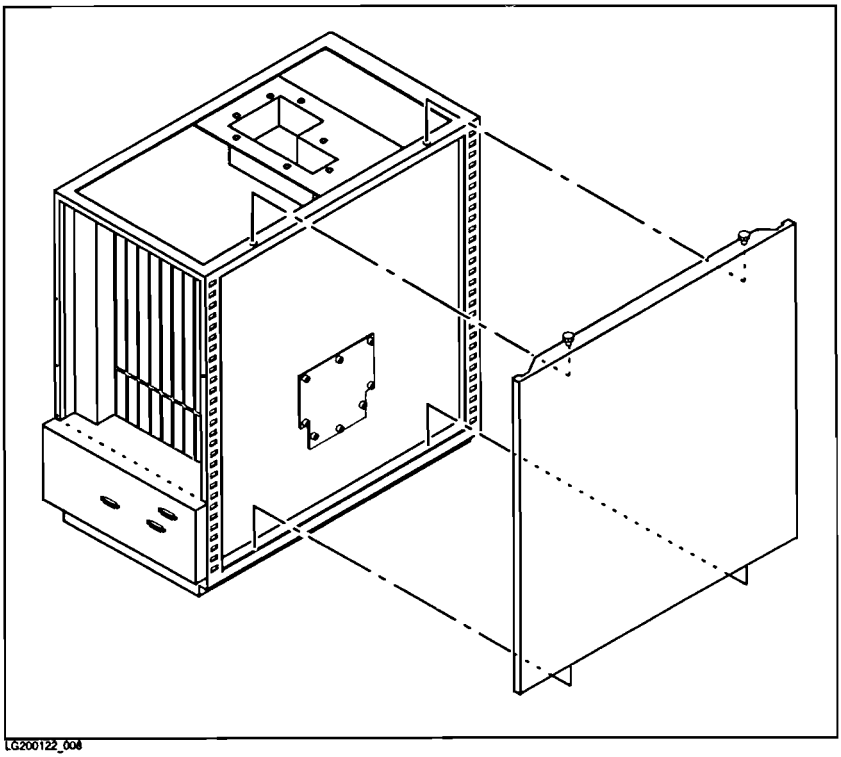


Figure 8-13. Left Side Panel Removal

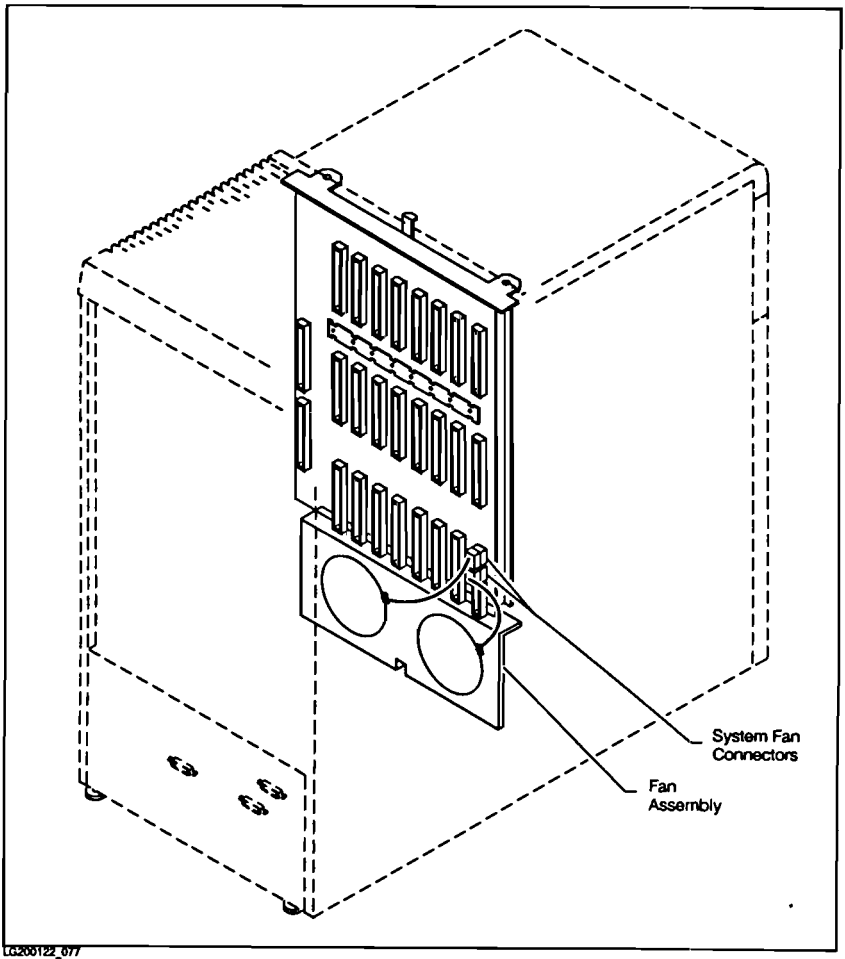


Figure 8-14. System Fan Power Connector Location

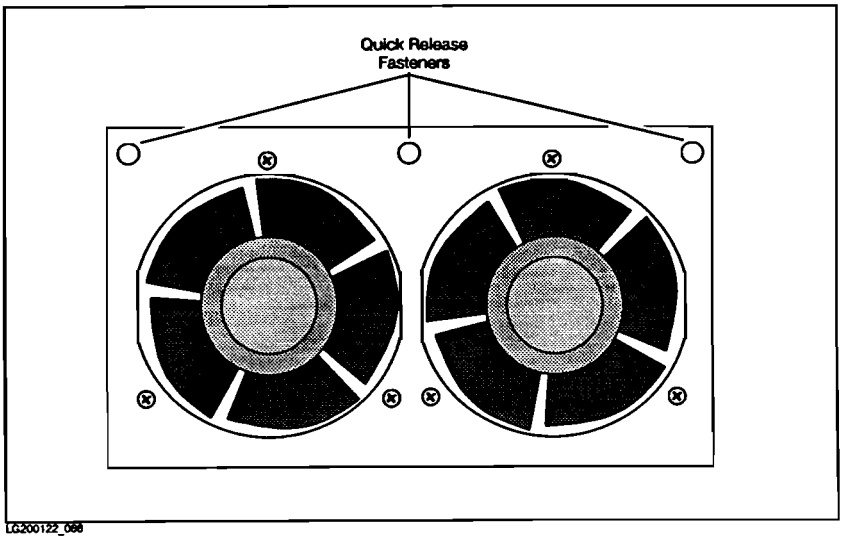


Figure 8-15. Fan Assembly

Front Display Panel Removal

1. Remove the top EMI shield by unscrewing the seven TORX screws (dee Figure 8-16).
2. Remove the three TORX screws that attach the display panel to the chassis (see Figure 8-17).
3. Remove the ribbon cable from the EMI ferrite bracket.
4. Pull the panel forward and disconnect the display panel cable harness assembly from the backplane.
5. Place the display panel in an anti-static container.

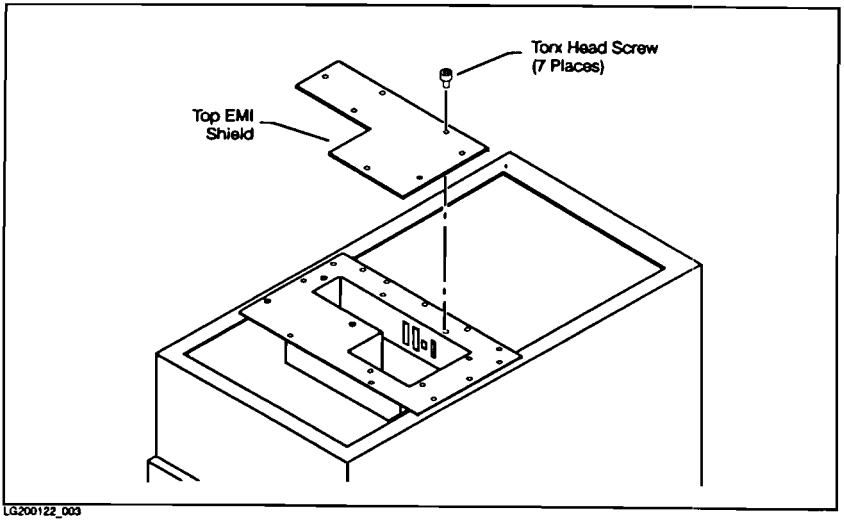


Figure 8-16. Top EMI Shield Removal

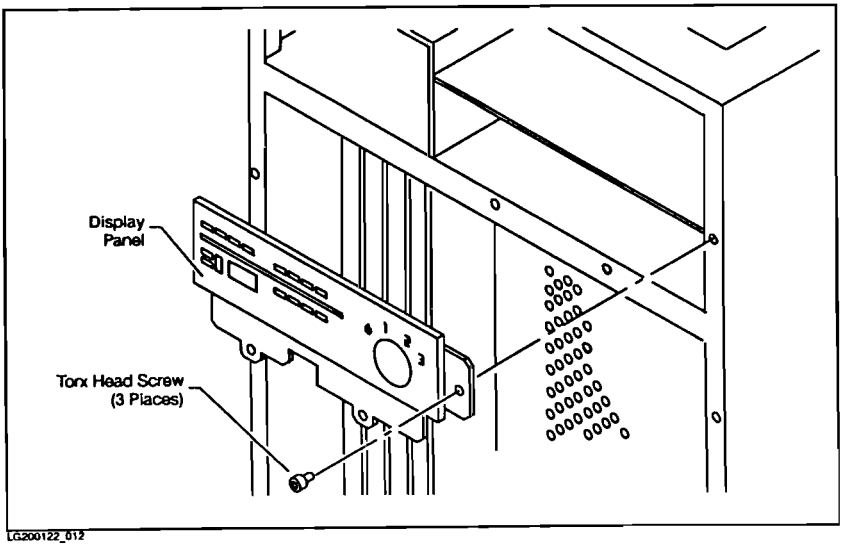


Figure 8-17. Front Display Panel Removal

DDS-Format Device HP-IB Controller PCA Removal

1. Locate the Controller PCA and disconnect the front and rear connectors as noted (see Figure 8-18 and Figure 8-19).
2. Slide the PCA forward until it is free from the cabinet.
3. Place the PCA in an anti-static container and set it aside.
4. Unscrew the two TORX head screws which fasten the tape drive mechanism to the chassis (front tabs).
5. Disconnect the power cable on the rear of the tape drive.
6. Carefully pull the tape drive out of the cabinet and set it aside.

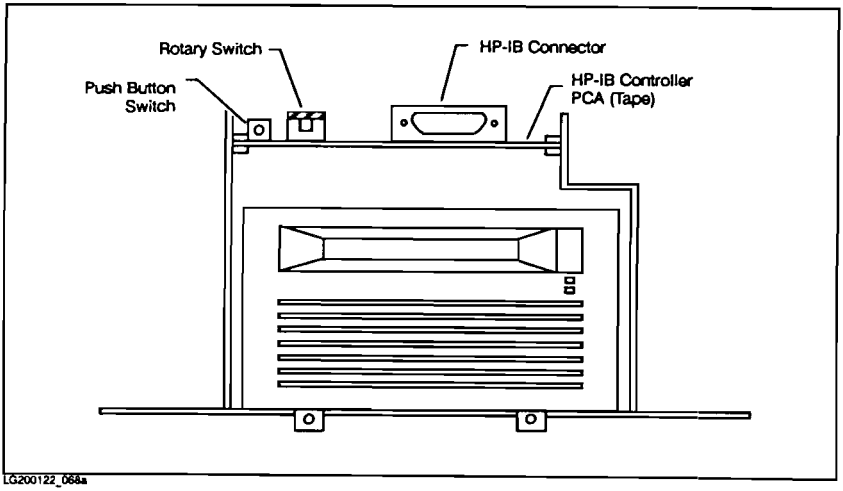


Figure 8-18. DDS-Format HP-IB Controller PCA

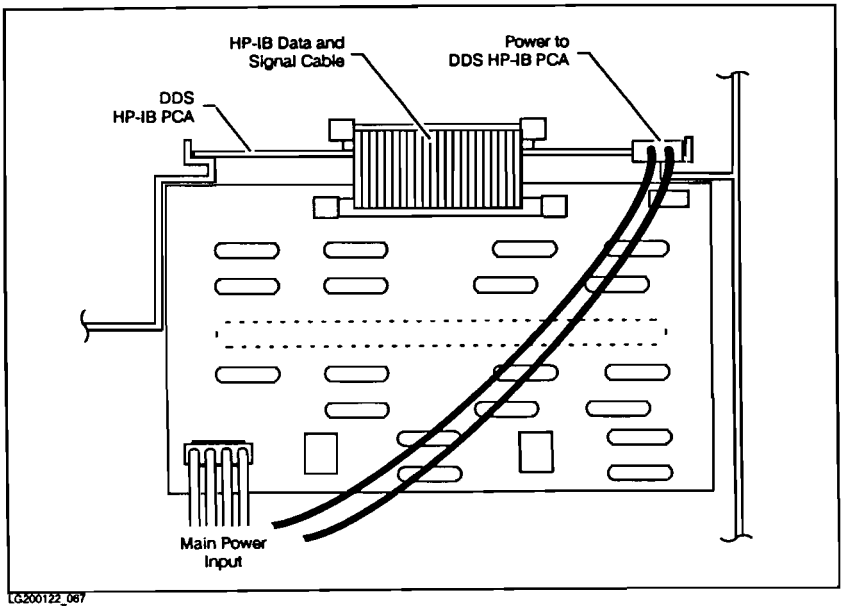


Figure 8-19. DDS-Format Device and HP-IB Controller (Rear View)

DDS-Format Device Internal HP-IB Cable Replacement

1. Remove top, front, back, and side panels as described elsewhere in this chapter.
2. Thread large connector end of the internal HP-IB cable for the DDS-format device through the side access door, through the cable channel, and up into the top front compartment (see Figure 8-20).
3. Thread small connector end of the cable through the side access door, under the card cage floor, and into the rear of the chassis.
4. Secure the cable to the chassis side with cable clips in two places, as shown in Figure 8-20.
5. In the top front compartment, place two ferrite blocks (p/n 9170-1390) around the large connector end of the cable just below the "Clamp Here" label. Secure the ferrite blocks together using two metal ferrite clips (p/n 9170-1459).
6. Lock the ferrite block into place using the hinged ferrite holder on the back wall of the tape compartment (see Detail A of Figure 8-20). The lips on the ferrite clips must face outward. The plastic button on the ferrite holder locks the ferrite into place.
7. Clamp the cable into place as shown in Detail A, placing the clamp directly over the "Clamp Here" label. The cable connector should be within 1.5 inches of the cable clamp.
8. Place two ferrite blocks on the rear end of the cable in the location shown in Detail B of Figure 8-20. Secure the ferrite blocks together using two ferrite clips.
9. Clamp the ferrite block assembly into place using the plastic button to secure the ferrite bracket latch.

Note The cable fold must be on the inside of the sheetmetal lip.

---

10. Fold the end of the cable as shown in Detail B and clamp into place directly over the cable label.

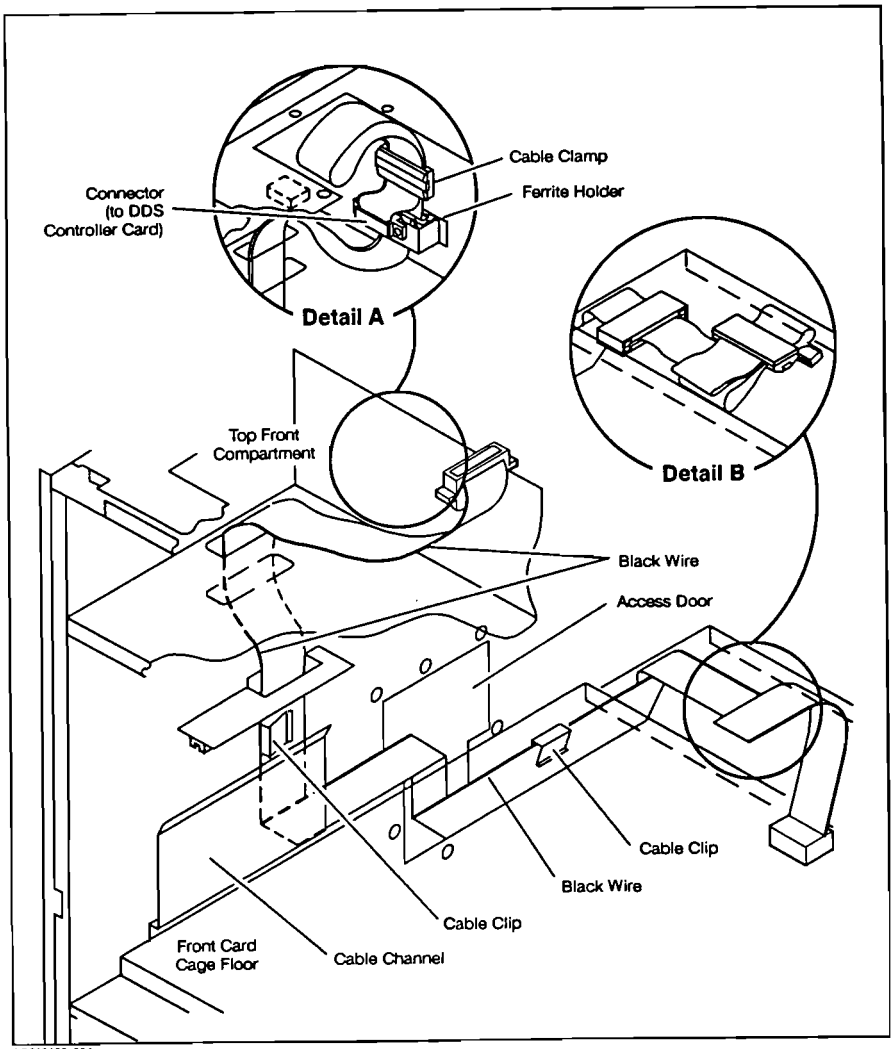


Figure 8-20. DDS-Format Device Internal HP-IB Cable Replacement

Rear Panel Removal

1. Pull the panel out from the top and lift up and out (see Figure 8-21).
2. Set the panel assembly aside.

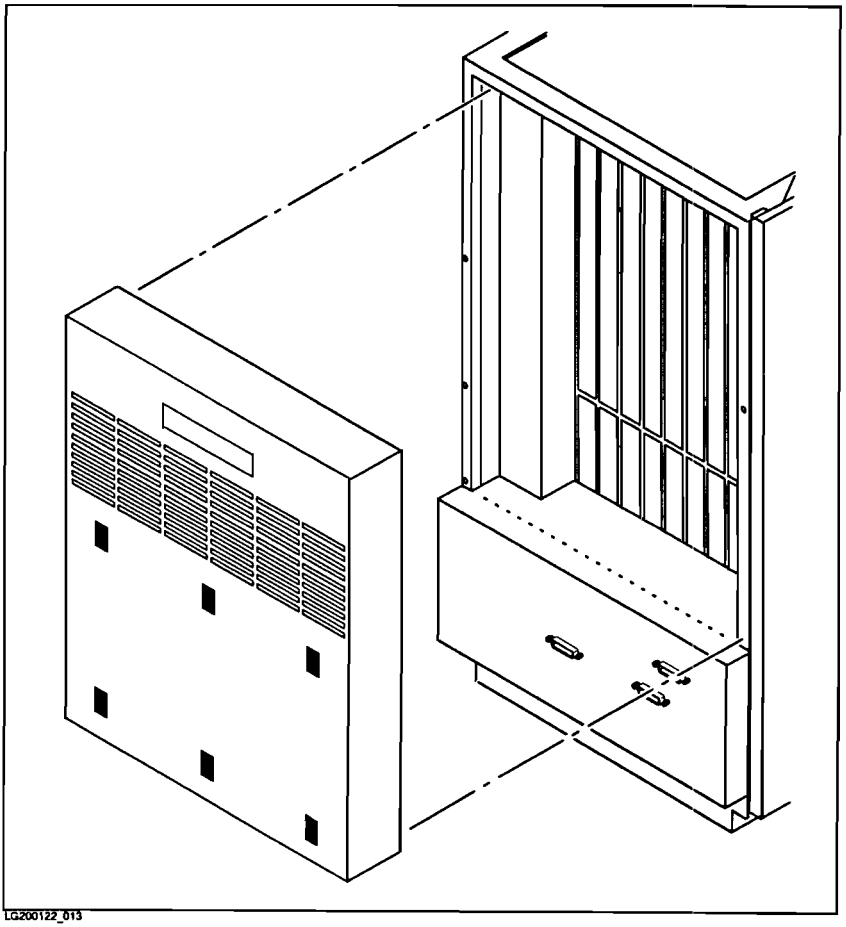


Figure 8-21. Rear Panel Removal

CIO Device Adapter Removal

1. Locate the CIO device adapter cover plate and unscrew the upper bulkhead screw (see Figure 8-22).
2. Loosen the lock plate screw.
3. Remove two locking screws on cover plate and remove the bulkhead.
4. Remove the CIO interface connector.
5. Unscrew the lower bulk head screw.
6. Grasp the cable guide and the upper tab of the device adapter and pull the assembly out as one piece (see Figure 8-23).
7. Remove the entire assembly and place it in an anti-static container.

Precision Bus Adapter (PBA) Removal

The Precision Bus Adapter (PBA) is similar to the CIO-PB Connector assembly in that it provides an interface to a CIO device adapter. The PBA differs from the CIO/PB Connector assembly in that it contains the HP-PB to CIO channel adapter circuitry (same as on the CIO Channel Adapter).

The PBA provides only a single CIO card slot. The PBA comes with either a CIO HP-IB card (PBA-IB) or CIO HP-FL card (PBA-FL).

1. Locate the PBA cover plate and unscrew the upper bulkhead screw (see Figure 8-22).
2. Loosen the lock plate screw.
3. Remove two locking screws on cover plate and remove the bulkhead.
4. Unscrew the lower bulk head screw.
5. Grasp the cable guide and the upper tab of the device adapter and pull the assembly out as one piece (see Figure 8-24).
6. Remove the entire assembly and place it in an anti-static container.

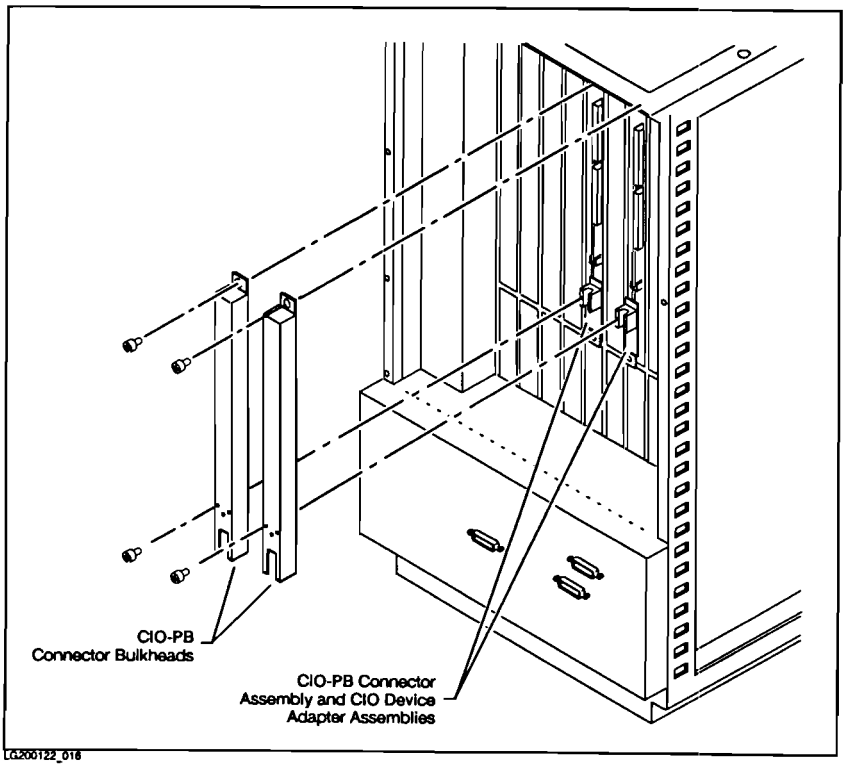


Figure 8-22. CIO Bulkhead Removal

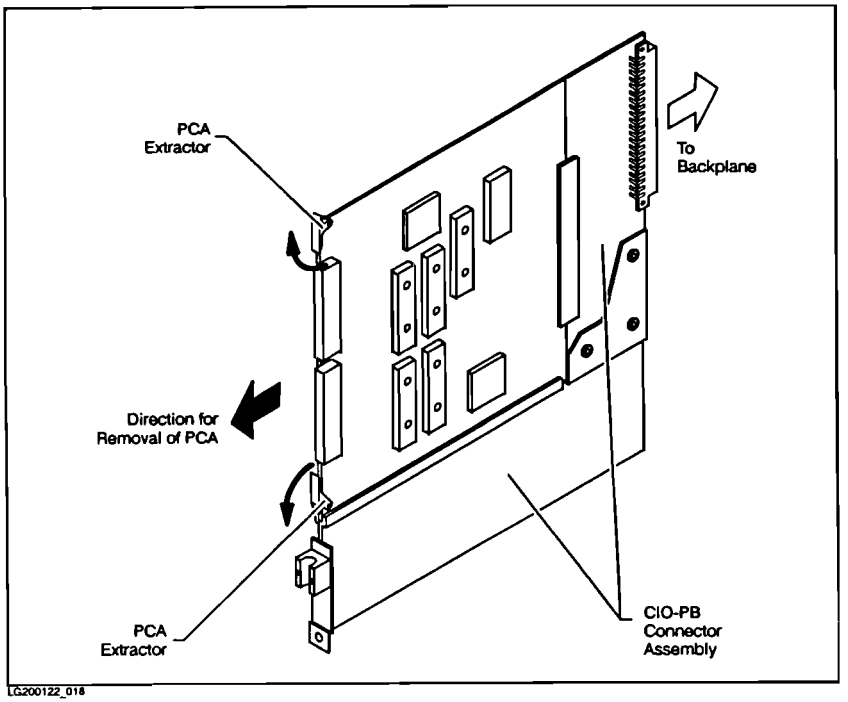


Figure 8-23. CIO-PB Connector Assembly Removal

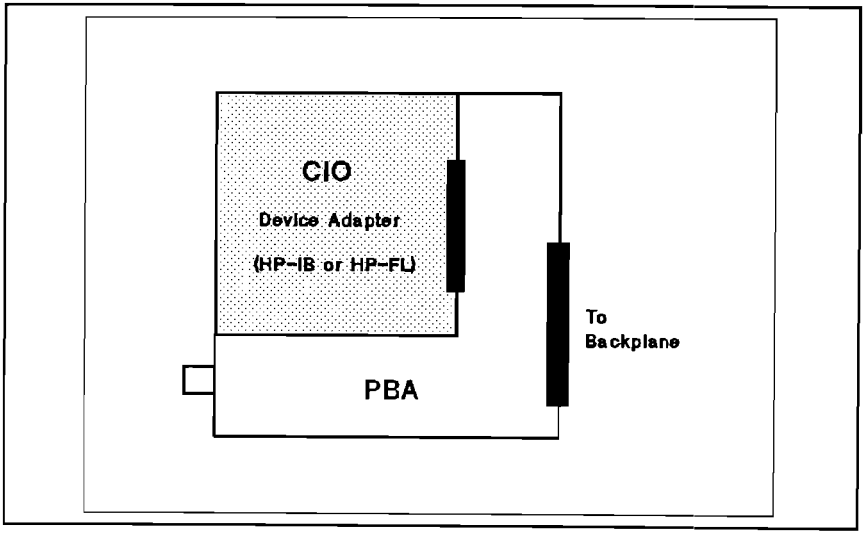


Figure 8-24. PBA PCA Assembly Removal

Processor PCA Removal (Except HP 3000 Series 920)

1. Remove the Processor PCA by unscrewing the six TORX screws on the Processor PCA bulk head (see Figure 8-25).
2. Use the two bulk head brackets located on the front edge of the Processor PCA and pull the board out.

Caution Do not stack PCAs on top of each other. Severe damage can occur to components.

3. Remove the remaining PCAs by unscrewing the TORX screws and extract the PCAs.
4. Remove all remaining two-board adapters and bulkheads.
5. Place all PCAs in anti-static containers and set it aside.

Caution Replace lithium batteries only with the specified part. Do not use substitutes.

Ensure correct polarity before installing new batteries.

Recycle used batteries.

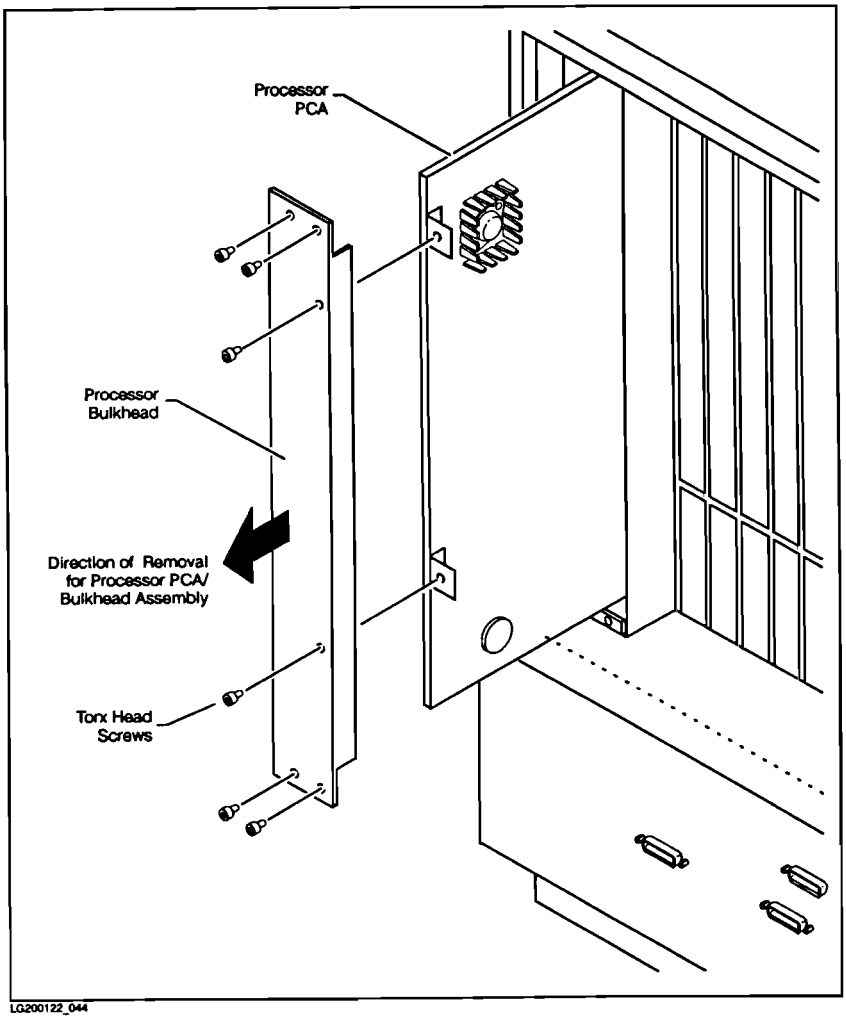


Figure 8-25. Processor PCA Removal

Processor PCA Replacement (HP 3000 Series 948/958 and HP 9000 Model 842S/852S)

The processor exchange assembly for Series 948/958 and Model 842S/852S systems comes with floating point chips. This assembly can be configured as either a high or low performance processor. The exchange assembly is not shipped configured, and must be configured on site for the correct performance level. The configuration procedure is as follows:

1. Move the following components from the removed processor to the exchange assembly (see Figure 8-26):

   PDC ROM
   Clock Crystal

2. Verify that jumper J103 on the exchange assembly is in the proper position. Use the following information to determine the proper position.

PDC ROM Part Number	Clock Crystal Part Number	Jumper Position
A1701-81002	1813-0775	HI (high)
A1700-81002	1813-0786	LO (low)

Note If the jumper is in the wrong position, the processor MAY NOT fail immediately. Therefore, do not assume the jumper setting of the removed processor is correct. Always use the PDC ROM and crystal part numbers to verify the correct jumper setting.

As a security procedure, always check that the model indicated on the regulatory label (at rear of cabinet) corresponds to the performance configuration of the processor.

3. Set clock calibration constant and user limit in stable storage using SS_CONFIG. The process to follow is listed below:

   a. Load and execute ss_config from the Support Tape (version 7.06 or greater). Remember that ss_config requires a password.

   b. Use the **sysclock** command to set stable storage to the system clock value corresponding to the performance level of the processor. The system clock value for the 842S/948 systems is 28 MHz; the value for 852S/958 systems is 50 MHz.

Note When using ss_config versions earlier than A.01.06, double the clock values. The clock value for 842S/948 systems will be 56 MHz; the value for 852S/958 systems will be 100 MHz.

   c. Use the SW-CAP command to set stable storage to the appropriate user limit.

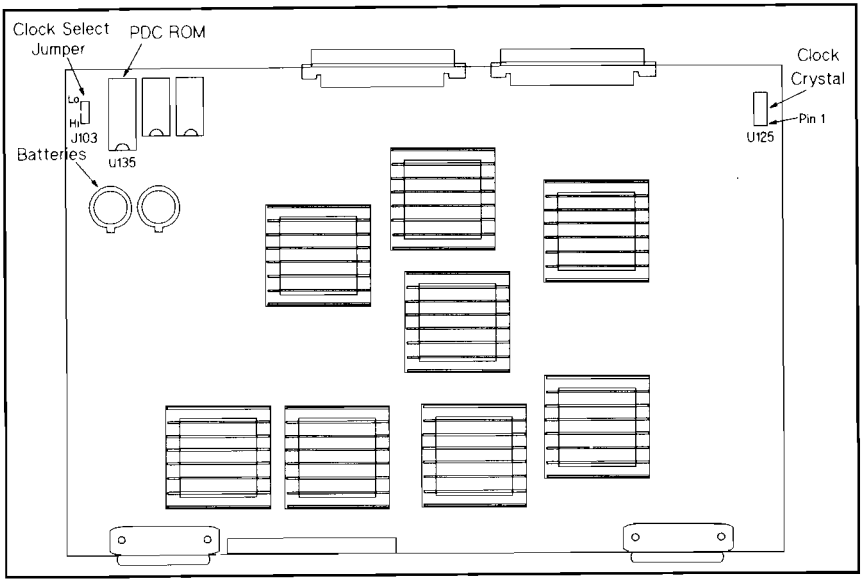


Figure 8-26. HP 3000 Series 948/958 and HP 9000 Model 842S/852S Processor PCA

Processor PCA Removal and Replacement (HP 3000 Series 920)

Removal

1. Remove the cover plate from the Processor PCA by unscrewing the four TORX screws on the four corners of the plate (see Figure 8-27).
2. Grasp the handle and remove the Processor PCA with the attached air baffle and card guide adapter. At this point, you can change the Boot ROM (BROM), if necessary.
3. To replace a defective board, remove the air baffle and card guide adapter.

Replacement With 922/932/948/958 Processor PCA Upgrade

- Install the Processor PCA and attach the cover plate provided in the upgrade kit. Tighten all screws before replacing the rear panel.
- Discard the old cover plate and the air baffle and card guide adapter that were attached to the Series 920 Processor PCA.

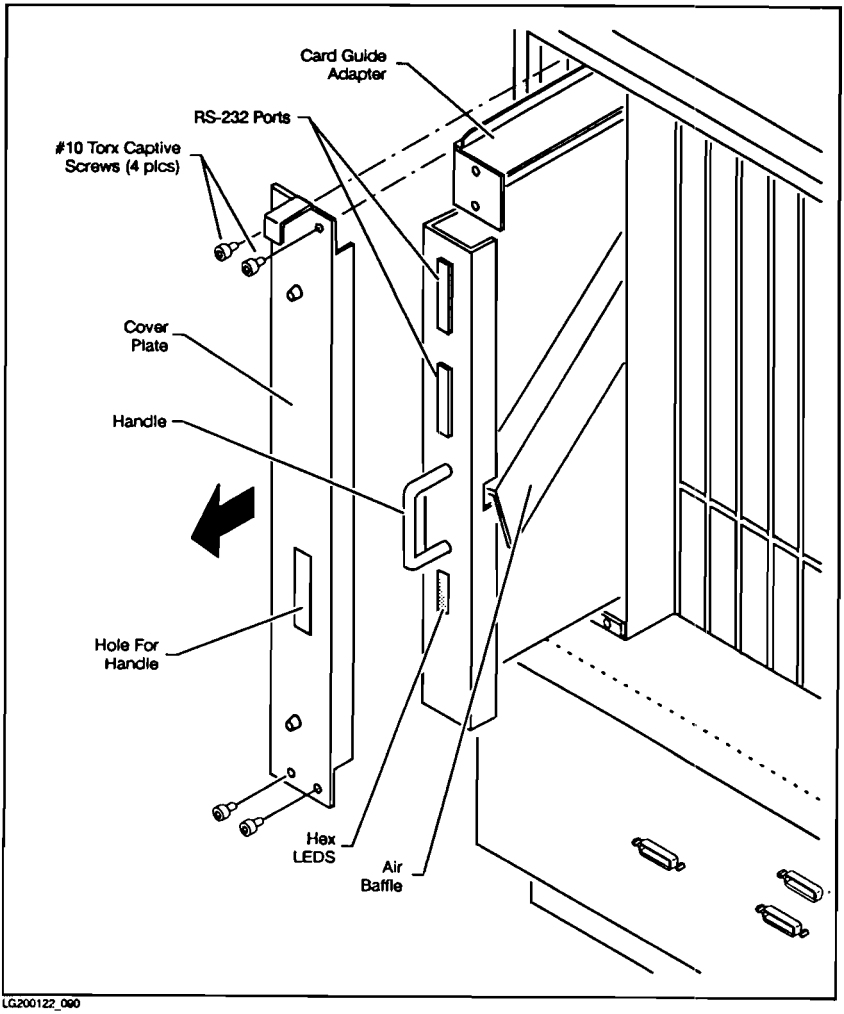


Figure 8-27. HP 3000 Series 920 Processor PCA Removal

Remove Air Baffle

1. Remove two captive TORX screws from the air baffle (see Figure 8-28).
2. Remove the air baffle from the card guide adapter. Take care not to dislodge any heat sinks on the LSI chips on the Processor PCA.
3. Only discard the air baffle when installing a Processor PCA upgrade. Keep the air baffle when installing another Series 920 Processor PCA. Series 920 processor exchange assemblies do not ship with an air baffle or card guide adapter.

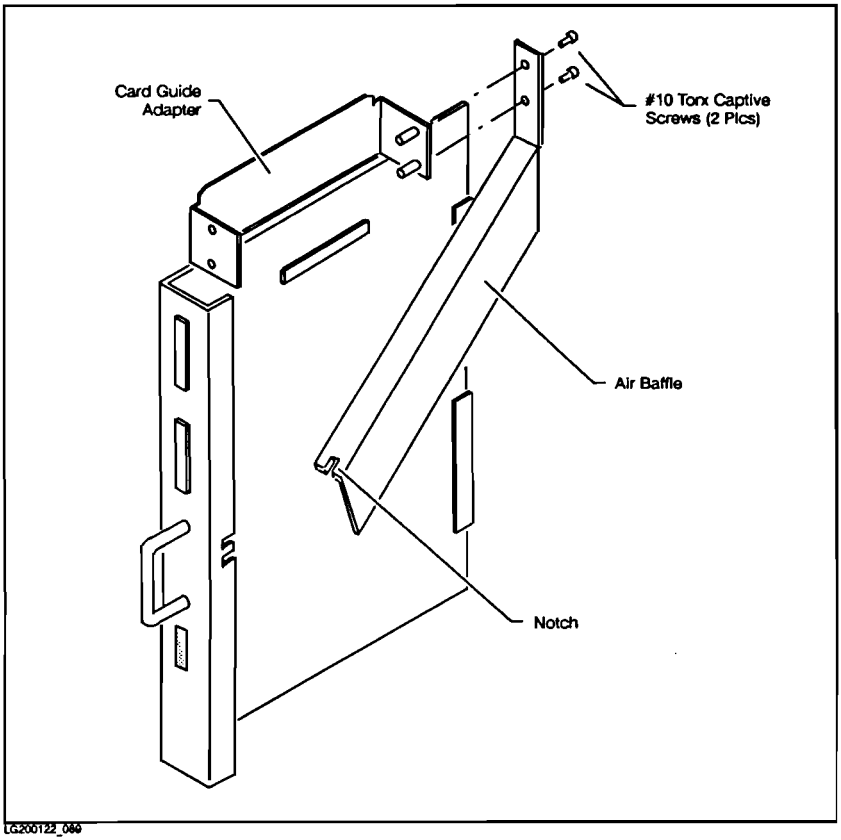


Figure 8-28. Air Baffle Removal

Remove Card Guide Adapter

1. Remove two captive TORX screws from the card guide adapter (see Figure 8-29).
2. Remove the card guide adapter from the Processor PCA.
3. Only discard the card guide adapter when installing a Processor PCA upgrade. Keep the card guide adapter when installing another Series 920 Processor PCA. Series 920 processor exchange assemblies do not ship with an air baffle or card guide adapter.
4. Go to the Processor PCA Return Procedure section.

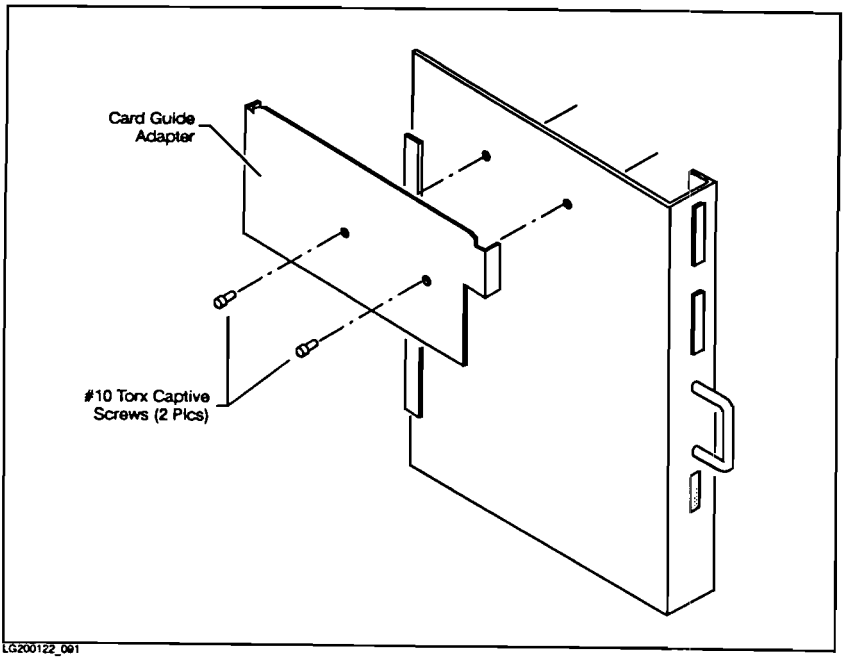


Figure 8-29. Card Guide Adapter Removal

Console Support Panel Removal

1. Unscrew the four TORX screws which fasten the console support panel to the chassis (see Figure 8-30).
2. Pull the panel forward and disconnect the two ribbon cables attached to the back.
3. Remove the panel assembly and set it aside.

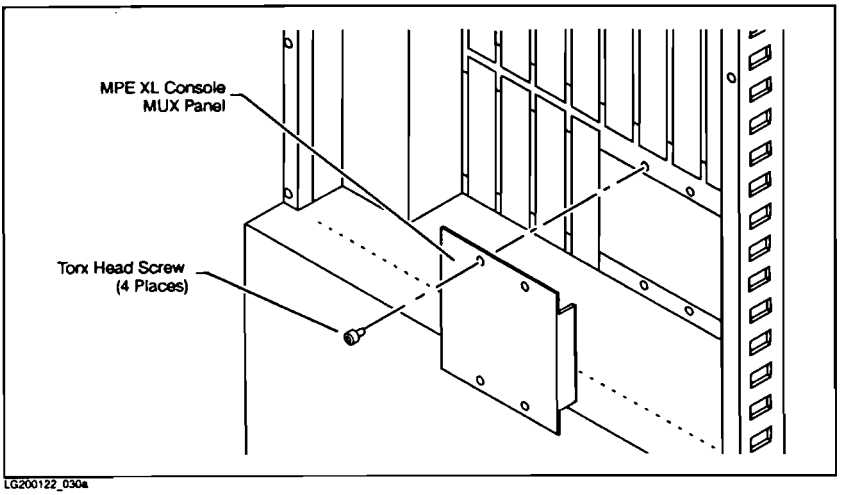


Figure 8-30. Console Support Panel Removal

HP-IB Connector Panel Removal

1. Remove the panel by unscrewing the five TORX screws (see Figure 8-31).
2. If Disks 2 and 3 are installed, lean the panel forward and remove them.
3. Once the all disks are removed, the HP-IB connector panel and attached ribbon cables can be removed from the cabinet.

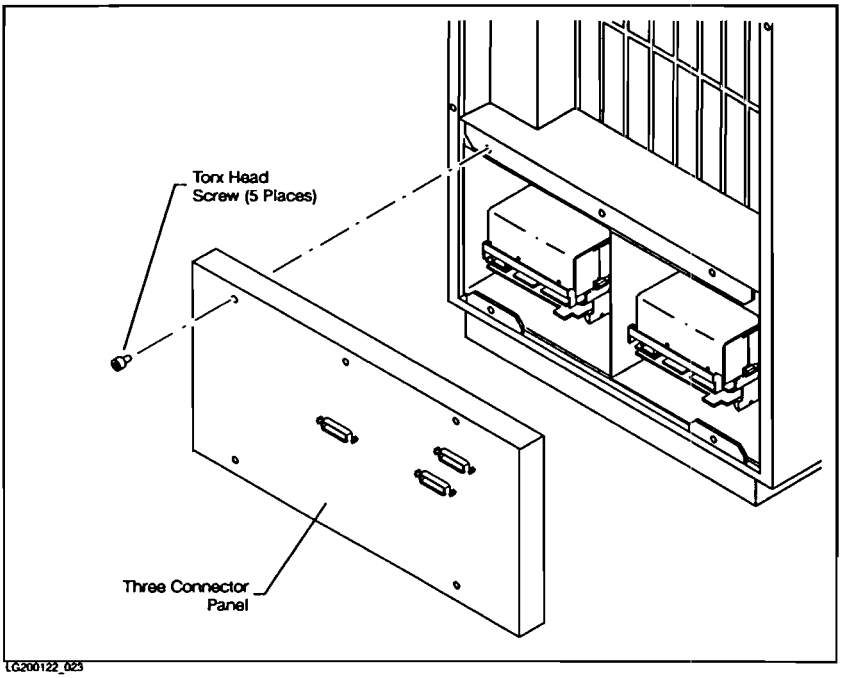


Figure 8-31. HP-IB Panel Removal

Backplane Removal

1. Disconnect any connectors that are attached to the front of the backplane (see Figure 8-32).
2. Disconnect any connectors that are attached to the rear of the backplane (see Figure 8-33).
3. Remove the two TORX head screws which fasten the backplane assembly to the chassis (see Figure 8-34).
4. Grasp the extraction handle and slowly pull the backplane assembly up. Do not force this assembly. If the backplane does not come out easily, then either a cable connector or PCA is still attached.

Caution Take care not to bend the power connector pins at the bottom of the backplane.

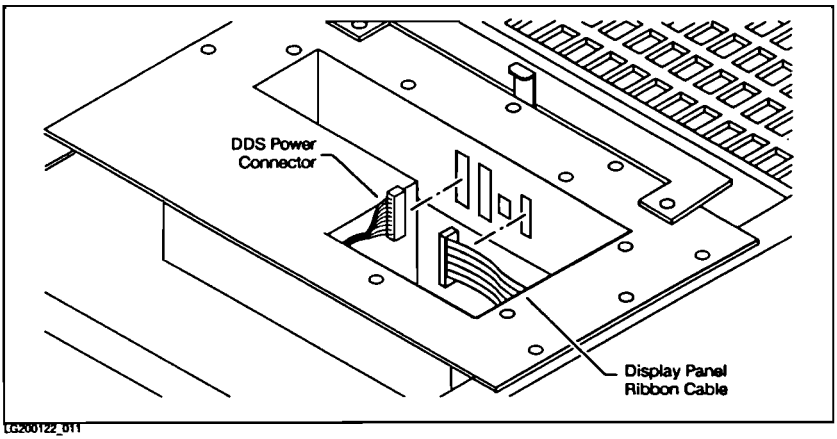


Figure 8-32. Backplane Cable Connectors (Front View)

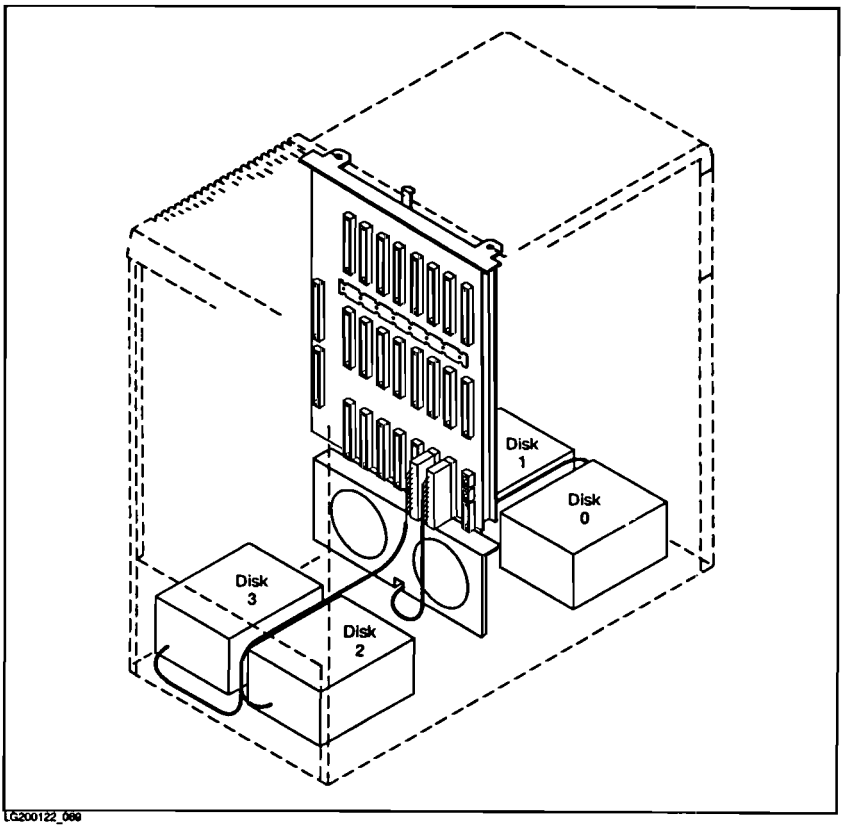


Figure 8-33. Backplane Cable Connectors (Rear View)

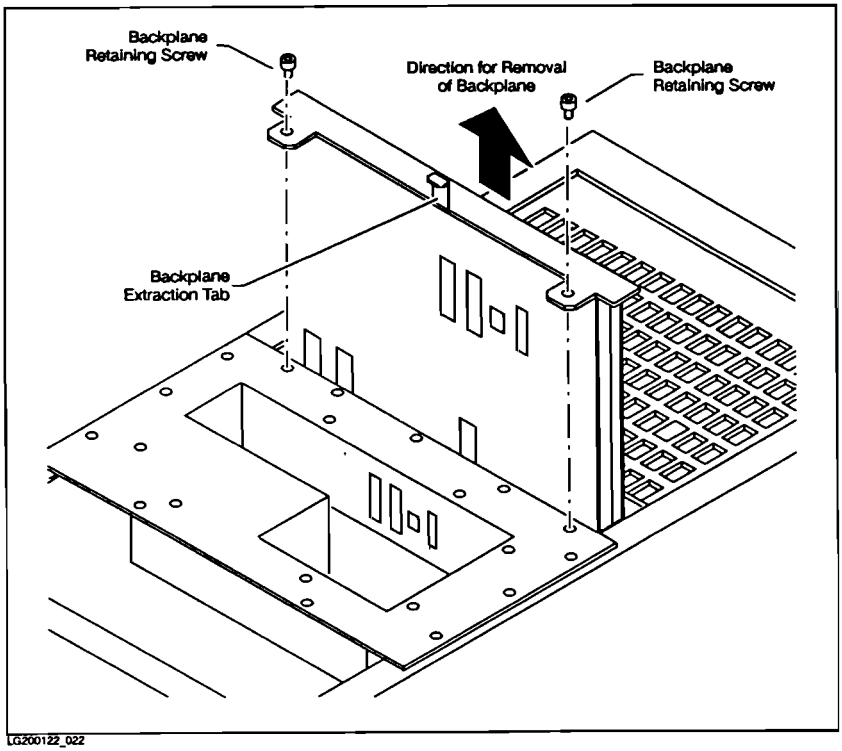


Figure 8-34. Backplane Removal

Internal AC Power Cable Replacement

1. Slide the ac line cable through the chassis center rail until lug on short green/yellow ground wire aligns with the threaded hole on the chassis bottom (see Figure 8-35). Tape the wire ends together if you have difficulty threading them through the chassis center rail.
2. Place the M5 starlock washer (p/n 2190-0012) over the M5 screw (p/n 0515-1510) and screw the ground lug half way down into the center M5 hole.
3. Attach the ac receptacle to the chassis using two M3 flat head screws (p/n 0515-0914).
4. Finish tightening the ground lug to the chassis, rotating the wire if necessary to clear the ac shield.
5. Install the ac shield with two M5 screws as shown.

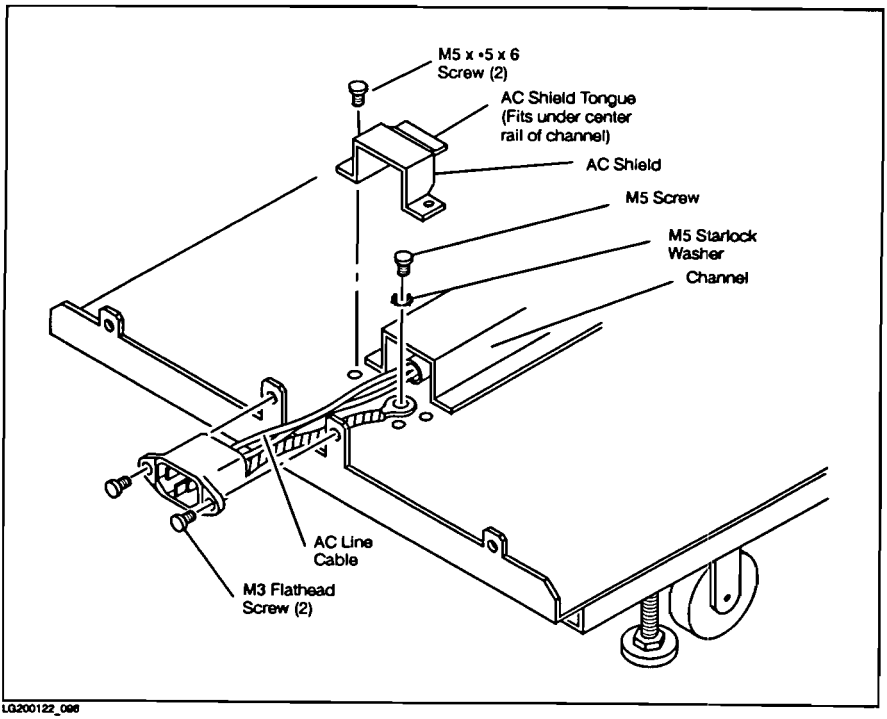
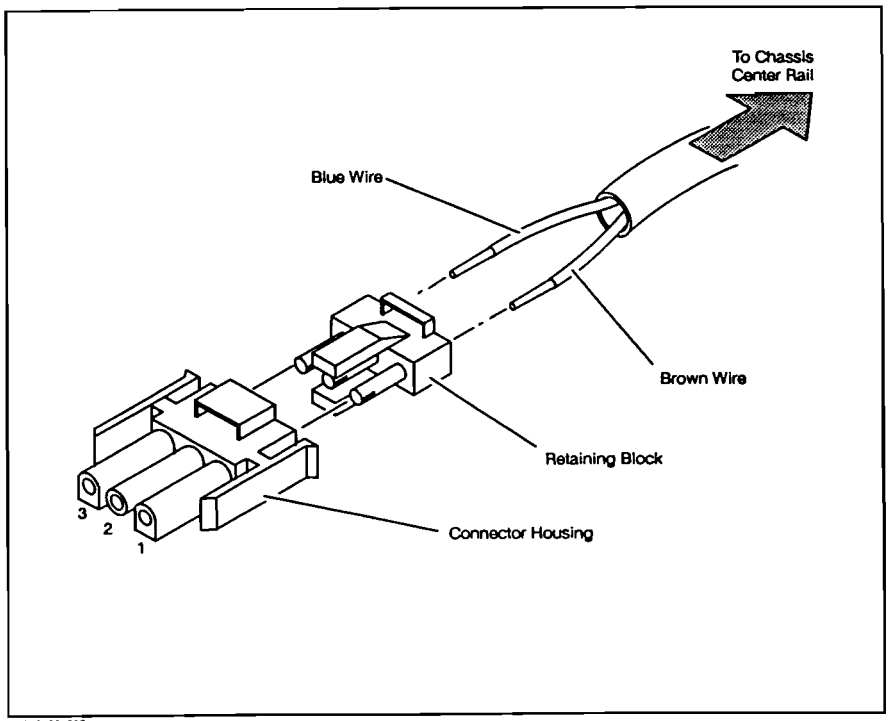


Figure 8-35. AC Line Cable Replacement

6. On the power supply end of the internal ac power cable, snap the retaining block half way into the connector housing as keyed (see Figure 8-36).
7. Insert the blue wire into position 3 of the retaining block. Insert the brown wire into position 1. Use caution to orient the wires correctly. Make sure both wires are fully seated.
8. Completely snap the connector pieces together.
9. Plug the internal ac line cable into the power supply module connector as shown in Figure 8-37. The connector is keyed for proper orientation. The brown wire must be on top.



LG200122_095

Figure 8-36. Internal AC Power Connector Replacement

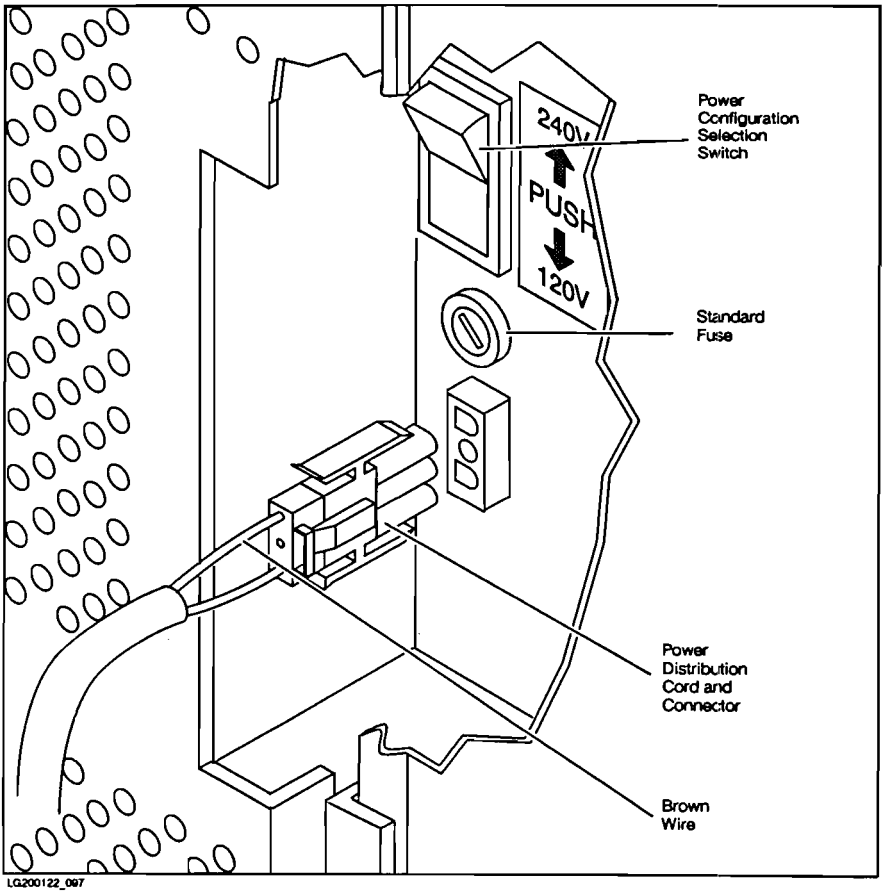


Figure 8-37. Power Supply Module

Replacement

Replacement procedures are performed in the reverse order of the removal procedures. Refer to the appropriate removal procedure for replacement instructions.

Diagrams

This section provides diagrams to aid the CE in troubleshooting the HP 3000 Series 920 Family and HP 9000 Model 822S Family computer systems.

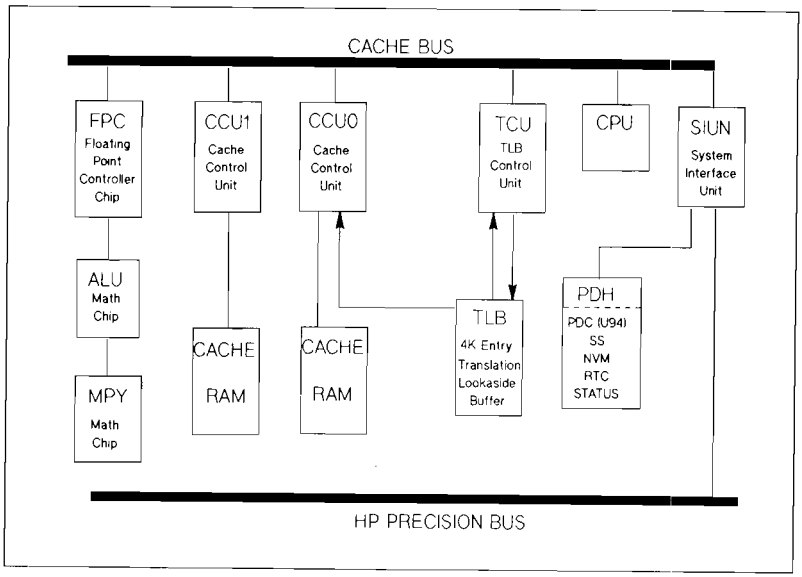


Figure 9-1. CPU Block Diagram

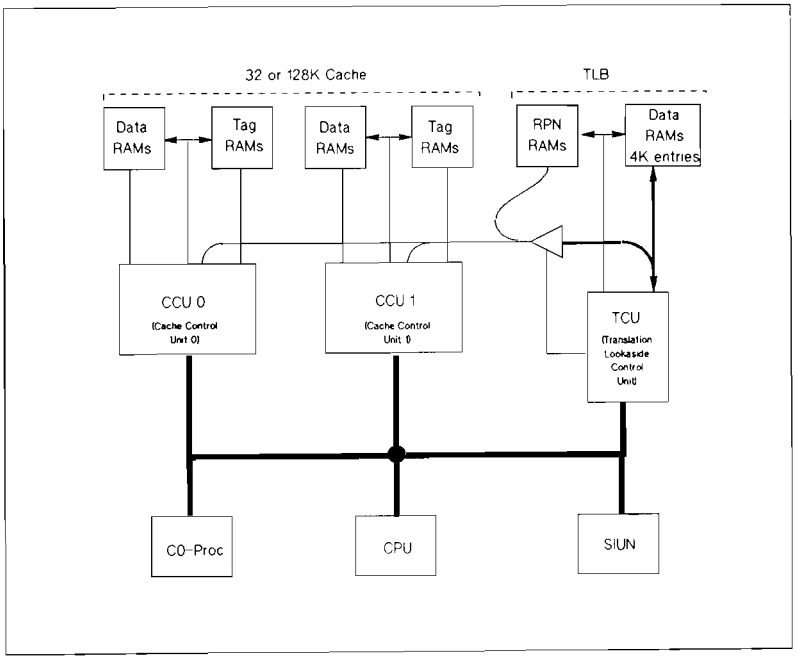


Figure 9-2. Cache Block diagram

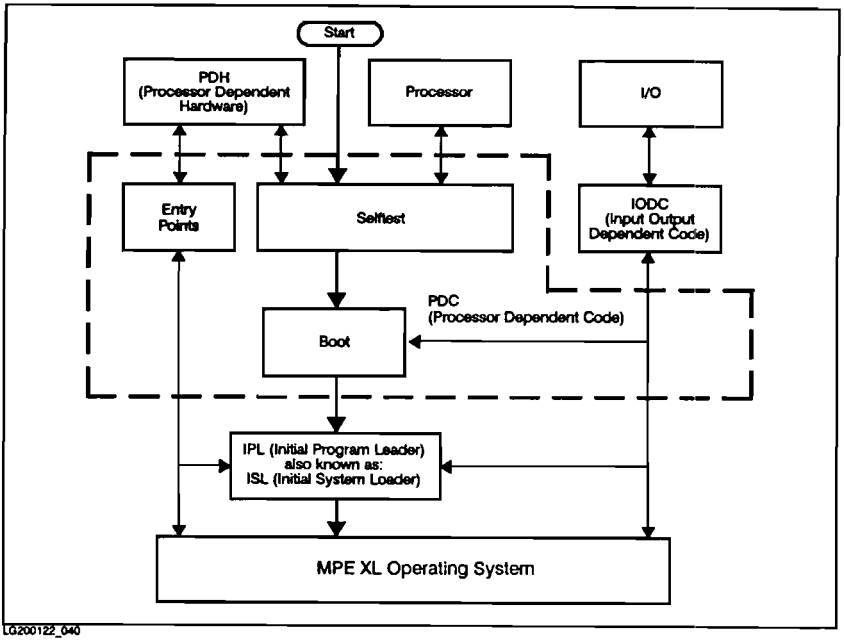


Figure 9-3. Processor Dependent Code and Interface

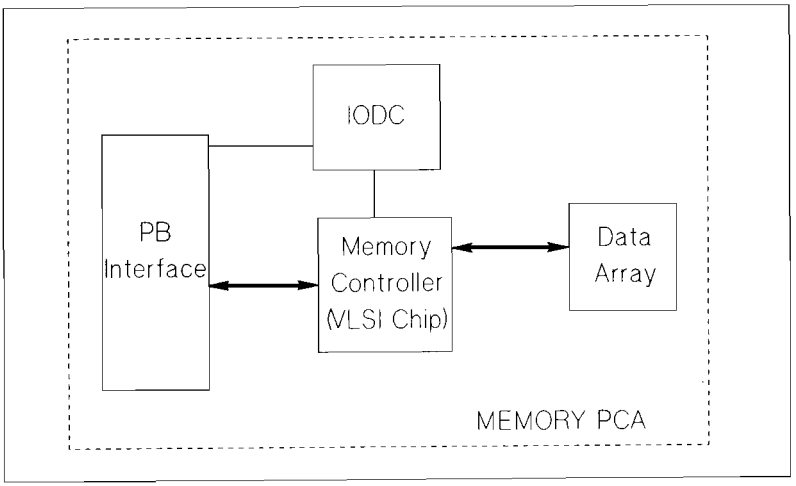


Figure 9-4. Memory Subsystem Block Diagram

10

Reference

This section contains a list of HP system acronyms to aid the Customer Engineer (CE) in recognizing the terminology used when correcting or solving an SPU problem in HP 3000 Series 920 Family and HP 9000 Model 822S Family computer systems.

HP System Acronyms

Table 10-1. HP System Acronyms

Acronym	Description
AP	Access Port
ACD	Architecture Control Document
ADP	Access Data Port
CA	Channel Adapter
CCU	Cache Control Unit
CIO	Channel I/O
CPU	Central Processor Unit
DA	Device Adapter
DIO	Direct I/O
DMA	Direct Memory Access
DUI	Diagnostic User Interface
ECC	Error Correction Circuitry
ECL	Emitter Coupled Logic
FRU	Field Replaceable Unit
HP-CS	Hewlett-Packard Common SCSI
HP-IB	Hewlett-Packard Interface Bus
HPMC	High Priority Machine Check
HP-PA	Hewlett-Packard Precision Architecture
HP-PB	Hewlett-Packard Precision Bus

Acronym	Description
HP-UX	Hewlett-Packard UNIX
IB	Internal Bias
IC	Integrated Circuit
I/O	Input/Output
IODC	I/O Dependent Code
IPL	Initial Program Loader
ISL	Initial System Loader
LANIC	Local Area Network Interface Controller
LED	Light Emitting Diode
LPMC	Low Priority Machine Check
LRU	Least Recently Used
LUT	Look Up Table
MAU	Media Attachment Unit
MIU	Math Interface Unit
MUX	Multiplexer
NMOS	N-channel enhancement Metal-Oxide Semicouductor
NS	Network Services

Table 10-1. HP System Acronyms (continued)

Acronym	Description
OS	Operating System
PDC	Processor Dependent Code
PDH	Processor Dependent Hardware
PFR	Powerfail Recovery
PON	Power On
RAM	Random Access Memory
RISC	Reduced Instruction Set Computer
ROM	Read Only Memory
RS-232C	Standard for Serial Communication Interface
RSI	Remote Support Interface
RTC	Real Time Clock
SCSI	Small Computer Systems Interface
SIU	System Interface Unit
SPU	System Processor Unit
TC	Transfer of Control
TCU	Translation lookaside Control Unit
TLB	Translation Lookaside Buffer
TOC	Transfer of Control
TTL	Transistor/Transistor Logic
VLSI	Very Large Scale Integration

11

Service Notes

Notes

Notes

Notes

Notes

Notes

12

Interface and Networking Cards

This chapter provides information about the interface and networking cards available for the system, including:

- Specifications
- Configuration
- Troubleshooting
- Field Replaceable Units

HP-IB Device Adapters

The *HP 28650A HP-PB Device Adapter* is supported on HP 9000 Model 822S Family computers. The *HP 27113A CIO HP-IB Device Adapter* is supported on HP 3000 Series 920 Family computers.

Specifications

The HP 28650A HP-IB Device Adapter is a medium speed data transfer device. It can be used on all HP computers that have a precision bus. Specifications are listed in Table 12-1.

Table 12-1. HP-PB HP-IB Device Adapter Specifications

Description	Specification
Electrical Requirement	Less than 2A at 5V dc; no 12V dc requirement
Slow/Medium Bus Speed	Up to 500 Kbytes per second
High Bus Speed	Up to 750 Kbytes per second

Configuration

Card Configurations and Switch Settings

The HP-PB HP-IB card is shown in Figure 12-1. This card has no manual switches and comes preloaded with seven resistive loads for high speed operation. Figure 12-1 identifies additional resistor packs.

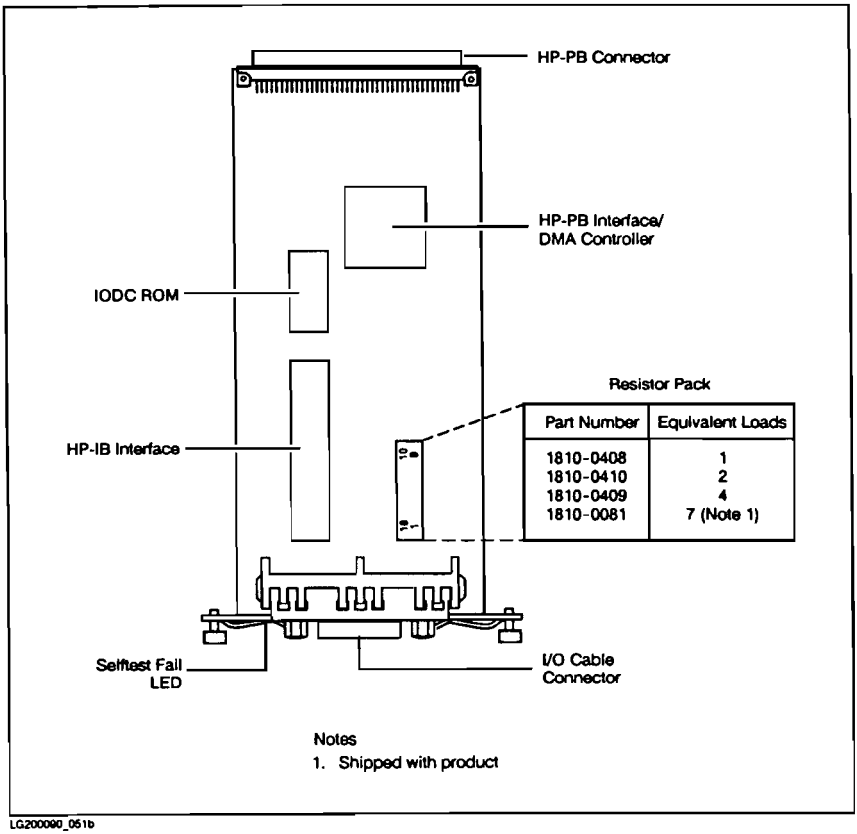


Figure 12-1. HP-PB HP-IB Device Adapter Card

The CIO HP-IB card has onboard configuration (address) switches. These address switches are not used by the SPU; the address and priority of the HP-IB are set by the CIO slot position. Each HP-IB card contains eight switches in a DIP package (see Table 12-2).

Table 12-2. CIO HP-IB Device Adapter Switch Settings

Switch	Function	Settings
S8	No Listener Detection	Down - Disabled
S7	Data Settling Time Selection	UP - Medium/slow speed DOWN - High speed
S6	System Controller Selection	UP - System controller DOWN - Not system controller
S1-S5	HP-1B Address Selection (NOT USED)	Doesn't matter

Recommended Switch Settings:

```
 S1   S2   S3   S4   S5   S6   S7    S8
DOWN  X    X    X    X   UP  DOWN  DOWN

      X = either setting ok
     UP = relative to component side
```

Note Ensure the resistor pack on the CIO HP-IB is installed at location U123 (HP part number 1810-0081).

HP-IB Cabling

The HP-IB Device Adapter is used to connect embedded and external HP-IB peripherals to the system. The cable connects to the device adapter and is routed out the rear of the cabinet to the appropriate connector on the HP-IB 3-connector panel. See Figure 12-2 and Figure 12-3.

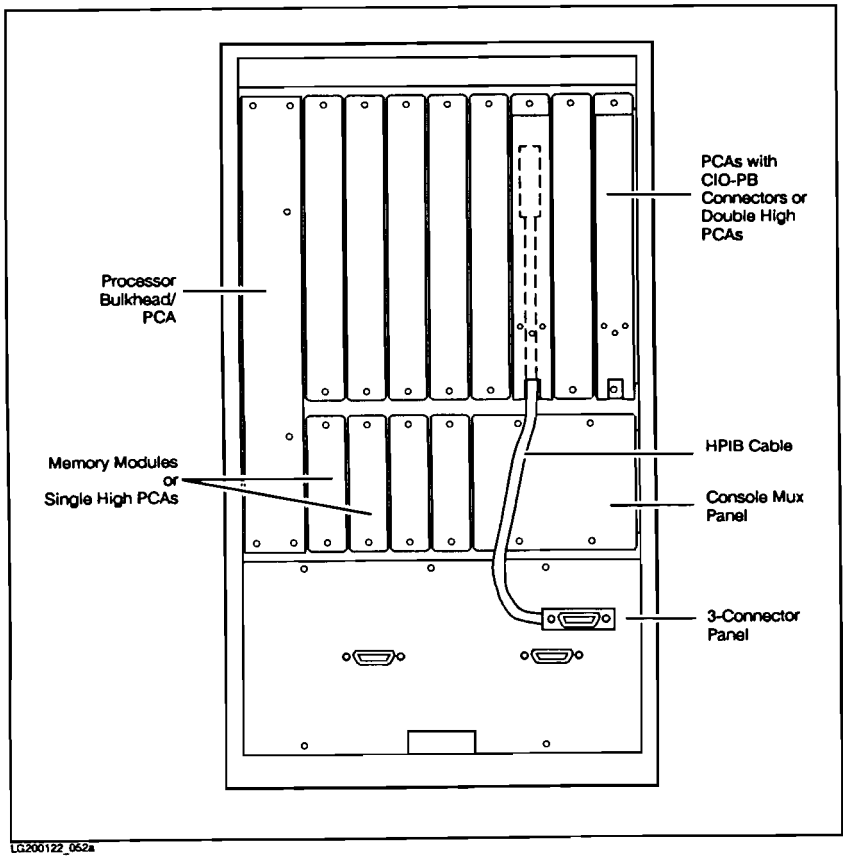


Figure 12-2. HP 3000 3-Connector Panel Cabling Example

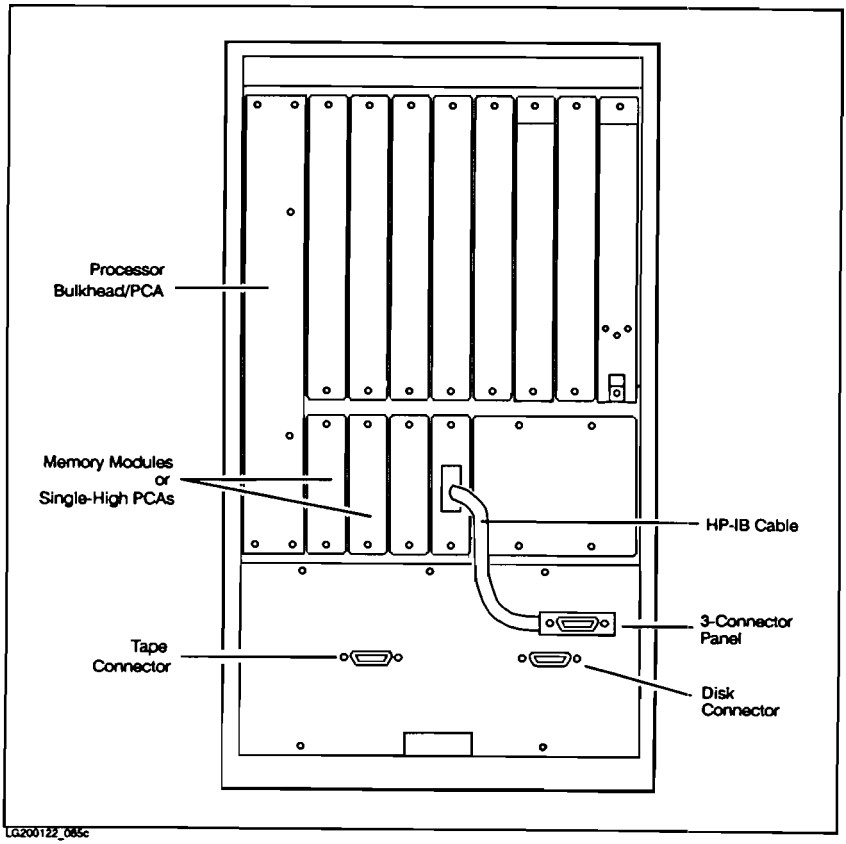


Figure 12-3. HP 9000 3-Connector Panel Cabling Example

HP-IB Configuration Examples

Three configuration examples are given in the following pages.

Four Embedded Disks and One Embedded Tape

The internal cable lengths differ between disk pairs (Disks 0, 1 and Disks 2, 3). Figure 12-4 shows each pair of disks connected to an HP-IB Device Adapter. The disks are connected in a star configuration.

In this example, the embedded tape is connected to a third device adapter. In some models, the embedded tape and the embedded disk drives can be connected to the same HP-IB Device Adapter by connecting the HP-IB cable between the connectors labeled **EXTERNAL DEVICES** and **DISK 0,1**.

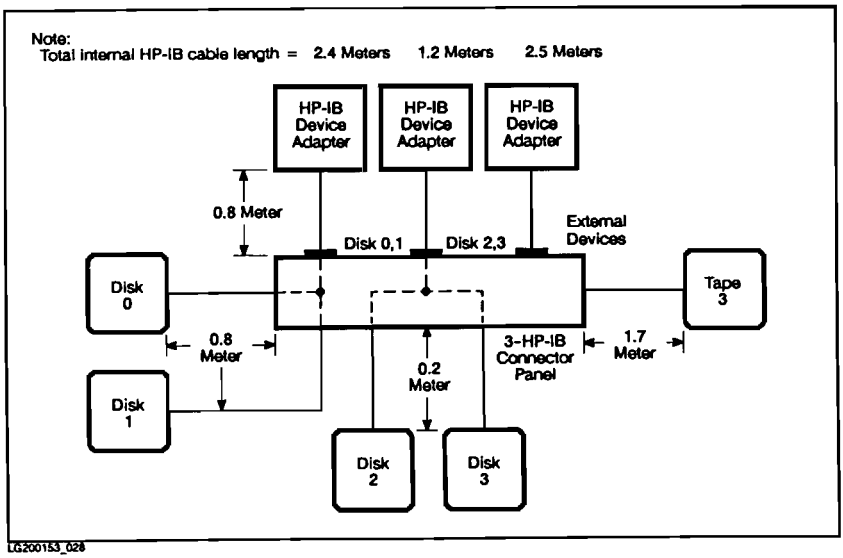


Figure 12-4. Embedded Peripheral Cabling

Four Embedded Disks

Figure 12-5 shows all four disks connected to one HP-IB Device Adapter. A jumper between J06 and J07 on the inside of the HP-IB 3-Connector panel is used for this purpose.

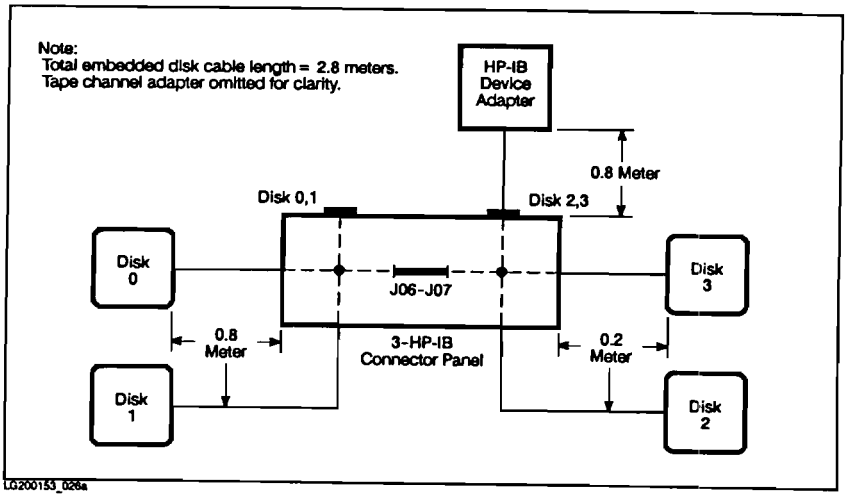


Figure 12-5. Four Embedded Disk Cable Configuration

Adding External Peripherals

To determine the length of a configuration, all internal and external cable lengths must be included in the calculations. Figure 12-6 shows two HP 7937A disk drives added to the system.

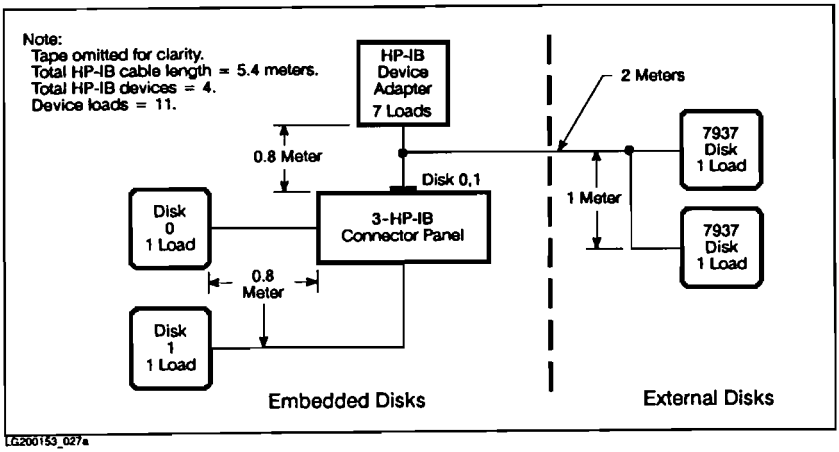


Figure 12-6. Embedded and External Disk Drive Configuration

HP-IB Configuration Rules

General Guidelines

- HP-IB switch boxes are not supported.
- Use a daisy chain configuration for all devices.
- All devices must have a unique address between 0 and 7.
- All cable connections should occur at the device, that is, no cables should be connected together simply to extend the effective length of the cable.
- All cables should be attached to a device at both ends.
- All devices must be connected to a common (single point) system reference ground. The system ground must be isolated from other electrical devices such as copy machines, arc welders, and air conditioners.
- Power on all devices and make sure they complete their self-tests before powering on the SPU.
- Keep all devices powered on during and after system boot-up.
- Mixing disks on the same device adapter with printers and tape drives is not recommended for performance reasons.
- (*HP 3000 CIO HP-IB only*) A mixture of disks, tapes, and printers may be attached to an HP-IB Device Adapter as long as the firmware date code is 2912 or greater.

Load Factors

Two load factors must be considered when calculating the cabling parameters of the HP-IB:

1. **Internal Load Factor.** The internal load factor of the Device adapter is seven loads.
2. **External Load Factor.** The external load factor of the peripherals is dependent upon the individual peripherals and interconnect cables. (Refer to *HP 3000 Computer Systems Configuration Guide*, HP part number 5954-9354, Appendix 1 for peripheral load values.) A basic rule for determining load values is one electrical load is equivalent to one meter length of HP-IB cable.

HP-IB Cable Length

The maximum total length of HP-IB cable that can be connected to a device adapter is 15 meters. When embedded and external peripherals are being used in the system, the HP-IB cables lengths for both must be calculated together. When testing a configuration, use the following rules:

1. No more than six HP-IB devices per HP-IB Device Adapter.
2. Maximum of 15 device loads (internal + external).
3. Maximum HP-IB cable length must not exceed one meter per device load (maximum = 15 meters).

Field Replaceable Units

Table 12-3 lists HP part numbers for the HP-IB card.

Table 12-3. Replaceable HP-IB Assemblies

HP Part Number Non-Exchange (new)	HP Part Number Exchange	Description
28650-60001	28650-69001	HP-PB HP-IB adapter card
27113-60301	5062-3303	CIO HP-IB adapter card

SCSI Device Adapters

The *HP 28655A HP-PB SCSI/Parallel Adapter* is a dual port interface card supported on HP 9000 Series 600/800 computers that use the HP-PB backplane (available for HP-UX 8.0 and later). One port provides a connection to a high-speed Small Computer System Interface (SCSI) bus. The other port provides a standard HP parallel connection to common, output-only devices.

The *HP 27251A CIO SCSI Host Adapter* (HA) is an interface card supported on HP 3000 Series 900 computers that use the CIO backplane (available for MPE XL 3.0 and later). The SCSI HA provides a connection to a SCSI bus.

Note The HP 25251A CIO SCSI HA includes a 2.0 meter cable. When ordering this card for Series 920 Family systems, you must also order option 003, which is the CIO/HP-PB Connector PCA.

Specifications

Technical specifications are listed in Table 12-4 and Table 12-5.

Table 12-4. HP-PB SCSI/Parallel Adapter Specifications

Description	Specification
Bulkhead Connectors	One 25-pin female subminiature D connector for parallel connection
	One 50-pin shielded female, high-density SCSI connector
Typical Current:	
+5Vdc	0.75 Amps
+12Vdc	0 Amps
-12Vdc	0 Amps
Typical Power Consumption	3.75 Watts
SCSI Burst Transfer Rate, Synchronous	5.0 Mbytes per second (supported maximum)
SCSI Burst Transfer Rate, Asynchronous	3.0 Mbytes per second (supported maximum)
Parallel Burst Transfer Rate, Asynchronous	330 Kbytes per second (supported maximum)
SCSI Transfer Mode	Initiator only
Data Bus Width	8 bits
On-board SCSI Bus Length	0.1 meter

Table 12-5. CIO SCSI Host Adapter Specifications

Description	Specification
SCSI Bus Connector	50-pin male, SCSI alternative 2
Backplane Voltage:	
+5V dc	2.6A (typical) 3.5A (2 Sigma)
+12V dc	0.004A (typical) 0.0041A (2 Sigma)
-12V dc	0.004A (typical) 0.0041A (2 Sigma)
Power Consumption:	
+5V dc	13.0W (typical) 17.43W (2 Sigma)
+12V dc	0.043W (typical) 0.05W (2 Sigma)
-12V dc	0.043W (typical) 0.05W (2 Sigma)
SCSI Module Transfer Rate, Synchronous	5.0 Mbytes maximum
SCSI Module Transfer Rate, Asynchronous	1.5 Mbytes maximum
Transfer Mode	Initiator only
SCSI Bus Connection:	
Signal Type	Single-ended
Data Bus Width	8 bits
Maximum Cable Length (total of both external and internal cables)	6 meters
SCSI Host Adapter Cable Length	2 meters

Configuration

SCSI device adapters contain a dual in-line package (DIP) switch pack for setting the parity-checking capability of the card and the SCSI bus address. They also contain resistor packs for terminating one end of the SCSI bus. See Figure 12-7 and Figure 12-8.

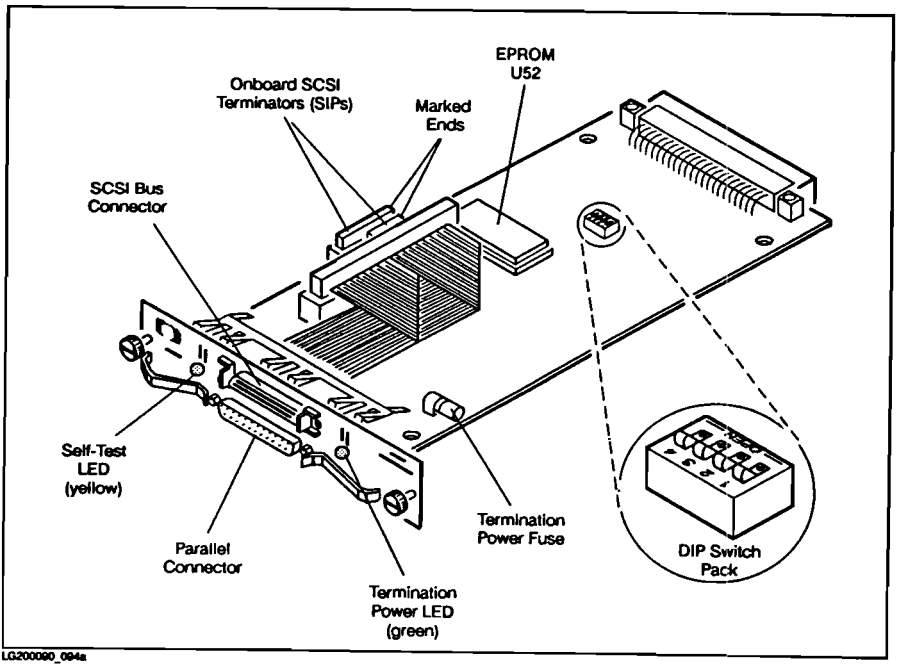
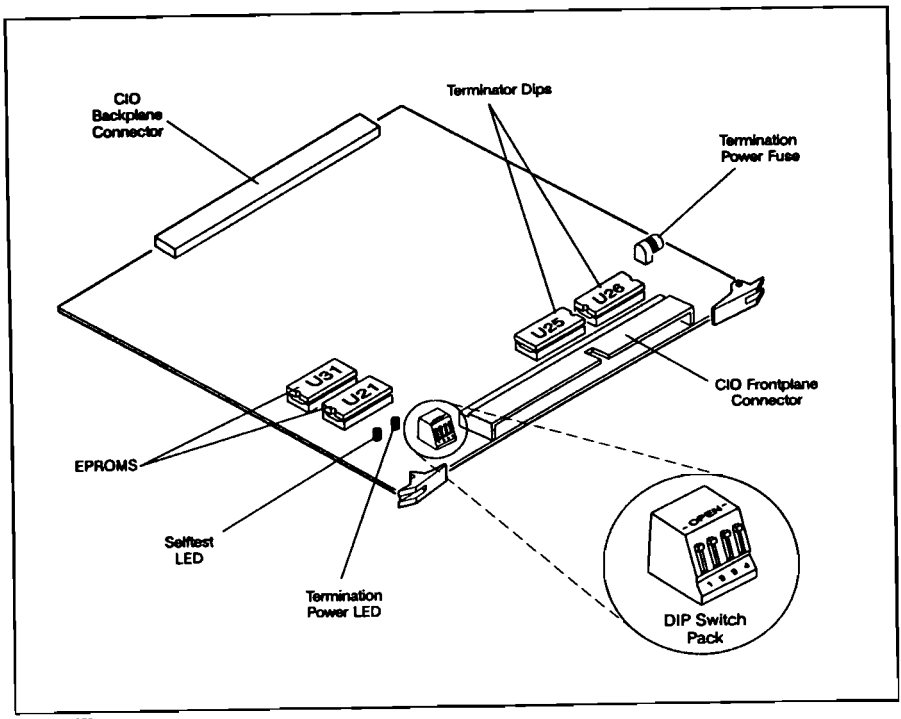


Figure 12-7. HP-PB SCSI/Parallel Adapter Card

Note All switches in the DIP Switch Pack are factory set to open. This sets the SCSI address to 7 and enables parity-checking.



LG200051_052

Figure 12-8. CIO SCSI Host Adapter Card

Note All switches in the DIP Switch Pack are factory set to open. This sets the SCSI address to 7 and enables parity-checking.

SCSI Configuration Guidelines

Configuration guidelines—except the parallel port on the HP-PB SCSI/Parallel Adapter—are grouped under the following categories:

- HP-UX 8.0 Limitations
- MPE XL 3.0 Limitations
- IODC Requirement
- Peripheral Configurations
- Cabling
- Installation and Operation
- Terminators and Termination Power
- Addressing and Parity

Note The HP-PB SCSI is only available on Model 822S Family systems running HP-UX 8.0 and later, and the CIO SCSI is only available on Series 920 Family systems running MPE XL 3.0 and later.

HP-UX 8.0 Limitations

- Use of third party peripherals is at the user's risk. Third party peripherals are not supported by HP's standard support process.
- HP-UX Release 8.0 of SCSI does not support system powerfail recovery. System powerfail recovery is automatically disabled when a SCSI peripheral is connected to a Series 800 system. System powerfail recovery is planned for a future release of HP-UX. Customers requiring powerfail recovery should consider delaying their purchase of SCSI devices until the availability of system powerfail recovery.

MPE XL 3.0 Limitations

- MPE XL 3.0 only supports the HP Series 6300 Model 20GB/A Optical Disk Library System (Product Number C1700A, options 1AB and 1AC).
- MPE XL 3.0 has no system boot capabilities.

Peripheral Configurations

- **(HP-UX Systems Only)** Up to 7 SCSI peripherals can be connected to each SCSI host adapter. Seven disks have been tested on a single host adapter without a performance penalty.
- **(HP-UX Systems Only)** The C1700A HP Series 6300 Model 20GB/A Optical Disk Library System counts as two disk drives. If two C1700As are racked on the same cabinet, they count as two systems and four disk drives and require six device addresses.
- **(HP-UX Systems Only)** Total disk drive support is limited to 32 devices.
- **(HP-UX Systems Only)** SCSI peripherals—disks and tapes—can be mixed and matched in any combination on the same SCSI bus as long as the total number of SCSI addresses does not exceed seven.
- **(MPE XL Systems Only)** Only one C1700A Series 6300 Model 20GB/A Optical Disk Library System can be supported on each SCSI host adapter. The maximum cable length is 6 meters, including internal cables. Only three C1700A systems are supported on each SPU.

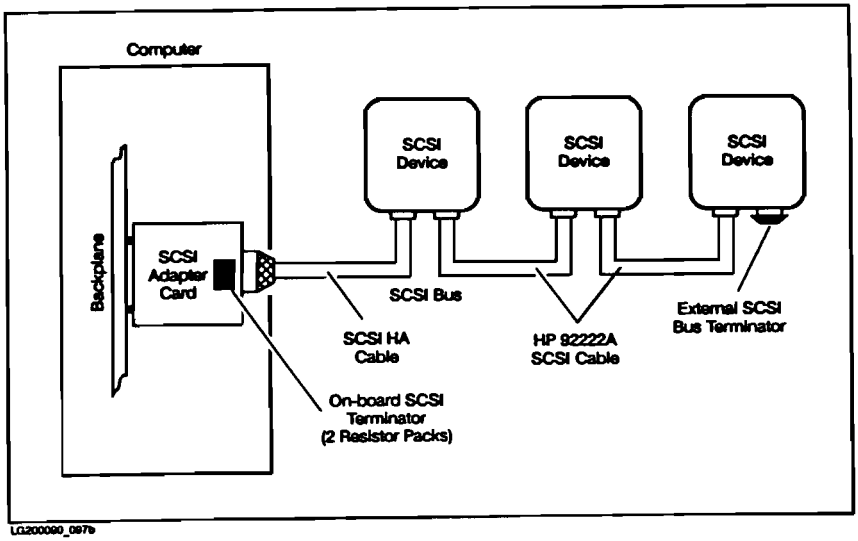


Figure 12-9. Typical SCSI Daisy Chain Configuration

Cabling

- SCSI devices should be installed in a daisy-chain configuration, as shown in Figure 12-9. The total cable length of the bus (including external and internal cables) cannot exceed 6 meters. (See Table 12-7 for internal cable lengths.)
- Keep the SCSI bus length as short as possible, but do not use device-to-device cables shorter than 0.5 meters. (HP-CS recommends no shorter than 0.3 meters.)
- Make sure that all cables are attached to a device at both ends.
- Use only HP cables, because SCSI cable impedance and construction can have a significant effect on signal quality.

Installation and Operation

- Observe anti-static precautions when installing or removing the SCSI card.
- All devices must be connected to a common (single point) system reference ground. The system ground must be isolated from other electrical devices such as copy machines, arc welders, and air conditioners.
- Power on all SCSI peripherals and make sure they have time to complete their self-tests before powering on the SPU.

Note Some devices require termination power to pass the self-test. These devices may fail self-test if they are powered on before the host is powered on. If this occurs, the system will still boot up successfully and clear the error on the device.

- Power on all SCSI peripherals that provide termination power first. (See Table 12-7.)
- Keep all devices powered on during and after system boot-up.
- Do not add or remove SCSI devices while the system or any SCSI peripheral providing termination power is powered on.

Caution Power-cycling any SCSI device or breaking any of the SCSI connections while the system is in operation may result in data corruption.

Terminators and Termination Power

- All devices that can supply termination power should do so (see Table 12-7). Also, the first two devices that supply termination power should be located at both ends of the SCSI bus. Other devices supplying termination power can be placed anywhere along the bus.

Caution Only the two ends of a SCSI bus should be terminated. Excessive or improper termination may overload the termination power circuitry on the SCSI port. This may result in blowing the TERMPWR fuse on the adapter, or may damage transceivers on any attached device (including the adapter).

- Terminator resistors must be installed in the host adapter. These terminators provide impedance matching on the bus circuits. Without the terminators, the SCSI bus may fail intermittently.
- Use only *active terminators* like those supplied with the host adapter card. (See Table 12-11 for the HP part number.)
- The last SCSI device in the chain (even if it is the only device) must have a terminator installed on its second connector.

Addressing and Parity

- There are 8 possible SCSI addresses on each SCSI bus. The card uses one address; the remaining 7 addresses can be used by the peripheral devices on the bus. All peripheral devices must have a unique address between 0 and 6. Most peripherals use only one address. Note that the C1700A HP Series 6300 Model 20GB/A Optical Disk Library System requires three SCSI addresses—one for the autochanger and one for each of its two disks.
- (**CIO SCSI HA**) The hardware address of the CIO SCSI host adapter is set in binary by switches 2 (most significant bit), 3, and 4 of the dual in line package (DIP) switch. Note that the binary values are etched on the card. This address must be set to 7, which is the factory default setting. (See Table 12-6 for additional addresses.)
- (**HP-PB SCSI/Parallel Adapter**) The hardware address of the HP-PB SCSI/parallel adapter is set in binary by switches 3 (most significant bit), 2, and 1 of the dual in line package (DIP) switch. This address must be set to 7, which is the factory default setting. (See Table 12-6 for additional addresses.)

Table 12-6. SCSI Address Switch Settings

HP-PB SCSI Switch Positions			SCSI Address	CIO SCSI Switch Positions		
3	2	1		2	3	4
0	0	0	0	0	0	0
0	0	1	1	0	0	1
0	1	0	2	0	1	0
0	1	1	3	0	1	1
1	0	0	4	1	0	0
1	0	1	5	1	0	1
1	1	0	6	1	1	0
1	1	1	7 (default)	1	1	1

Note 1 = ON (open position) 0 = OFF (closed position)

- (**Parity**) Switch 1 on the CIO SCSI HA or Switch 4 on the HP-PB SCSI/Parallel Adapter *activates* (open) or *deactivates* (closed) parity checking. All devices on a SCSI bus must have the same parity-checking capability. If any device added to the SCSI bus does not generate parity, then all devices on the bus, including the adapter, must be configured to disable parity checking. Currently, all supported devices offer parity checking (see Table 12-7).

HP-PB SCSI Switch 4	Parity Checking	CIO SCSI Switch 1
1	Enable	1
0	Disable	0

Note 1 = open 0 = closed

- SCSI contains an additional addressing layer known as *lun* (logical unit number). Lun is purely a SCSI term, not related to logical units in the Series 800 I/O system. For HP-UX 8.0, all luns are zero.

Table 12-7.
Specifications and Capabilities of SCSI Peripherals (HP-UX 8.0 Only)

Product	Description	Internal Cable Length	Boot	System Disk	Install/ Update	Parity	Term Power
C2212A	332 MB Disk	1.5 meters	yes	yes	no	yes	no
opt 001	332 MB Disk		yes	yes	no	yes	no
opt 003	1.3 GB DAT		yes	no	yes	yes	no
opt 004	CD ROM		yes	no	yes	yes	no
opt 005	Optical Disk		yes	yes	no	yes	no
opt 024	2 CD ROM		yes	no	yes	yes	no
C2213A	664 MB Disk	1.5 meters	yes	yes	no	yes	no
opt 001	332 MB Disk		yes	yes	no	yes	no
opt 002	664 MB Disk		yes	yes	no	yes	no
opt 003	1.3 GB DAT		yes	no	yes	yes	no
opt 004	CD ROM		yes	no	yes	yes	no
opt 005	Optical Disk		yes	yes	no	yes	no
opt 024	2 CD ROM		yes	no	yes	yes	no
7980S	1/2 inch Tape	0.0 meters	yes	no	yes	yes	yes
C1701A	Optical Disk	0.1 meters	yes	yes[1]	no	yes	yes[2]
C1700A	Optical Disk Library	0.9 meters	no	no	no	yes	yes[2]
C1512A	1.3 GB DAT	0.4 meters	yes	no	yes	yes	yes
28655A	HP-PB SCSI/Parallel Adapter	0.1 meters (Also includes a 1 meter cable)[3]					
27251A	CIO SCSI HA	0.0 meters (Also includes a 2 meter cable)[3]					
92222A	Cable	0.5 meters (male to male)					
92222B	Cable	1.0 meters (male to male)					
92222C	Cable	2.0 meters (male to male)					
92222D	Extender Cable	1.0 meters (female to male)					

Note

[1]Can be used as a system disk, but not recommended because it has slower throughput than a Winchester disk drive. The best use for optical devices is for online backup or large data archival. If the optical disk is used as the system disk, the cartridge tape installed on it must have a 1024 byte sector size (the standard HP cartridge tape). A cartridge tape with a 512 byte sector size will not work.

[2] Optical disk library systems and optical disks with serial number prefixes 3045 and below do not provide termination power.

[3]Only external SCSI peripherals are supported on HP-UX 8.0.

Parallel Port Configuration Guidelines

Configuration guidelines for the parallel port on the HP-PB SCSI/Parallel Adapter are as indicated:

- Only uni-directional parallel devices such as printers are supported by this port.
- Only one parallel device can be attached to each SCSI/parallel adapter.
- The maximum supported cable length is 2 meters.

Caution Do not connect RS-232 compatible cables to the parallel port. Failure to comply may damage the card.

Parallel Port Signal Pin Assignments

The signal pin assignments for the parallel port are listed in Table 12-8.

Table 12-8. Parallel Port Signal Pin Assignments

Pin Number	Signal Name	In/Out	Pin Number	Signal Name	In/Out
1	nStrobe	Out	14	nAutoFd	Out
2	Data1	Out	15	nFault	In
3	Data2	Out	16	nReset	Out
4	Data3	Out	17	nSelectIn	Out
5	Data4	Out	18	Ground	
6	Data5	Out	19	Ground	
7	Data6	Out	20	Ground	
8	Data7	Out	21	Ground	
9	Data8	Out	22	Ground	
10	nAck	In	23	no connect	
11	Busy	In	24	Ground	
12	PError	In	25	Ground	
13	Select	In			

Parallel Cable Wiring Diagram

Figure 12-10 shows the parallel port cable and wiring diagram.

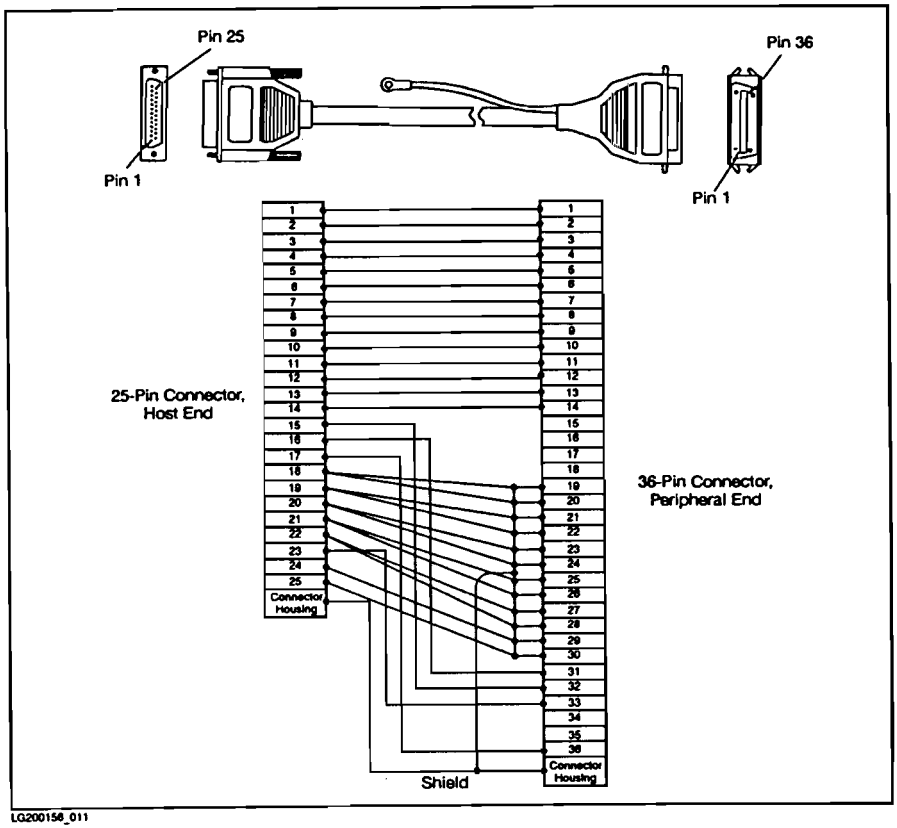


Figure 12-10. Parallel Cable Wiring Diagram

Troubleshooting

The following troubleshooting aids are available:

- Card's Self-Test
- TERMPWR LED
- Online Diagnostics
- Troubleshooting Flowcharts

CIO SCSI Self-Test

The CIO SCSI self-test runs each time the SPU is powered on and may run several times during the boot process. Table 12-9 describes power-on self-test results as displayed by the card's self-test LED.

Table 12-9. SCSI PBA Self-Test Results

LED Display	Condition	Action
Yellow self-test LED on the card goes on for two-to-five seconds and then goes off.	The card has passed self-test. This LED will operate even if the termination power fuse is blown.	The card is functional.
LED remains on.	Self-test has failed.	First check the termination power LED (see Table 12-10). If the fuse is not causing the problem, replace the card. For a more complete verification of the card, run the appropriate online diagnostic—*scsipba* for the HP-PB SCSI/Parallel Adapter or *scsicio* for the CIO SCSI HA.

Note To fully test the SCSI card, use a SCSI loopback hood installed on the end of the SCSI adapter cable. (See Table 12-11 for the HP part number.)

HP-PB SCSI/Parallel Adapter Self-Test

On HP 9000 Series 822 Family Systems, the self-test for the HP-PB SCSI/Parallel Adapter card runs only when the card is in the boot path. If self-test fails, results are returned to the system console. The system disables the card's self-test LED.

TERMPWR LED

Table 12-10 describes how to interpret the termination power LED.

Table 12-10. SCSI Termination Power LED Conditions

LED Display	Condition	Action
Green Termination Power LED is on.	The SCSI card is supplying termination power to the SCSI bus.	The termination power fuse is good. Termination power is available from the SCSI card. No action is required.
Termination Power LED is off.	There may be a problem with the TERMPWR circuitry.	Check and replace the TERMPWR fuse[1].

Note

[1]If another device on the SCSI bus provides termination power, the bus will continue to operate normally.

Before replacing the TERMPWR fuse, identify the reason for the failure. Check for sources of short circuits on the SCSI bus cables and connectors. Check for proper mating of contact pins on the SCSI bus cables. Be sure that power is off on the host computer and peripheral devices when connecting SCSI bus cables to prevent inadvertent shorting.

Online Diagnostics

The online diagnostics *scsipba* and *centpba* are available for use in troubleshooting the HP-PB SCSI/Parallel Adapter. Separate diagnostics allow testing of each functional module on the adapter—SCSI or parallel. HP recommends use of section 1 for troubleshooting a functional module. It provides symptom and action information with messages appropriate for FRU-level troubleshooting. Section 1 also returns card configuration information (such as parity and SCSI bus address settings).

Note that scsipba provides an external loopback test. An external loopback test on the SCSI port requires the use of a loopback hood (see Table 12-11 for the HP part number). If an external loopback test is desired, use section 4, step 43. In this case, you must power off the computer and peripheral devices (assuming the card is not in the boot path) and attach the loopback hood to the peripheral end of the card cable.

The online *scsicio* diagnostic is used for troubleshooting the CIO SCSI HA to the FRU level. HP recommends use of section 1. It provides symptom and action information with messages appropriate for FRU-level troubleshooting. Section 1 also returns card configuration information (such as parity and SCSI bus address settings).

If an external loopback test is desired, use section 4, step 43. An external loopback test requires the use of a loopback hood. In this case, you must power off the computer and peripheral devices (assuming no mounted or boot path devices), disconnect the card cable from the first peripheral, and attach the loopback hood to the end of the SCSI HA cable. If the SCSI bus roll call test in section 1 is successful, an external loopback test is probably not necessary.

To run the online diagnostics, refer to chapter 5.

Troubleshooting Flowcharts

Figure 12-11 provides a flowchart for troubleshooting the HP-PB SCSI/Parallel Adapter.

Figure 12-12 provides a flowchart for troubleshooting a CIO SCSI Host Adapter.

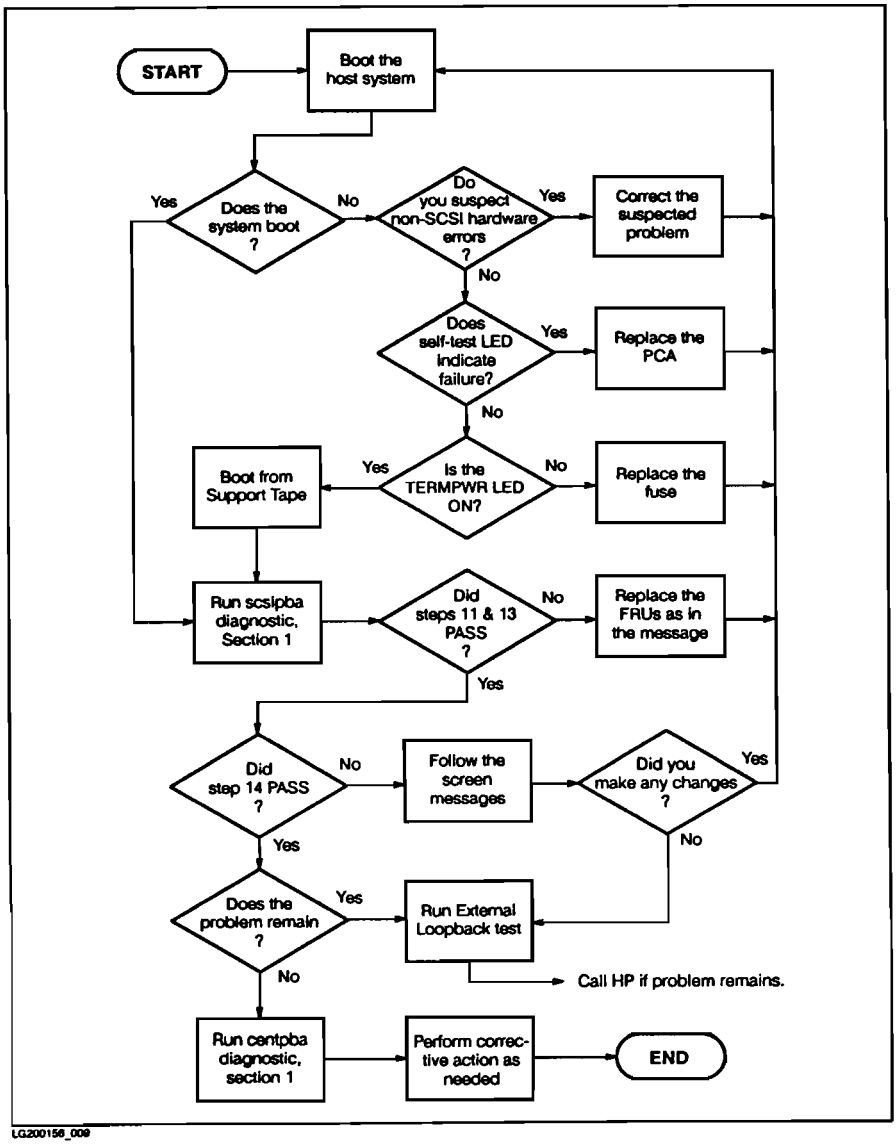


Figure 12-11. HP-PB SCSI/Parallel Adapter Troubleshooting Flowchart

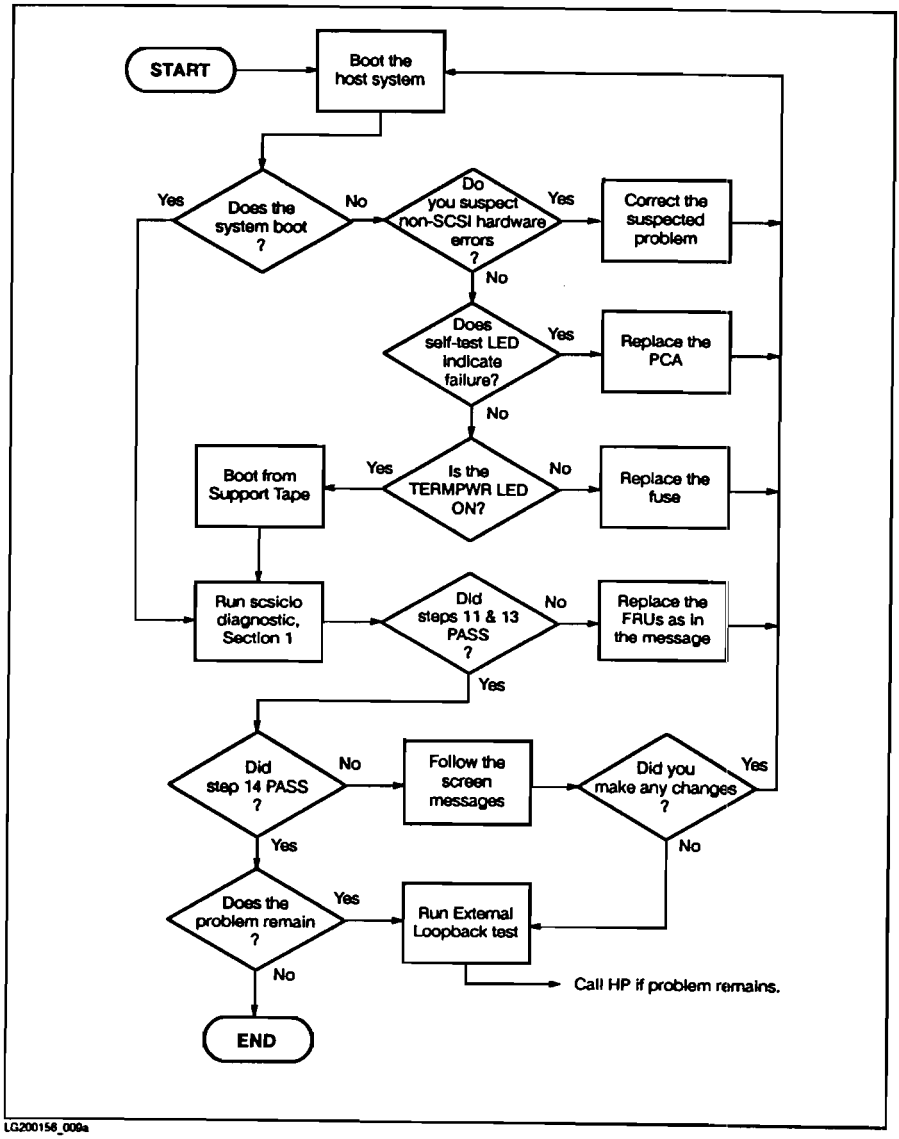


Figure 12-12. CIO SCSI Host Adapter Troubleshooting Flowchart

Field Replaceable Units

Table 12-11 lists the FRU assemblies for the HP-PB SCSI/Parallel Adapter and the CIO SCSI HA.

Table 12-11. Replaceable SCSI Assemblies

HP Part Number Non-Exchange (new)	HP Part Number Exchange	Description
28655-60001	28655-69001	HP-PB SCSI/Parallel Adapter card
5181-6144	N/A	PROM (location U52) on HP-PB SCSI/Parallel Adapter
27147-60001 (contains EPROMs)	27147-69001 (no EPROMs)	CIO SCSI Host Adapter card
2110-0517	N/A	Fuse, Termination Power
1810-0676	N/A	SCSI bus terminator (2 required)
5062-3383	N/A	SCSI card cable, 50-pin, high- to low-density (high-density is thumbscrew; low-density is bail lock) 1 meter for HP-PB SCSI/Parallel Adapter
5180-0010	N/A	HP 92284A parallel cable, 36-pin male, 25-pin male, 2 meters for HP-PB SCSI/Parallel Adapter
27147-63001	N/A	CIO SCSI HA cable (2 meters)
1252-3920	N/A	External SCSI bus terminator (active, single-ended)
5061-6565	N/A	SCSI loopback hood (single-ended)

N/A = not applicable

SCSI PCA Removal and Replacement

Removal

Remove the SCSI PCA as follows:

1. Shut down the operating system and switch off the computer power.
2. Access the HP-PB I/O or CIO card cage.
3. Disconnect the cable from the card and from the grounding bus on the card cage.
4. Simultaneously lift both extractor levers on the card. This will disconnect the card from the backplane connector.
5. Slide the card out of its slot.
6. Place the PCA on a grounded surface to protect the components from ESD damage. You must wear a grounding wrist strap to prevent irreversible damage to the PCA.
7. If you are returning a CIO SCSI PCA to Hewlett-Packard for replacement, remove the EPROMs.

Replacement

Install the PCA as follows:

1. Observe anti-static precautions.
2. Verify product contents and record PCA identification information.
3. Power off the computer.
4. Set the SCSI address to 7. Set switch 4 to the appropriate setting. (For further information, refer to the section, SCSI Configuration Guidelines.)
5. Select an appropriate slot and record the slot number.
6. Insert the card in the card cage.
7. Connect the card cable.

Caution Do not connect an RS-232 cable to the parallel port. Failure to comply may damage the HP-PB SCSI/Parallel Adapter card.

8. Make sure that all the peripheral devices are on.
9. Power up the SPU and check that the PCA passes its internal self-test (see Table 12-9).
10. Run the appropriate online diagnostics.

PROM and Termination SIPs (HP-PB SCSI/Parallel Adapter)

The PROM is replaced when faulty or when upgrading to newer versions. The PROM firmware version is displayed during system boot and can also be determined from the *scsipba* diagnostic.

Removal

Remove the PROM or termination SIPs as follows:

1. Remove the PCA from the card cage as described previously.
2. Use a chip extractor or similar tool to gently pry and remove each component from its socket.

Caution Excessive prying and pressure can damage the component or its socket. Use care during removal.

Replacement

Replace the PROM or Termination SIPs as follows:

1. Identify the proper socket location for the replacement component.
2. Note the half-circle notch or identification mark located on one end of the component. When installed, the component must be oriented so that its notch or mark is in the same direction as a similar notch or mark on the socket.
3. Ensure that the component's contact pins are aligned with the socket's receptacles. You may need to adjust the pins (bow them inward or outward) for proper alignment.
4. Gently press the component into place to properly seat the pins.

Caution If pressure is not uniformly applied, the pins on one side or the other may buckle and collapse without making proper electrical contact. If this happens, remove the components, straighten the pins, and try again. If damage was extensive, you may need a new component.

EPROM and Termination DIP Removal and Replacement (CIO SCSI HA)

Removal

Under the HP board exchange program, EPROMs must be removed before returning the SCSI HA to HP. The EPROMs must be reinstalled into the replacement board. EPROMs must also be replaced when upgrading to a new firmware version.

To remove the EPROMs or termination DIPs, proceed as follows:

1. Remove the card from the host computer as described earlier in this chapter.
2. Use a chip extractor or similar tool to gently pry and remove each component from its socket.

Caution Excessive prying and pressure can damage the component or its socket. Use care during removal.

Replacement

To install replacement components, proceed as follows:

1. Identify the proper socket location for the replacement component.

   Terminator DIPs must be installed in socket locations U25 and U26.

   Each EPROM must be installed in a specific socket location, either U21 or U31. Typically, the EPROM with the lower part number will be installed in U21, while the EPROM with the higher part number will be installed in U31.

2. Note the half-circle notch located on one end of the component. When installed, the component must be oriented so that its notch is in the same direction as a similar notch on the socket. See Figure 12-8.
3. Ensure that the component's contact pins are aligned with the socket's receptacles. You may need to adjust the pins (bow them inward or outward) for proper alignment.
4. Gently press the component into place to properly seat the pins.

Caution If pressure is not uniformly applied, the pins on one side or the other may buckle and collapse without making proper electrical contact. If this happens, remove the component, straighten the pins, and try again. If damage was extensive, you may need a new component.

SCSI Termination Power Fuse Removal and Replacement

The SCSI termination power fuse is located on the SCSI/Parallel Adapter card.

Removal

Remove the fuse as follows (refer to Figure 12-13):

1. Remove the PCA from the card cage as described previously.
2. Pull the fuse out of the socket as shown in Figure 12-13. It is usually a good idea to verify that the fuse is open by using a continuity tester.

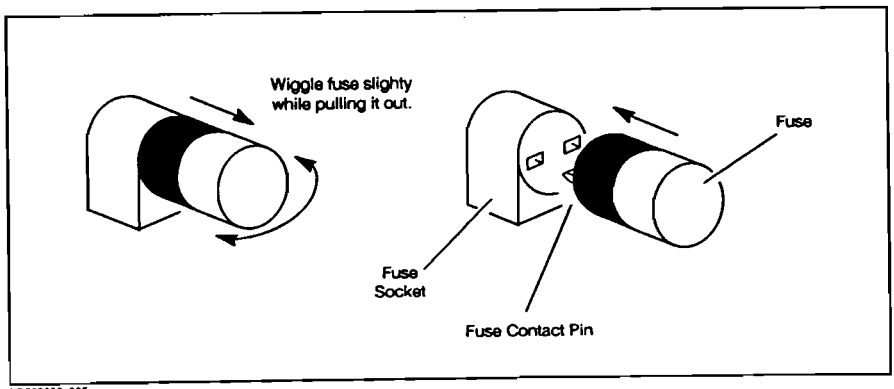


Figure 12-13. SCSI Termination Power Fuse Removal and Replacement

Replacement

Replace only with a fuse of the same type and rating. Install the fuse as follows (refer to Figure 12-13):

1. Carefully align the two contact pins on the fuse with the socket holes. The fuse has no polarity, so the pins can go into either socket hole.
2. Press the fuse into the socket.

A

HP-UX Quick Reference

The purpose of this appendix is to give experienced HP-UX personnel a quick look-up reference. For more detailed information, refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*, or other associated HP-UX documentation.

Caution Commands listed in this appendix can seriously effect system performance. Do not execute any commands with which you are unfamiliar.

HP-UX Directory Structure

Table A-1. HP-UX Directories

Directory	Description
/	root
/bin	Public commands
/dev	Special files (device files)
/etc	Commands and files for System Administration
/etc/conf	Contains object code and header files for driver generation and system configuration
/etc/conf/gen	Contains the S800 file
/etc/newconfig	Contains new versions of configuration files and shell scripts
/lib	Contains frequently used object code libraries and related utilities
/hp-ux	The HP-UX operating system (kernel)
/tmp	Contains temporary files
/mnt	User home directories

Table A-1. HP-UX Directories (continued)

Directory	Description
/usr	Contains less frequently used commands and other miscellaneous files
/usr/lib	Overflow for /lib. Additional system material and utility data files
/usr/mail	Mail directory, used for depositing mail files
/usr/man	Manual pages from the HP-UX reference manual
/usr/man/man1 ... man8,man1m	Contains the unformatted version of **man** pages
/usr/man/cat1 ... cat8,cat1m	Contains the formatted version of **man** pages
/usr/spool/uucppublic	Used for free access of files to other systems via **uucp** or LAN
/usr/spool	Spooled (queued) files for various programs
/usr/spool/uucp	Queued work files, lock files, log files, status files, and other files for **uucp**
/usr/spool/cron	Spooled jobs for **cron** and **at**
/usr/spool/lp	Control and working files for the **lp** spooler
/usr/tmp	Alternate place for temporary files
/usr/contrib	Contains any contributed files and commands
/usr/contrib/bin	Contains contributed commands
/usr/contrib/lib	Contains contributed object libraries
/usr/contrib/man	Online documentation for any contributed files
/usr/news	Directory that contains news items about your system
/usr/diag/bin/sysdiag	Online diagnostics
/usr/include	High level C language header files
/usr/include/sys	Low level (kernel related) C language header files
/usr/lib/uucp	Configuration files for **uucp**
/usr/adm	System administrative data files

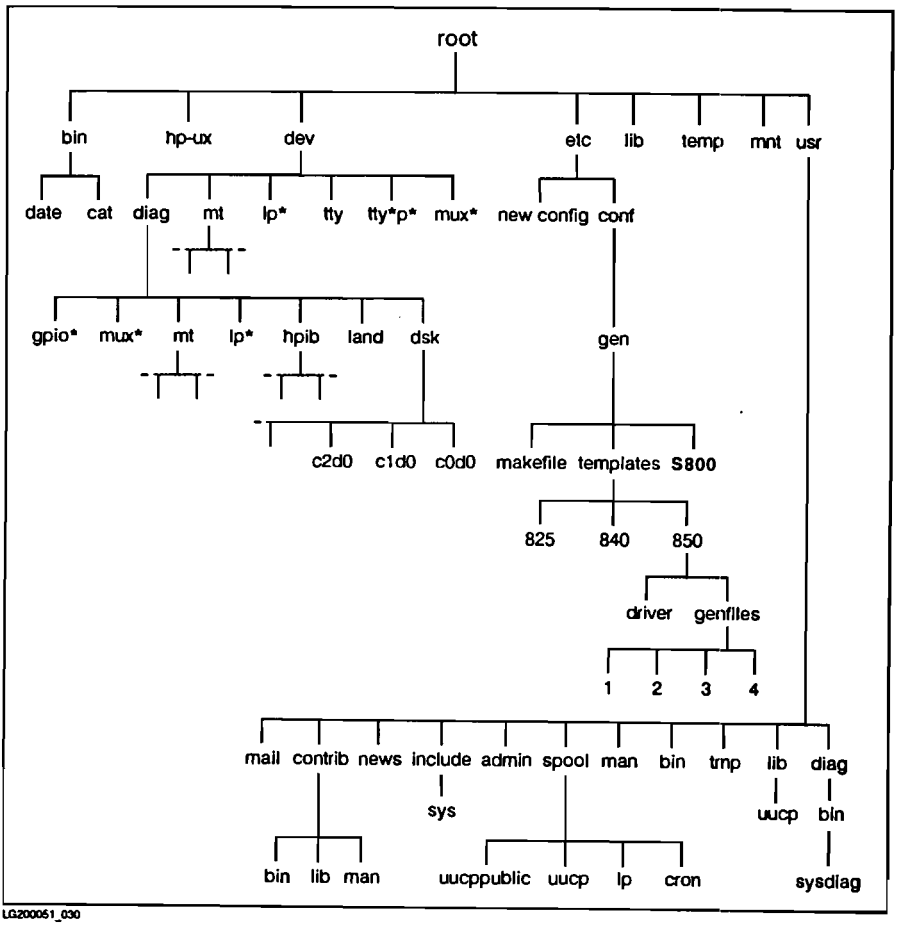


Figure A-1. Typical Directory Structure

HP-UX Commands

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* or other HP-UX documentation for more information about HP-UX commands.

Table A-2. HP-UX File Commands

File Commands	
`cat` *file1*	Displays the contents of *file1* on screen.
`more` *file2*	Displays the contents of *file2* on screen.
`q`	Quits display and returns to command line when using `more`.
(Return)	Displays one more line when using `more`.
(Space)	Displays another screen when using `more`.
`cat >` *newtest*	Takes what you type at your terminal and puts it into the new file *newtest*, until you type (CTRL)D.
`cat >>` *oldtest*	Takes what you type at your terminal and adds it to the existing file *oldtest*, until you type (CTRL)D.
`cat` *file1 file2 > file3*	Combines *file1 and file2* and puts them in *file3* with *file1* first.
`grep` *berlina alpha*	Displays the lines in which the string *berlina* occurs in the file *alpha*.
`cp` *rick rack*	Makes a copy of the file *rick* and calls it *rack*. (If *rack* is a directory, a copy of *rick* is put in that directory.)
`mv` *grey black*	Changes the name of *grey* to *black*. If *black* is a directory, the *grey* file is moved into it.
`sort` *acct*	Sorts *acct* and displays on screen. Default is alphabetical order.
`rm` *taxes*	Deletes the file *taxes*.
`lp` *stuff*	Sends the file *stuff* to the system line printer.
`vi` *tutorial.5*	Creates or edits the file *tutorial.5* with the vi screen editor.
`diff` *myfile myfile1*	Displays the differences between *myfile* and *myfile1*.
`chown` *sam acct*	Changes the ownership of your file *acct* to *sam*.
`chgrp` *pubfiles sec1*	Changes your group ID of *sec1* to *pubfiles*.
`chmod go-rwx` *dates*	Removes read,write, and execute permission on the file *dates* for users in your group and for all other users (See "Using chmod" on next page).
`chmod ugo+rwx` *pubfiles*	Opens the existing subdirectory *pubfiles* so that anyone can read, write, or execute the files in it. See "Using chmod" on the next page.

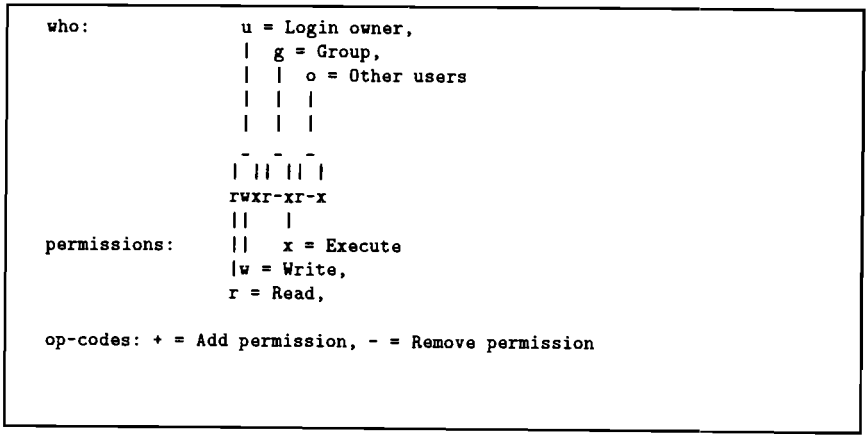


Figure A-2. Using chmod

Table A-3. HP-UX Directory Commands

Directory Commands	
`ls`	Lists the files and subdirectories in the current directory
`ls -F`	Lists all contents, flags directories (/) and executable files (*)
`ls -l`	Gives a "long" listing of the current directory with complete information on each file
`ls` *acct?*	Directory list of files named *acct* plus one other character
`ls` *acct**	Directory list of files named *acct* plus 0 or more characters
`lssf` */dev/diag/**	Lists all the special files in directory */dev/diag*.
`file *`	Lists all files in current directory and tells file type
`ll`	Lists all the contents of the current directory
`ll` *sue*	Lists the contents of the directory *sue* in the long format showing all the protection codes and information
`ll` *sue &| lp*	Lists the contents of the directory *sue* in the background and sends them to the line printer
`pwd`	Displays the name of files in the current directory
`cd`	Returns you to your home directory
`cd` */user/sue*	Moves you to the directory */user/sue*
`cd ..`	Moves you to the parent directory. If you were in **sue**, this command would put you in **user** directory, as above
`mkdir` *Chap4*	Creates a new subdirectory in your current directory called *Chap4*
`rm -r *`	Removes all files in current directory - DANGEROUS. Make sure you know what directory you're in before typing this command.
`rmdir` *budget87*	Deletes the directory *budget87* (only if the directory contains no files)

Table A-3 (cont'd). HP-UX Directory Commands

`find . -name` *test.1* `-print`	Finds *test.1* and displays its path name
`find` */users/tmp* `-user` *pubfiles* `-print`	Searches from */users/tmp* and displays all files belonging to user *pubfiles*
`find / -user` *sue* `-print`	Finds all files belonging to *sue* and displays them

Table A-4. HP-UX System Commands

System Commands	
`who`	Displays the users currently logged onto the system and the ports used
`ps`	Displays the processes you are currently running
`ps -a`	Displays the processes being run by all users on the system
`man` *ls*	Displays information about the *ls* command and its options
`man -k` *mail*	Lists the HP-UX commands that relate to the keyword *mail*
`kill` *4507*	Terminates the background process number *4507*
`history`	Lists the last 20 commands entered from last to first
`!!`	Repeats the last command entered (C-shell only)
`login` *moondog*	Login as user *moondog*
`logout`	Logout
`bdf`	Shows disk space usage
`du`	Shows disk usage
`lpstat -t`	Shows status of print spooler
`write`	Writes to users already logged on
`wall`	System wide announcement to all users
`echo` *message*	Displays message on the screen
`init s`	Changes run level from multiuser to single user
`init 2`	Changes run level from single user to multiuser
`mount`	Lists what file systems are mounted
`mount -a`	Attempts to mount all the file systems listed in */etc/checklist*
`umount` */dev/dsk/c1d0s11*	Manually unmounts */dev/dsk/c1d0s11* file system
`ioscan`	Shows current hardware I/O configuration (HP-UX 8 0 and later)
`amesg`	Displays console messages

Table A-5. HP-UX Command Keys

Command Keys	
CTRL C or DEL	Interrupt. Stops a command currently being executed
CTRL D	Removes you from the current environment. At the $, #, or % prompts, these keys log you off the system (if you are in your Primary Shell)
CTRL H or Backspace	Deletes the previous character
CTRL S	Temporarily halts the output from the current command being executed (halts terminal scrolling, for instance)
CTRL Q	Resumes the output that was halted by CTRL S

Table A-6. HP-UX Wildcard Characters

Wildcard Characters	
*	Designates all files in the current directory.
s*	Designates all files beginning with s in the current directory.
*.c	Designates all files ending with .c in the current directory.
????	Designates any 4 character filename in the current directory.
s???	Designates any 4 character filename beginning with s in the current directory.
??.c	Designates any 4 character filename ending with .c in the current directory.

Using vi

Use **vi** as a screen-oriented editor to edit a file. The following commands take effect as soon as the keys are pressed.

Table A-7. Vi Enter/Exit Commands

vi *file1*	Enter **vi** to edit *file1*
(ESC)	Return to command mode from text entry mode
:q	Quit **vi** if no writes since last save
:q!	Quit **vi** without saving current changes to file
:wq	Save file and quit **vi**
:w *file1*	Save *file1*
ZZ	Save file and quit **vi**

Table A-8. Vi Move Cursor Commands

	First, press (ESC) to ensure you are in Command Mode
arrow keys	Move in key direction
H	Move to top of screen
L	Move to bottom of screen
^	Move to beginning of line
$	Move to end of line
nG	Move to **n**th line of file

Table A-9. Vi Edit Commands

(ESC)	Return to command mode from text entry mode
a	Add after cursor
A	Enters text at the end of current line
i	Insert before cursor
I	Enters text to the left of the first character that is not a blank on the current line
o	Add a line below cursor
O	Add a line above cursor
cw	Changes one word starting at cursor position

Table A-9. Vi Edit Commands (continued)

dw	Delete word
ndw	Delete **n** words
dd	Delete line
ndd	Delete **n** lines
r	Replaces character at cursor position
R	Replaces only those characters that are typed over with new text
x	Delete character
nx	Delete **n** characters
J	Join with next line
np	Retrieve **nth** last delete
yy	Yank, copies line to temporary storage. To insert blank line, move cursor to desired position and press (Return).
3 **yy**	Yank. Copy the next **n** lines to temporary storage
p	Put the "yanked" lines here (at the cursor)

Table A-10. Vi Move Screen Commands

(CTRL)f	Moves to the next screen
(CTRL)b	Moves to the previous screen

Table A-11. Vi Search Commands

/acct	Search forward in file for the string *acct*
? *asparagus*	Search backward in file for string *asparagus*
n	Repeat search, same direction
N	Repeat search, other direction

Table A-12. Vi Miscellaneous Commands

u	Undo last change
U	Restore current line
:set nu	Temporarily display line numbers with file
.	Repeats action initiated by last command

Backup Utilities

tar

Tar is used to save and restore files on magnetic tapes or flexible disks. This command is not recommended for system backup. For more information on `tar`, refer to the man pages on the system. (Type: `man tar`)

Syntax:

```
# tar -[key] [modifier] [file(s)]
```

Key	Description
`r`	Add files to end of archive
`x`	Extract (restore) named files from archive
`u`	Update only
`c`	Create a new archive
`t`	Lists contents of archive
Modifiers	**Description**
`v`	Displays names of files archived
`w`	tar will print action and file name, then wait for you to reply (y) or (n)
`f`	Allows you specify another device other than /dev/rmt/0m

Examples:

From `/users`, copy all of the files under `/users` to tape:

```
cd users
tar -cv users
```

Display file names on archive:

```
tar -vt
```

From `/users`, restore file `test` from archive to disk under `/users`:

```
cd users
tar -xvf /dev/mt/test users
```

From `/users`, copy file `/users/test` to the end of `/dev/mt/1m`:

```
cd users
tar -crf /dev/mt/1m users/test
```

cpio

The cpio command copies files in and out of an archive. An archive may be a file or a raw device. For more information on cpio, refer to the man pages on the system. (Type: `man cpio`)

Options	Description
`-o`	Reads *stdin* to obtain a list of path names and copies those files onto *stdout*
`-i`	Extracts from *stdin* those files that match patterns
`-p`	Used to copy files between directories instead of between devices
`-d`	Create directories if needed
`-t`	Print table of contents only
`-v`	List names as they are copied

Examples:

Copies all files from `/olddir` to `/newdir`:

```
mkdir newdir
cd olddir
find /user/local -print | cpio -pd newdir
```

Copies current directory to tape:

```
find . -print | cpio -o >  /dev/rmt/0m
```

Displays files on tape:

```
cpio -it <  /dev/rmt/0m
```

fbackup

The fbackup utility does full and incremental backups, as specified by a level number between 0 and 9. The user need not be superuser, but if the user does not have access to a given file, that file will not be backed up. For more information, refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* and the **man** pages on the system.

Syntax:

```
/etc/fbackup -f device [-0-9] [options]
```

Options	Description
-f *device*	Specifies name of backup device (usually a magnetic tape drive).
-0-9	Specifies backup level, where 0 = full backup; 3 = weekly backup; 8 = daily backup.
-u	Updates **/usr/adm/fbackupfiles/dates** to contain the backup level, start and finish times of the backup session, and the graph file used for the session. If you use **fbackup** for incremental backups, you must keep a database of past backups.
-g *graphf*	Specifies path name of a text file (**/user/adm/fbackupfiles/graphfile**) that names the trees to include or exclude from the backup graph. If the basic directory structure of the system remains constant, this graph file can be used for all backups.
-i	Includes the specified file tree in backup.
-e	Excludes the specified file tree from backup.
-I *filename*	Specifies path name of an index file that will list names of the backup files.
-c *config*	Specifies path name of a file (**/usr/adm/fbackupfiles/fb_config**) that contains parameter values. Common parameters are: name of file to be executed when a fatal error occurs, number of times to try to back up an active file, and number of file reader processes to use.
-v	Runs in verbose mode.

Examples:

Full backup to a 9-track magnetic tape:

```
/etc/fbackup -0i / -f /dev/rmt/0h
```

Daily backup to a 9-track magnetic tape using u, g, and -c options:

```
/etc/fbackup -u8f /dev/rmt/0h -g /usr/adm/fbackupfiles/graphfile
-c /usr/adm/fbackupfiles/fb_config
```

frecover

The frecover utility restores files that were backed up using the **fbackup** command. The user need not be superuser, but if the user does not have access to a given file, frecover will not restore that file. For further information about **frecover**, refer to the man pages on the system.

Syntax:

```
frecover -r [options] [-f device]
        or
frecover -x [-g graphf] [-i path] [-f device]
```

Options	Description
-r	Recovers all files on backup tape.
-R *path*	Continues an interrupted recovery.
-f *device*	Identifies the backup device.
-x	Either extracts or does not extract files identified by -i, -e, or -g.
-g *graphf*	Uses specified graph file.
-i	Includes a file tree in recovery.
-e	Excludes a file tree from recovery.
-I *filename*	Specifies path name of an index file that will list names of the backup files.
-o	Recovers files regardless of age.
-v	Runs in verbose mode.

Examples:

Recover all files specified by -g option and execute a shell script specified by -c option if the recovery process encounters an error:

```
/etc/frecover -x -g /usr/adm/fbackupfiles/graphfile
-c /usr/adm/fbackupfiles/fr_config -f/dev/rmt/0h
```

Recover all files on the backup media and organize them into the directories from which they were backed up:

```
/etc/frecover -r -f/dev/rmt/0h
```

Cookbook Procedure for Modifying HP-UX

This section briefly describes the steps to modify HP-UX for a new I/O configuration. Refer to Appendix B of the *HP 9000/825/835 Installation and Configuration Guide* or *HP 9000 Series 800 HP-UX System Administration Tasks Manual* for a complete explanation.

1. At the HP-UX prompt, issue the command:

   ```
   cd /etc/conf/gen
   ```

2. Copy the existing S800 `file` to a different name, so that you will have a backup copy in case of problems. For example:

   ```
   cp S800 S800BACKUP
   ```

3. Edit the S800 `file` so that it contains the device drivers and hardware addresses for the new I/O configuration. You can use the `vi` screen editor to edit the file. For example:

   ```
   vi S800
   ```

4. Recompile the kernel with `uxgen`, using the edited S800 `file` as input:

   ```
   /etc/uxgen S800
   ```

5. Copy the old kernel `/hp-ux` in the root (/) directory. Write down the name of this file in case the new kernel does not boot. For example:

   ```
   cp /hp-ux /SYSBCKUP
   ```

6. Change the working directory:

   ```
   cd /etc/conf/S800
   ```

7. Move `hp-ux` to `/hp-ux`, by entering the command:

   ```
   mv hp-ux /hp-ux
   ```

8. Shut down the system and turn off system power:

   ```
   cd /
   shutdown -h 0
   ```

9. Install cards in the desired slots.
10. Turn on the system and reboot.
11. Change the name of the old kernel and make a backup copy of the new kernel in case of problems. Enter the commands:

    ```
    mv /SYSBCKUP /OLDSYS
    cp /hp-ux /SYSBCKUP
    ```

Setting Up A Print Spooler

To set up a particular printer to be used with the LP Spooler, you can either edit and use the `/etc/mklp` script, or type in the commands directly from the keyboard. Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* section "Configuring the LP Spooler" for more information.

1. Log in as superuser (root) and shut down the LP scheduler:

```
/usr/lib/lpshut
```

2. Execute the `lpadmin` command with the `-p` option. Repeat the command for each printer you want to configure.

```
/usr/lib/lpadmin -plp -v/dev/lp0 -mhp2934a -h
```

Parameter	Description
`-plp`	Names the printer `lp` (logical destination)
`-v/dev/lp0`	Specifies the full path name of the printer's (lp0) special file, the physical destination
`-mhp2934a`	Specifies the printer model hp2934a from the `/usr/spool/lp/model` directory
`-h`	Means the printer is "hard-wired"

3. For each of the printers defined with `lpadmin`, execute `accept` and `enable` to allow requests to reach the printer:

```
/usr/lib/accept lp
/usr/bin/enable lp
```

4. Select a printer as the system default:

```
/usr/lib/lpadmin -dlp
```

5. Restart the LP scheduler and see if it's running properly:

```
/usr/lib/lpsched
lpstat -t
```

6. If the scheduler is not running properly, remove the file `schedlock`. You may also need to remove the file `fifo`. Then repeat Step 5.

System Shut Down

It is wise to shut down HP-UX before turning off power. If you turn off power while HP-UX is running, you can damage the file system. Follow these steps to properly shut down the system:

1. Login as the superuser `root`.
2. Move to the root directory of the file system by entering the command `cd /` at the prompt.
3. Check to see if anyone is on the system. If not, enter the `shutdown -h 0` command to shut down and halt the system immediately. (If you are already in single-user mode, you can enter `reboot -h` instead.)
4. You can turn off power when the console displays a message like:

   ```
   Halting (in tight loop) -- OK To Hit Reset Button
   ```

   For more information, see the section "Shutting Down the System" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*.

You can also turn off the system at the ISL prompt without damaging the system.

Creating a New File System

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* section "Creating a New File System" for more information.

1. Make sure a device file exists on the disk where the file system is to reside.

   ```
   lssf /dev/dsk/*
   ```

2. Make sure the model of the disk drive you want to use exists in **/etc/disktab** along with correct default assignments for your system.

   ```
   more /etc/disktab
   ```

3. Run **newfs** to create a new file system. For example, on a HP 7935 using c1d0s11 (section 11):

   ```
   newfs /dev/rdsk/c1d0s11 hp7935
   ```

   Record superblock numbers as they are displayed on the screen.

4. Create a directory where the new file system will be mounted.

   ```
   mkdir /disc1
   ```

5. If you want the new file system mounted automatically, update **/etc/checklist** to include information about your new file system. When you type the following command all of the file systems listed in **/etc/checklist** will be mounted.

   ```
   mount -a
   ```

   You can also mount the file system manually by using the following command:

   ```
   mount /dev/dsk/c1d0s11 /disc1
   ```

   You can unmount the file system by using the following command:

   ```
   umount /dev/dsk/c1d0s11 /disc1
   ```

Checklist File

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*, Chapter 7, under "The Checklist File" for more information.

The `etc/checklist` file lists all file systems and swap devices:

```
special_file directory options pass_number backup_freq comment
```

Parameter	Description
special_file	A required field that specifies a block special file name
directory	Name of the directory to be mounted
options	One or more options:
defaults	Use all default options
rw	Read-write (default)
ro	Read-only
suid	Set user ID execution allowed (default)
nosuid	Set user ID execution not allowed
pass_number	Used by **fsck** to determine the order to check file systems (when -p is used)
backup_freq	Reserved for future use
comment	Optional comment field beginning with # and ending with Return

Example:

```
/dev/dsk/c1d0s11 /disc  rw  4  0  #  /user
```

fsck

For more information, refer to Appendix C "Using the fsck Command" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*.

Requirements

- Single-user mode (Use the **shutdown** or **init s** command.)
- Quiescent or can cause loss of data
- Uses directory /lost+found
- **fsck** should be executed using a character special device file, not a block special device file except when run on the root file system, must use the block device (for example, **/dev/dsk/c0d0s0**).
- If **fsck** makes changes to the root file system, the system must be rebooted.

Modes

The following modes are supported with **fsck**.

Mode	Description
default	allows you to choose to perform each action or not.
-b	specify alternate superblock.
-p	fixes the following automatically and never removes data: unreferenced inodes unreferenced pipes and fifos link counts in inodes too large missing blocks in the free list wrong counts in the superblock clean byte marked wrong
-P	operates same as **-p**, except ignores file systems marked clean by commands like **umount** and **reboot**.
-n	causes **fsck** to answer NO to all questions that might remove data. Can be used in multiuser (though not recommended), single-user, or in background.
-q	prints only the messages that require a response.
-y	causes **fsck** to answer YES to all questions. Might remove data.

Caution The **fsck -y** command can remove data automatically. Use with caution.

Setting Up a New User

For more information, see "Adding a New User" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual.*

1. Log in to root.
2. Edit `/etc/passwd` to add a new user to the last line of the file:

```
vi /etc/passwd
carol ::101:1 comment :/mnt/carol:/bin/csh
```

   Where the integer *101* in this example represents the next sequential user ID number.

3. Edit `/etc/group` to add the user `carol` to an existing group:

```
vi /etc/group
nfl::11:todd,jerry,carol
```

4. Create directory for new user:

```
mkdir /mnt/carol
```

5. Change ownership for new user:

```
chown carol /mnt/carol
```

6. Have the System Administrator customize the user environment for the new user.

READER COMMENT SHEET

Systems Technology Division

HP 3000 Series 920 Family and HP 9000 Model 822S Family Computer Systems CE Handbook

Manual Part Number A1027-90008 August 1991

A reader comment sheet helps us to improve the readability and accuracy of the document. It is also a vehicle for recommending enhancements to the product or manual. Please use it to suggest improvements.

SERIOUS ERRORS, such as technical inaccuracies that may render a program or a hardware device inoperative should be reported to your HP Response Center or directly to a Support Engineer. An engineer will enter the problem on HP's STARS (Software Tracking and Reporting System). This will ensure that critical and serious problems receive appropriate attention as soon as possible.

Editorial suggestions (please include page numbers):_____

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Recommended improvements (attach additional information, if needed):

_____

_____

_____

Name: _____ **Date:** _____

Job Title: _____ **Phone:** _____

Company: _____

Address: _____

_____

HP 3000 Series _____ (e.g., 922, 932, 925, 935, 949, 950, etc.)

HP 9000 Series _____ (e.g., 822, 832, 825, 835, 845, 850, etc.)

☐ Check here if you would like a reply.

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Systems Technology Division
19483 Pruneridge Avenue
Cupertino, California 95014-9786