Model 745 Industrial Controller
Owner's Guide

This guide contains installation instructions

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Preface

This owner's guide describes how to install and use the Model 745 industrial controller.

Audience

This guide is intended for Models 745/132L and 745/165L industrial controller users.

Release Document(s)

Please refer to the *Release Document(s)* you received with your system or system software for additional information that we may not have been able to include in this guide at the time of its publication.

Related Manuals

Refer to the following manuals for more information:

- *Using Your HP Workstation* (A2615-90003)
- *Installing and Updating HP-UX* (B2355-90050)
- *Configuring HP-UX for Peripherals* (B2355-90053)

To order manuals, please contact your local sales office.

Manuals are also available on the World Wide Web at http://www.docs.hp.com and http://www.hp.com/es/service

Revision History

The revision history for each edition of the manual is listed below:

HP Part No.	Edition	Revision History
A4964-90601	E0698	First printing.
A4964-90604	E0499	Updated disk mounting and added 745/165L
A4964-90605	E1199	New memory configurations added

Documentation Conventions

Unless otherwise noted in the text, this guide uses the following symbolic conventions.

user-supplied values	Italic words or characters in formats and command descriptions represent values that you must supply.
sample user input	In examples, information that the user enters appears in color.
output	Information that the system displays appears in this typeface.
literal values	Bold words or characters in formats and command descriptions represent commands or keywords that you must use literally. Pathnames are also in bold.
KEY	Text with a line above and a line below denotes a key on your keyboard, or a key or button which is drawn on your workstation's graphic display. (In this manual we refer to the **Enter** key. On your keyboard the key may be labeled either **Enter** or **Return**.)

Questions, Suggestions, or Problems

If you have any questions, suggestions, or problems with our hardware, software, or documentation, please contact the HP Response Center for your country.

1

Product Description

This chapter introduces the Model 745 Industrial Controller. Its purpose is to familiarize you with the system features, controls, and indicators.

The major sections within this chapter are:

- Features
- Model 745 Physical Dimensions and Power Requirements
- Board Computer Configurations
- Cables

The Model 745 Industrial Controller

The Model 745 Industrial Contoller provides for a wide variety of PCI or EISA cards. In combination with the Model 744 board computer as the system controller, the Model 745 is exceptionally flexible and responsive, being based on Hewlett-Packard's PA-RISC technology. Figure 1-1, Figure 1-2, and Figure 1-3 show a front view of the Model 745, a rear view, and the front panel of the board computer.

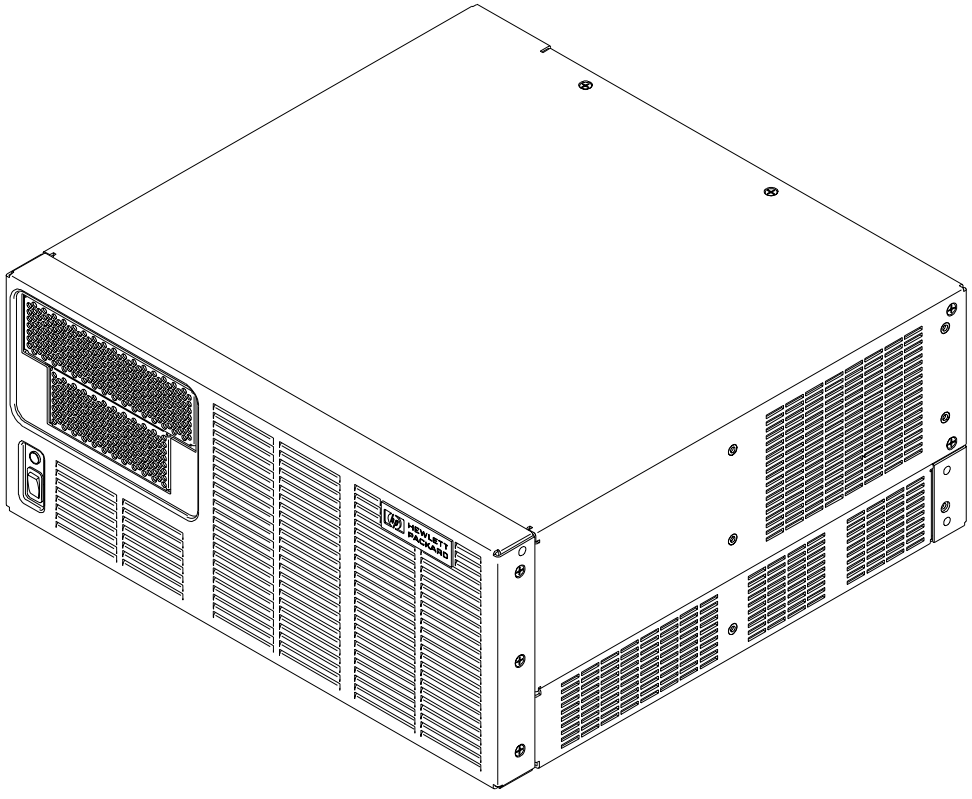

Figure 1-1 **Model 745 Front View**

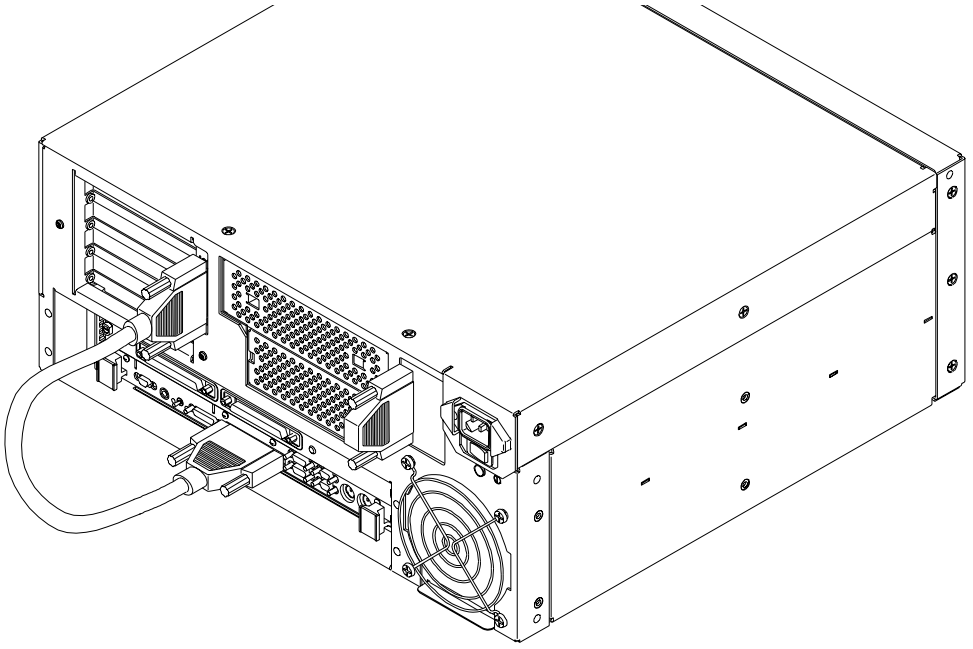

Figure 1-2 **Model 745 Rear View**

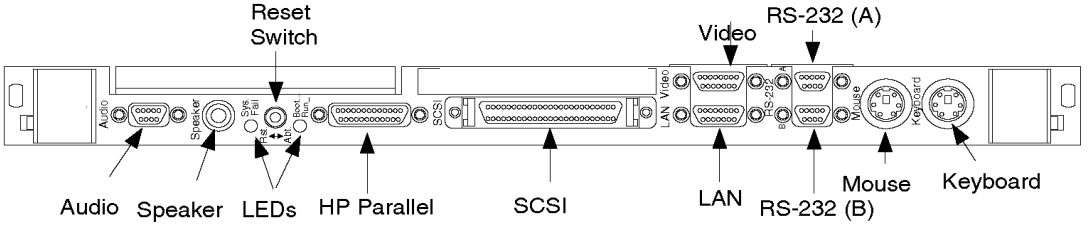

Figure 1-3 **Board Computer Front Panel**

Features

The Model 745 has the following general features:

- Single-board computer processor

  132 MHz, or

  165 MHz

- Input/Output:

  Onboard graphics, with optional

  17-inch 1280x1024 monitor, or

  19-inch 1280x1024 monitor

  2 RS-232C ports

  AUI (LAN) port

  HP parallel port

  Audio I/O ports

  Speaker port

  Single-Ended (SE) SCSI for internal and external devices

- PS/2 keyboard and mouse with mini-DIN connectors
- Slots for up to four user installed cards,

  PCI or

  EISA

- Optional PMC adapters available for 2 or 4 PMC sites added to board computer
- Mass storage bays for up to five devices, with up to two forward or rear facing removable media devices, including:

  4GB or 9 GB single-ended SCSI hard drive

  1.4MB floppy drive

Fast CD-ROM drive

DDS-2 tape drive

- One 400 Watt power supply
- Operating system

  HP-UX 10.20 (or later)
  - Supports SICL libraries
  - Supports Rocky Mountain Basic (RMB).

- User interface

  CDE or HP VUE graphical user interface.

- Compatibility

  Source and binary code compatible with HP 9000 product family.

Typical External Devices

The Model 745 supports the following external devices:

- LAN transceiver

  HP A2670A ThinLAN ETHERNET Transceiver
  HP A2671A EtherTWIST Transceiver

- Speaker; 8 ohm impedance with $^{1}/_{8}$-inch sub-miniature stereo connector

Only products with Hewlett-Packard approved parts, accessories, peripherals, operating systems, and application programs are supported by Hewlett-Packard. Any product with other than HP approved hardware or software connected or installed must have the non-HP approved hardware and software removed by the customer before on-site repair is conducted.

Physical Dimensions and Power Requirements

Physical dimensions:

- Height: 177 mm (6.97 in.) - 4 EIA Units
- Width: 425.45 mm (16.75 in.)
- Depth: 412.77 mm (16.25 in.)

Power requirements:

- Input voltage: autoranging 100-240 Vac
- Input frequency:50/60 Hz
- Power: 700 Watts maximum
  2390 BTU/hour maximum
  600 Kcal/hour maximum
- Input current: RMS 7 A - 3.5 A maximum @ 100-240 Vac

The power supply for the Model 745 provides sufficient power to all devices and option slots, within specifications for those options. No power budgeting is required for options.

Board Computer Configurations

The Model 745 Industrial Controller incorporates the Model 744 single-board compter (SBC) as its processor. The Model 744 is a high-performance Precision Architecture board computer based on the Hewlett-Packard PA-RISC 7300LC technology. It contains the following key features:

- Model type:

  Model 744/132L,

  Primary internal cache - 128 KB: 64 KB instruction, 64KB data

  Model 744/165L,

  Primary internal cache - 128 KB: 64 KB instruction, 64KB data
  Secondary external cache - 512KB

- Clocks

  Battery-backed real-time clock
  Interval timers (One 32 bit, Two16 bit)
  Watchdog timer

- Main Memory

  Up to four RAM cards may be installed.
  When mixing memory card capacities that include 128MB or 256MB cards, the 128MB and 256 MB card(s) must be installed into the lowest memory slots before adding cards of other capacities.

Cables

Cables needed to connect to the ports of the Model 745 industrial controller are provided with the system.

The high-density I/O connectors for the board computer require conversions to standard cabling. These cables are 75 cm (30 in.) long.

See Table 1-1 for details of the cable included with the system.

Table 1-1 Cabling

Cable Number	Description
HP A4300A	HP Parallel: High Density 25-pin to standard 25-pin (female)
HP A4301A	RS-232C: High Density 9-pin to standard 9-pin (male)
HP A4302A	Audio: High Density 9-pin to three mini jacks
HP A4303A	LAN: High Density 15-pin to 15-pin AUI
HP A4305A	Video for EVC monitors: High Density 15-pin to EVC 35-pin connector (female)
HP A4223A	Video: High Density 15-pin to standard 15-pin (female)
HP C2955A	SCSI: High Density 50-pin to High Density 50-pin, .5m (male)
HP K2291	SCSI: High Density 50-pin terminator
HP A4199A	Power cord (if no localization kit was ordered)

Standard interface cables are available and may be required to connect to the cable listed above.

Environmental Requirements

Table 1-2 shows the environmental requirements for the Model 745.

Table 1-2 Environmental Requirements

Temperature	Operating: 0° to 55°C (without mass storage) 5° to 40°C (with mass storage); 10°c/min rate of change maximum Non-operating: -40° to 70°C
Humidity	Operating: 40°C: 95% RH max (without mass storage) 90% RH max (with mass storage)
Altitude	Operating: 4,600m (15,000 ft) (without mass storage) 3,050m (10,000 ft) (with mass storage) Non-operating: 4,600m (15,000 ft) to 40°C

Operating System Overview

The Model 745 uses the standard HP-UX 10.20 or later operating system, a highly versatile system for multitasking, running your application programs, and performing a variety of development tasks. Refer to *HP-UX System Administration Tasks* for detailed installation and operation procedures for HP-UX.

When systems are configured at the factory, a specific HP-UX kernel configuration is chosen. If you reload HP-UX after receiving your system, you must reconfigure the kernel according to the directions in Chapter 9.

Manuals for System Information

HP-UX

After you have completed the installation procedures in this book, you may consult the following sources for further information:

- For HP-UX administration information, see HP-UX *System Administration Tasks.*
- For a quick reference to commonly-used HP-UX commands, see the appendix in *Using HP-UX.*
- HP VUE or CDE is the default interface for HP-UX. At some point, you may want to interact with the Model 745 using CDE or HP VUE via the LAN, with an X Window System display. As a simpler window alternative, you can also use the X Window System by itself. All interfaces are included in HP-UX. For further information, refer to *Using the X Window System*, *Using HP-UX*, *CDE User's Guide*, or *HP VUE User's Guide*.

The following manuals are also useful:

- If you have not yet installed your HP-UX OS, see *Installing HP-UX*.
- For troubleshooting HP-UX, see Chapter 9 of this manual, and the manual *Solving HP-UX Problems*.

HP VUE

For information on using and configuring the HP VUE interface with HP-UX, see *HP VUE User's Guide*. For information on installing HP VUE, refer to *HP VUE Installation Guide*.

HP CDE

For information on using and configuring the CDE interface with HP-UX, see *CDE User's Guide*. For information on installing CDE, refer to *CDE Installation Guide*.

Online Sources of Information

HP-UX is designed so that you can access many sources of information without leaving your system. Most of these information sources are accessible through the shell command line on a character terminal.

- Man pages: The HP-UX information found in *HP-UX Reference* is online and accessible by clicking on the Toolbox button at the right of your Front Panel, or by entering **man *command*** on a command line, where *command* is the name of the HP-UX command or routine you want to get information on. If you're not sure of the command name, you can enter **man -k *keyword***, where *keyword* is a likely topic word to search on. This results in a display listing commands having the keyword in their description.

There are also a variety of files which contain version-specific information. These will be useful in administering and configuring cards and devices for your version of HP-UX. Among these files are the following:

- Release Notes: This is the online version of the Release Notes which come with your system. It contains all the latest information, undocumented changes, and bug fixes for your release of HP-UX. It also contains information on the current version of HP VUE. The Release Notes document resides in the **/usr/share/doc** directory, named by its release number; for example, **10.20RelNotes** for HP-UX 10.20.
- HP-UX and HP VUE Help. For graphics displays, extensive help information on the operating system and the visual interface is included with HP VUE.
- Newconfig: The directory **/usr/newconfig/etc** contains information and new versions of HP-UX product configuration files, as well as shell scripts which may have been customized on your system. The contents of this directory will vary depending on which products you have loaded onto your system. In most cases, old versions of these files, in their regular locations in the file system, are not overwritten by the update process.

Audio

HP-UX includes audio software comprising an audio editor, Audio Application Program Interface (AAPI), and some sample programs. Audio output is available through the audio port on the front panel of the Model 745. For highest quality audio, an external headphone set or speaker is recommended.

Audio is implemented using a CODEC (coder-decoder) combining stereo audio-digital converters for microphone and line-input levels. The input sampling rate and format are programmable, as are the input gain and output attenuation.

A $^{1}/_{8}$-inch mini-jack is used for the speaker output connection. The remaining audio signals are via a 9-pin D-sub connector. Output impedance is nominally 8 ohms, but higher impedance devices can also be driven.

For information on programming for audio, refer to *Using the Audio Developer's Kit* (B2355-90069) and the man page *audio.*

2

Connecting Cables

The major sections within this chapter are:

- Connecting a Monitor or Text-Only Terminal
- Audio Connection
- Keyboard and Mouse Connections
- SCSI Connection
- Network Connection
- Printer Connections

Introduction

This chapter discusses connecting cables to one of the following ports on your Model 745 industrial controller from a peripheral or accessory:

- Text terminal (RS-232) connection
- An audio connection
- A video (graphics circuit) connection
- A keyboard or mouse (PS/2 ports) connection
- A SCSI port connection
- A Network (AUI LAN) connection
- Printer (HP parallel and RS-232) connections

Figure 2-1 shows the front panel connectors for the Model 745.

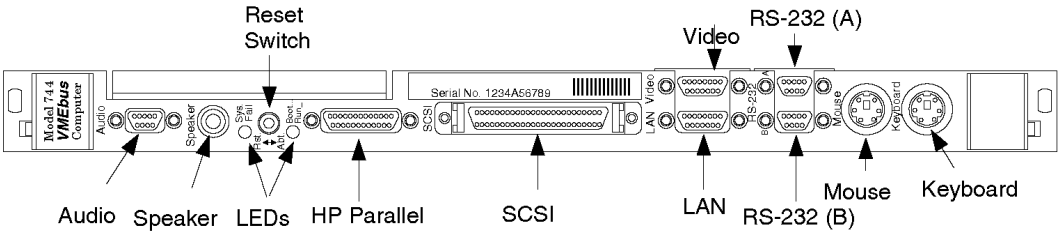

Figure 2-1 Model 745 Front Panel Connectors

Connecting a Monitor or Text-Only Terminal

The Model 745 typically uses one of two types of display:

- CRT-based color monitor connected to a video port
- Terminal connected to a serial port

The Model 745 supports a maximum of four monitors at the same time.

Configuration Requirements

This section provides information on configuration requirements and step-by-step instructions for connecting one or more display devices to your Model 745.

Monitors

Video conversion cables are required to connect a monitor to a video connector on the board computer. If your monitor uses an EVC style cable, use conversion cable A4305A that includes and EVC connector. If your monitor uses a standard 15-pin D-sub connector, use cable A4223A.

Multi-Display Systems

See the *Graphics Administration Guide* (B2355-90109) for information about setting up multiple displays.

Connecting the Monitor

This section provides step-by-step instructions for connecting a monitor to your system. Refer to Figure 2-2 for help when connecting your monitor.

CAUTION: Some CRT-based monitors are heavy. Use caution when lifting and unpacking the monitor.

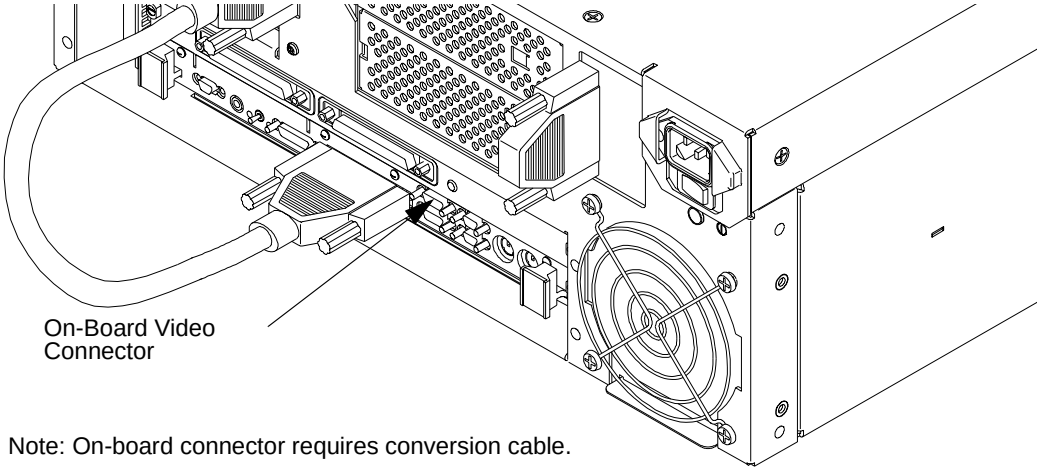

Figure 2-2 Connecting a Monitor

1. Plug the small connector of the conversion video cable (bundled with the Model 745) into the video connector of your board computer.
2. Connect the monitor cable (comes with the monitor) to the conversion cable.
3. Connect the monitor cable to your monitor.

Monitor Power Cord

If your monitor has an attached power cord, connect the plug to a power source. If your monitor has a separate cord, connect the cord to the monitor, then connect the plug to a power source.

WARNING:	**Do not connect your monitor to a power extension strip. Doing so can cause a shock hazard.**
NOTE:	Do not turn on your monitor until all cable connections are made and you are ready to boot the system (see Chapter 3).

Connecting a Terminal

This section provides step-by-step instructions for connecting a terminal to your Model 745's board computer. Refer to Figure 2-3.

1 Using the HP A4301A conversion RS-232C Cable, plug its micro-miniature connector to one of the RS-232 connectors as follows:

- The recommended port for connecting a terminal is the (A) port.
- Using the (B) port for terminal connection is not recommended.

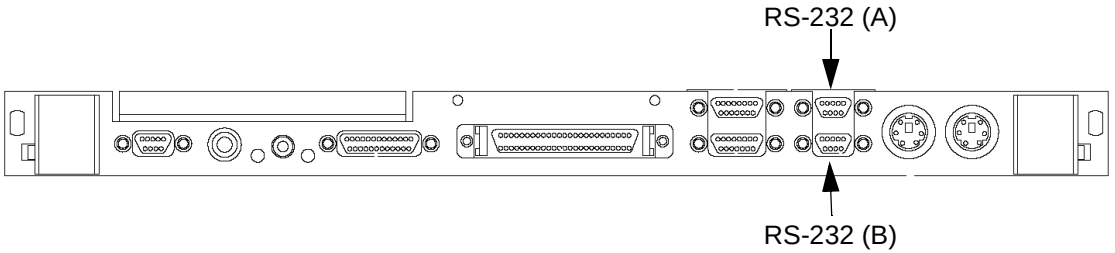

Figure 2-3 **Connecting a Terminal to the RS-232 Ports**

2 Plug the standard end of the conversion cable into the appropriate connector of RS-232 serial cable HP 24525G.

3 Plug the other end of the serial cable into the serial connector on the terminal.

Once you have connected and powered on your terminal and board computer, you may need to reconfigure your board computer for the terminal to be the console (see Appendix B).

Audio Connection

The Model 745 provides audio input and output in stereo with a 16-bit coder-decoder (CODEC) over a frequency range of 25-20,000 Hz. Output is provided by a small internal speaker and a stereo headphone mini-plug (8 ohms impedance). Input is provided by a stereo line-in and mono microphone mini-plugs.

The CODEC combines stereo A/D converters for microphone and line input levels. D/A converters for driving headset and line outputs are used. The input sampling rate and format are programmable, as are the input gain control (used for software control of recording levels) and output attenuation.

A $^{1}/_{8}$-inch mini-jack is used for the speaker out connection. The other audio signals are on a 9-pin micro D-sub connector. The output is capable of driving 8 ohms; it can also be used for higher impedance devices with little or no additional distortion. A line-level input can be driven by the headset output.

Table 2-1 lists the audio specifications, Figure 2-4 shows the audio connector, and Table 2-2 shows the audio connector pinouts.

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Table 2-1 Audio Specifications

Function	Range
Headphone maximum output level	2.75 V pp at 50 ohms
Input sensitivity	Line in, 2.0 V pp at 47 K ohms microphone, 22 mV at 1 K ohm
Programmable input gain	0 to 22.5 dB in 1.5 dB steps
Programmable output attenuation	0 to 96 dB in 1.5 dB steps
Programmable rates	8, 11.025, 16, 22.05, 32, 44.1, 48 KHz
Signal to noise ration	Headphone, 61 dB Line in, 61 dB Microphone, 57 dB

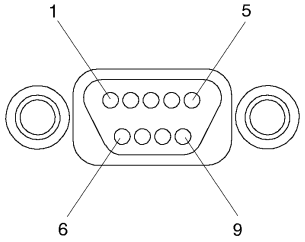


Figure 2-4 Audio Connector

Table 2-2 Audio Connector Pinouts

Pin Number	Signal
1	Mic GND
2	Line-in left
3	Line-in right
4	Headset right
5	Headset left
6	Mic-in A
7	Mic-in B
8	Line-in GND
9	Headset GND

Video Connection

The Model 745 can be configured for several types of monitors. Graphic monitors connect to the 15-pin video connector. Figure 2-5 shows the video connector, and Table 2-3 shows the video connector pinouts.

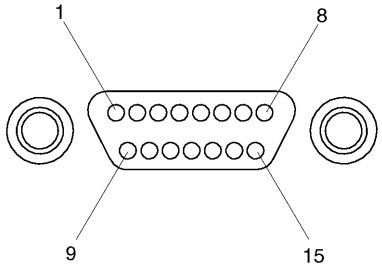


Figure 2-5 Video Connector

Table 2-3 Video Connector Pins and Signals

Pin Number	Signal	Pin Number	Signal
1	DDC	9	GND
2	GND	10	HSYNC
3	RED	11	+5V
4	GND	12	GND
5	GREEN	13	SSYNC
6	GND	14	GNC
7	BLUE	15	VSYNC
8	GND		

Keyboard and Mouse Connections

There are two PS/2 style serial ports: one PS/2 keyboard port and one PS/2 mouse port. In the Boot Console Handler's hardware menu, they are listed as PS/0 and PS/1. Figure 2-6 shows the PS/2 connector. Also refer to Figure 2-1; the two ports on the right, labeled Mouse and Keyboard.

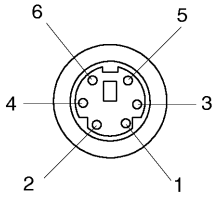


Figure 2-6 **PS/2 Connector**

Table 2-4 shows the PS/2 connector pinouts.

Table 2-4 **PS/2 Connector Pinouts**

Pin Number	Signal
1	Data
2	Not used
3	GND
4	+5
5	Clock
6	Not used

SCSI Connections

The built-in SE SCSI port is implemented using an NCR710 macrocell inside the I/O ASIC chip. This 8-bit single-ended implementation is compatible with the current HP products and supports 5 MB/sec data transfer rates.

The SCSI bus is terminated to 3.3 volts through 127 Ohms on the system board.

Internal mass storage devices must have their terminators removed or disabled. If an external disk drive is used, an active terminator must be used on the last drive's uncabled connector.

A SCSI cable shipped with the system must be connected between the board computer and the mass storage module, as shown in Figure 2-7.

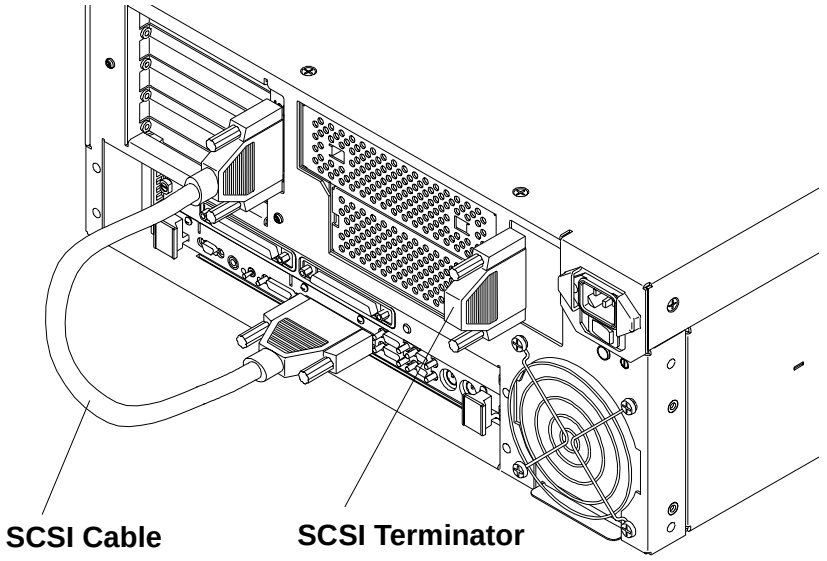


Figure 2-7 SCSI Cable

The last device on the SCSI bus must be terminated. If no external devices are connected to the SCSI bus, the terminator supplied with the Model 745 must be installed on the external bus connector.

When connecting external devices, be aware that SCSI specifications state that a single-ended SCSI bus must not exceed 6 meters. The bus cable length internal to the Model 745 is 1.5 meters (including the .5m cable connecting the board computer to the mass storage module). Ensure that all device cabling connected to the external SCSI port of the Model 745 does not exceed 4.5 meters.

Figure 2-8 shows the SCSI connector.

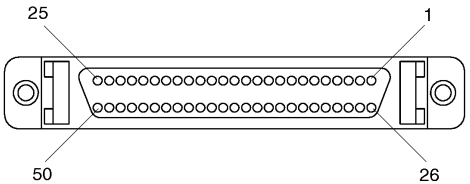


Figure 2-8 SCSI Connector

Table 2-5 shows the SCSI connector pinouts.

Table 2-5 SCSI Connector Pinouts

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	GND	21	GND	41	ATN
2	GND	22	GND	42	GND
3	GND	23	GND	43	BSY
4	GND	24	GND	44	ACK
5	GND	25	GND	45	RST
6	GND	26	DATA 0	46	MSG
7	GND	27	DATA 1	47	SEL
8	GND	28	DATA 2	48	CD
9	GND	29	DATA 3	49	REQ
10	GND	30	DATA 4	50	IO
11	GND	31	DATA 5		
12	GND	32	DATA 6		
13	NC	33	DATA 7		
14	GND	34	Data Parity		
15	GND	35	GND		
16	GND	36	GND		
17	GND	37	GND		
18	GND	38	+5		
19	GND	39	GND		
20	GND	40	GND		

Network Connection

LAN circuits use the Ethernet/IEEE 802.3 standard interface. Only the Attachment Unit Interface (AUI) version is used; no BNC connector is provided for ThinLAN. Figure 2-9 shows the AUI LAN connector. Also refer to Figure 2-1.

The AUI connector enables connections to an external MAU.

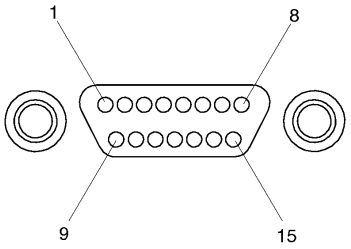


Figure 2-9 AUI LAN Connector

Table 2-6 shows the AUI LAN connector pinouts.

Table 2-6 AUI LAN Connector Pinouts

Pin Number	Signal
1	GND
2	CI-A
3	DO-A
4	DI-S (GND)
5	DI-A
6	GND
7	CO-A (NC)
8	CO-S (NC)
9	CI-B
10	DO-B
11	DO-S (GND)
12	DI-B
13	+12V
14	GND
15	CO-B (NC)

Printer Connections

Preparing for HP-UX Installation

You may have to do some configuration for appropriate data interchange with a new printer. This section gives you general guidance for these tasks.

You can use SAM (System Administration Manager) procedures to make your printer installation easier. SAM can determine the status of any of your connected devices and performs the necessary software installation of the printer for you.

If you don’t want to use SAM to install the printer, or if SAM is not on your system, you can use HP-UX commands directly to accomplish the same tasks. For information on using manual system administration procedures, see *HP-UX System Administration Tasks*.

Configuring HP-UX for a Printer

You will need to supply certain items of information needed to identify the printer you are installing. It will help to have this reference information available during the software installation process. In the following checklist, fill in the items relevant to your printer:

Printer Interface

- Parallel:_____
- Serial (RS-232C) (Port A):_____
- Serial (RS-232C) (Port B): _____
- Printer Name (a name the system uses to identify the printer. It can be any name.):_____
- Printer Model Number (located on a label on the back of the printer):_____

Printer Cables

For connection to the board computer high-density parallel port, depending on what printer you have and whether you select parallel or serial data exchange, you will need to select from the following:

- HP A4300A (HP Parallel): high-density 25-pin to standard 25-pin “F”
- HP A4301A (Serial): 9-pin high density to standard 9-pin “M”

Other standard cables may be required, depending on the selected printer.

Installation Procedure

Follow these steps to install your printer:

1. Log in as **root**. If you do not know how, or do not have permission to log in as root, ask your system administrator for help.
2. Run SAM by typing the following command:

   /usr/sbin/sam Enter

   If you need help using SAM, press the **F1** key to obtain context-sensitive information for the object at the location of the cursor.

   Use the arrow keys and **Tab** to move the highlighted areas around the screen. Press **Enter** to “choose” an item when illuminated (such as OK).
3. At the SAM opening screen, choose the following:

   `Printers and Plotters`
4. Choose **`Printers/Plotters`** from the next screen.

   The system displays a message if there are no printers connected to your system. Make sure you have a printer connected. Choose **OK** or press **Enter**.
5. From the **`Actions`** menu (on the menu bar at the top of the screen), choose the following:

   `Add Local Printer/Plotter`

6 Choose an appropriate selection on the sub-menu giving options for Parallel, Serial, HP-IB, and so on.

   A screen provides you with the information on available parallel or serial interfaces.

7 If you chose **`Add Serial (RS-232C) Printer/Plotter`**, more than one serial interface could be listed. The serial interfaces are listed in ascending order. The lowest-numbered serial interface corresponds to the lowest-numbered serial connector on your system. Choose the one to which your printer is connected.

8 Choose **OK**.

   A display opens for **`Add Local Printer/Plotter`**.

9 Choose the box labeled **`Printer Name`** and enter your printer name for the new printer (see "Printer Interface," earlier in this chapter).

10 Choose **`Printer/Model Interface`**.

11 Use the arrow keys to scroll down the next screen. Find the Model Name of your printer. Choose **OK** or press **Enter** when your printer is highlighted.

12 In the **`Add Local Printer/Plotter`** display, select and choose the box labeled:

```
Make this the system default printer
```

13 Choose **OK**.

14 If the print spooler was not previously running, a screen appears with the question: **`Do you want to start the print spooler now?`** Choose **Yes** or press **Enter**.

15 The system displays a confirmation screen asking if your printer is turned on, connected to your system, and online. Check your printer to ensure that it is ready, and press **Enter**.

16 The system displays the message **`Task completed`**. Press **Enter**.

17 Exit the task and press the **Exit SAM** function key.

18 Enter the following to exit root and return to user status:

exit Enter

Refer to *System Administration Tasks* for additional SAM information.

Testing the Printer Installation

If you made your printer the default system printer, type the following commands to test it:

cd Enter

lp .profile Enter

If your printer (called printername) is not listed as the default system printer, enter the following command to test it:

lp -d*printername* **.profile Enter**

The file named **.profile** should print out on your new printer.

NOTE: For information on printer-related problems, see Chapter 9 of this book.

HP Parallel

The parallel port is compatible with Centronics® standards, plus some additional features found in HP Series 700 workstations. It supports a bi-directional register model interface in addition to printer-only DMA. Series 700 Scanjet interfaces are not supported.

A high-density micro D-sub connector is used for the HP Parallel interface. An HP A4300A conversion cable is required to convert to a standard PC compatible 25-pin female D-sub cable.

Figure 2-10 shows the HP parallel connector. Also refer to Figure 2-1.

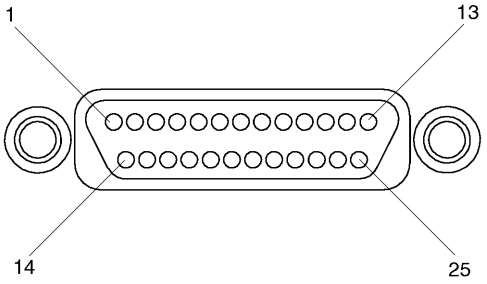


Figure 2-10 HP Parallel Connector

Table 2-7 shows the connector pinouts for the HP parallel connector.

Table 2-7 HP Parallel Connector Pinouts

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	NSTROBE	10	NACK	19	GND
2	Data 0	11	BUSY	20	GND
3	Data 1	12	PE	21	GND
4	Data 2	13	SLCT	22	GND
5	Data 3	14	NAFD	23	GND
6	Data 4	15	NERROR	24	GND
7	Data 5	16	NINIT	25	GND
8	Data 6	17	NSCT IN		
9	Data 7	18	GND		

RS-232 Port A

There are two PS/2 type serial interfaces - Port A and Port B. The serial ports use a high-density connector. An HP A4301A conversion cable is required to convert to a standard PC-compatible 9-pin male D-sub cable. Figure 2-11 shows the RS-232 serial connector. Also refer to Figure 2-1. Table 2-8 shows the RS-232-C connector pinouts.

NOTE: The RS-232 Port B operates through different circuitry than Port A. Port B is configured to operate when the system is built at the factory. However, if you ever reload HP-UX, you will need to reconfigure the HP-UX kernel as described in Chapter 9.

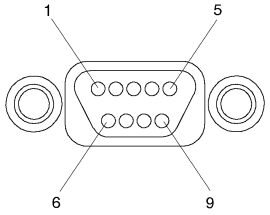


Figure 2-11 RS-232 Serial Connector

Table 2-8 RS-232-C Connector Pinouts

Pin Number	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

3

Power-On/Power-Off

This chapter discusses how to turn on and turn off the system.

The major sections within this chapter are:

- Powering On the System
- Powering Off the System

Powering On the System

The Model 745 has two power switches - either may be used to power on the system (see Figure 3-1 and Figure 3-2).

Before powering on the system, ensure that power cords are first connected to both the system and the monitor, and that the power cords are then connected to site power.

NOTE: When connecting power to the Model 745 chassis, one or both of the power switches may already be in the ON position, allowing the system to power on. If the system powers on when connecting the power cord, push either front or rear power switch to power off the system (the LED next to the switch will be off).

Make sure of the following:

- For systems using a graphics display, there must be a keyboard connected (the monitor will not initialize if no keyboard is present).
- The appropriate LAN connection has been made to the Model 745.
- If you use a remote graphical display host connected via LAN, make sure the remote system is configured to host the board computer. Normally, you will use a character terminal connected to the RS-232C (Port A) on the board computer.

1 Turn on the power to your display. The power indicator LED on the display unit shows that it is turned on, even if the screen remains dark.

2 Check the SCSI connections and power on any peripheral devices.

3 The Model 745 has two power switches - either may be used to power on the system. Push the power switch on the rear of the system (see Figure 3-1), or push the power switch on the front of the system (see Figure 3-2).

The green LED next to the switch lights when to power is ON.

NOTE: If there is a problem arising from the console path having been changed, you can boot your Model 745 to display on any console device. See "Configuring the Console Path and Display Format" and "Using the Emergency Interactive Console Search" in Appendix B.

The board computer's green LED (on the right) on the front panel blinks slowly until the OS is booted; then remains *on*. The red LED (on the left) will be *on* when power is activated and before HP-UX boots. After the OS is booted, the red light is off.

4 The system displays a sequence of boot messages. The Model 745 boots from its internal disk unless it has an external disk or another LAN-configured system selected to boot. See Appendix B for configuring an automatic boot selection. Otherwise, allow the boot to continue.

5 During the boot process, a new system displays messages prompting you for the host name, IP number, and time zone. If you have this information, enter it as requested. Otherwise, press **Enter**.

You can also enter or update this information later by typing the following after you log in as root:

set_parms initial Enter

The information is as follows:

a The time zone where your system is located.

b The host name for your system: any alphanumeric, single-word name with eight or fewer characters.

c The network address number, also called an IP address, for your system. This consists of four address fields separated by periods: for example, *255.32.3.10*. You may need to consult with your system administrator for this information. Or, if your host name and IP address have already been assigned, you can find out the host name, after boot, by entering **uname -a**. If you know your host name, you can determine your IP address by entering **nslookup *host_name***, at the system prompt.

6 The system prompts you to set a root password at this time.

The system completes the boot sequence and displays the following prompt:

```
Console login:
```

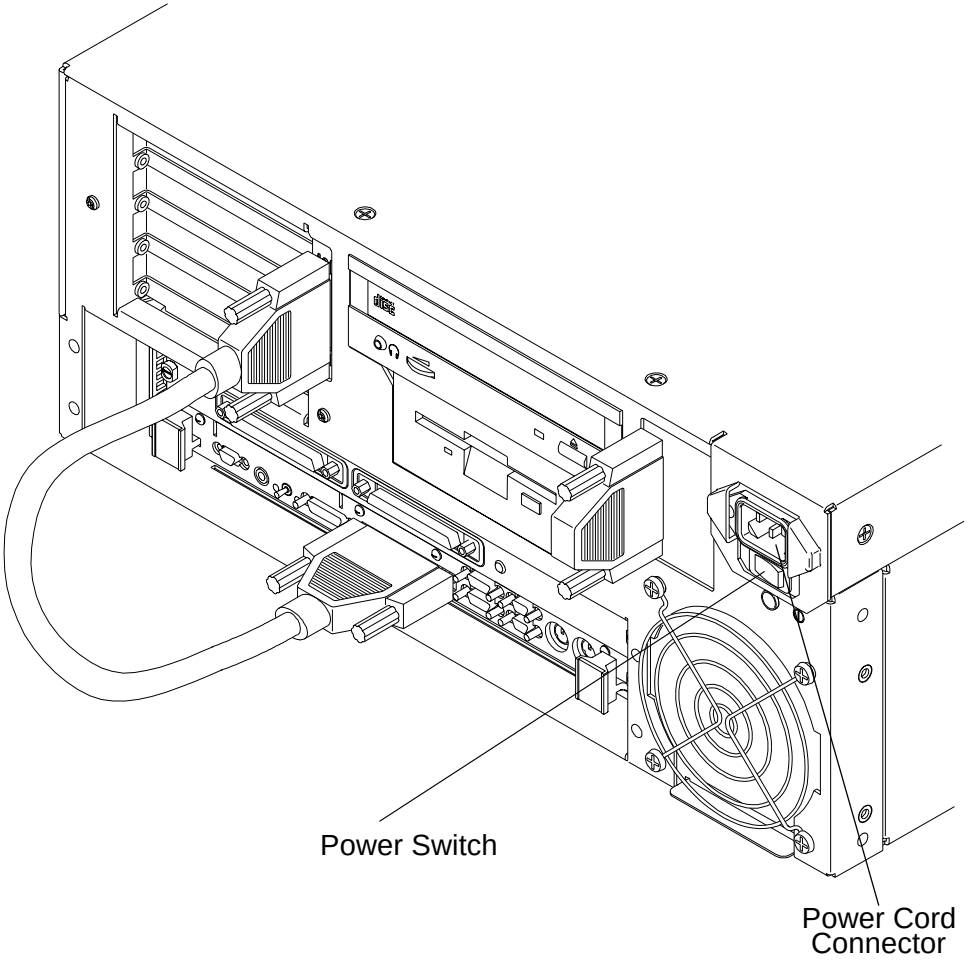


Figure 3-1 **Power Supply Connector and Rear Switch**

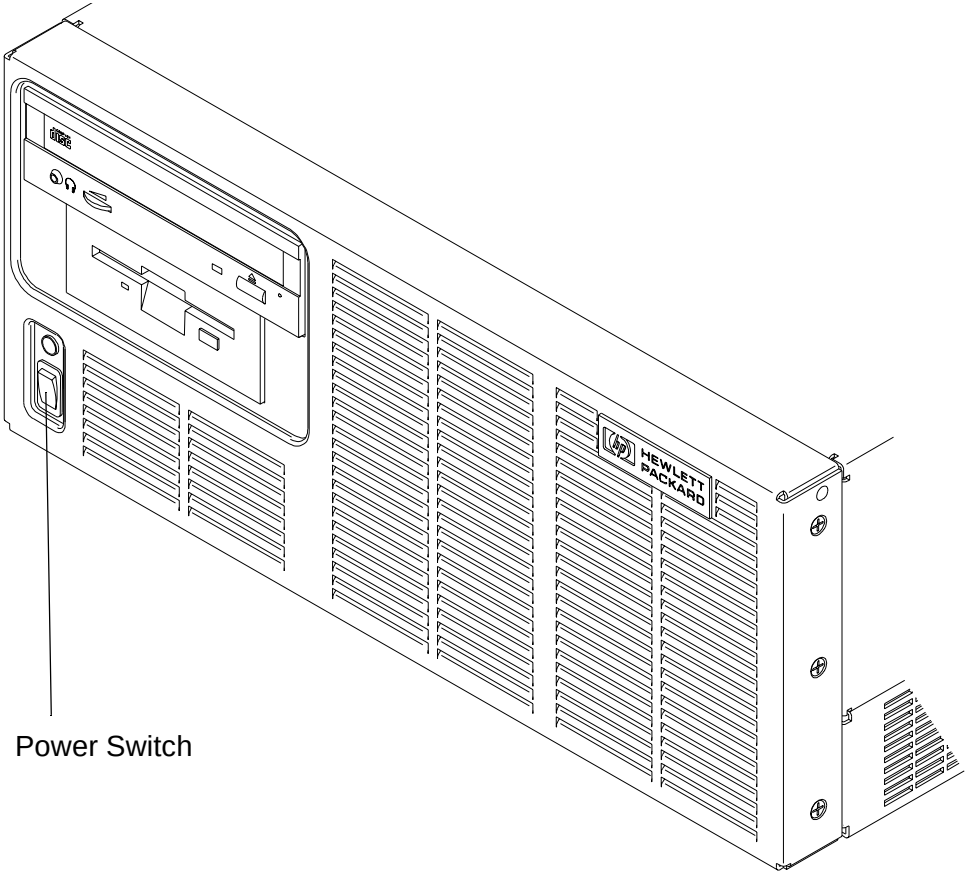


Figure 3-2 Front Power Switch

Powering Off the System

This section provides step-by-step instructions for powering down your Model 745.

CAUTION: If you have an internal disk, do not turn off power to the system without first shutting down the operating system software according to the following procedure. Turning off the power for your system without first doing the shutdown procedure may result in damage to data on your disk. Always execute the shut-down process to completion first.

1. Exit all processes currently running.
2. Enter the following command to bring the system to a halted state

   reboot -h

   This gives a zero-length “grace period” before the system goes down to the halted state.
3. After completing several shutdown procedures, the system eventually displays the following message:

   ```
   Halted, you may now cycle power.
   ```
4. At this time the system no longer responds to keyboard input and you may turn off the power. Turning the system back on initiates the boot sequence.
5. Once the operating system is shut down, press either the switch on the front of the system or the switch on the rear of the system.

   The green LED next to the switch is not lit, showing that the system power is OFF.

If you want to shutdown and reboot automatically, instead of the above procedure, simply enter the reboot command with no options.

See *reboot*(1M) for various other options.

Using SAM to Stop the HP-UX System

If you are using SAM, you might also want to use it to shut down your system.

CAUTION: If you are using an internal disk of the Model 745, do not turn off power to your system without first shutting down the operating system software according to the following procedure. Turning off the power for your system without first doing the shutdown procedure may result in damage to data on your disk. Always execute the shutdown process to completion first.

Follow these steps to use SAM to shut down your system.

1. Log in as root and type the following command, followed by **Enter**:

   /usr/bin/sam

2. Choose **Routine Tasks** from the opening menu.
3. Choose **System Shutdown**.
4. The system provides you with the following choices:
   - Halt the system. All currently executing processes except those essential to the system are terminated. Then the system is halted.
   - Reboot (restart) the system. The system is shut down and rebooted automatically.
   - Go to **Single User State**. The system is put in single-user mode for administrative purposes such as backup or file system consistency checks.
5. Exit SAM using the appropriate function key.

Using the Command Line

For guidance on entering HP-UX commands and using the HP-UX file system, tools, and networking commands, see *Using HP-UX*. For more advanced work with shell programming, see *Shells: User's Guide*.

4

Processor Options Installation

This chapter describes the accessories you can install on the Model 745's Board Computer and tells you how to install them.

The major sections within this chapter are:

- Tools Required and Preliminary Procedures
- Safety Precautions
- Memory
- PMC Bridge and Expansion Boards

Tools Required and Preliminary Procedures

Tools Required for Installation

All parts can be accessed with these tools:

Static grounding wrist strap

No. 1 Pozidriv screwdriver

Small flat-tipped screwdriver

5mm (3/16-inch) nutdriver (RAM standoffs require this tool)

Preliminary Procedures

Perform the following steps before installing or removing accessories:

1 Exit application programs.

2 Shut down the operating system and power off the chassis. (See Chapter 3 for detailed instructions.)

3 Remove all cables connected to the board computer.

4 Set up a static-free place on which to work.

Safety Precautions

It is essential to practice safety precautions when working with any electrical or electronic products. Following these safety precautions can help protect both you and the equipment from injury and possible permanent damage.

Whether the ICs are installed on a printed circuit board or lying on a table, integrated circuit components can be damaged by electro-static discharge. Static charges can build up in people to a potential of several thousand volts by simply walking across a room.

Protect integrated circuits by:

- Using a static-free work place and wearing clothes that do not hold static charges before handling any of the workstation's PC boards.
- Unplugging the power supply before removing or installing a part.
- Touching sheet metal with your fingers before touching the printed circuit assembly.

If the assembly is not going to be re-installed, place the assembly in an anti-static bag and set it aside. Following these precautions extends the life of the computer products you maintain.

Removing the Processor Board

When changing the processor board configuration, you must remove it from the chassis as described in the following procedure.

1. Stop any application programs, then shut down your system.
2. Turn the system off, and unplug the power cord.
3. Using a flat-tipped screwdriver, unscrew the captive screws that secure the board computer in the chassis, as shown in Figure 4-1.
4. Use the ejector handles to eject the board, and pull the board computer assembly out of the chassis.

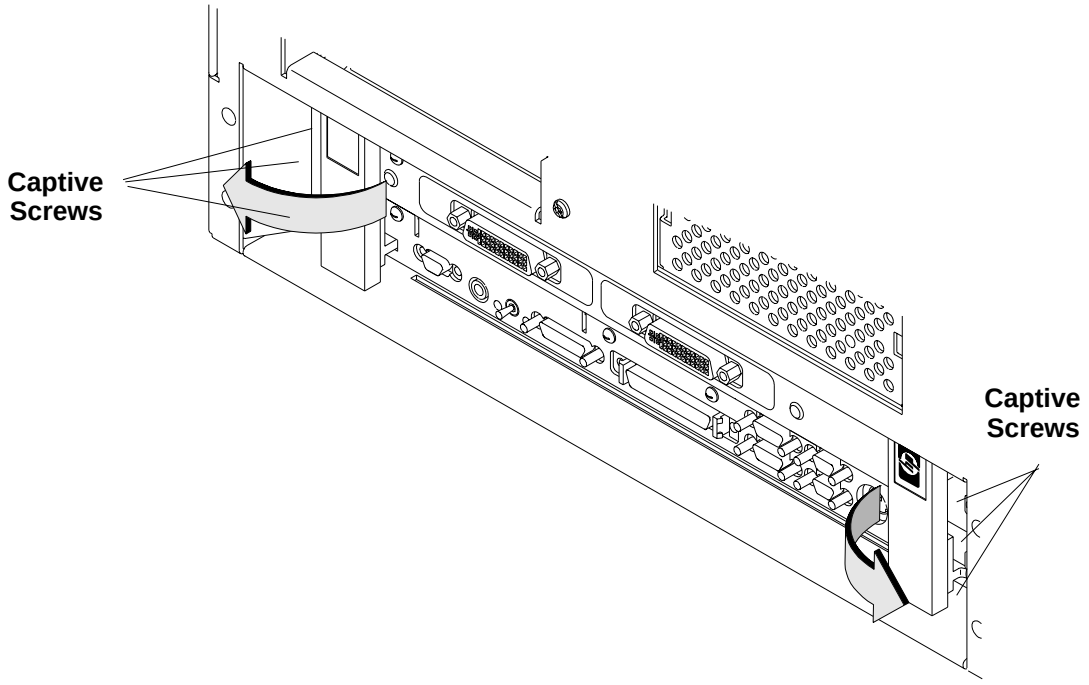


Figure 4-1 **Removing the Board Computer Assembly**

Memory

This section provides step-by-step instructions for installing RAM cards in the Model 745. The memory kit contains a memory card, a set of standoffs, a set of screws, and a wrist strap.

Preliminary Requirements

Perform the following steps before you install a RAM card into the board computer:

1. If the board computer is already installed in the Model 745 chassis, you must remove it.
2. Place the board computer on a static-free mat on a clean, level surface.

RAM Card Installation

Up to four RAM cards may be stacked. Use these steps and Figure 4-2 to install the RAM cards:

NOTE: When mixing memory card capacities that include 128MB or 256 MB cards, the 128MB and 256MB card(s) must be installed into the lowest memory slots before adding cards of other capacities.

1. Begin with the Model 744 placed so that you face the front bezel.
2. If the Model 744 has RAM card(s) already installed, remove the screws that secure the topmost RAM card, and then install the new standoffs that came with your RAM card onto the topmost card (see Figure 4-2).
3. Hold the RAM card you are installing so that the chamferred corner is the upper-left corner (see Figure 4-2).
4. While placing the new RAM card over the CPU or topmost installed card, align the holes in the RAM card with the spacers/standoffs underneath it.
5. Properly align the connectors by slightly rotating the RAM card until you can feel the connectors fit together.
6. Gently and evenly push on the top of the connectors with both of your

thumbs until the RAM cards are about 1/3 seated.

7 After the connectors are 1/3 seated, continue to push evenly with your thumbs, while pushing harder. The connectors will fully snap together.

8 Examine the connector seating from both sides of the RAM card to ensure there are no gaps between the RAM card connectors and the connectors underneath it.

9 Secure the topmost card with the screws you removed in Step 2.

RAM Card Removal

When removing RAM cards from the Model 744 CPU or the RAM card stack, remove the cards one at a time. Carefully lift the card by the edge near the connectors. Do not try to pry the card up with a tool.

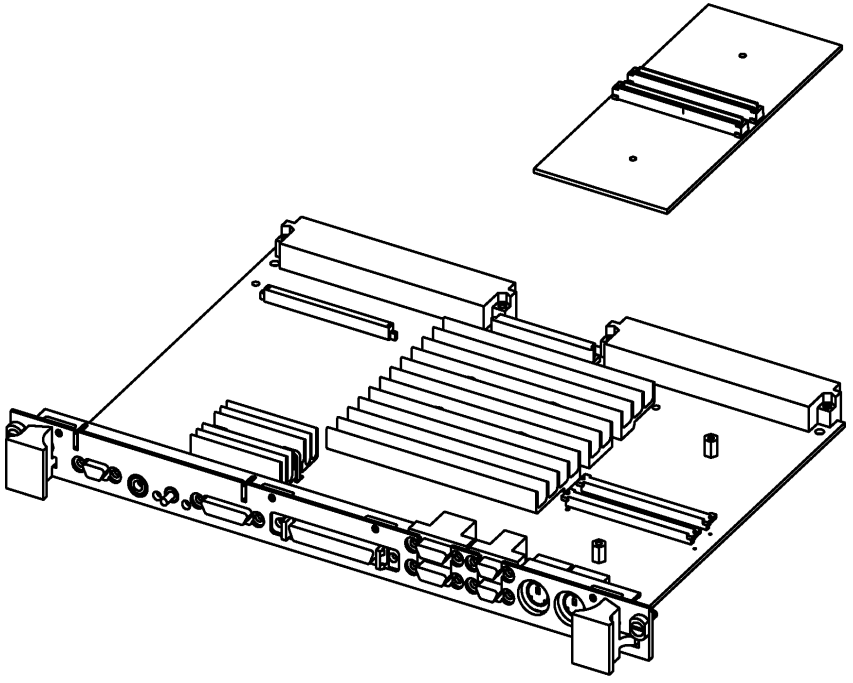


Figure 4-2 Installing RAM Cards

PMC Bridge Adapter and Expansion Adapter

This section provides step-by-step instructions for installing the PMC bridge and expansion adapters onto the board computer. When the PMC bridge adapter is installed onto the board computer, the result is a two-board assembly. When both the PMC bridge and expansion adapters are installed onto the board computer, the result is a three-board assembly.

Preliminary Requirements

Perform the following steps before installing the adapters onto your Board Computer:

1. If the board computer is already installed in your Model 745 chassis, you must remove it.
2. Place the board computer on a static-free mat on a clean, level surface.

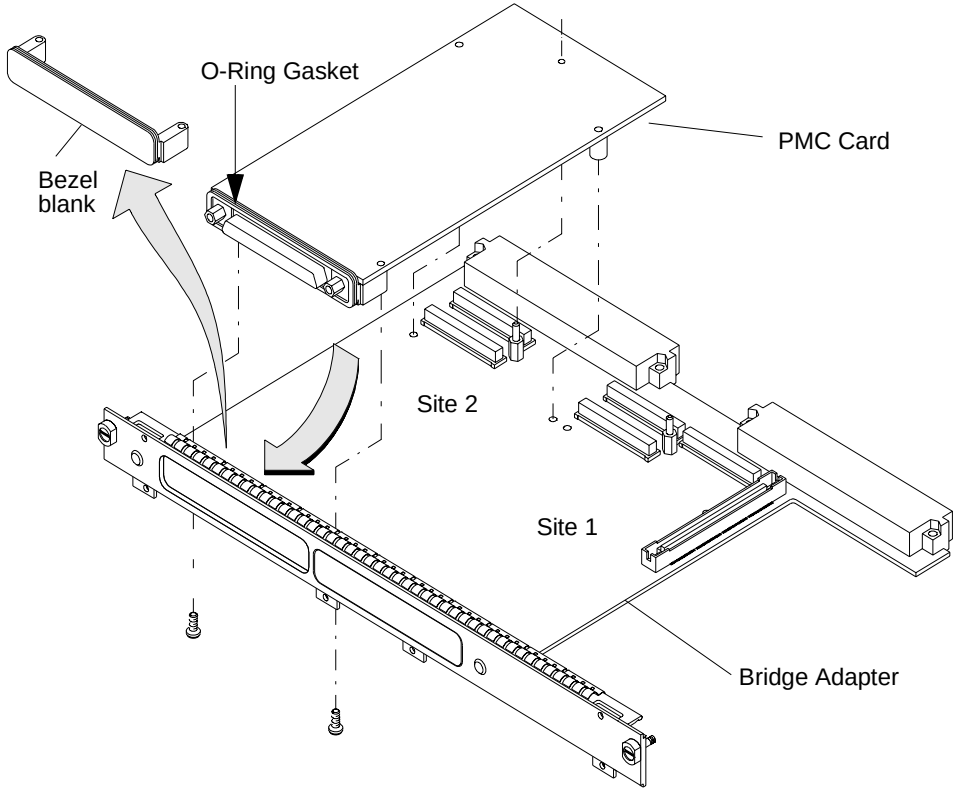
PMC Bridge Adapter and Expansion Adapter Installation

1. Refer to your PMC card installation manual, and set any configuration switches or jumpers that may be required for your application.
2. On the PMC bridge adapter board, at the sites where you will be installing the PMC card(s), remove the two screws that secure the bezel blank(s), and remove the blank(s). See Figure 4-3.

NOTE: When installing a PMC card, ensure that the O-ring type gasket near the bezel remains in place.

3. Install the PMC card(s) onto the bridge adapter by aligning the front of the card with the front bezel, and the rear of the card with the connectors and keying pin. See Figure 4-3. There are four screws that secure the PMC card from the bottom of the bridge adapter.

Figure 4-3 Installing a PMC Card onto the Bridge Adapter



If you are installing only the bridge adapter, go on to step 10. If you are also installing the expansion adapter, continue with step 4.

4 Refer to your PMC card installation manual, and set any configuration switches or jumpers that may be required for your application.

5 On the PMC expansion adapter, remove the bezel blank(s) from the sites where you will be installing the PMC card(s). See Figure 4-4.

NOTE: When installing a PMC card, ensure that the O-ring type gasket near the bezel remains in place.

6 Install PMC card(s) onto the expansion adapter by aligning the front of the card with the front bezel, and the rear of the card with the connectors and keying pin. See Figure 4-4. There are four screws that secure the PMC card from the bottom of the expansion adapter.

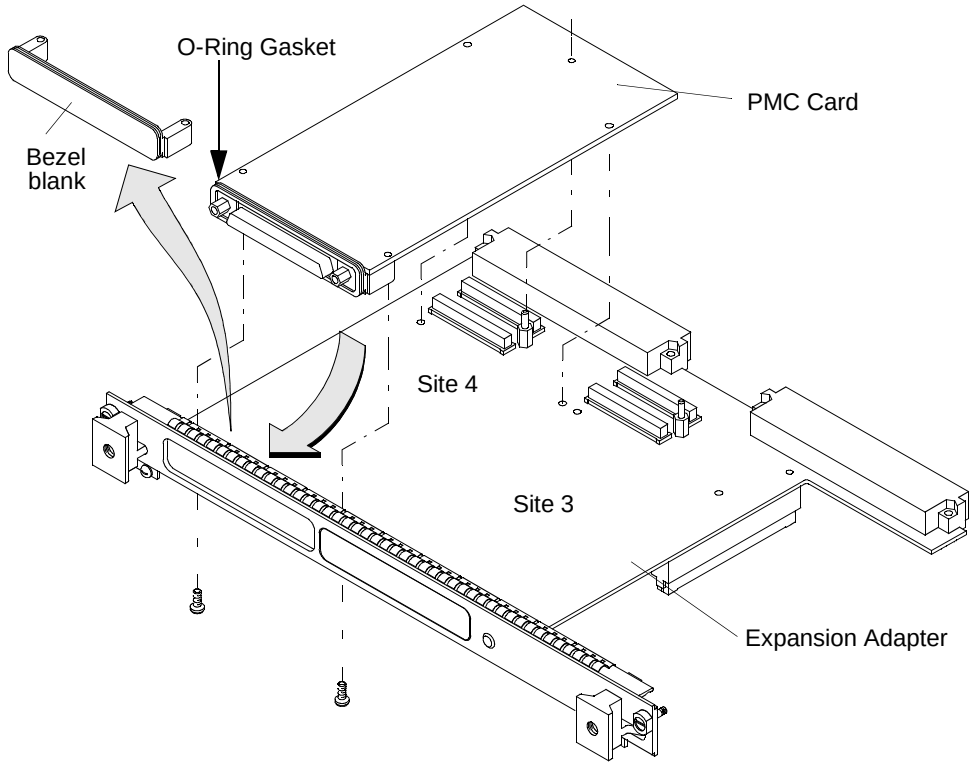


Figure 4-4 Installing a PMC Card onto the Expansion Adapter

7 The bridge adapter should NOT be assembled to the board computer. If it is, remove it by reversing the steps shown in Figure 4-7.

8 Remove the four screws from bridge adapter backplane connectors, and replace them with the four standoffs included in the expansion adapter kit. See Figure 4-5.

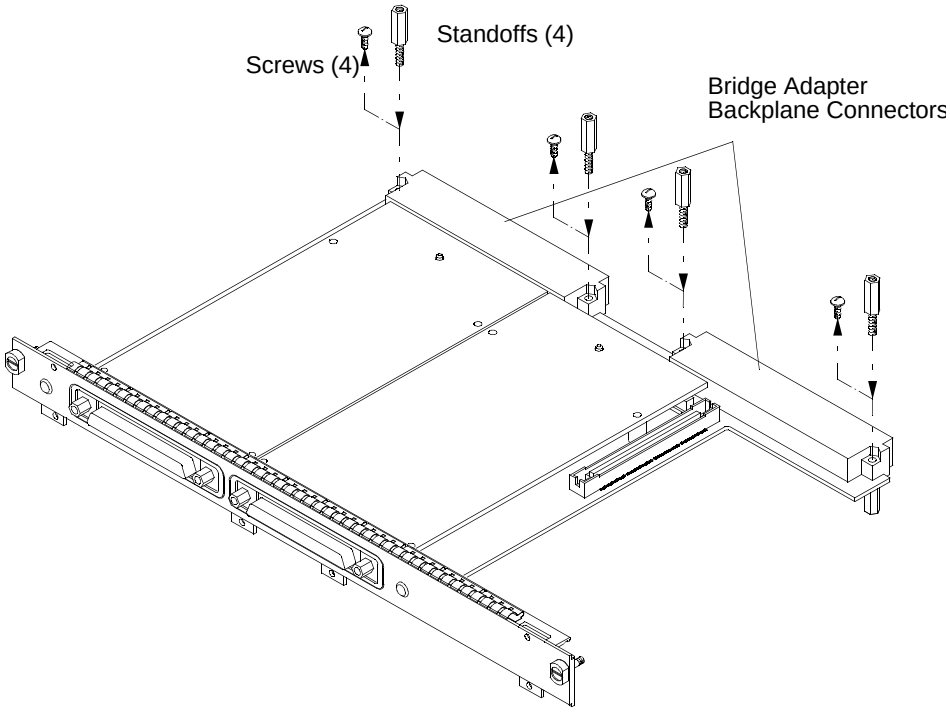


Figure 4-5 Removing Bridge Adapter Screws

9 Making sure that the connector and bezels are properly aligned, install the PMC expansion adapter onto the bridge adapter, as shown in Figure 4-6. Ensure that the interboard connector seats properly by applying pressure to the top of the expansion board and to the bottom of the bridge board. There are two screws that secure the front bezel and four screws to secure the backplane connectors.

NOTE: If the interboard connector is not tightly seated, PMC cards on the expansion adapter will not operate.

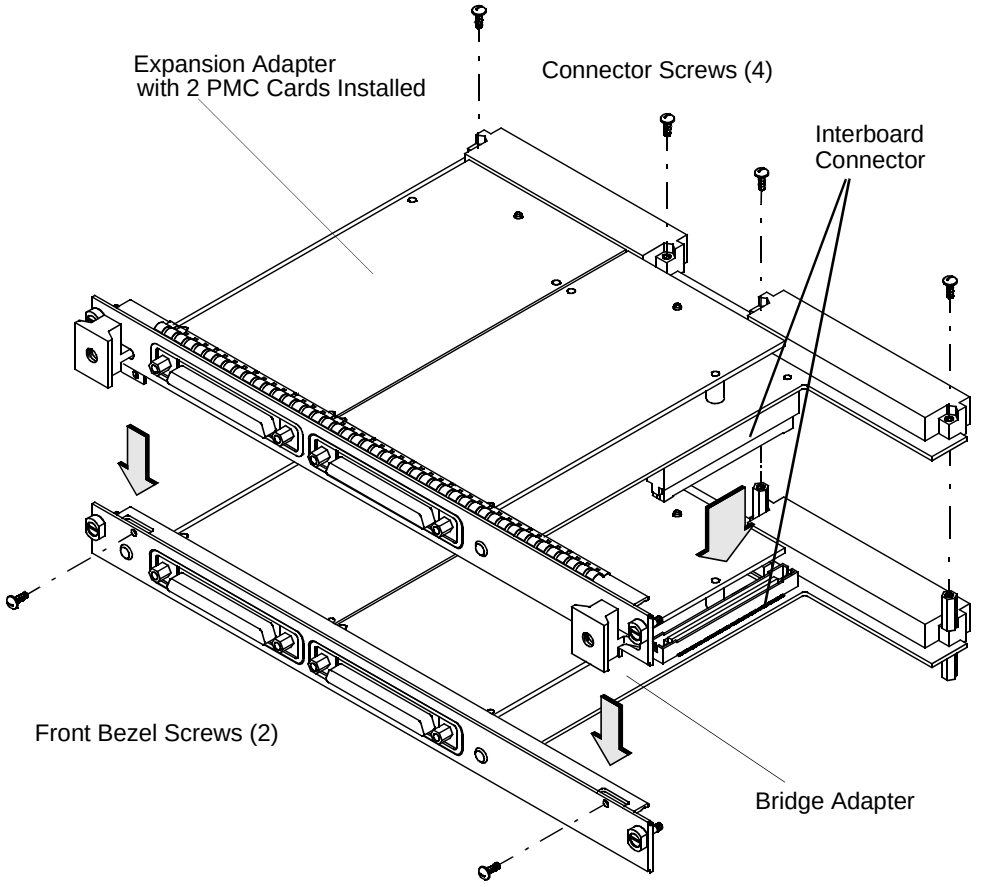


Figure 4-6 Installing the Expansion Adapter onto the Bridge Adapter

10 Remove the EMI gaskets from the bezel of the board computer, if installed.

11 Now install the PMC bridge adapter (as shown in Figure 4-7) or the bridge adapter with expansion adapter (as shown in Figure 4-8) onto the board computer. Align the GSC connector first, then the tabs on the front panel, and push the boards together. There are four screws that secure the front bezel, and four screws that secure the backplane connectors.

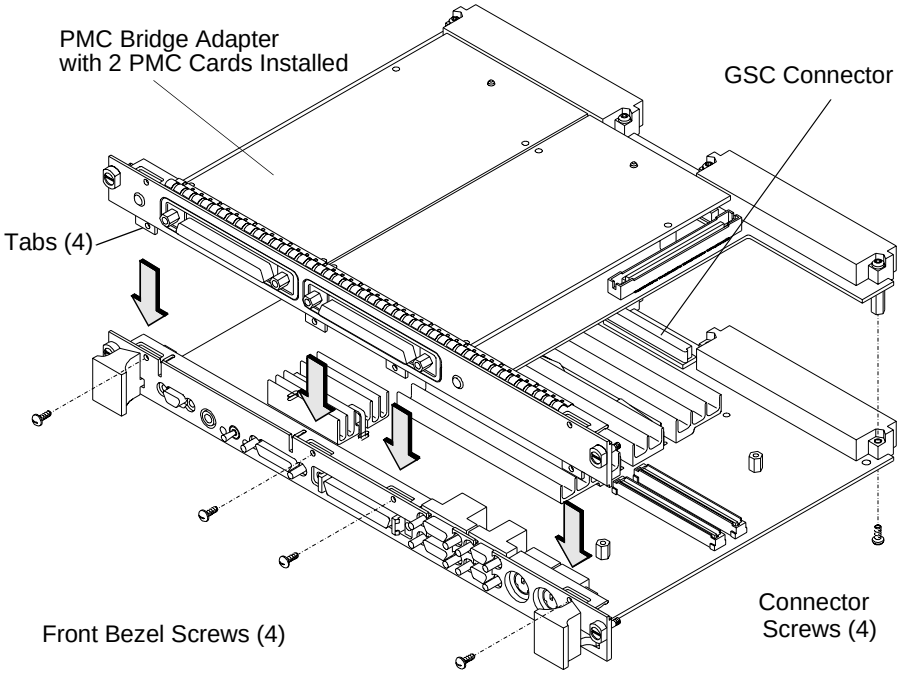
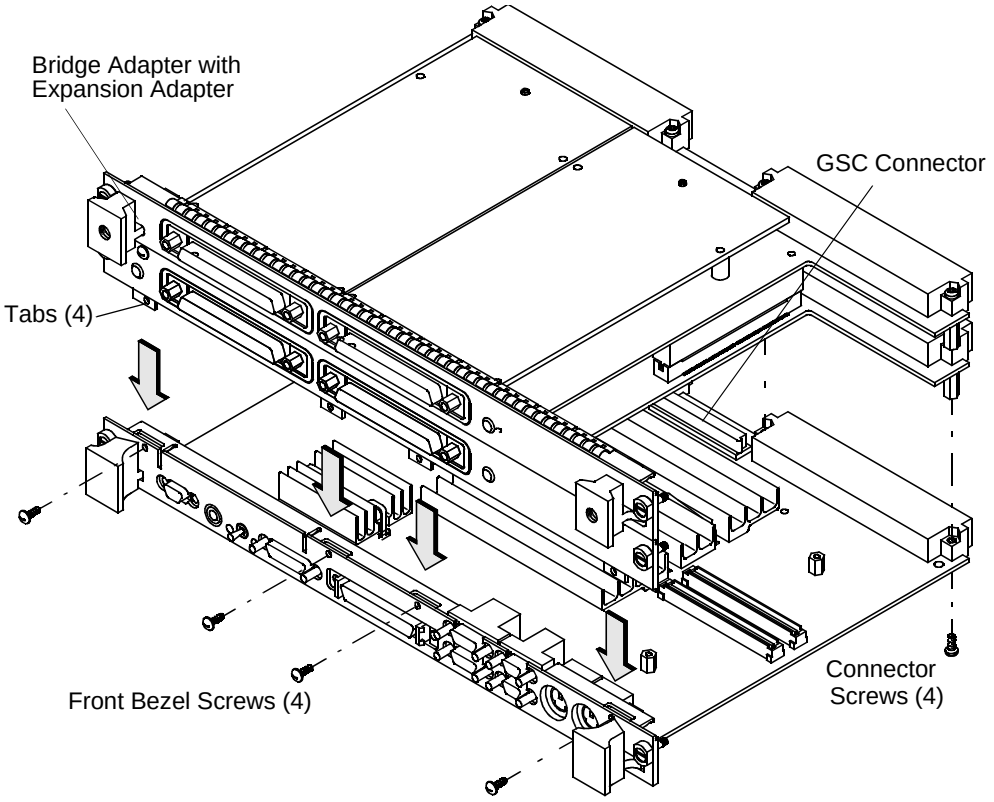


Figure 4-7 Installing the PMC Bridge Adapter onto the Board Computer

Figure 4-8 Installing the Bridge Adapter with the Expansion Adapter onto the Board Computer

PMC Bridge Adapter and Expansion Adapter



12 If you have installed a PMC expansion adapter, resulting in a three board assembly, we recommend that you install the ejector handle sleeves included in your kit.

a Remove the logo and model labels from the ejector handles on your board computer, as shown in Figure 4-9.

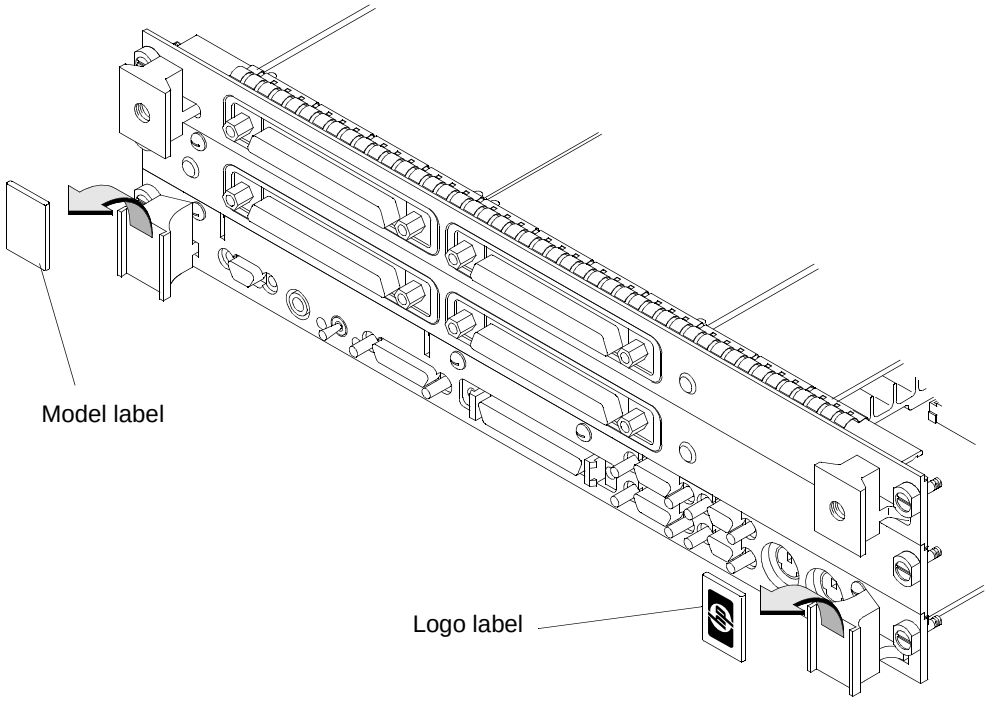


Figure 4-9 Removing Ejector Handle Labels

b Slide the sleeves over each set of handles, as shown in Figure 4-10.

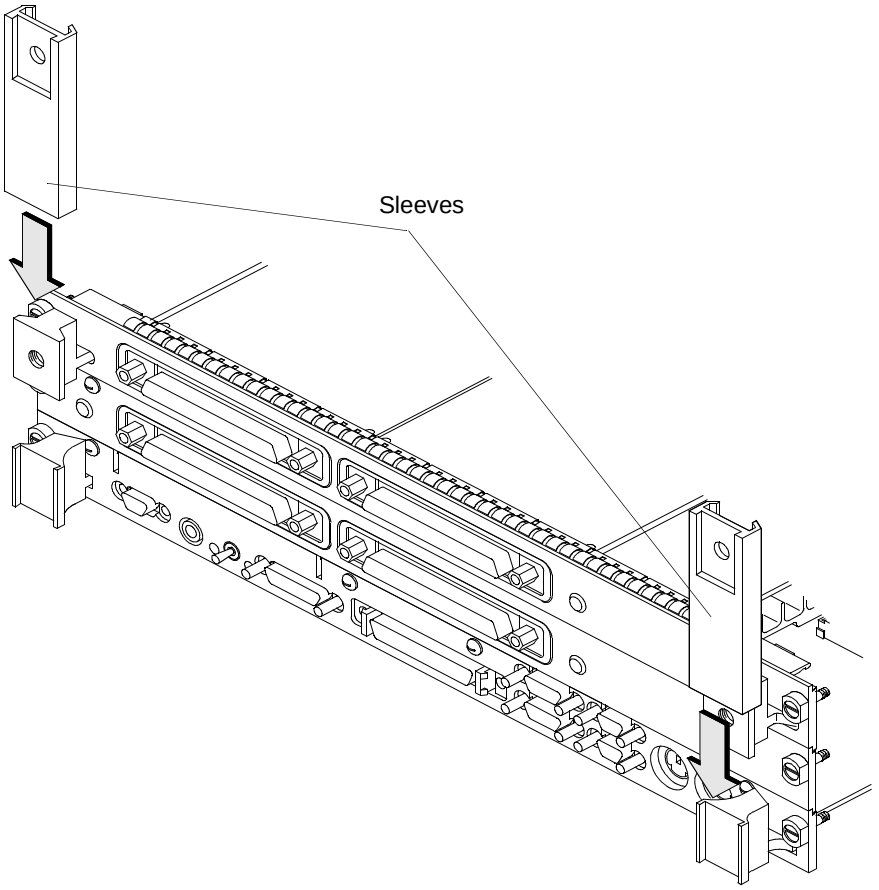


Figure 4-10 Installing Ejector Handle Sleeves

c Thread the springs included in the kit into the ejector handles on the PMC expansion board, and with the springs compressed, slide the labels from the board computer into the sleeves, as shown in Figure 4-11.

NOTE: To properly identify the board computer model and manufacturer, we strongly advise that the original labels from the board computer be placed into the ejector handle sleeves.

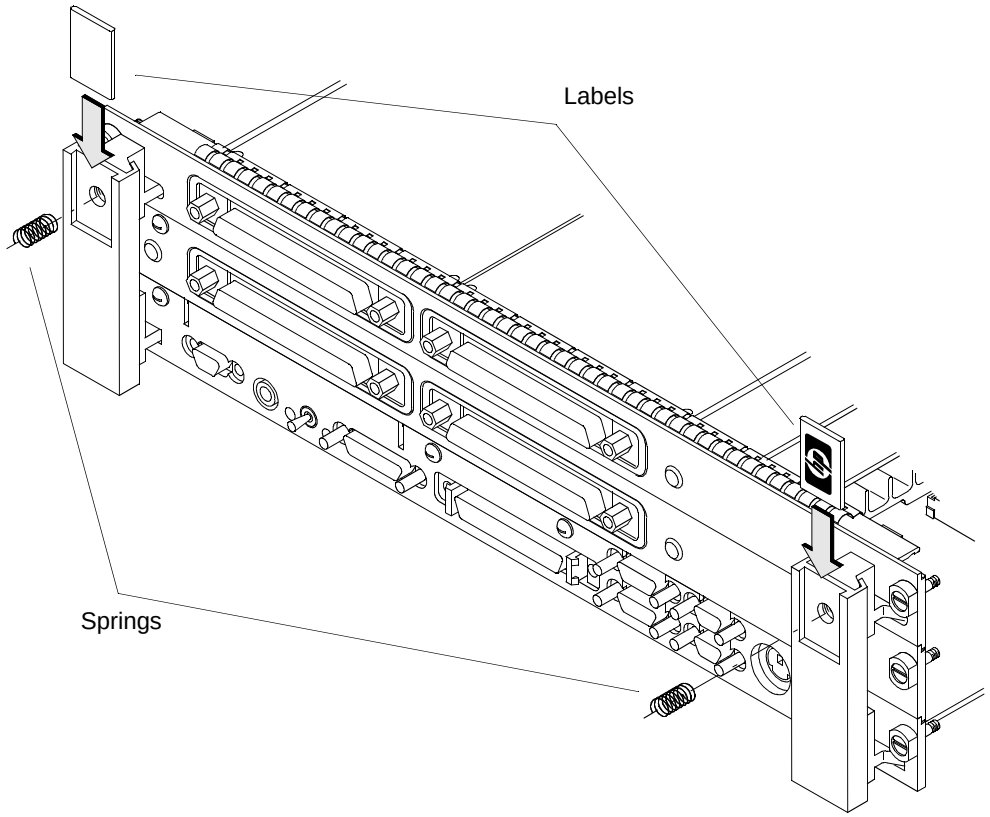


Figure 4-11 Installing the Springs and Labels

13 Remove the slot cover plate(s) from the chassis, as required to open the slots the new assembly will occupy.

14 Insert the board computer with the attached PMC adapter(s) into card cage slots until the assembly seats properly and the front panels are flush against the card cage.

CAUTION: Do not tighten any captive screws until each captive screw has been started to be threaded into its hole.

15 Engage all captive screws before tightening each screw of the board computer and PMC adapter(s). See Figure 4-12.

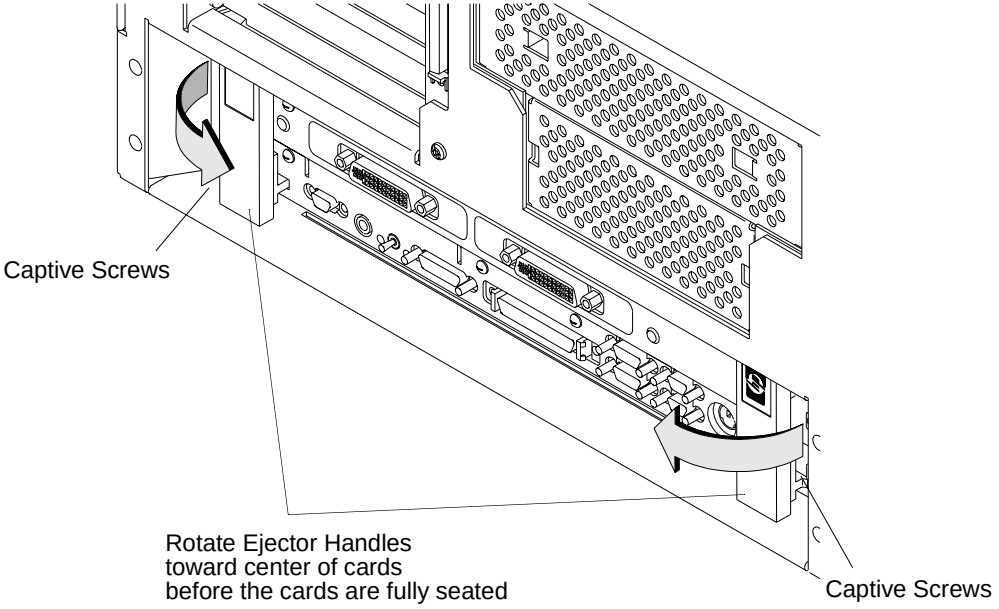


Figure 4-12 Installing the Board Computer with PMC into Chassis

16 Plug in the power cord, and then turn on the power for the chassis and boot the operating system.

17 If your system does not already support PCI cards (through the PCI backplane or PMC bridge board), log in as **root** and use the **SAM** utility to configure the HP-UX kernel for PCI support. (PMC cards require PCI drivers in the kernel.)

18 When SAM has started, choose the Kernel Configuration -> menu.

19 From the Kernel Configuration menu, choose Drivers

20 From the Drivers menu, select GSCtoPCI Driver.

21 Go to the Actions menu and select Add Driver to Kernel.

22 Go to the Actions menu and select Create a New Kernel.

23 When the new kernel is built, SAM asks if you want to move the kernel into place and reboot. Choose **Yes.**

The system reboots with the PCI driver loaded.

5

EISA Card Installation

This chapter describes installing an EISA card in the Model 745 industrial controller.

The major sections within this chapter are:

- EISA Accessory Card Configuration Files
- Hardware Installation

EISA Accessory Card Configuration Files

Four EISA slots are available in the Model 745 equipped with an EISA backplane.

The **man** page *eisa_config*(1M) has current information on installing your EISA card(s) on HP-UX using the **eisa_config** utility.

The configuration for EISA cards is determined when the system reads a file in the following directory:

```
/etc/eisa
```

This directory contains a number of files describing EISA identities and configurations for various systems. A file in this directory applies to your system and contains information as to how many slots are available and how they are identified. Your system will give you an error message should you attempt to address a card having a numerical ID that exceeds the number of EISA slots available on your system.

Hardware Installation

Tools Required

You'll need the following items to access the EISA cards in the Model 745

- No. 1 Posidriv screwdriver
- T-10 or T-15 Torx screwdriver
- Static-free work area.

Procedure

1 Stop any application programs, and then shut down your industrial controller.

2 Turn the industrial controller off, and unplug the power cord.

3 If the system is rack mounted, remove from the rack.

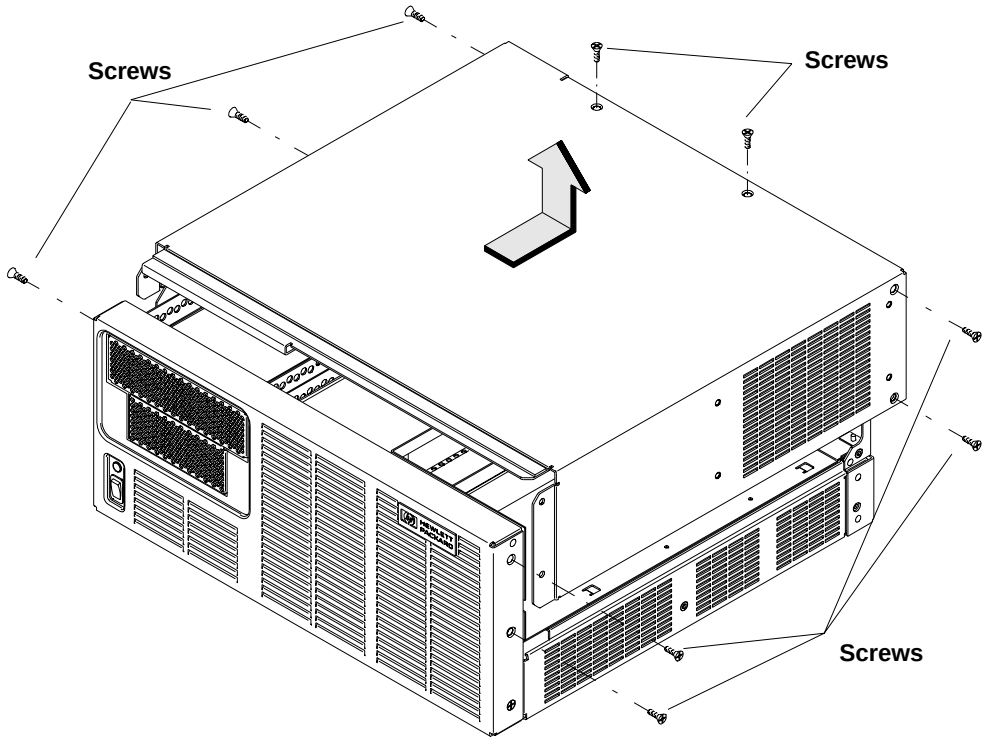


Figure 5-1 **Removing the top cover**

4 Remove the top cover of the system, as shown in Figure 5-1. There are nine screws to remove.

5 Note that the slots are numbered from 1 to 4.

Loosen the torx screw (see Figure 5-2) for the appropriate slot, and then remove the blank slot plate.

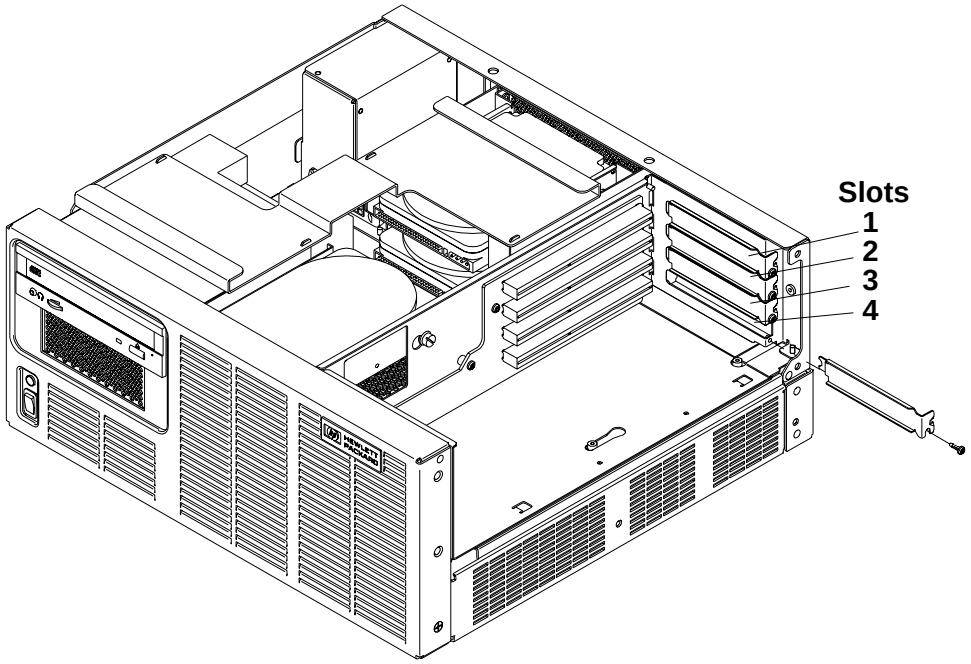
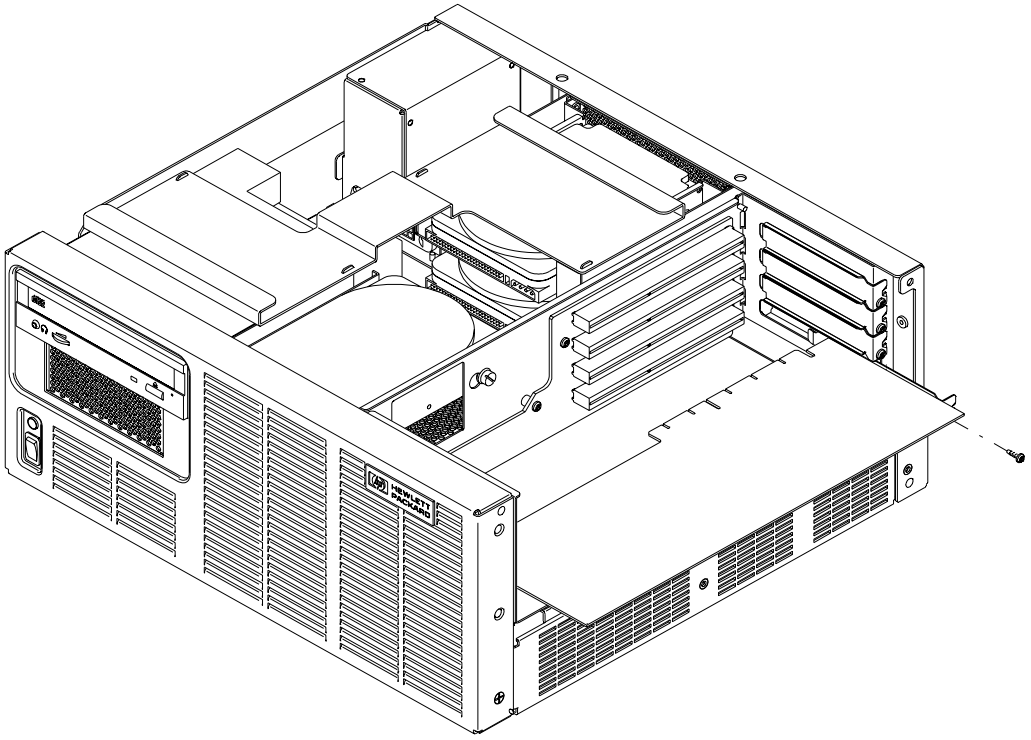


Figure 5-2 **Blank Slot Plate and Screw**

Figure 5-3 **Installing the EISA card and screw**

6 Refer to your EISA card installation manual, and then set any configurations that may be required for your application.

7 Install the EISA card in the slot. Make sure its connector is well seated in the EISA backplane. See Figure 5-3.



NOTE: Note that, due to clearance problems with standard HP-IB cable connectors, EISA HP-IB cards cannot be installed adjacent to each other. If you find it necessary to install an EISA HP-IB card directly over another one, you will have to use low-profile connectors furnished by other manufacturers.

8 Secure the EISA with the screw from the blank plate.

9 Replace the system's top cover.

10 If the system is to be rack mounted, mount it in the rack now.

11 Plug in the power cord, and then turn on the power for the chassis and boot the operating system.

12 Verify the installation by running the Support Tools Manager.

For More Information

Refer to *Configuring HP-UX for Peripherals* and your EISA installation guide for information on the EISA accessory card application, loading the software, and running it.

6

PCI Card Installation

This chapter describes installing a PCI card in the Model 745 industrial controller’s PCI backplane.

The PCI backplane accommodates up to four user installed PCI cards. The PCI cards must be standard +5 Vdc bus signalling cards.

Hardware Installation

Tools Required

You'll need the following items to access the PCI cards in the Model 745

- No. 1 Posidriv screwdiver
- T-10 or T-15 Torx screwdriver
- Static-free work area.

NOTE: This PCI backplane only supports option cards with +5 Vdc bus signalling.

Procedure

1 Stop any application programs, and then shut down your industrial controller.

2 Turn the industrial controller off, and unplug the power cord.

3 If the system is rack mounted, remove from the rack.

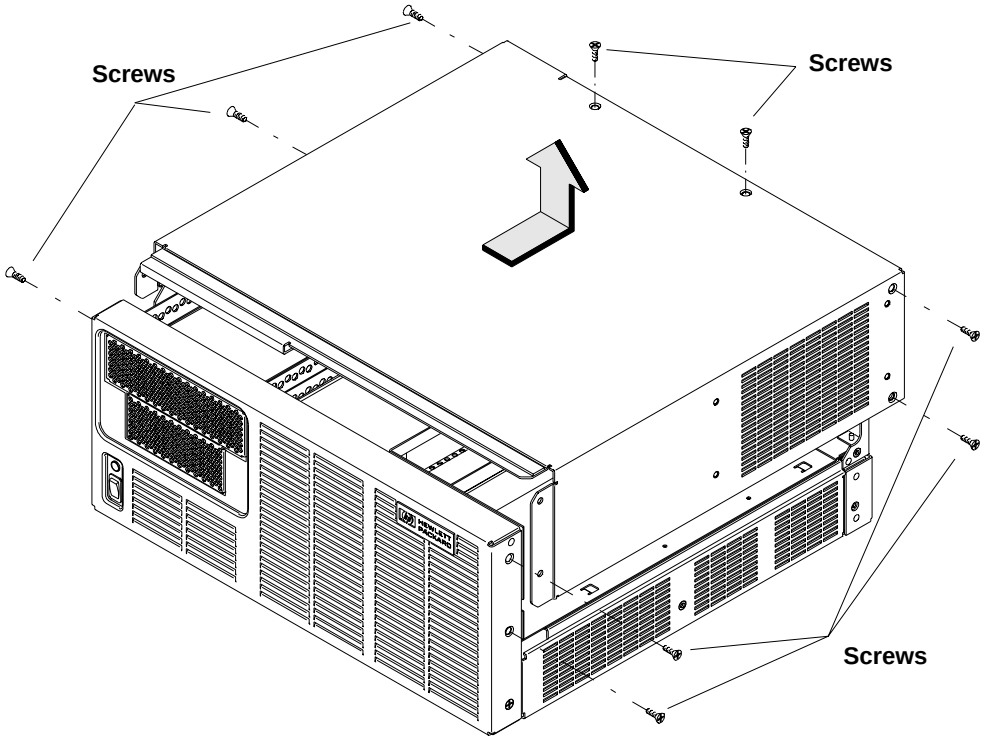


Figure 6-1 **Removing the top cover**

4 Remove the top cover of the system, as shown in Figure 6-1. There are nine screws to remove.

5 Note that the slots are numbered from 1 to 4.

Loosen the torx screw (see Figure 6-2) for the appropriate slot, and then remove the blank slot plate.

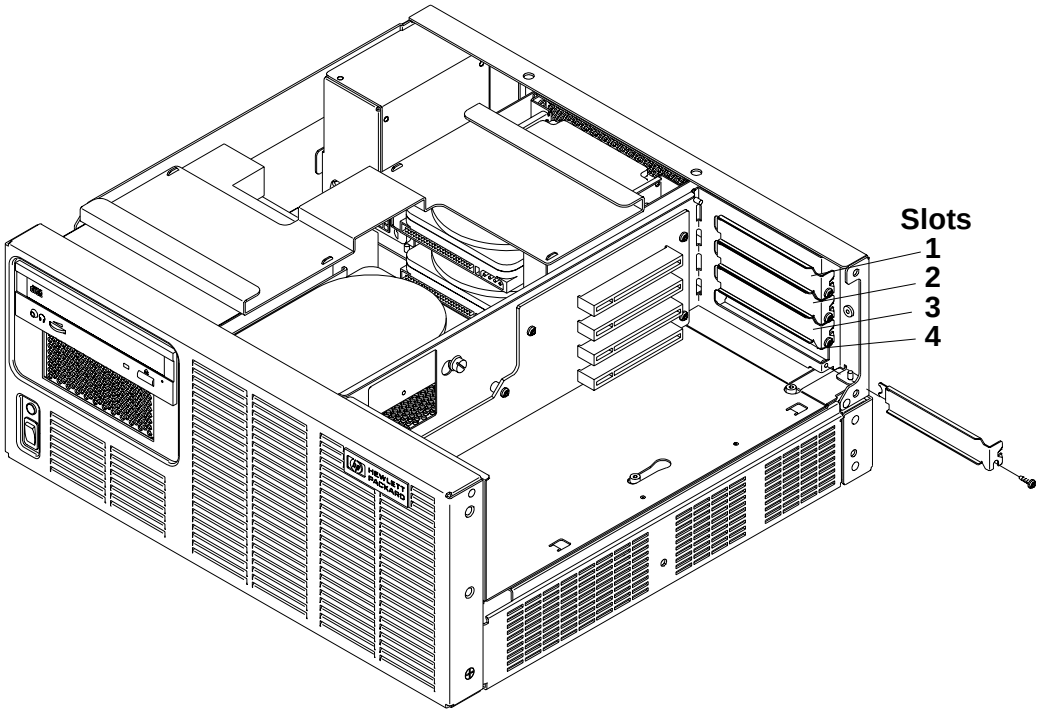


Figure 6-2 Blank Slot Plate and Screw

6 Refer to your PCI card installation manual, and then set any configurations that may be required for your application.

Install the PCI card in the slot. Make sure its connector is well seated in the EISA backplane.

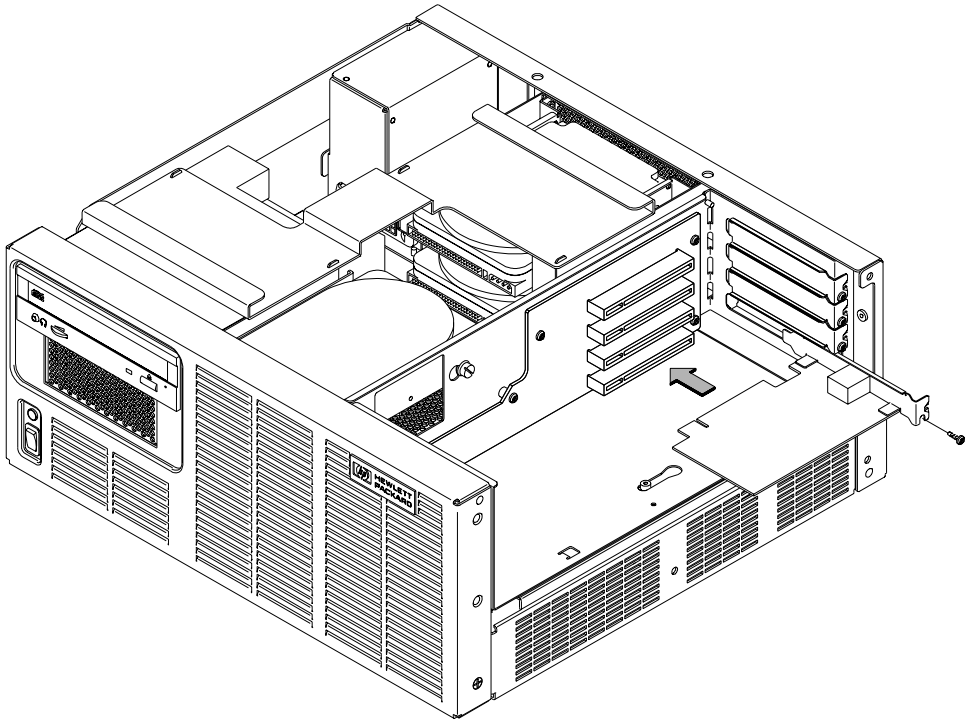


Figure 6-3 **Installing the PCI card and screw**

7 Secure the PCI card with the screw from the blank plate.

8 Replace the system's top cover.

9 If the system is to be rack mounted, mount it in the rack now.

10 Plug in the power cord, and then turn on the power for the chassis and boot the operating system.

11 Log in as **root** and use the **SAM** utility to configure the HP-UX kernel for PCI support, if it is not already configured.

12 When SAM has started, choose the Kernel Configuration -> menu.

13 From the Kernel Configuration menu, choose Drivers

14 From the Drivers menu, select GSCtoPCI Driver.

15 Go to the Actions menu and select Create a New Kernel.

16 When the new kernel is built, SAM asks if you want to move the kernel into place and reboot. Choose **Yes.**

The system reboots with the PCI driver loaded.

For More Information

Refer to *Configuring HP-UX for Peripherals* and your PCI card installation guide for information on the PCI accessory card application, loading the driver software, and running it.

7

Installing and Configuring Mass Storage Devices

This chapter describes installing the mass storage drives in your Model 745 industrial controller.

The major sections within this chapter are:

- Hardware Installation for Drives
- Finding the Status of Existing SCSI Bus Addresses
- Installing Mass Storage Devices
- Configuring for a Hard Disk Drive

Hardware Installation for Drives

The following products are supported for mass storage in the Model 745. The mass storage module can hold up to five drives. All mass storage devices operate on the same single-ended narrow SCSI bus.

There are two locations for a 5.25-inch device (one front facing and one rear facing) suitable for a removable media device or a fixed device. There are also two locations for a 3.5-inch device (one front facing and one rear facing) suitable for a removable media device or a fixed device. In addition, there is one location for a 3.5-inch fixed device. Included with the system are adapter brackets that allow mounting 3.5-inch devices in the 5.25-inch locations.

Table 7-1 Supported Mass Storage Devices

Description
3.5-inch, 4 GB Single-Ended Disk
3.5-inch, 1.4 MB flexible disk drive
3.5-inch, DDS Tape Drive
5.25-inch, CD-ROM Drive

Tools for Installation

Before you start to install a new drive, make sure you have the following tools:

No. 1 Pozidriv screwdriver

T-10 or T-15 Torx driver

Static-free work area

Module Orientations

The Model 745 uses three mass storage bays, with a total capacity of five drives.

Removable media drives can be installed as accessible from either the front or the rear of the chassis.

See Figure 7-1 for factory default drive locations.

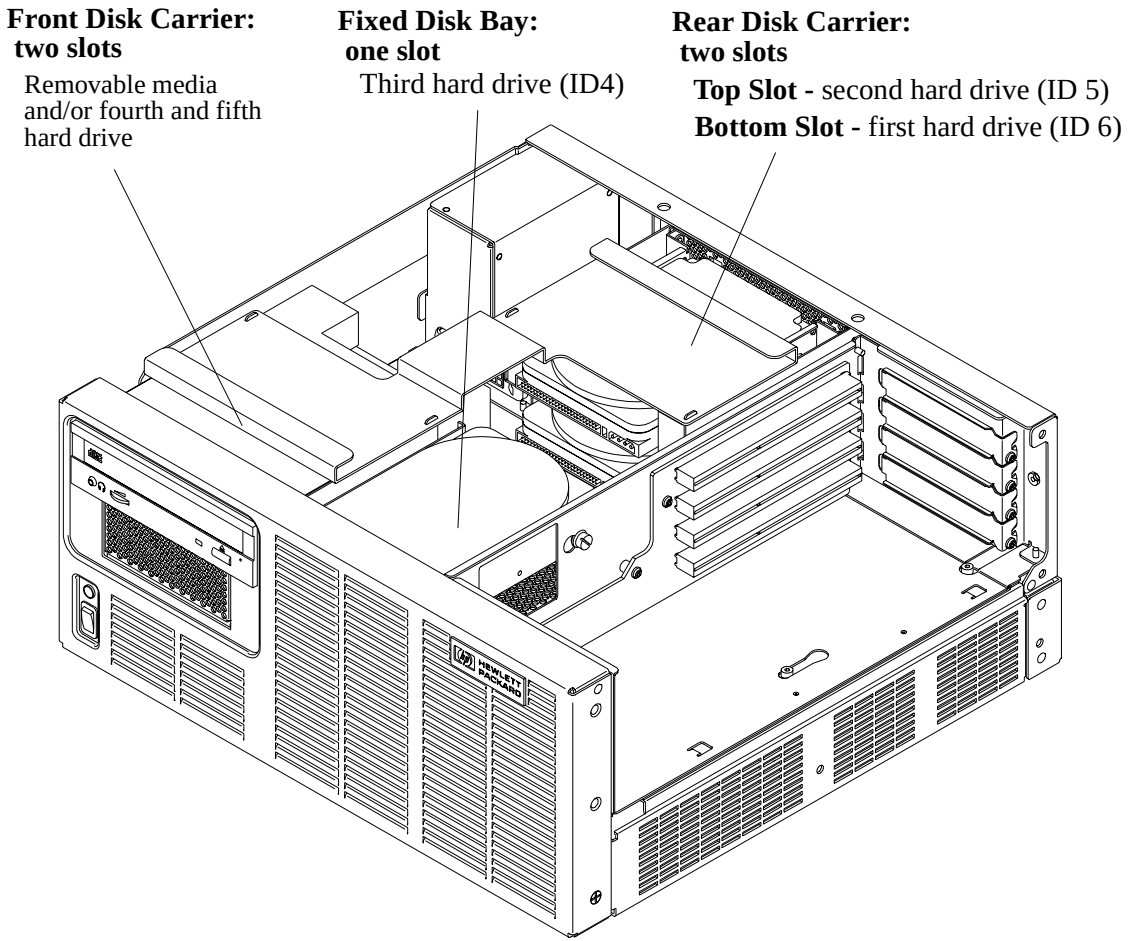


Figure 7-1 **Mass Storage Module: Typical Device Positions**

Finding the Status of Existing SCSI Bus Addresses

Before you install a new SCSI drive, to ensure that the SCSI bus address of your device is currently unused, you can use SAM, or you can use the ioscan tool to help determine which devices are currently connected. Of course, this is especially necessary for a system in which devices have previously been installed. To determine the currently connected SCSI bus IDs, enter the following command line:

/usr/sbin/ioscan -f

The result will be a display of information, similar to the following:

```
Class     H/W Path  Driver  H/W Status  S/W Status  Description
============================================================

   ...
disk       2.0.1.2.0 scsi     ok(0x5800101) ok  TOSHIBA CD-ROM
tape_drive 2.0.1.3.0 scsitape ok(0x1800202) ok  HP  HP35450A
disk       2.0.1.6.0 scsi     ok(0x101)     ok  MICROP  1528
   ...
```

For example, the SCSI bus address for the “MICROP” disk device is in the fourth column of its hardware address as “6” (2.0.1.*6*.0). SAM will help you determine an address for the device when you do the installation.

Use the following table to write down the current SCSI bus addresses:

Current SCSI Addresses and Devices

SCSI Address: _____ Device: _____

SCSI Address: _____ Device: _____

SCSI Address: _____ Device: _____

SCSI Address: _____ Device: _____

Installing Mass Storage Devices

Accessing the Mass Storage Carriers

1. Determine what SCSI bus addresses are in use by following the procedure in the previous section. Be sure to write down this information.
2. Shut down your system by typing **shutdown -h 0 Enter** and responding to the confirmation message.
3. Turn off the power to the Model 745.
4. Unplug the power cable to the Model 745.
5. If the system is rack mounted, remove it from the rack.
6. Remove the system's top cover (described in Chapter 5).

Removing a Device from the Mass Storage Carriers

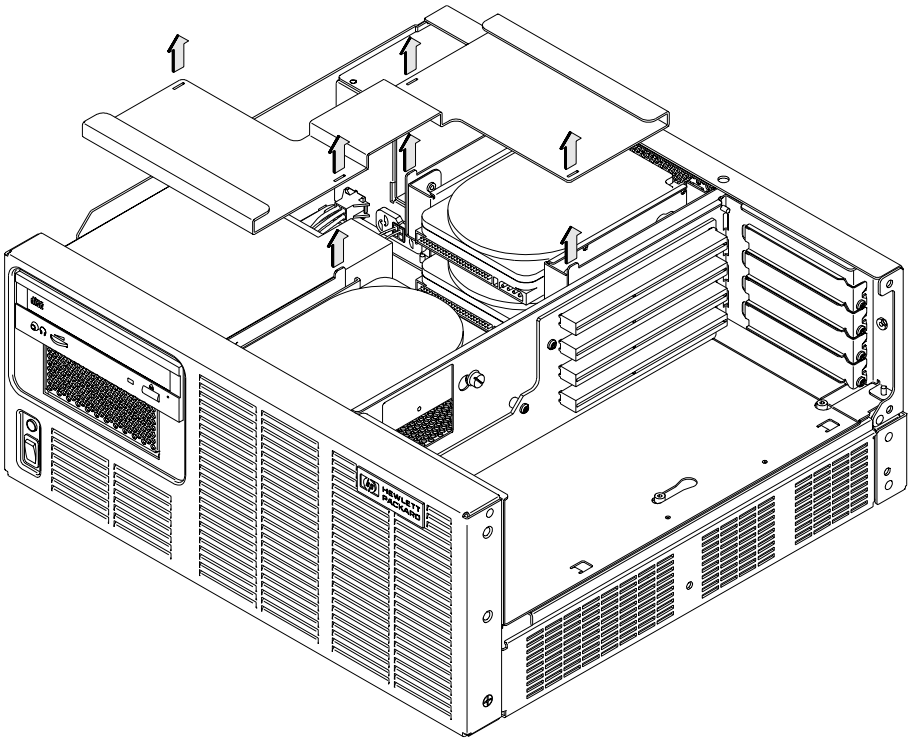
CAUTION: Hard disk drives are vulnerable to physical shock. *Dropping a hard disk drive from even a small height will damage its heads and platters.* Always handle hard disk drives with extreme caution. Do not place a hard disk drive upside down on any surface.

Follow these steps to remove a drive.

1. Remove the disk retainer bracket (see Figure 7-2).

Figure 7-2 Removing Retainer Bracket

2. Unplug power and SCSI cables for the drive.
3. Remove the appropriate disk carrier by pulling it towards the center of the chassis, and then up and out.
4. Loosen the screws for that drive on the sides of the disk carrier.
5. Lift the drive up or slide the drive out of the carrier, depending on its slot position and other drives in the carrier.



6 Repeat this procedure, as needed, if you are removing additional devices

7 If necessary, remove the disk adapter brackets used to mount a 3.5-inch device in a 5.25-inch bay.

Installing a Device in a Mass Storage Carrier

1. Remove the new device from its shipping box
2. Ensure that the hardware SCSI bus address selected on the device is not already used by the system.
3. In the case of a removable media device (flexible disk, CD-ROM, or DDS tape) note any special requirements for bezel installation.
4. Decide where to mount the device, and remove the appropriate disk carrier from the system (to install a disk in the fixed disk bay, you must remove the front disk carrier).
5. If this is a removable media device, remove the appropriate filler panel(s) from the disk carrier.

NOTE: Hard disk drives require special rubber grommets and mounting screws, shipped with the system.

6. If this is a hard disk drive, place the four rubber grommets in the mounting holes, as shown in Figure 7-4.
7. Place the device in the carrier and align the screw holes. See Figure 7-3 though Figure 7-6.

   Adapter brackets are shipped with the system to allow mounting a 3.5-inch device in the upper (5.25-inch) slots of the disk carriers. If these brackets are installed into the disk carriers, you do not need to remove them to install the device. The brackets are packaged seperately if a 5.25-inch device is mounted in this slot.
8. Start, but do not tighten, each mounting screw.

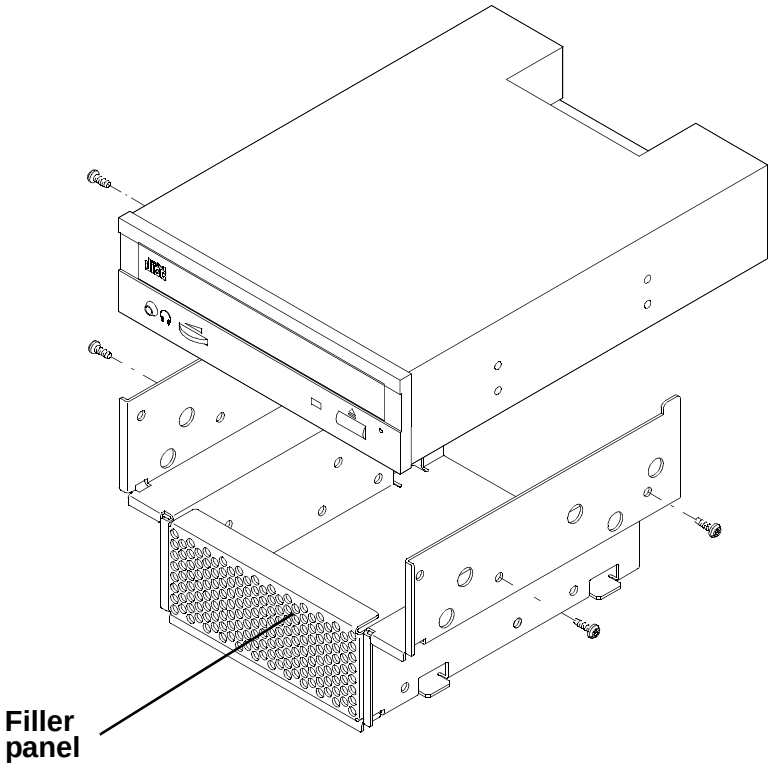


Figure 7-3 Device Installation in the Disk Carrier

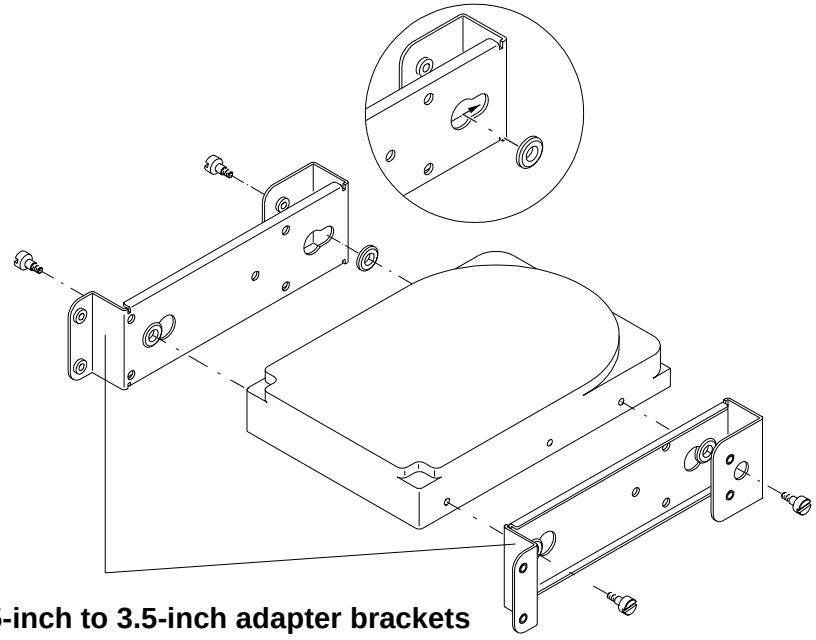


Figure 7-4 Installing the 3.5-inch adapter brackets

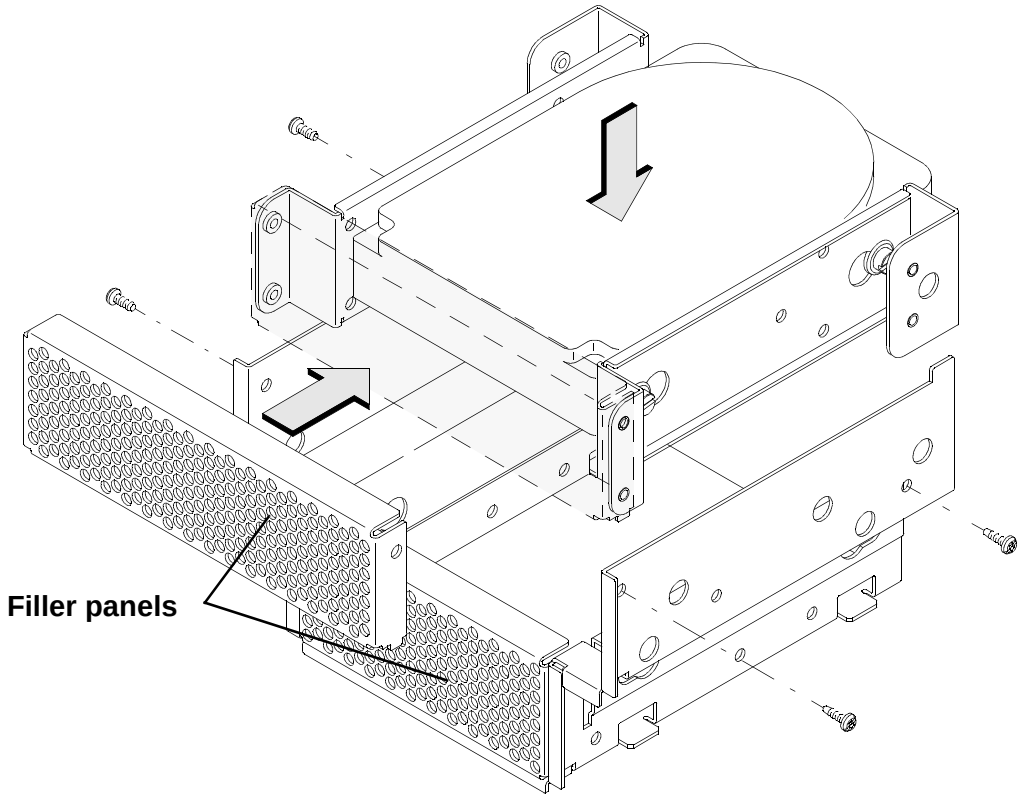


Figure 7-5 3.5-Inch Hard Disk Installation with Filler Panel

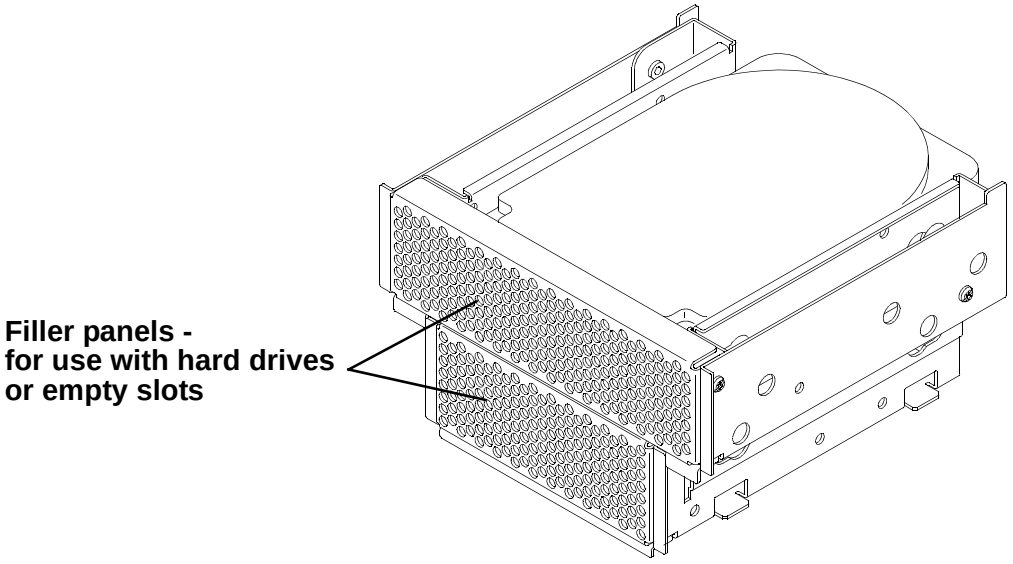


Figure 7-6 Disk Carrier and Filler Panels

9 After all mounting screws are started, tighten the mounting screws.

10 Replace disk carrier into the system. See Figure 7-7.

11 Replace the individual SCSI and power connectors.

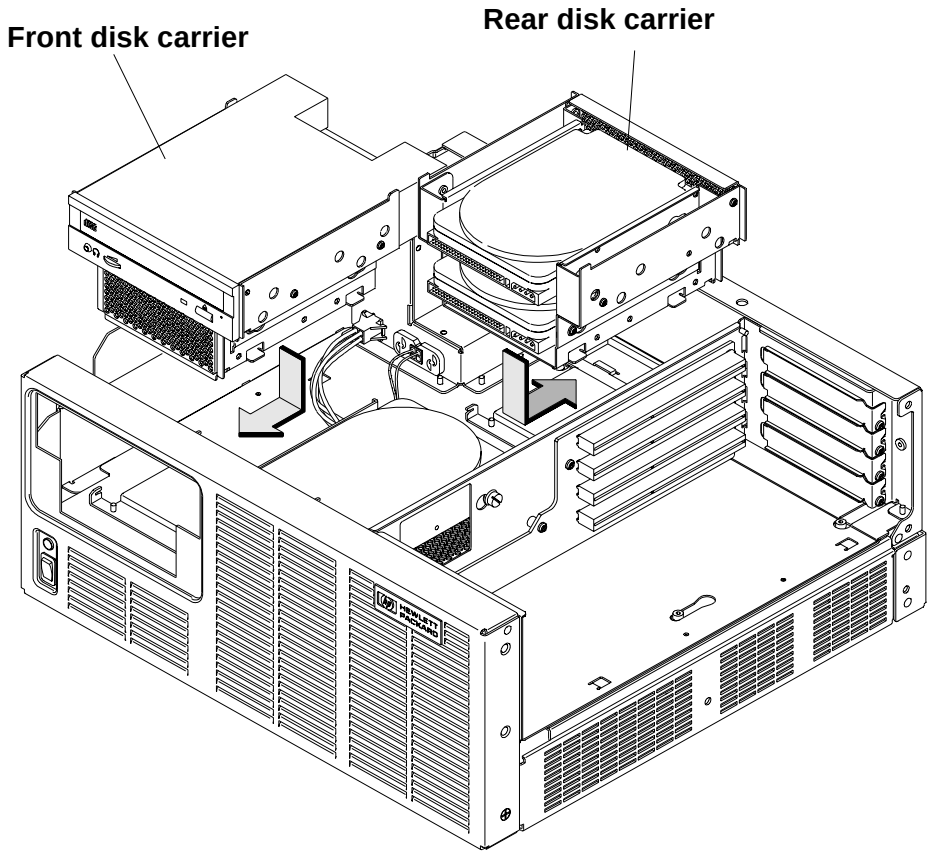


Figure 7-7 Installing the Disk Carriers

12 Replace the retainer bracket. See Figure 7-8.

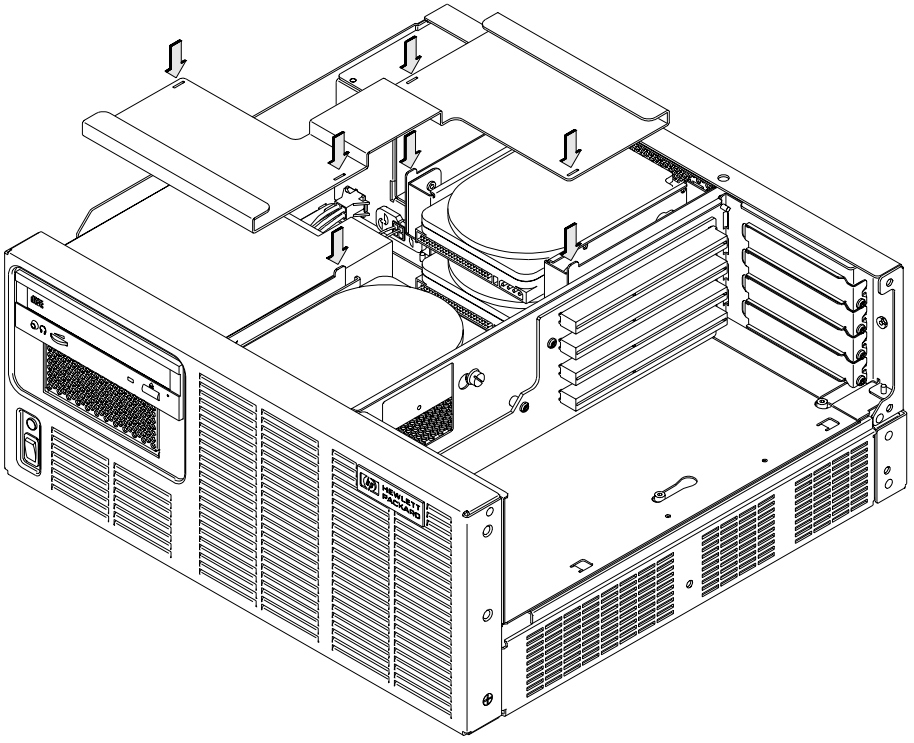


Figure 7-8 Replacing Retainer Bracket

13 Replace the system's top cover.

14 Reconnect the power cable.

15 If the system is to be rack mounted, install into the rack now.

16 Turn on the power and boot the operating system.

Configuring for a Hard Disk Drive

Hard disk drive upgrades can be installed to accommodate local file systems and swap space on your industrial controller.

Software Installation of the Hard Disk Drive Upgrade

After hardware installation has been completed, you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for manually configuring HP-UX to communicate with hard disk drive upgrades, in order to use the disks for mass storage and/or swap space. Note that your HP disk is pre-formatted.

CAUTION: Although the device is well-protected from physical shock when installed in the industrial controller, it is very easily damaged when separate. Avoid dropping or striking a device.

The factory-set SCSI bus address for the disk drive For an upgrade disk drive: SCSI bus address: 6

This SCSI address assumes usage of the disk as **`root`**. Although the configuration jumpers of the drive are factory-installed and should not require reconfiguring, it is possible that the SCSI bus address jumpers for an upgrade may be shipped with different settings. Therefore, please see the Installation Note shipped with the drive and the procedure for resetting jumpers, should it be necessary.

The following list outlines the software procedures you'll find in this section for installing the hard disk drive as a file system disk:

- Verify that you have an unused device file with the correct select code and bus address for your device. (Use SAM).
- Use SAM to:

  Install a disk on HP-UX.

  Build a file system on the disk (done automatically by SAM).

  Mount the disk so that you can access it as a file system.

NOTE: SAM does not support the following:

- Changing the hardware address of a disk drive containing the root file system.
- Changing the hardware address of a disk array.
- Changing the hardware address of a disk that is part of software disk striping.

After hardware installation has been completed, you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for doing this.

1 Run SAM by typing:

```
/usr/sbin/sam Enter
```

Pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.

2 Choose **`Disks and File Systems`** (highlight and click on OK or press Enter).

3 Choose **`CD-ROM, Floppy, and Hard Disks`**.

4 Choose the line identifying the type of new disk you have connected. In the "Use" column, it will be designated as "unused".

5 In the next screen, choose the line identifying the model of the new disk.

If the device you have connected does not appear on the list:

A Check your hardware connections, and make sure that the device is turned on.

B Click on the button **`Device Missing`**, and you will be given the following options:

Have SAM rescan the system for the device. If you have connected the device *after* starting SAM, you should click on **`Yes`**. Otherwise, click on **`No`**.

Respond to the confirmation screen regarding whether the device is connected and powered up.

Respond to the confirmation screen regarding whether additional device drivers are needed. (Unless the kernel has, for some reason, had drivers removed, the drivers needed for a hard disk should currently be in the kernel.)

You will be given an information screen suggesting things to try if the device still cannot be found. If this is the case, you will need to consult the manual *Peripheral Installation Guide*.

After you choose the device, you will see a form giving three tasks:

1 **`Select a Disk to Add`**. (You have already done this).

2 **`Set Disk Usage and Options`**.

3 **`Modify Defaults`**.... (This task is optional).

Choose: **`Set Disk Usage and Options`**.

1 On the form which appears, select how you want to use the disk ("File System", or other usage).

2 Click on OK when you have finished with this form.

3 A "Messages" Box appears, reporting the progress of the task. When the task is finished, click on **`OK`**.

4 Exit SAM. (SAM copies your original **/etc/checklist** to **/etc/checklist.old**).

Testing Your Installation

A simple test to make certain that the drive has been installed correctly (whether it is mounted or not) is to execute the command **`diskinfo`**, using the appropriate character device file name as the argument. For example:

diskinfo /dev/rdsk/c201d5s0

If the disk is installed correctly, diskinfo will display a listing of information about it, such as the following:

```
SCSI describe of /dev/rdsk/c201d5s0

          vendor: Quantum
      product id: XXXXXXX
            type: direct access
            size: 200000 Kbytes
bytes per sector: 512
```

After mounting a new disk on a directory, an ll listing of the directory should give you at least one file or directory entry. For example:

```
total 1024

drwxr-xr-x 2 root root 8192 Aug 31 15:24 lost+found
```

8

Using Mass Storage Devices

Using your CD-ROM Drive

This section describes how to use your CD-ROM drive. It is divided into the following subsections:

- CD-ROM drive and CD-ROM media descriptions
- Operating the CD-ROM Drive
- Mounting and unmounting a CD-ROM disc
- Troubleshooting

NOTE: Be sure you read and understand the information on mounting and unmounting CD-ROM discs before you begin using your CD-ROM disc drive.

This chapter provides an overview of the optional CD-ROM drive and media, and describes how to use the CD-ROM drive. We assume the CD-ROM drive is set to the factory default address of SCSI ID 2.

NOTE: Some procedures in this chapter require you to log in as root. If you cannot log in as root, contact your system administrator.

CD-ROM Drive and CD-ROM Media Descriptions

This section describes basic information needed for using the CD-ROM drive and CD-ROM discs.

CD-ROM Drive

The CD-ROM drive is a random access read-only mass storage device that uses removable CD-ROM discs. The drive supports the ISO 9660 and High Sierra format standards. You can access information from the drive like any other disk drive, except that you cannot write to the drive. The drive contains a semiconductor laser for reading data optically, and includes an embedded controller with a SCSI interface.

Controls and Features

Figure 8-1 shows and Table 7-1 describes the operating controls and features of the CD-ROM drives.

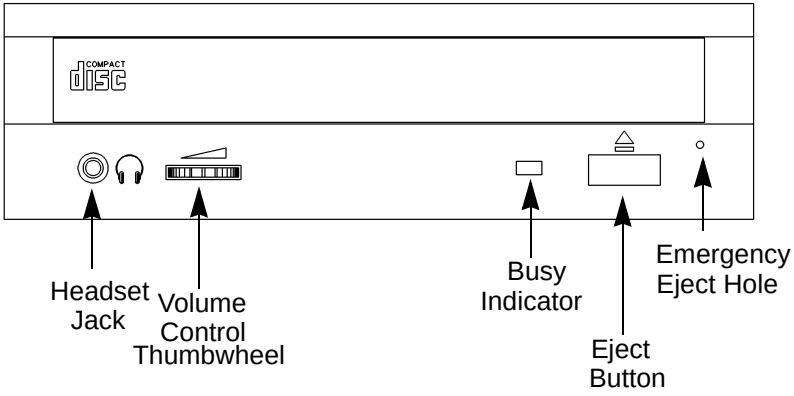


Figure 8-1 CD-ROM Drive Controls and Features

Table 7-1 CD-ROM Controls and Features

Control/Feature	Purpose
Headset Jack	You can plug mini-headphones with a 3.5-mm diameter miniature stereo plug into this jack.
Volume Control	Use the volume control to adjust the audio output volume to the headset jack.
Busy Indicator	The Busy Indicator lights during a data access operation and blinks during a data transfer. The indicator blinks initially and then stays lit when there is one of the following: • A defective disc • A disc insertion error (for example, an upside-down disc) • No disc present
Eject Button	Press the Eject Button to open the Disc Tray and insert or remove a disc. When the drive is in use, you must press the eject button for more than one second to open the Disc Tray.
Emergency Eject	By removing the Phillips type screw and inserting the end of a paper clip, you can open the Disc Tray when the workstation does not have power.

NOTE: The Volume Control, Headset Jack, and Audio Jack features of the CD-ROM drive are supported through applications only.

CD-ROM Media

CD-ROM discs are 120 mm (4.7 in.) in diameter, and use one data surface with a capacity of approximately 600 megabytes. The data surface contains pits and flat spots arranged in a continuous spiral track, which is read at a constant speed. You may access files and data stored on a CD-ROM disc, but you may not write files or data to a CD-ROM disc.

CD-ROM data discs are identical to audio compact discs (CDs) except that they store computer data and information.

CAUTION: Handle CD-ROM discs by the edges only. Always be sure a CD-ROM disc is either in the CD-ROM drive or its protective case when not in use. This will lessen the chance of exposing the disc surface to dust. Over time, dust reduces the reliability of the read head in the CD-ROM drive.

Caring for CD-ROM Discs

Observe the following guidelines to help prevent data loss and prolong the life of your CD-ROM discs and drive:

- Use CD-ROM discs in a clean environment to prevent dust particles from scratching disc surfaces.
- Store CD-ROM discs in a cool, dry place to prevent moisture and heat damage.
- Don't try to clean the surface of a CD-ROM disc with cleaning solvents, as some cleaning solvents may damage the disc.

NOTE: You must mount the disc after loading it into the drive. Refer to the section "Mounting and Unmounting a CD-ROM Disc," later in this chapter, for instructions about mounting a disc.

Operating the CD-ROM Drive

This section describes how to perform tasks with your CD-ROM drive.

Loading and Unloading a CD-ROM in the Disc Tray

This subsection describes how to load or unload a CD-ROM disc in the CD-ROM drive.

Disc Tray Description

This CD-ROM is designed to be used in either the horizontal or vertical position, depending on whether your system unit is horizontal or vertical (in the floor stand). The disc tray has four disc holders that hold the disc in place when the CD-ROM drive is in the vertical position. When the drive is in the horizontal position, the disc holders are not used and are held out of the way by four disc holder retainers. Figure 8-2 shows the CD-ROM disc tray, and disc holders.

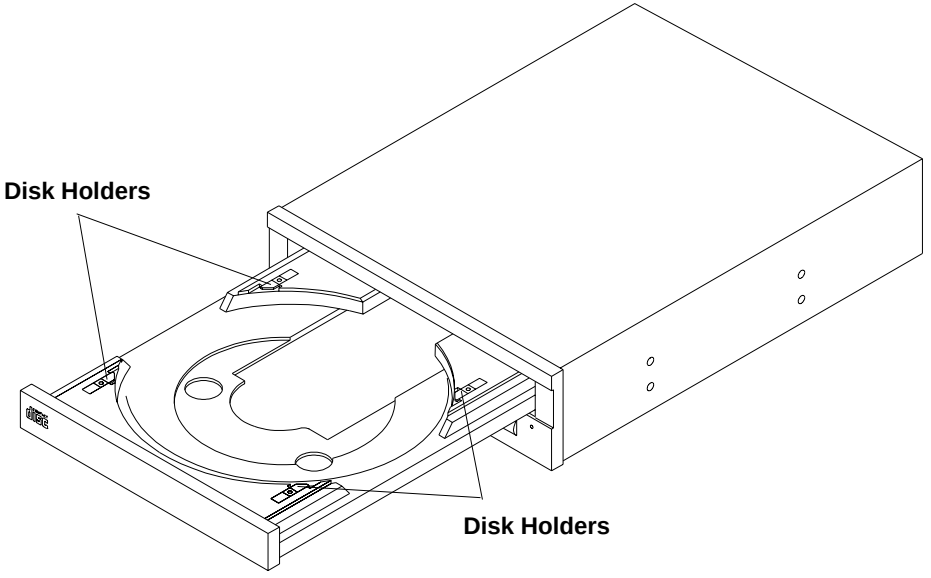


Figure 8-2 **CD-ROM Disc Tray**

Loading a CD-ROM Disc

This CD-ROM drive has an automatic loading/ejecting feature. To load a disc in the CD-ROM drive, follow these steps:

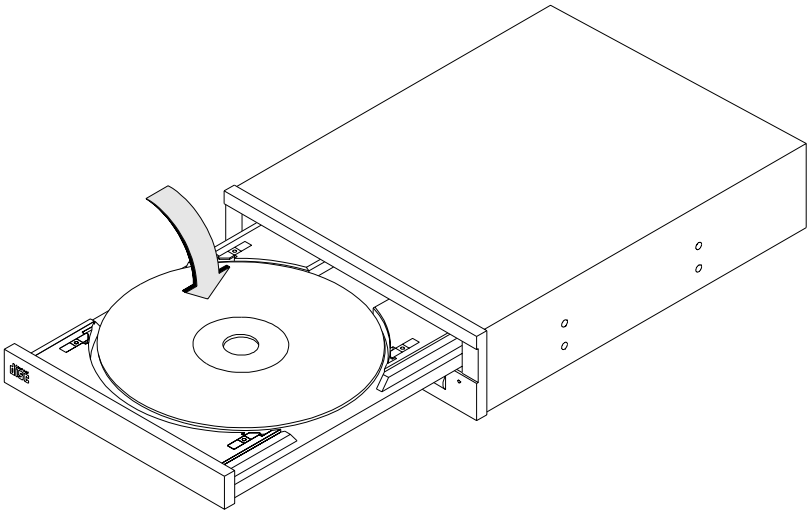


Figure 8-3 **Placing a CD-ROM Disc in a Drive**

1. Check that the workstation is powered on.
2. To open the disc tray, press and release the load/eject button on the CD-ROM drive.
3. Be sure the disc holders are slid away from the disc.
4. Hold the disc by the edges with the label side up and place it in the disc tray as shown in Figure 8-3.
5. To close the disc tray, push the front of the disc tray gently towards the drive until it closes by itself.

Unloading a CD-ROM Disc

Perform the following steps to unload a disc from the CD-ROM drive:

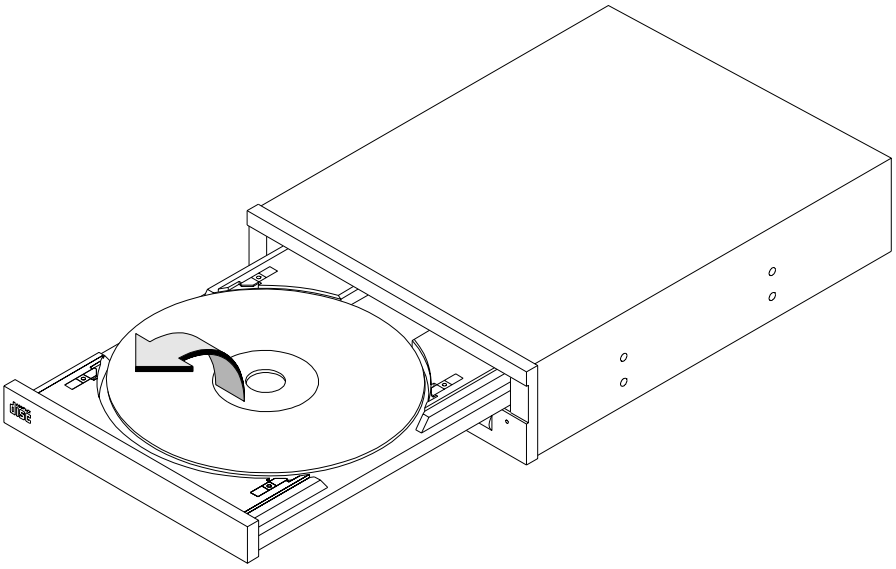


Figure 8-4 **Removing a CD-ROM Disc From a Drive**

1. Press the eject button to eject the disc tray from the drive. If the drive is in use, you must press the eject button for more than one second to eject the disc tray.

NOTE: You must unmount the disc before ejecting it from the drive. Refer to the subsection, "Unmounting a CD-ROM Disc Using SAM," for instructions on unmounting a disc.

2. Wait until the drive has fully ejected the disc tray, then remove the disc from the tray as shown in Figure 8-4. Be careful to touch only the edges of the disc.
3. To close the Disc Tray, push the front of the disc tray gently towards the drive until it closes by itself.

Verifying the CD-ROM Drive Operation

To verify that your workstation can communicate with the CD-ROM drive, follow these steps:

1 In a terminal window, enter the following command:

/usr/sbin/ioscan -d sdisk **Enter**

After a few moments the ioscan utility lists all of the SCSI I/O devices it could find. The list appears similar to the following:

```
H/W Path    Class      Description
============================================
          bc
8           bc         I/O Adapter
8/12        ext_bus    GSC built-in Fast/Wide SCSI Interface
8/12.0      target
8/12.0.0    disk       QUANTUM LPS1080WD
8/12.5      target
8/12.5.0    disk       DEC     DSP3210SW
8/12.6      target
8/12.6.0    disk       DEC     DSP3210SW
8/16        ba         Core I/O Adapter
8/16/5      ext_bus    Built-in SCSI
8/16/5.2    target
8/16/5.2.0  disk       TOSHIBA CD-ROM XM-4101TA
8/16/5.4    target
8/16/5.4.0  disk       SEAGATE ST3600N
8/16/5.6    target
8/16/5.6.0  disk       MICROP  2112
10          bc         I/O Adapter
10/12       ext_bus    GSC add-on Fast/Wide SCSI Interface
10/12.4     target
10/12.4.0   disk       SEAGATE ST31200W
```

If ioscan does not see your CD-ROM drive it returns the following message:

```
ioscan: No hardware found
```

If you receive this message, go to Chapter 9, “Dealing With Problems.”

Mounting and Unmounting a CD-ROM Disc

To access information on a CD-ROM disc, you must first mount the disc. This applies to file system information only. If you wish to load a music CD, for example, you would not need to mount the disc. Mounting a disc with file system information on it gives the disc a pathname that allows your workstation to communicate electronically with it. You must unmount the CD-ROM disc before removing it from the drive.

CAUTION: To use a CD-ROM disc as a mounted file system, you must mount the CD-ROM disc every time you load it into the drive. You must also unmount the CD-ROM disc every time you unload it from the drive. Failure to mount or unmount a disc can cause a system error condition that can require rebooting the system.

If your workstation is running HP CDE or HP VUE, follow these instructions to mount and unmount a CD-ROM disc as a file system. If you're using something other than HP VUE, use the instructions for mounting and unmounting a CD-ROM disc that come with that product. For more information on configuring your CD-ROM drive, see the *System Administration Tasks* manual or online help.

The procedures in this chapter require you to log in as root. If you cannot log in as root, contact your system administrator.

Mounting a CD-ROM Disc Using SAM

Use the following procedure to mount a CD-ROM disc:

1. Log in as root. If you need information on logging in or setting up a user account, see *Using Your HP Workstation.*
2. Load the CD-ROM disc into the disc tray and gently push the tray into the drive.
3. Invoke the System Administration Manager (SAM) either through an HP CDE or HP VUE toolbox or the command line of a terminal window:

   sam **Enter**

The system responses you receive depend on the release of HP-UX.

4 The System Administration Manager window opens. Double-click on Peripheral Devices ->.

5 The Peripheral Devices window opens. Double-click on Disks and File Systems ->.

6 The Disks and File Systems window opens. Double-click on Disk Devices (or CD-ROM, Floppy, and Hard Disks).

The following screen message appears:

Scanning the system's hardware...

The Disk Devices (or CD-ROM, Floppy, and Hard Disks) window opens containing a list of drives currently configured on this system. Disks that are unmounted will have the word "unused" in the Use column.

7 From the Actions menu, click on Add (or Add a Hard Disk Drive)

8 The Select a Disk to Add... window opens with a list of unused disks. Highlight the CD-ROM disc you want to mount.

9 Click on **OK**.

10 A window appears asking you if the disc is part of the Logical Volume Manager. Choose Without.

11 You then must to provide a pathname for mounting the disc, after which you click on **OK**.

12 The following screen messages appear:

```
Task started.
Creating the device file...
Mounting file system...
Modifying "/etc/checklist"...
Task completed.
```

Click on **OK**.

Now you can access the CD-ROM disc as you would any other mounted file system.

Unmounting a CD-ROM Disc Using SAM

Use the following procedure to unmount a CD-ROM disc:

NOTE: Before you unmount a CD-ROM disc, make sure that your working directory (the directory in which a relative path name search begins) is set to some directory other than the one under which the disc was mounted.

CAUTION: If you wish to use a CD-ROM disc as a mounted file system, you must mount the CD-ROM disc every time you load it into the drive. You must also unmount the CD-ROM disc every time you unload it from the drive. Failure to mount or unmount a disc may cause a system error condition that may require rebooting the system.

1. Log in as root. If you need information on logging in or setting up a user account, see Using Your HP Workstation.
2. In a terminal window, enter the following command:

   sam **Enter**

3. The System Administration Manager window opens. Double-click on Peripheral Devices ->.
4. The Peripheral Devices window opens. Double-click on Disks and File Systems ->.
5. The Disks and File Systems window opens. Double-click on CD-ROM, Floppy, and Hard Disks.

   The following screen message appears:

   Scanning the system's hardware...

   The CD-ROM, Floppy, and Hard Disks window opens containing a list of drives currently configured on this system.
6. Highlight the disc you want to unmount and click on Remove a Hard Disk Drive from the Actions menu.
7. A window with the following message opens:

   Do you want to remove the disk?

   Click on **Yes**.

8 Press the eject button on the CD-ROM drive and remove the CD-ROM disc from the disc tray.

Reading the Busy Light

The CD-ROM busy light shows the status of the drive during the self test and during activity with the host system.

The CD-ROM drive performs the self test when one of the following happens:

- You load a disc and close the Disc Tray.
- You turn on the system with a disc already loaded in the CD-ROM drive.

For the self test, the busy light operates in the following sequence:

1 Light On - The busy light goes on as the disc loads into the drive.

2 Light Flashing - The light flashes while a read test is performed.

3 Light Off - The light goes off when the self test is complete.

The busy light stays on after the self test when one of the following conditions exist:

- A defective disc
- A disc insertion error (for example, an upside-down disc)
- No disc present

The busy light goes off when one of the following conditions exist:

- A CD-ROM drive power failure exists.
- The drive is idle on the SCSI bus.
- No media is mounted

The busy light flashes:

- during normal activity with the system.
- at a 3.2 second interval when disk or optics cleaning is required
- at a 1.6 second interval when playing an audio track.

DDS Tape Drive and Data Cassette Descriptions

This section describes how to use the optional Digital Data Storage (DDS) tape drive. It also describes how to maintain and care for the drive.

This chapter provides information on the following:

- DDS tape drive and data cassette descriptions
- Operating the DDS tape drive
- Ordering information

CAUTION: Use only data cassettes labeled DDS (Digital Data Storage). Never use audio cassettes labeled DAT (Digital Audio Tape) in your DDS-format drive.

DDS Drive

Your DDS tape drive is a DDS-2 tape drive with a 3.5-inch form factor, data compression, and a single-ended SCSI interface. Tbe drive incorporates data compression capability and are high-capacity, high transfer-rate devices for data storage on tape. With compression, the DDS-2 drive can store up to 8 GB of data on a 120 meter tape.

Storage Capacities

The maximum storage capacities of different DDS drives with and without data compression are shown in Table 7-2 and Table 7-3.

Table 7-2 DDS Tape Drive Capacities Without Data Compression

Tape Length	Full Height 5 1/4 DDS Tape Drive¼	DDS-DC Tape Drives	DDS-2 Tape Drive	DDS-3 Tape Drive
60 meter	1.3 GB	1.3 GB	1.3 GB	1.3 GB
90 meter	Not Supported	2.0 GB	2.0 GB	2.0 GB
120 meter	Not Supported	Not Supported	4.0 GB	4.0 GB
125 meter	Not Supported	Not Supported	Not Supported	12.0 GB

Table 7-3 DDS Tape Drive Capacities With Data Compression

Tape Length	Full Height 5 1/4 DDS Tape Drive¼	DDS-DC Tape Drives	DDS-2 Tape Drive	DDS-3 Tape Drive
60 meter	2.6 GB	2.6 GB	2.6 GB	2.6 GB
90 meter	Not Supported	4.0 GB	4.0 GB	4.0 GB
120 meter	Not Supported	Not Supported	8.0 GB	8.0 GB
125 meter	Not Supported	Not Supported	Not Supported	24.0 GB

Controls and Indicators

Figure 8-5 shows the LEDs and eject button of the DDS-format tape drives.

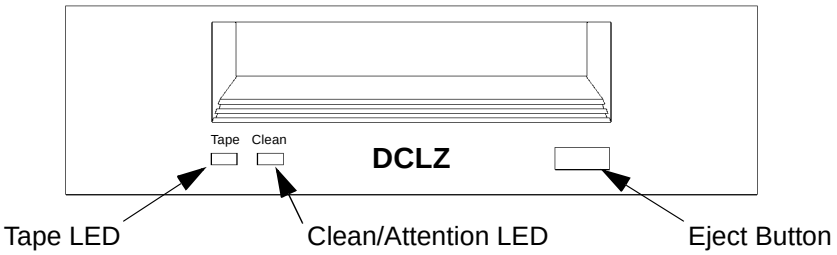


Figure 8-5 Tape Drive Controls and Indicators

LEDs

This section describes the LED codes that are displayed.

The two LEDs on the front panels of the DDS drive indicate different activities or problems that occur.

Figure 8-6 lists the LED codes and their meanings

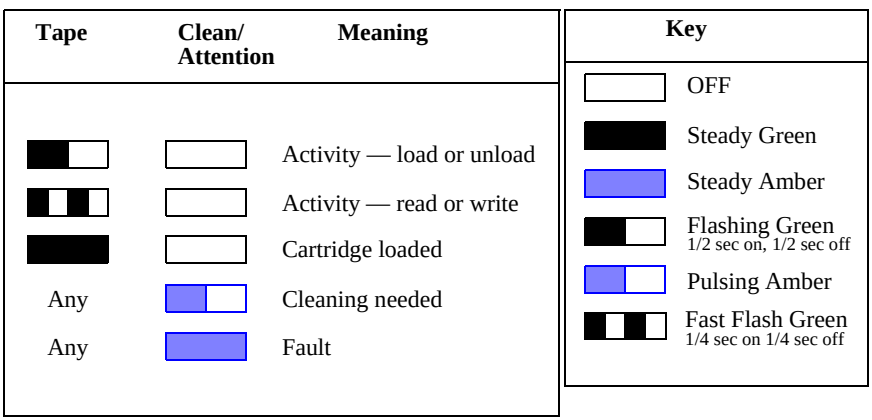


Figure 8-6 Tape Drive LED Display Codes

LED Warning Conditions

The following sections describe actions to take if the LEDs indicate a warning condition.

High Humidity If the LEDs display the high humidity signal, the humidity is too high. The drive does not perform any operations until the humidity drops.

Self-Test (Failure) If the LEDs display the self-test (failure) signal, a fault was diagnosed during the self tests. Note the pattern of the pulses and contact your local service representative.

Media Wear (Caution) Hewlett-Packard DDS drives continually monitor the number of errors they have to correct when reading and writing to a tape to determine tape wear and tape head cleanliness. If excessive tape wear or dirty tape heads are suspected, the drive warns you by displaying the Media Wear (Caution) signal on the LED indicators.

If the LED indicators on your DDS-format drive display the Media Wear (Caution) condition, follow this procedure:

1. Check the system console for any tape error messages. A hard error during a read or write operation may have occurred.
2. Clean the heads with a cleaning cassette (HP92283K) as described in "Cleaning the Tape Heads," later in this chapter.
3. Repeat the operation you performed when the Media Wear (Caution) signal displayed. If the Media Wear (Caution) signal still displays, then the data cassette should be replaced.
4. If you are performing a backup from disk to tape, discard the data cassette and back up your files using a new data cassette.
5. If you are performing a restore from tape to disk, complete the restore, back up the files to a new data cassette, then discard the data cassette.

Data Cassettes

Media Life

HP DDS data cassettes are currently specified to 2000 passes over any part of the tape under optimal environmental conditions (50% relative humidity, 22 degrees C). During a tape operation, any one area of the tape may have multiple passes over the heads. This translates into approximately 200 to 300 backups or restores.

Under certain conditions, the life of your data cassette is less. Replace your data cassettes after 100 backups or restores if your operating conditions meet any of the following criteria:

- The relative humidity in your operating environment is consistently less than 50%.
- You know that the backup software you are using makes multiple passes over sections of the tape during backups or restores.
- You notice that when you do backups and restores the tape stops and starts frequently.

Cleaning the Tape Heads

Clean the heads of your tape drive after every 25 hours of tape drive use or if the Media Wear (Caution) signal is displayed on the LED.

NOTE: Only use HP Cleaning Cassettes (HP92283K) to clean the tape heads. Do not use swabs or other means of cleaning the tape heads.

Follow this procedure to clean the tape heads:

1. Insert the cleaning cassette into the drive. The tape automatically loads the cassette and cleans the heads. At the end of the cleaning cycle, the drive ejects the cassette.
2. Write the current date on the label on the cleaning cassette so that you know how many times you have used it. Discard the cleaning cassette after you have used it 25 times.

Media Restrictions

If you interchange media between other DDS-format tape drives, note that data cassettes with compressed data can only be read by tape drives that have data compression capabilities. This includes data cassettes that contain both compressed and noncompressed data.

Setting the Write-Protect Tab on a Data Cassette

You can only store or change information on a data cassette when the write-protect tab is in the write position. So, before trying to write to the data cassette, make sure that the write-protect tab is in the write position, as shown in Figure 8-7.

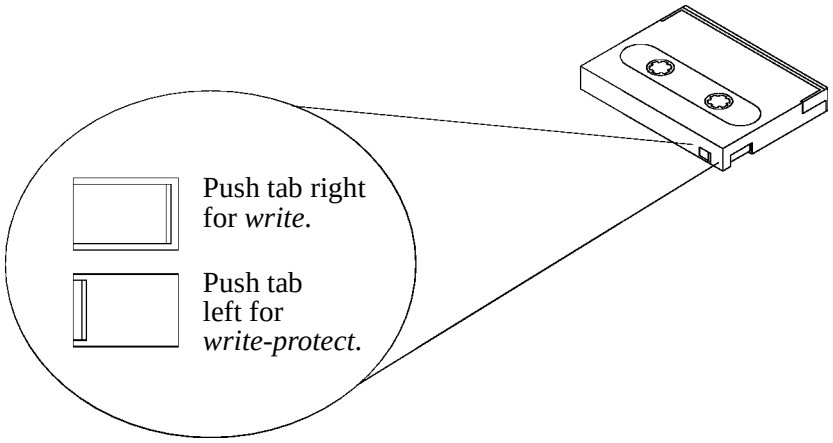


Figure 8-7 Setting the Write-Protect Tab on a DDS Tape

To protect information on a data cassette from being overwritten, set the write-protect tab to the write-protect position, as shown in Figure 8-7.

NOTE: The write-protect tab should always be in the write position for transferring data to a cassette.

Operating the DDS Tape Drive

This section describes how to perform tasks with your DDS tape drive.

Loading and Unloading a Data Cassette

Follow these steps to load and unload a data cassette from the DDS tape drive:

1 Insert the data cassette into the drive, as shown in Figure 8-8.

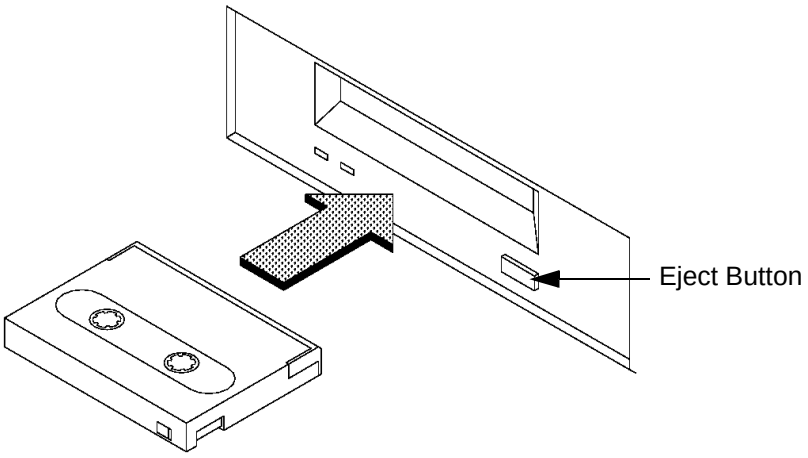


Figure 8-8 **Loading and Unloading a Data Cassette**

2 Push the data cassette about three quarters of the way into the drive. The drive automatically pulls the data cassette the rest of the way in. When the LEDs on the front of the drive stop flashing, the drive has loaded the data cassette.

3 To remove the data cassette, press and release the eject button on the front of the drive, as shown in Figure 8-8. The LEDs on the drive flash on and off. Ten to twenty seconds later, the data cassette slides partway out of the drive. Remove the cassette from the drive.

Verifying the DDS Tape Drive Operation

To verify that your workstation can communicate with the DDS-format tape drive, enter the following:

/usr/sbin/ioscan -d stape Enter

After a few moments the ioscan utility returns a message similar to the following:

```
H/W Path    Class       Description
========================================
8           bc          I/O Adapter
8/16        ba          Core I/O Adapter
8/16/5      ext_bus     Built-in SCSI
8/16/5.3    target
8/16/5.3.0  tape        HP   HP35480A
```

If ioscan does not see your tape drive, it will return the following message:

```
ioscan: No hardware found
```

If you receive this message, go to Chapter 9 “Dealing With Problems.”

Using Device Files

Device files are special files that tell your system which system hardware pathway to use when communicating with a specific device, and what kind of device it is.

To determine what device files are available for use with your tape drive, use the following procedure:

1 In a terminal window, enter the following command:

sam Enter

2 The System Administration Manager window opens. Double-click on Peripheral Devices ->.

3 The Peripheral Devices window opens. Double-click on Tape Drives ->.

4 The Tape Drives window opens.

5 In the list of tape drives, click on the desired tape drive to select it.

6 From the Actions menu, click on Show Device Files.

A window opens with a list of the device files for the selected tape drive with an explanation of each one.

Archiving Data

This section describes how to transfer data to and from a DDS-format data cassette (saving and restoring) using the HP-UX tar command and your tape drive's device file.

The tar command allows you to save files to a data cassette, restore files from a data cassette to your system, or list the files on your data cassette.

Writing to a Data Cassette

Use the following instructions to save files to a data cassette:

1 Check that the write-protect tab on the data cassette is in the write position.

2 Load the data cassette into the tape drive.

3 In a terminal window, enter the following command line to write to the tape:

tar -cvf /dev/rmt/*devicefile pathname* **Enter**

where *devicefile* is one of the device files listed from sam and *pathname* is the pathname of the file or directory containing files that you want to write to the tape. To use the data compression mode, use one of the device file names that sam listed as supporting compression.

Restoring Files from a Data Cassette to Your System

Use the following instructions to restore files from a data cassette to your system:

1. Load the data cassette into the tape drive.
2. In a terminal window, use cd to change to the directory you want the files to reside in.
3. Enter the following command line to restore data:

   tar -xvf /dev/rmt/*devicefile pathname* **Enter**

   where *devicefile* is one of the device files listed from sam and *pathname* is the pathname of the file or directory containing files that you want to restore from the tape. If pathname is not specified, everything on the data cassette is restored. If the tape was made using data compression, use one of the device file names that sam listed as supporting compression.

Listing the Files on a Data Cassette

Use the following instructions to list the files on a data cassette:

1. Load the data cassette into the tape drive.
2. In a terminal window, enter the following command line to receive a file listing of the data cassette:

   tar -tvf /dev/rmt/*devicefile* **Enter**

   where *devicefile* is one of the device files listed from sam. If the tape was made with data compression, use one of the device file names that sam listed as supporting compression.

Further Command Information

For additional information on using tar and a complete list of the command arguments, refer to the tar man page by typing the following:

man tar Enter

The man utility looks up man pages on the system.

You may also communicate with the tape drive with the cpio, ftio, mt, and fbackup commands. For more information on these commands, enter the following in a terminal window:

man *command* **Enter**

Ordering Information

To order Hewlett-Packard data cassettes and cleaning cassettes for use in your DDS tape drive, use the following order numbers:

- HP92283A - Box of five 60-meter DDS data cassettes
- HP92283B - Box of five 90-meter DDS data cassettes
- HP92300A - Box of five 120-meter DDS data cassettes
  (not supported on the DDS-DC drives)
- HP92283K - Package of two head-cleaning cassettes
- HP92283L - Lockable storage box for 12 cassettes

CAUTION: Use only data cassettes labeled as DDS (Digital Data Storage) cassettes. Never use audio cassettes labeled DAT (Digital Audio Tape) in your DDS-format drive.

Using the Floppy Diskette

This section describes basic information needed for using your floppy diskettes.

Setting the Write-Protect Tab on a Diskette

You can only store or change information on a diskette when the write-protect tab is in the write position. So, before trying to write to the diskette, make sure that the write-protect tab is in the write position, as shown in Figure 8-9.

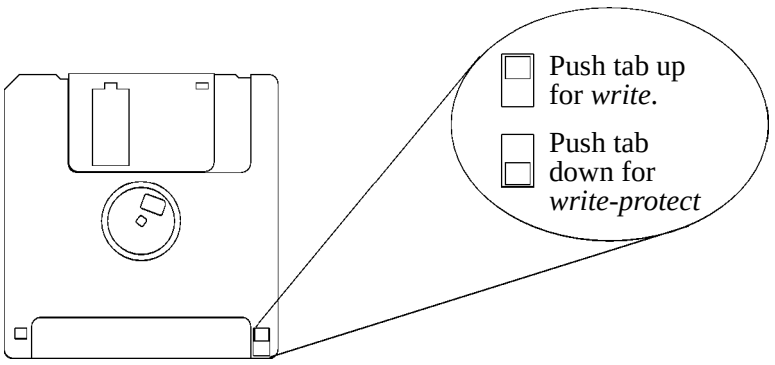


Figure 8-9 **Setting the Write-Protect Tab on a Floppy Diskette**

To protect files on a diskette from being overwritten, set the write-protect tab to the write-protect position, as shown in Figure 8-9.

NOTE: The write-protect tab should always be in the write position for formatting a new diskette and transferring data to a diskette.

Inserting and Removing a Diskette

Follow these steps to insert and remove a diskette from the floppy disk drive:

1 Insert the diskette into the drive, as shown in Figure 8-10.

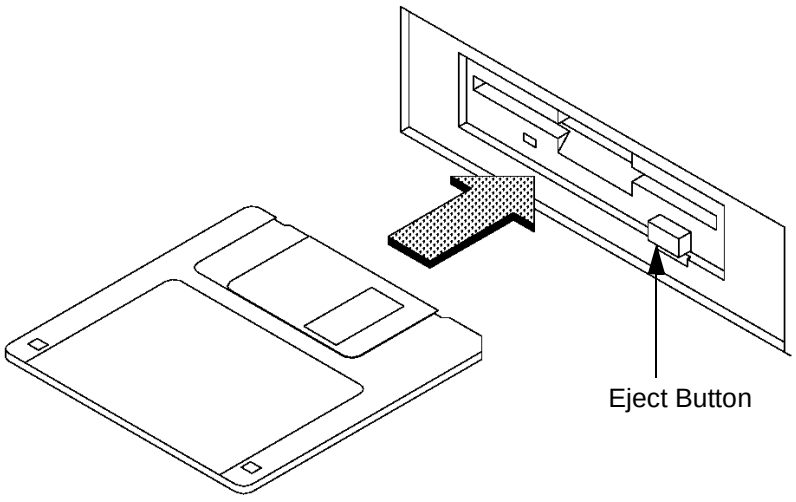


Figure 8-10 **Inserting and Removing a Floppy Diskette**

2 Push the diskette into the floppy drive until it clicks into place.

3 To remove the diskette, push the eject button (Figure 8-10), then take out the diskette.

Operating the Floppy Drive

This section describes how to perform tasks with your 3.5-inch floppy disk drive.

Verifying the Floppy Drive Configuration

To verify that your workstation can communicate with the floppy drive, use the ioscan command to see which devices are currently in use on your system.

1 Enter the following at a command prompt:

/usr/sbin/ioscan Enter

After a few moments the ioscan utility lists all of the I/O devices it could find. If there is a floppy drive in the list, that listing appears similar to the following:

```
H/W Path      Class         Description
============ ============ ====================
8             bc            I/O Adapter
8/0           graphics      Graphics
8/16/10       unknown       Built-in Floppy Drive
```

Using Device Files

Device files are special files that tell your system which system hardware pathway to use when communicating with a specific device and what kind of device it is.

To determine what device files are available for use with your floppy drive, use the following procedure:

1 In a terminal window, enter the following command:

sam Enter

2 The System Administration Manager window opens. Double-click on Disks and File Systems->.

3 The Disks and File Systems window opens.

4 In the list of drives, click on the floppy drive listing to select it.

5 From the Actions menu, click on View More Information

A window opens with a list of information for the floppy drive, including the device files.

Formatting a New Diskette

You must always format a new floppy diskette with the mediainit utility before using it. To format a new floppy diskette follow these steps:

1 Log in as root.

2 Make sure that the write-protect tab on the floppy diskette is in the write position, as shown in Figure 8-9.

3 Insert the diskette into the floppy disk drive.

4 In a terminal window, execute mediainit with an interleave of 2 by entering the following:

mediainit -i2 *devicefile* **Enter**

where devicefile is the device file as listed by sam.

Transferring Data To and From a Floppy Diskette

This section describes how to transfer data to and from your floppy diskette (saving and restoring) using the HP-UX tar command with your floppy drive's device file.

The tar (tape file archiver) command saves files to a floppy diskette, restores files from a floppy diskette, or lists files on a floppy diskette.

You need to set the write protect tab to the write position to transfer data to the diskette. The write-protect tab can be in either position when restoring data from a diskette or listing the files on a diskette.

Saving Files to a Floppy Diskette

Use the following instructions to save files to a floppy diskette:

1. Check that the write-protect tab on the floppy diskette is in the write position.
2. Load the formatted floppy diskette into the disk drive.
3. In a terminal window, enter the following command line to write to the diskette:

   tar -cvf *devicefile pathname* **Enter**

   where devicefile is the device file as listed by sam and pathname is the pathname of the file or directory containing files that you want to write to the diskette.

Restoring Files from a Floppy Diskette to Your System

Use the following instructions to restore files from a floppy diskette to your system:

1. Load the floppy diskette into the disk drive.
2. In a terminal window, use the cd command to change to the directory you want the files to reside in:

   cd *directory_path* **Enter**

   where directory_path is the pathname of the directory.

3 Enter the following command line:

tar -xvf *devicefile pathname* **Enter**

where devicefile is the device file as listed by sam and pathname is the pathname of the file or directory containing files that you want to restore from the diskette. If you don't specify pathname, everything on the floppy diskette is restored.

Listing the Files on a Floppy Diskette

Use the following instructions to list the files on a floppy diskette:

1 Load the floppy diskette into the disk drive.

2 In a terminal window, enter the following command line:

tar -tvf *devicefile* **Enter**

where devicefile is the device file as listed by sam.

All files on the floppy diskette are listed.

For More Information

For more information on using tar and a complete list of the command arguments, refer to the tar man page by typing the following in a terminal window:

man tar Enter

The man utility looks up man pages on the system.

You can mount the floppy drive as a file system using the SAM utility. Be sure to unmount the drive before removing it as a file system. For more information about how to mount and unmount the floppy drive, see the manual *Using HP-UX* (B2910-90001).

For more information on copying data to or from your system to other media, including your floppy diskette, refer to the cpio man page by typing the following in a terminal window:

man cpio Enter

For more information on copying to or from DOS files, refer to the man page by typing the following in a terminal window:

man doscp

For more information on listing the contents of DOS directories, refer to the dosls man page by typing the following in a terminal window:

man dosls Enter

For more information on using your floppy disk drive and floppy diskettes, refer to the floppy man page by typing the following in a terminal window:

man floppy Enter

For more information on using the mediainit command, refer to the mediainit man page by typing the following in a terminal window:

man mediainit Enter

Configuring the Floppy Driver

If you reload software or rebuild the Instant Ignition system on your workstation, you need to reconfigure the HP-UX Kernel to add the floppy driver. Use the SAM utility to add the flexible disk driver and build a new HP-UX kernel.

For more information about how to reconfigure the kernel using SAM, see the following manuals:

- *System Administration Tasks HP 9000 Series 700 Computers* (B2355-90040)
- *Using HP-UX* (B2910-90001)

Ordering Information

To order Hewlett-Packard micro flexible diskettes for use in your 3.5-inch floppy disk drive, use the following order number:

HP-92192X	High-Density Micro Flexible Disks (1.44MB Formatted Capacity) - box of ten diskettes

9

Dealing With Problems

This chapter contains information to help you determine what's wrong with your system when you have problems. If you have a problem that isn't listed in this chapter, or if your problem persists, contact your designated service representative. When calling for service, always have your system model number and serial number ready.

The major sections in this chapter are:

- Interpreting the LED Indicators
- Managing a Boot Failure
- Recovering from a System Panic
- Dealing with Network Failures

Interpreting the LEDs

The Model 745 provides two LEDs, located to the left and right of the reset switch, as shown in Figure 9-1. The red LED is labeled SYSFAIL and the green LED is labeled POWER.

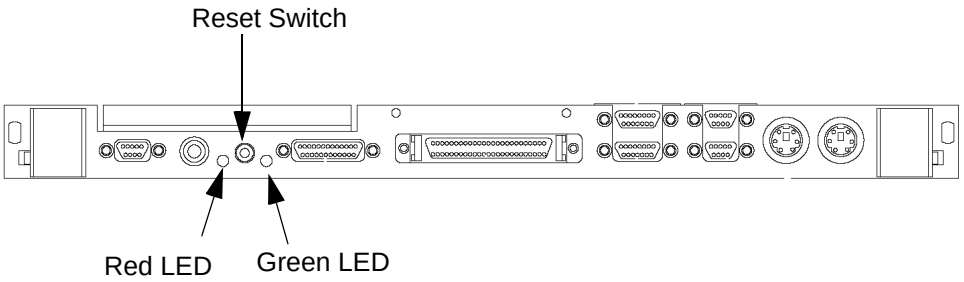


Figure 9-1 Model 745 LED Location

Table 9-1 provides information on the red and green LEDs.

Table 9-1 LED Indicators

SYSFAIL (Red)	POWER (Green)	Meaning	Possible Solution
Off	Off	No Power	Check for board seating in chassis.
On	2Hz Flash	Normal Power-on/self-test	
On	Off	Memory Failure	Troubleshoot for failed RAM card or problem with the RAM connection.
On	1 Flash/sec.	CPU (board) Failure	Replace the system board.
On	4 Flash/sec.	No console identified	Check the console search path and keyboard connections. If no problem is found, replace the system board.
On	On	OS is booted with failure	Check the HP-UX kernel (see).
Off	On	OS is booted OK	

Managing a Boot Failure

The boot program is located in the firmware of the board computer. You can configure the behavior of the boot process by interacting with the boot console handler. See Appendix B for procedures to deal with the boot console handler. If you have indications that the boot process has failed, check the following items.

Boot Program Initializes Hardware

Problems during the first stage of the boot process are rare. At this stage problems can be caused by:

- No power to the chassis (check the local circuit breakers and the power connections to your chassis).
- Processor hardware failure.
- Interface card hardware failure.

  The processor isn't fully plugged into its slot.

  The LAN MAU connector is loose.
- Incorrectly connected SCSI cable.

  Turn off the power to the chassis. Wait five or ten seconds and turn the power to the system back on.

  If the problem recurs, record the symptoms, the status of any indicators (especially any LED displays) on your processor, and any messages that appear on your system console.

At this stage in the boot process, most of the problems that occur require your hardware to be serviced by a person trained and qualified to do so.

Recovering from a System Panic

A system panic simply means that the operating system encountered a condition that it did not know how to respond to, so it halted your system.

System panics are rare and not always the result of a catastrophe. They sometimes occur at boot if your system previously was not shut down properly. Sometimes they occur as the result of a hardware failure. In a clustered HP-UX environment, a diskless client node will panic if too much time has elapsed since its last communication with its server. This could be the result of nothing more than a LAN cable that has been disconnected for too long.

Recovering from a system panic can be as simple as rebooting your system. If you have an up-to-date set of file system backup or system recovery tapes, the worst case scenario would involve reinstalling the operating system and restoring any files that were lost or corrupted. If this situation was caused by a rare hardware failure such as a disk head crash, you will, of course, have to have the hardware fixed before you can perform the reinstallation.

CAUTION: If you use fast boot mode, make sure only one graphics subsystem is installed in the board computer and that the graphics subsystem is configured as the console.

When fast boot is selected during boot configuration the Processor-Dependent Code (“PDC”) does a very abbreviated test of only the console path. If your Model 745 has graphics (on-board or as an additional card) *and* the console device is an RS-232C port, then the system cannot successfully boot in fast boot mode and will panic. This is because the PDC code cannot initialize the graphics ASIC, if it is not the console.

NOTE: It is important to maintain an up-to-date backup of the files on your system so that, in the event of a disk head crash or similar situation, you can recover your data. How frequently you update these backups depends on how much data you can afford to lose. For detailed information on how to back up data, see the manual *System Administration Tasks*.

Should your system panic, it is important to record and categorize the circumstances associated with the panic. Table 9-2 will help you do so:

Table 9-2 Summary of Possible Causes of Panics Problem Area and Action

Problem Area	Action
Hardware	• If the failure appears to be associated with a peripheral device: Check the integrity of the cable connections Ensure that the peripheral is online. • If the above did not correct the problem, the failure may be associated with the System Processing Unit. In this case; call your designated service representative.
File System	• Run the file system checker, **fsck**, to correct the problem. Follow the instructions that **fsck** may give, and use **reboot -n**, for HP-UX, for any subsequent reboots required by **fsck**. See *System Administration Tasks* for detailed HP-UX information.
LAN	• Ensure the integrity of all LAN connections, including taps in any AUI cable. Check for proper 50 ohm terminations at both ends of the LAN.
Other	• Reboot the system.

Other problems may result from faulty configuration of the Mode Configuration area of the Boot Console Handler. If you have boot problems, check that the FASTBOOT option is set to "**NO**".

Procedures for Recovering from a System Panic

Step 1: The Panic Message

In a log book, record and categorize the panic message displayed on the system console. The panic message will tell you why the operating system panicked. Sometimes panic messages refer to internal structures of HP-UX (or its file systems) and the cause might not be obvious. Generally, the problem is in one of the following categories, and wording of the message should allow you to classify it into one of them:

Table 9-3 System Panic Procedures

Category	Action Step Number
Hardware Failure	Step 2a
File System Corrupted	Step 2b
LAN Communication Problem	Step 2c
Other Situations	Step 2d

Step 2a: Recovering from Hardware Failure

If the panic message indicated a hardware failure, the text or context of the message should indicate what piece of hardware failed.

If the hardware failure appears to be associated with a peripheral, ensure that its cables are tightly connected to their proper locations and that the device is powered on, and in an “online” state. If there is an error indicated on the device’s display:

1 Record the error message(s) in your log book.

2 Turn the device off.

3 If the device is a disk drive, wait for it to stop spinning.

4 Turn the device back on.

If the problem reappears on the device or if the hardware failure appears to be associated with an interface card or an internal component of the system module, you should refer the problem to your HP service representative. Proceed to Step 3, **Rebooting Your System**|.

Step 2b: Recovering from a File System Problem

If the panic message indicates a problem with one of your file systems, you will need to run the file system checker **fsck** to check and correct the problem(s). This is normally done automatically at boot time (from the **/etc/rc** file) so you should proceed to Step 4 (Rebooting Your System). Follow all directions that **fsck** gives you *especially if it is your root file system (the one with the "/" directory) that has the problem*. It is important to use the "**-n**" (HP-UX) option to the **reboot** command if requested to do so by **fsck** during any subsequent reboot.

Step 2c: Recovering from a LAN Communication Problem

If the panic messages indicates a problem with LAN communication (such as when a diskless cluster client node is prevented from communication for too long), check all LAN cable connections to ensure the following:

- All connectors are tightly fastened to the LAN cable and the media access units (MAUs).
- LAN is assembled correctly and does not exceed recommended lengths. If you use an AUI, the LAN must be connected *directly* to the MAU with no intervening length of cable between the MAU on your board computer and the LAN tee.
- Your LAN is properly terminated.

Proceed to Step 3, **Rebooting Your System**.

Step 2d: Recovering from Other Situations

When you suspect the problem was something other than the above (or when you do not know where to classify it), proceed to Step 3, **Rebooting Your System**. In this case, it is especially important that you write down the exact text of the panic message, just in case you need it for future troubleshooting or help from HP service personnel.

Step 3: Rebooting Your System

Once you have checked for and corrected any problems from Step 2, you are ready to reboot your system. You can reboot your system using the Reset switch on the panel of the Model 745. Otherwise, you can turn the system off and then back on to initiate the boot sequence.

You will probably notice a few differences in boot behavior as compared with your normal boot sequence. Your system might save a “core” file to disk. This core file is a “snapshot” of the previously running kernel at the time that it panicked. If necessary, this core file can be analyzed using special tools to determine more about what caused the panic.

NOTE: For HP-UX, core files are quite large and, if your system is so configured, they are saved to the directory **/var/adm/crash**. If you feel you need to save these files for future analysis (something that isn’t usually required), it is best to save them to tape and remove them from your file system in order to free up space. If you *know* why your system panicked, you can delete the core files. Core files are used in rare circumstances to diagnose hard-to-find causes of system panics.

If the reason your system panicked was because of a corrupted file system, **fsck** will report the errors and any corrections it makes. If the problems were associated with your root file system, **fsck** will ask you to reboot your system when it's finished. When you do this on an HP-UX system, use the following command:

```
reboot -n
```

The **-n** option tells **reboot** not to sync the file system before rebooting.

Since **fsck** has made all the corrections on disk, you do not want to undo the changes by writing over them with the corrupt memory buffers.

Step 4: Monitoring the System

If your system successfully boots, there is a good chance that you can resume normal operations. Many system panics are isolated events and are unlikely to reoccur. Check your applications to ensure that they are running properly and monitor the system closely. For a day or so, you might want to do backups more frequently until you are confident that the system is functioning properly.

For More Information

Refer to *HP-UX System Administration Tasks* for further information on operating-system related problems.

Dealing with Network Failures

If the program you have been running uses resources from a local area network (LAN) and it stops unexpectedly, the following may help locate the source of the problem:

Table 9-4 Problems with the Network

Problem	Action
No systems respond to the **/etc/ping** hostname command.	• Check the network connection on the panel of your board computer. Make sure that the cable is securely fastened to the connector.
Your system doesn't respond to **/etc/ping** from another system on the network.	• Check to see if the networking software is still running on your system. For HP-UX, use **ps -ef** to do so.
Some systems respond to **/etc/ping**, but others do not.	• Contact your network administrator, if you have one. This condition either indicates that some systems are down, or that there is a fault with the network.

Configuring the HP-UX Kernel

If you reinstall HP-UX after receiving your Model 745, you need to reconfigure the HP-UX kernel for proper operation of the LED indicators and RS-232 Port B.

To reconfigure the HP-UX kernel:

1. Login as **root** or **superuser (su)**.
2. Start the System Administration Manager (SAM) either through an Application Manager System_Admin toolbox or through the command line:

   `/usr/sbin/sam` **Enter**
3. When SAM starts, choose the **Kernel Configuration** icon.
4. From the Kernel Configuration window, choose **Drivers**.
5. Scroll down the list of drivers, and select **vme2**.
6. With **vme2** highlighted, select **Actions** on the menu bar.
7. Select **Add Driver to Kernel.** The “Pending State” column now shows vme2 as being “In”.
8. Now select **Actions** again, and choose **Create a New Kernel.**
9. Follow all the prompts to allow a new kernel to be built and for the system to be rebooted.

A

Safety and Regulatory Statements

This appendix contains safety and regulatory statements pertaining to your Model 745 industrial controller. It provides information on the following topics:

- Declaration of conformity
- Emissions regulations
- Emissions regulations compliance
- Acoustics
- Electrostatic discharge (ESD) precautions
- Safety statement
- Laser safety statement
- Warnings and cautions

Declaration of Conformity

Declaration of Conformity

According to ISO/IEC Guide 22 and EN 45014

Manufacturer: Hewlett-Packard Company
3000 Minuteman Road
Andover, MA 01810-1099
USA

Declares, that the:

Product Name: HP Model 745 Industrial Controller
Model Numbers: HP Model 745/132L and 745/165L
Base Product Number: A4964A
Product Options: all

Conforms to the following specifications:

Safety: IEC 60950: 1991 +A1 +A2 +A3 +A4 / EN 60950: 1992 +A1 +A2 +A3 +A4 +A11
IEC 825 / EN60825-1: 1993
USA 21CFR Subpart J - for FC Laser module

EMC: CISPR 11: 1990 / EN 55011: 1991 Class A
CISPR 22: 1993 / EN 55022: 1994 +A1 +A2 Class A
EN 61000-3-2: 1995 Harmonics
EN 61000-3-3: 1995 Voltage Flicker
EN 50082-1: 1992
IEC 801-2: 1991 / EN 55024-2: 1992 - 4kV CD, 8 kV AD
IEC 801-3: 1984 / EN 55024-3: 1991 - 3 v/m
IEC 801-4: 1988 / EN 55024-4: 1995 - 0.5 kV Signal Lines, 1 kV Power Lines
US FCC Part 15, Level A

and is certified by:

British Standards Institute: ISO 9000-2 for Celestica New England, Exeter, NH
UL Listed to UL1950, 3nd edition, E177374
UL Certified to CSA 22.2 No.950M89 LR53901
TUV-Product Service Certified to EN60950/A4: 1997
CB Report by TUV-Product Service

supplementary information:

The product herewith complies with the requirements of the following Directives and carries the CE marking accordingly:

- the EMC directive 89/336/EEC and 92/31/EEC and 93/68/EEC
- the Low Voltage Directive 73/23/EEC and 93/68/EEC

Chelmsford, MA, USA 04-MAR-99
Date

Thomas G. Wildman, GCO Engineering Manager

For Compliance Information ONLY, contact:

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE Standards Europe, Herrenberger Straße 130, D-71034 Böblingen (FAX: +49-7031-14-3143)

Americas Contact: Hewlett-Packard, GCO Engineering Manager, 3000 Minuteman Road, MS 585, Andover, MA 01810-1099, USA (FAX: 978-659-4205)

Emissions Regulations and Statements

Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules and interference causing regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference in a non-residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (determined by turning the equipment off and on), you can correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and HP shielded cables, such as those you receive with your computer. Changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

VCCI Class A ITE

この装置は，情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwan BCIQ Class A

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Emissions Regulations Compliance

Any third-party I/O device installed in HP system(s) must be in accordance with the requirements set forth in the preceding Emissions Regulations statements. In the event that a third-party noncompliant I/O device is installed, the customer assumes all responsibility and liability arising therefrom.

Acoustics

Regulation On Noise Declaration For Machines -3. GSGV

Lpa <70dB	Lpa<70dB
operator position	am Arbeitsplatz
normal operation	normaler Betrieb
per ISO 7779	nach DIN 45635 T.19

Electrostatic Discharge (ESD) Precautions

Electrostatic charges can damage the integrated circuits on printed circuit boards. To prevent such damage from occurring, observe the following precautions during board unpacking, installation, and configuration:

- Stand on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge is discharged from your body to ground.
- Connect all equipment together, including the static-free mat, static strap, routing nodes, and peripheral units.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.

Safety Statement

This equipment conforms to the following safety standards:

- UL 1950
- CSA 950
- IEC 950
- EN 60950

Laser Safety Statement

The CD ROM mass-storage system is certified as a Class-1 Laser Product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968 and IEC 825-1:1993.

This means that the mass-storage system does not produce hazardous laser radiation. Because laser light emitted inside the mass-storage system is completely confined within protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

Warnings and Cautions

WARNING:	**Removing device cover may expose sharp edges in equipment chassis. To avoid injury, use care when installing customer add-on devices.**
WARNUNG:	**Das Entfernen der Geräteabdeckung legt die scharfen Kanten im Inneren des Gerätes frei. Um Verietzungen zu vermeiden, seien Sie vorsichtig beim Einbau von zusätzlichen Bauteilen, die vom Kunden selber eingebaut werden können.**
AVERTISSEMENT:	**Des bords tranchants du châssis de l'équipement peuvent être exposés quand le cache de l'unité n'est pas en place. Pour éviter des blessures, faire très attention lors de l'installation de modules supplémentaires par le client.**

WARNING:	**Disconnect power plug from wall outlet or source power before moving or removing the device, or installing add-on components.**
WARNUNG:	**Entfernen Sie die Stromzuführung von der Steckdose oder der Stromquelle bevor Sie das Gerät bewegen, abbauen, oder zusätzliche Bauteile installieren.**
AVERTISSEMENT:	**Débrancher la fiche de la prise de courant ou de la source d'alimentation électrique avant de déplacer ou de retirer l'unité, ou avant d'installer des modules supplémentaires.**

WARNING:	**Lithium batteries may explode if mistreated. Do not put lithium batteries in fires or try to recharge or dissasemble them.** **Replace battery only with RAYOVAC BR-1225 three-volt litium battery (HP part number 1420-0541)! Use of any other battery may cause fire or explosion.**
WARNUNG:	**Lithiumbatterien können bei unsachgemäßer Behandlung explodieren. Lithiumbatterien nicht ins Feuer legen und nicht versuchen, sie wieder aufzuladen oder auseinanderzunehmen.** **Die Batterie nur durch eine RAYOVAC BR-1225 Drie-Volt-Lithiumbatterie (HP-Teilenummer 1420-0541) ersetzen! Der Einsatz einer anderen Batterie kann ein Feuer oder eine Explosion verursachen.**
AVERTISSEMENT:	**Les piles us lithium peuvent exploser en cas d'endommagement. Ne pas jeter les piles au litium dans un feu. Ne pas essayer de les recharger ou de les démonter.** **Remplacer la pile uniquement avec une pile 3 volts au lithium RAYOVAC BR-1225 (pièce HP n° 1420-0541) ! L'utilisation d'une auter pile peut entraîner un risque d'incendie ou d'explosion.**

B

The Boot Console Interface

This chapter describes the interface to the Boot Console Handler (BCH).

Boot Console User Interface Features

There are times when you want to interact directly with the hardware of your single board computer **before** it boots the operating system. Your 745 system provides a menu-driven **boot console interface** that allows you to perform special tasks, display information, and set certain system parameters, even if the operating system is unavailable.

Here are some of the things you can do:

- Boot your workstation
- Search for bootable media
- Reset your workstation
- Display and set boot paths
- Display and set your monitor type
- Display memory configuration information
- Display the status of the EISA slots
- Set Auto Boot and Auto Search
- Set Fastboot
- Display LAN information
- Display system information
- Display PIM information

The **boot console** menus follow, showing the various tasks you can perform and the information available.

The shortened version of all commands is indicated by the uppercase letters.

Help is available for all menus and commands by using either **help**, **he**, or **?** and the menu or command you want help on.

Main Menu

```
------ Main Menu ----------------------------------------
Command                                 Description
-------                                 -----------
BOot [PRI|ALT|<path>]                   Boot from specified path
PAth [PRI|ALT|CON|KEY][<path>]          Display or modify a path
SEArch [DIsplay|IPL] [<path>]           Search for boot devices

COnfiguration [<command>]               Access Configuration menu/commands
INformation [<command>]                 Access Information menu/commands
SERvice [<command>]                     Access Service menu/commands

DIsplay                                 Redisplay the current menu
HElp [<menu>|<command>]                 Display help for menu or command
RESET                                   Restart the system
------
Main Menu: Enter command >
```

Configuration Menu

```
------ Configuration Menu -------------------------------------------
Command                                              Description
-------                                              -----------
AUto [BOot|SEArch] [ON|OFF]       Display or set specified auto flag
BootID [<proc>] [<boot ID>]       Display or modify processor boot ID
BootINfo                          Display boot-related information
BootTimer [0 - 200]               Seconds allowed for boot attempt
DEfault                           Set the system to predefined values
FastBoot [ON|OFF]                 Display or set boot tests execution
MOnitor [LIST|<path> <type>]      Change the current monitor type
PAth [PRI|ALT|CON|KEY] [<path>]   Display or modify a path
SEArch [DIsplay|IPL] [<path>]     Search for boot devices
SECure [ON|OFF]                   Set/show security mode
TIme [c:y:m:d:h:m:[s]             Read or set real time clock in GMT

BOot [PRI|ALT|<path>]             Boot from specified path
DIsplay                           Redisplay the current menu
HElp [<menu>|<command>]           Display help for menu or command
RESET                             Restart the system
MAin                              Return to Main Menu
------
Configuration Menu: Enter command >
```

Information Menu

```
------ Information Menu -------------------------------------------
Command                         Description
-----------                     -----------
ALL                             Display all system information
BootINfo                        Display boot-related information
CAche                           Display cache information
ChipRevisions                   Display revisions of VLSI and firmware
COprocessor                     Display coprocessor information
FwrVersion                      Display firmware version
IO                              Dispay I/O interface information
LanAddress                      Display built-in system LAN address
MEmory                          Display memory information
PRocessor                       Display processor information
WArnings                        Display selftest warning messages

BOot [PRI|ALT|<path>]           Boot from specified path
DIsplay                         Redisplay the current menu
HElp [<menu>|<command>          Display help for menu or command
RESET                           Restart the system
MAin                            Return to Main Menu
------
Information Menu: Enter command >
```

Service Menu

```
------ Service Menu -----------------------------------
Command                         Description
-------                         -----------
ChassisCodes [<proc>]           Display chassis codes
CLEARPIM                        Clear (zero) the contents of PIM
EepromRead [<addr>] {<len>]     Read EEPROM locations
MemRead <addr> [<len>] [a]      Read memory locations
PIM [<proc> [HPMC|TOC]]         Display PIM information

BOot [PRI|ALT|<path>]           Boot from specified path
DIsplay                         Redisplay the current menu
HElp [<menu>|<command>]         Display help for menu or command
RESET                           Restart the system
MAin                            Return to Main Menu
------
Service Menu: Enter command >
```

Accessing the Boot Console Interface

To access the boot console interface, follow these steps:

NOTE: This procedure should be done by a system administrator with **root** user privileges.

1 Close any files and applications on your workstation.

2 In a terminal window, enter the following command:

```
reboot -h
```

3 When the system has completely shut down, power off the system then power it back on.

If **Autoboot** is turned off, the boot sequence automatically stops at the boot console Main Menu.

If **Autoboot** is turned on, you will see the following messages:

> Processor is starting Autoboot process. To discontinue, press any key within 10 seconds.

If **Autoboot** and **Autosearch** are both turned on, you will see the following messages:

> Processor is booting from first available device.To discontinue, press any key within 10 seconds.

NOTE: If you are using a power-saving monitor, you will have less than 10 seconds from the time this message appears to press a key. Power saving monitors usually indicate the presence of a live video sync signal through the power LED on the monitor. When the LED is on, press **ESC** .

4 Press a key. You will then see the following message:

```
Boot terminated
```

The Main Menu of the boot console appears.

```
------ Main Menu ----------------------------------------
Command                                 Description
-------                                 -----------
BOot [PRI|ALT|<path>]                   Boot from specified path
PAth [PRI|ALT|CON|KEY][<path>]          Display or modify a path
SEArch [DIsplay|IPL] [<path>]           Search for boot devices

COnfiguration [<command>]               Access Configuration menu/commands
INformation [<command>]                 Access Information menu/commands
SERvice [<command>]                     Access Service menu/commands

DIsplay                                 Redisplay the current menu
HElp [<menu>|<command>]                 Display help for menu or command
RESET                                   Restart the system
------
Main Menu: Enter command >
```

Booting Your Workstation

Usually, you start your workstation by turning it on and waiting for the operating system to boot automatically. However, you may not always want the usual sequence to occur.

For example, you may want to start your workstation from an operating system that is stored on a device that is different from your usual boot device. If your normal operating system kernel or the disk on which it resides becomes damaged or unusable, you may wish to boot from a different disk or perhaps another type of device, such as a DDS-format tape drive.

Here are some situations and examples:

- If you know which device you want to boot from, and you know that it contains a bootable operating system, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

  Main Menu: Enter command > **boot** *device*

  where *device* is the **hardware path** to the device, specified in Mnemonic Style Notation. When prompted whether or not to interact with the ISL enter **n** for no.

  For example, if you wish to boot an operating system that is stored on a DDS-format tape in a drive that is located at ''sescsi.1.0'', follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following command at the prompt:

  Main Menu: Enter command > **boot sescsi.1.0**

  Interact with ISL (Y,N,Q)> **n**

  The operating system on the specified device is used to start your workstation.

- The Initial System Loader (ISL) is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system. If you wish to interact with the ISL before booting your workstation, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

  Main Menu: Enter command > **boot** *device*

  You are prompted:

  ```
  Interact with ISL (Y,N,Q)>
  ```

  Answering quit (**q**) aborts the boot and returns you to the boot console handler.

  Answering no (**n**) continues the boot sequence with the device specified from the main menu prompt.

  Answering yes (**y**) causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on your screen:

  ```
  ISL>
  ```

  For example, if the usual kernel (**/stand/vmunix**) on your root disk (**fwscsi.6.0**) has become corrupted, and you wish to boot your workstation from the backup kernel (**/stand/vmunix.prev**), type the following at the ISL> prompt:

  ISL> **hpux /stand/vmunix.prev**

  To quit out of the ISL without booting, you must power cycle to board computer.

- If you do not know which media in your file systems have bootable operating systems, you can find them with the **search IPL** command. See the section "Searching for Bootable Media".

Searching for Bootable Media

To list devices that contain bootable media, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **search ipl**

The search command searches all buses. The search may turn up more devices than there are lines on your display. If you are using a text terminal, you may control the progress of the search from your terminal's keyboard by using the following commands:

- To hold the display temporarily, press **Ctrl S**
- To continue the display, press **Ctrl Q**
- To halt the search, press any other key

These flow-control commands do not work with a bitmapped display, but such a display can show more than forty lines of text, so you are unlikely to need them.

To search for devices of *just one type* that actually contain bootable media, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **search ipl** *device_type*

Where *device_type* is one of the following:

sescsi is the built-in single-ended SCSI bus

lan is all connections to the built-in LAN

pci*n* is an optional PCI card in slot *n*

pmc*n* is an optional PMC card in site *n*

Restoring the Factory Default Configuration

To restore the factory default values in the EEPROM, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt to access the Configuration Menu:

```
Main Menu: Enter command > co
```

When the Configuration Menu appears, type the following at the prompt:

```
Configuration Menu: Enter command > default
```

The process takes less than 30 seconds and messages similar to the following are displayed:

```
Initializing...


TEST 30CD
INIT 30CD
Configuration Menu: Enter command >
```

The factory default EEPROM settings are now restored.

The defaults are as follows:

OS_ID:	HP-UX
Fast Size:	0xF (all memory is tested)
Primary Path:	sescsi.6.0
Alternate Path:	sescsi.5.0
Console Path:	GRAPHICS(0) or PMC*n* where *n* is the lowest numbered device installed. If no graphics devices are installed this is set to SERIAL_1.
Keyboard Path:	PS2
Autoboot:	OFF
Autosearch	OFF
Autostart	ON

Displaying and Setting Paths

A **path** is the hardware address of a device that is attached to the I/O system of your workstation. The **path** command sets the system paths shown in Table B-1.

The **path** command sets and displays the hardware address of a specified device attached to the I/O bus of your workstation.

Table B-1 System Paths

Path Type	Device
primary or **pri**	Your workstation's default boot device (usually the root disk)
alternate or **alt**	Your workstation's alternate boot device (usually a DDS-format tape device)
console or **con**	Your workstation's primary display device
keyboard or **key**	Your workstation's primary ASCII input device

To display the current settings for the system paths, type the following at the prompt:

Main Menu: Enter command > **path**

To obtain a full listing of currently supported boot device "mnemonic" paths, use the following command:

Main Menu: Enter command > **pa prim ?**

To obtain a full listing of currently supported console "mnemonic" paths, use the following command:

Main Menu: Enter command > **pa con ?**

The paths are displayed in **Mnemonic Style Notation,** as shown in Table B-2.

Table B-2 Mnemonic Style Notation

I/O Type	Specification Format
Built-in SCSI	**sescsi.***scsi_address***.***logical_unit_number*
Built-in LAN	**lan.***server_address***.***init_retries.io_retries*
PCI Slot	**pci***n*
PMC Slot	**pmc***n*
On-board Graphics	**graphics(0)**
PS/2 Keyboard	**ps2**
RS232(A)	**serial_1.***baudrate.wordlength.parity*
RS232(B)	**serial_2.***baudrate.wordlength.parity*

To display the current setting for a particular system path, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **path** *path_type*

where *path_type* is one of the path types listed in Table B-1.

For example, to get the path to the primary boot device, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **path primary**

To set a system path to a new value, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **path** *path_type path*

where *path_type* is one of the path types listed in Table B-1 and *path* is the specification of the path in Mnemonic Style Notation (as described in Table B-2). For example, to set the primary boot path to a SCSI disk with an ID of 6.0, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt:

Main Menu: Enter command > **path pri sescsi.6.0**

Displaying and Setting the Monitor Type

Your system ships from the factory preset to use a monitor with a specific resolution and frequency. If you replace your workstation's monitor with a different type of monitor, you must reconfigure your workstation to support the new monitor.

The Monitor Command

The **monitor** command lets you change your workstation's graphics configuration. This command is available in the Configuration Menu of the boot console interface.

To display the current graphics and console information, enter the following command:

Configuration Menu: Enter command > **monitor**

The correct usage for setting the graphics configuration is:

Configuration Menu: Enter command > **monitor** *graphics_path type*

where valid *graphics_path* parameters are:

graphics(0) - The on-board 8-plane graphics adapter.

pmc1 - Graphics adapter installed in PMC site 1.

pmc2 - Graphics adapter installed in PMC site 2.

pmc3 - Graphics adapter installed in PMC site 3.

pmc4 - Graphics adapter installed in PMC site 4.

and *type* is the numerical monitor type as shown with the **monitor list** command.

You can also use the **monitor** command to disable the onboard graphics if you plan to use only PMC graphics cards to drive displays. To disable the onboard graphics, enter the following command:

Configuration Menu: Enter command > **monitor disable builtin**

NOTE: If you disable the onboard graphics, and later need to use the onboard graphics as the console device, see Using the Emergency Interactive Console Search.

Displaying the Current Monitor Configuration

To display the current monitor configuration for your system from the Configuration Menu of the boot console interface, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter. Once you are in the Boot Console Interface Main Menu, type:

Main Menu: Enter command > **configuration**

This places you in the Configuration Menu. From here type:

Configuration Menu: Enter command > **monitor**

The screen displays a list of the current graphics adapters and their monitor types configured for your workstation.

```
MONITOR INFORMATION

  Path       Slot  Head    HPA      Resolution  Freq  Type  Class
----------   ----  ----  ------   ----------  ----  ----  --
GRAPHICS(0)   0     1   f8000000  1280x1024   72Hz   12

Configuration Menu: Enter command >
```

In this example, only the built-in graphic adapter graphics(0) is configured. The monitor type for graphics(0) is set to type 12, which is a 1280 by 1024 monitor that uses a frequency of 72 Hz.

Setting the Monitor Type

You can set the monitor type for a graphics adapter from the configuration menu by entering the following:

Configuration Menu: Enter command > **monitor graphics(*n*)** *tt*

Where *n* is the number of the graphics adapter and *tt* is the monitor type.

To display a list of supported monitors, enter the following command;

Configuration Menu: Enter command > **monitor list**

A list of valid monitor types similar to the following is displayed;

MONITOR INFORMATION

```
 Path        Slot Head Type   Size     Freq  Class
 ----        ---- ---- ---- ---------  ----  -----
  GRAPHICS(0)  0    1    1   1280x1024  75Hz  VESA
* GRAPHICS(0)  0    1    2   1280x1024  75Hz  VESA, Double buffered
  GRAPHICS(0)  0    1    3   1280x1024  75Hz  VESA, Greyscale
* GRAPHICS(0)  0    1    4   1280x1024  75Hz  VESA, Double Buffered,Greyscale
  GRAPHICS(0)  0    1    5   1024x768   75Hz  VESA
  GRAPHICS(0)  0    1    6   800x600    75Hz  VESA
  GRAPHICS(0)  0    1    7   640x480    75Hz  VESA
* GRAPHICS(0)  0    1    8   1600x1200  75Hz  VESA
* GRAPHICS(0)  0    1    9   1600x1200  75Hz  VESA,Greyscale
* GRAPHICS(0)  0    1   10   1200x1600  75Hz  VESA
* GRAPHICS(0)  0    1   11   1200x1600  75Hz  VESA,Greyscale
  GRAPHICS(0)  0    1   12   1280x1024  72Hz
* GRAPHICS(0)  0    1   13   1280x1024  72Hz  Double buffered
  GRAPHICS(0)  0    1   14   640x480    60Hz
  GRAPHICS(0)  0    1   15   --------user defined-------

Configuration Menu: Enter command >
```

* These monitor types are not supported on the Model 745 on-board graphics.

To set the monitor type for graphics(0) to monitor type 2 you would enter the following;

Configuration Menu: Enter command > **monitor graphics(0) 2**

This will take effect on the next reboot.

MONITOR INFORMATION

Path	Slot	Head	HPA	Resolution	Freq	Type	Class
GRAPHICS(0)	0	1	f8000000	1280x1024	72Hz	2	

The boot console displays a message that tells you that your new monitor selection will take effect the next time you reboot your system.

The boot console also displays the new monitor information.

Trying to change the monitor type to a number not listed for that graphics device fails and gives you the following warning message:

Value of monitor type n out of range (n - nn)

Setting the Monitor Type at Power On

If you replace your workstation's monitor with a different monitor type, and do not set the workstation's graphics parameters by using the monitor command before doing so, you need to perform the following steps at power on:

If your keyboard connects to the PS/2 connector on your system, wait 2 seconds after the Num Lock light flashes near the end of the boot sequence, then press **Tab** to initiate the automatic monitor selection process.

If you have a keyboard that connects to the HIL connector on your system, press **Tab** every three seconds during the boot sequence to initiate the automatic monitor selection process.

The system cycles through all of the available monitor types one at a time. When you can see a message similar to the following clearly and legibly, select that monitor type by pressing **Enter**.

```
MONITOR INFORMATION

  Path       Slot  Head  Type     Size     Freq  Class
-----------   ----  ----  ----  ----------  ----  -----
GRAPHICS(0)     0     1     n    nnnnxnnnn   nnHz
Press [RETURN] to select this monitor type (type n of n types).
```

NOTE: If you are using a power saving monitor, the power LED will light when the monitor senses a valid video synch signal.

The system queries you to confirm your selection. Press **Y** to save this monitor type.

If you press any key other than **Y**, the following message is displayed:

```
Monitor type not saved.
```

At this point, the new monitor type is active, but not saved. Because you didn't save the monitor type, the next time you reboot the system, the original monitor type will be used.

Next, the following message is displayed:

```
To select a new Graphics Monitor Type press the <TAB> key now, otherwise EXIT by entering any other key (or will time out in 15 seconds)...
```

To restart the monitor selection process, press **TAB**.

Using the Emergency Interactive Console Search

If the system console is set to a device that is not installed in the system, you can use the emergency interactive console search to set the console to one of the terminal devices that is currently connected.

Use the following procedure to set the console with the emergency interactive console search:

1. Make sure that the monitor(s) and/or terminal(s) are powered on.
2. Hold the Model 745 board computer's reset/abort switch in its **Abort** position, then turn on power to the chassis.
3. A message similar to the following is displayed on each monitor connected to a graphics device recognized by the system:

```
GRAPHICS(s) MONITOR INFORMATION
Slot      Model       Type  Resolution  Freq  Class
----  ----------------  ----  ----------  ----  -----
  0  INTERNAL_EG_1280    12  1280x1024   75Hz
The following keyboard(s) are available:
     PS2
     HIL
Press the <n> key to select GRAPHICS(s) as the CONSOLE or
press the <Tab> key to select the next monitor type.
```

   Where n is a single-digit number or a keyboard key.

   When the message is displayed clear and undistorted on the monitor for your console device, enter the number or key that corresponds to the display device that you are selecting.

NOTE: The message is displayed for sixty seconds before proceeding to the next monitor resolution.

If you are using a power saving monitor, the power LED will light when the monitor senses a valid video synch signal.

If this message is not displayed on your monitor, review the installation procedures to make sure that you correctly installed the option board.

If no keyboards are found the following message is displayed:

```
WARNING: No keyboard(s) found. Turn off system
    power, check keyboard connection(s) and
    repeat interactive console search.
```

To advance all graphics adapter monitors to the next resolution, press the <Tab> key **one** time and wait five seconds for all monitor types to change. Do not hold down the <Tab> key or press it multiple times as this will cause the monitor types to advance for each press of the <Tab> key.

4 When the following message is displayed, press the <Esc> key to confirm selection of the device as the console:

```
Press the <Esc> key to confirm selection of GRAPHICS(s) as the CONSOLE.
This selection will timeout in 10 seconds if not confirmed.
```

NOTE: The message is displayed for only ten seconds before console search is resumed. Press <Esc> as soon as possible after the message is displayed.

The following message is displayed on the selected display:

```
GRAPHICS(s) MONITOR INFORMATION
Slot      Model       Type  Resolution  Freq  Class
----  ----------------  ----  ----------  ----  -----
  0  INTERNAL_EG_1280    12  1280x1024   75Hz
Selected CONSOLE path is: GRAPHICS(s)
Selected KEYBOARD path is: PS2
```

Displaying the Current Memory Configuration

The **memory** command shows the memory configuration table.

To display the current memory configuration for your system, from the Information Menu of the boot console interface, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter. Once you are in the Boot Console Interface Main Menu, type:

Main Menu: Enter command > **information**

This places you in the Information Menu. From here type:

Information Menu: Enter command > **memory**

The screen displays status and configuration information for the memory modules installed in your workstation.

Memory Information Example

If a memory card failure is detected during power-on selftest, the following message is displayed on the console (after completing all selftests) and the autoboot/autosearch process is automatically stopped:

```
WARNING: One or more memory banks were not configured due
         to a SIMM size mismatch or a SIMM failure. For
         more details, use the MEMORY command in the
         INFORMATION menu.
```

NOTE: The above condition occurs only after the testing and successful configuration of at least one memory card.

The following listing is a sample memory configuration table when memory modules are properly installed and configured:

```
        MEMORY INFORMATION


        MEMORY STATUS TABLE
        Slot        Size        Status
        ----------------
        0           64MB        Configured
        1           32MB        Configured
        2           64MB        Configured
        ---------
TOTAL               160MB
```

If the power-on selftest detects a defective or damaged memory card, using the **memory** command (from the Information Menu prompt) displays the following information:

```
WARNING: One or more memory banks were not configured due
      to errors in the following SIMM(s).

 Physical Slot   Error Type
 -------------   -----------
 3               SIMM hardware error

          Memory Card Stack
      +-------------------------+
Slot 3|       Failed            |
      +-------------------------+
      +-------------------------+
Slot 2|       64MB OK           |
      +-------------------------+
      +-------------------------+
Slot 1|       32MB OK           |
      +-------------------------+
      +-------------------------+
Slot 0|       64MB OK           |
      +-------------------------+
============================================================
Side view of Model 9000/744 Single Board Computer PCB.

SUGGESTION: If possible, turn off the computer and check to
          see if the memory card(s) are seated properly.

        Memory
        HVERSION                SVERSION
        ---------------         ---------------
        0x0740                  0x0900
```

Displaying the Status of the System I/O

The **IO** command is available from the information menu. It lets you identify all built-in I/O devices and optional I/O devices installed in the option slots.

To use the **IO** command from the Information Menu of the boot console interface, type:

Information Menu: Enter command > **IO**
Information about the built-in and optional I/O devices is displayed as shown in the following example:

```
I/O MODULE INFORMATION
                                                                          IODC  IODC
Path          Decimal   Type               Location    HVER SVER Vers  Dep
------------  -------   -----------------  ----------  ---- ---- ----  ----
8             8         Bus Converter      built-in    5040 0000 0x00  0x00
8             8         Bus Converter      built-in    5050 0000 0x00  0x00
GRAPHICS(1)   8/0       HPA208LC1024       GSC slot1   0080 8500 0x01  0x00
GSC2          8/8       A DMA I/O          GSC slot2   0141 8980 0x96  0x00
8/16          8/16      Bus Adapter        built-in    04b0 8100 0x00  0x00
8/16/0        8/16/0    Parallel           built-in    04b0 7400 0x00  0x00
8/16/1        8/16/1    Audio              built-in    04b4 7b00 0x00  0x00
SERIAL_1      8/16/4    RS232              built-in    04b0 8c00 0x01  0x00
SESCSI        8/16/5    SE SCSI            built-in    04b0 8200 0x96  0x00
LAN           8/16/6    LAN                built-in    04b0 8a00 0x02  0x00
PS2           8/16/7    Keyboard           built-in    04b0 8400 0x00  0x00
8/16/8        8/16/8    Mouse              built-in    04b0 8400 0x00  0x00
8/20          8/20      Bus Adapter        EISA        0110 8e00 0x00  0x00
HIL           8/20/1    HIL                EISA        0110 7300 0x00  0x00
EISA          8/20/5    Bus Adapter        EISA        0110 9000 0x00  0x00
GRAPHICS(0)   8/24      INTERNAL_EG_1280   built-in    04b0 8500 0x01  0x00
8/28          8/28      Bus Adapter        built-in    04a0 9300 0x00  0x00
SERIAL_2      8/28/2    RS232              built-in    04a0 8c00 0x01  0x00
BPR           8/28/3    BPR                built-in    04a0 8f00 0x00  0x01
62            62        Native Processor   built-in    50f0 0481 0x00  0x00
63            63        Proc Dep Memory    built-in    0740 0900 0x00  0x00

EISA Cards
Path      Type                            EISA ID
----      ----                            -------
20/5/1    100VG AnyLAN adapter cardHWP1990
20/5/2    Unknown EISA card or empty slot
20/5/3    Smart 16/4 Ringnode cardMDG0002
20/5/4    PSI card                        HWP1870
20/5/5    Unknown EISA card or empty slot
20/5/6    Unknown EISA card or empty slot
20/5/7    Unknown EISA card or empty slot
20/5/8    Unknown EISA card or empty slot

PCI Cards
Slot      Path                          Bus   Class
----      ---------------------------   ---   --------------

Information Menu: Enter command >
```

Setting the Auto Boot and Auto Search and Auto Start Flags

The **auto boot, auto search,** and **auto start** flags are variables stored in your workstation's nonvolatile memory. (Nonvolatile memory retains its contents even after power is turned off.) If you reset these flags to a new value, the change takes effect the next time you reboot the workstation.

The **auto boot** variable boots the operating system whenever your workstation is turned on.

To examine the state of **auto boot** and **auto search**, type the following at the prompt:

Configuration Menu: Enter command > **auto**

If **auto boot** is set to **on**, your workstation automatically attempts to boot the operating system when turned on. If **auto boot** is set to **off**, your workstation enters the boot administration mode of the boot console user interface.

The state of **auto search** determines how your workstation seeks a boot device during autoboot. If **auto search** is set to **on**, your workstation will search for other boot devices if the primary boot device is not available. If **auto search** is **off**, your workstation will default to the boot administration mode if it can't see the primary boot device.

To change the state of **auto boot** or **auto search**, enter either of the following commands at the prompt:

Configuration Menu: Enter command > **auto boot** *state*

Configuration Menu: Enter command > **auto search** *state*

where *state* is **on** or **off**.

Autosearch searches for devices in the following order:

Primary Boot Path
Alternate Boot Path
Built-in Single-Ended SCSI Devices
Built-in LAN bootp servers

Displaying and Setting the Security Mode

The **SECure** flag is a variable stored in non-volatile memory. (Non-volatile memory retains its contents even after power is turned off.) If you reset this flag to a new value, the change takes effect the next time you reboot the board computer.

When the **SECure** flag is set to **on**, **autoboot** and **autosearch** are enabled and cannot be stopped. The system boots from the default boot paths regardless of user intervention.

To display the current setting for the **SECure** flag, enter the following command:

Configuration Menu: Enter command > **secure**

To set the **SECure** flag on or off, enter one of the following:

Configuration Menu: Enter command > **secure on**

Configuration Menu: Enter command > **secure off**

Displaying and Setting the Fastboot Mode

When **fastboot** is enabled (set to **on**), your workstation does a quick check of the memory and skips I/O interface testing during its power-on self tests. This enables your workstation to complete its boot process more quickly. The default factory setting is for **fastboot** to be disabled (**off**).

The **fastboot** mode allows your workstation to boot quickly by performing a less extensive check of the system's memory.

When **fastboot** is disabled (set to **off**), more extensive memory testing and I/O interface testing is performed during the selftests, causing the boot process to take longer.

If you are experiencing difficulty in booting your workstation, set **fastboot** to **off** and reboot the system. The more extensive testing may reveal the error condition.

To display the status of **fastboot**, type the following at the prompt:

Configuration Menu: Enter command > **fastboot**

To disable **fastboot**, type the following at the prompt:

Configuration Menu: Enter command > **fastboot off**

To enable **fastboot**, type the following at the prompt:

Configuration Menu: Enter command > **fastboot on**

CAUTION: If a graphics adapter is installed in the system, it must be selected as the console device. If additional graphics adapters are installed, Fastboot mode cannot be used.

Displaying the LAN Station Address

It is sometimes necessary to supply a LAN station address of your workstation to other users. For example, if your workstation is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your workstation to the cluster.

A **LAN station address** of your workstation is the label that uniquely identifies the LAN connection for your workstation at the **link level** (the hardware level).

To display your workstation's LAN station addresses, type the following at the prompt:

```
Information Menu: Enter command > lanaddress
```

The LAN station address is displayed as a twelve-digit number in hexadecimal notation, similar to the following:

```
LAN Station Addresses:    0060b0-789abc
```

The address is for the system's built-in LAN.

Displaying System Information

The **all** command allows you to display the system's processor revision and speed, cache size, memory size, flag settings, and the boot and console paths. To display system information from the Information Menu, type the following at the prompt:

```
Information Menu: Enter command > all
```

This information is paged to allow you to view it as necessary.

Displaying PIM Information

The **pim** command allows you to display the most recent PIM information for the specified fault type. To display PIM information for a specific fault, type the following at the Service Menu prompt:

Service Menu: Enter command > **pim** *processor_number*

You can use **pim** in the following ways:

pim - Gives all fault types

pim 0 - Gives HPMC information on the processor

pim 0 *fault_type* -Provides fault type information on the processor. Where *fault_type* is **HPMC**, **LPMC**, or **TOC**

Glossary

absolute path name The name of a file which lists all the directories leading to it, starting with root ("/") and ending with the file base name itself. If the path name indicates a directory, leave the trailing slash. For example, **/users/jth/**. See *Using HP-UX* for more information on path names and directory structures in HP-UX.

access permissions File name characteristics (including read, write, and execute) which determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by a *chmod(1)* command.

alternate boot path The address at which the firmware searches for a boot device, if it has not found the device specified by the primary boot path.

application A program used to perform a particular task, usually interactively, such as computer-aided design, text editing, or accounting.

argument The part of a command line which identifies what (file, directory, etc.) is to be acted upon.

ASIC Application Specific Integrated Circuit.

backup A copy of all or part of the file system.

boot To start or activate a system.

boot device A device such as a disk drive, DDS tape drive, or network device that contains the appropriate program for booting the operating system.

boot ROM A EEPROM memory which is incorporated into a system for the purpose starting the operating system, testing the terminal, and producing a standard display. Thought loosely referred to as ROM, it includes a writable function to allow reconfiguration of path and boot-configuration information.

Bourne Shell A command interpreter, invoked as /bin/sh. The Bourne Shell is the default shell in HP-UX.

bus address A number which makes up part of the address HP-UX uses to locate a particular device. The bus address is determined by a switch setting on a peripheral device which allows the computer to distinguish between two devices connected to the same interface.

button A graphic element in a display that functionally represents an actual push button. It is usually accessible by mouse pointer and is used to start an action.

CD-ROM Compact Disc Read-Only Memory.

CD ROM file system A read-only memory file system on compact disk. Typically, you can read data from a CD ROM file system, but you cannot write to one.

character An element used for the organization, control, or representation of text. Characters include graphic characters and control characters.

click To press and release a mouse button rapidly.

cluster A group of workstations connected via a LAN. One computer, the ++cluster server++, performs as a file-system server for the <term nogloss>cluster clients (For information on clusters, see <book|Managing Clusters of HP 9000 Computers: Sharing the HP-UX Filing System|).

cluster client A cluster node that does not have a local HP-UX file system. Its file system resides on the cluster server. A **client** can also refer to any process run by a server.

cluster node Any workstation networked into an HP-UX cluster. (Also called “cnode”.)

cluster server The cluster node which acts as a file system server and operating system server for all the cluster nodes in an HP-UX cluster. Also called <term nogloss|cluster root server|.

cnode Abbreviation for ++cluster node++.

CPU Central Processing Unit. The instruction-processing module of the computer. See also ++SPU++.

C Shell An HP-UX command interpreter, invoked as csh.

current working directory The directory in which relative path name searches begin. It is also called the “current directory” or “working directory”, and is identified by entering the command pwd.

device driver A software program that provides the communication interface between the operating system kernel and a hardware device.

device file A file used for the computer to communicate with a device such as a tape drive or a printer.

DDS Digital Data Storage. HP-supported format for data storage.

dialog box A subwindow of an application used to request information, or to display status or error conditions.

directory A table of identifiers and references (such as file names) that refer to corresponding files and items of data. Used in a typical HP-UX organizational structure to provide an organizational and logical identity for a given group of files and directories.

EISA Extended Industry Standard Architecture. EISA is an extension of ISA (Industry Standard Architecture) to 32 bits.

environment The set of defined shell variables (some of which are PATH, TERM, SHELL, HOME) that define the conditions under which your commands run. These conditions can include your terminal characteristics, home directory, and default search path.

file access permissions File name characteristics (including read, write, and execute) which determine whether a

process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by the *chmod(1)* command.

fileset A logically-defined, named set of files on an update or installation tape.

file system The organization of files on a given storage device, possibly including hierarchical directories.

$HOME The value of the environment variable representing the ++home directory++.

home directory The directory name given by the value of the shell variable HOME. This is the directory where the user starts after logging in, typically /users/login, where login is your login name.

host name Refers to a string which uniquely identifies a system in a network. There are generally different ++host name++ domains associated with different networks.

HP-HIL Hewlett-Packard Human Interface Link.

HP-IB Hewlett-Packard Interface Bus (IEEE 488 standard).

HP-UX cluster A group of workstations connected via a LAN. One computer, the ++cluster server++, performs as a file-system server for the ++cluster client++.

IPL Initial Program Loader (such as the ISL program).

ISL Initial System Loader. This implements the operating-system independent portion of the boot process.

kernel The part of the HP-UX operating system that manages the computer's resources, such as memory, file system, and input/output.

Korn Shell An HP-UX shell, featuring command history recall and line-editing. Invoked as /bin/ksh.

LAN See **Local Area Network**.

LED Light-emitting diode.

Local Area Network The systems and/or clusters which share data, hardware, and software resources via Networking Services software.

locally-mounted file system A file system mounted on a disk attached to a cluster client and shared by other nodes in the cluster.

login Your login name, the name by which you are known to the workstation. This may be any group of characters, so long as it meets system rules.

mother board The vertical system backplane board into which the ++system board++ plugs.

mount To add an auxiliary (removable) file system to an active existing file system.

mount directory The directory in an existing file system that is the root directory of a mounted auxiliary file system.

multiuser state The condition of the HP-UX operating system in which the cluster nodes (and console) allow communication between the system and all its users.

Native Language Support (NLS) A feature of HP-UX that provides the user with internationalized software and the application programmer with tools to develop this software.

NFS Network File Services.

NFS file system A file system accessible over a network via the NFS Services product.

node name A unique string used to identify each node in a cluster.

operating system The contents of **/hp-ux**, including the kernel, commands, input-output control, system accounting, storage assignment, and other services. *Also see* **kernel**.

owner The owner of a file, usually the creator of that file. However, the ownership of a file can be changed by the superuser or the current owner with the *chown(1)* command or the *chown(2)* system call.

password An encrypted sequence of characters used by HP-UX to identify an authorized user and to permit authorized login on a system.

path name A sequence of directory names, separated by slashes, which specify the location of any file or directory.

PDC Processor-Dependent Code. Firmware (such as the boot ROM) that implements all processor-dependent functionality, including initialization and self-test of the processor.

PID Process identity (number).

Posix Shell POSIX-compliant version of the Korn Shell.

primary boot path The first address at which the firmware searches for a boot device.

process An invocation of a program. Generally, **process** refers to a program running in memory, while **program** is the code stored on disk.

process ID A unique identification number assigned to all processes by the operating system. *Also see* **PID**.

pty Pseudo-terminal.

RAM Random-access memory.

regular expression A string of characters that selects text.

relative path name The name of a file, listing all the directories leading to that file in relation to the current working directory.

ROM Read-only memory.

root directory The highest level directory of the hierarchical file system, from which all other files branch. In HP-UX, the slash (/) character refers to the "root directory." The root directory is the only directory in the file system that is its own "parent directory."

root file system The file system mounted on the cluster server.

root server The node in a cluster to which the storage device containing the root file system of the cluster is physically attached. Also ++cluster server++.

root user The user with root permission, having a separate "root" account and password.

run-level The system state determined at boot which defines, among other things, multi- or single-user status.

SAM System Administration Manager. A subsystem of HP-UX that does a wide range of system administration tasks interactively.

script A file that contains commands that a shell can interpret and run.

SCSI Small Computer System Interface.

server A computer program that provides file access, login access, file transfer, printing and other services across a network. Sometimes, but not always, a server consists of a dedicated computer.

shell An HP-UX command interpreter (Bourne, Korn, Key, Posix or C), providing a working environment interface for the user. The shell takes command input from the keyboard and interprets it for the operating system. See *Shells: User's Guide* for information on the characteristics of the various shells.

shell script A file that contains commands that a shell can interpret and run. Also "shell program."

shut down To take the system from multi-user state to a state in which no processes are running, using the shutdown command.

single-user state The state of a computer where there is little or no process activity and no users logged in. The system is only accessible to the current system administrator (root). This mode is brought about by execution of *shutdown(1)*. Also called 'single-user mode'.

SPU System Processing Unit. The instruction- and graphics-processing module of the computer (in this case, the Model 744 board computer), containing the CPU and I/O processors. Also called the "SPU module".

standard error The destination of error and special messages from a program, intended to be used for diagnostic messages. The standard error output is often called stderr, and is automatically opened by the shell for writing on file descriptor 2 for every command invoked. Standard error usually appears on the display unless it is directed otherwise.

standard input The source of input

data for a program. The standard input file is often called stdin, and is automatically opened by the shell for reading on file descriptor 0 for every command invoked.

standard output The destination of output data from a program. Standard output appears on the display unless it is redirected otherwise.

su Super User. See **root user**.

system board The printed-circuit board of a workstation where the CPU and memory RAM reside.

system name The eight-character (or less) string which uniquely identifies a system. Usually identical with the system's host name found in */etc/hosts*. The Internet Protocol (IP) number is sometimes used instead of a system name to identify the system.

tree structure The HP-UX method of organizing files and directories into a branching hierarchical structure. This structure looks like an inverted tree with the "root" directory at the top, descending into multiple directory/file branches that end in clusters of files.

user Any person who interacts directly with a computer system.

user interface The medium through which users communicate with their workstations. The command-line prompt is one type of interface. The graphical objects of HP VUE are another type of interface.

working directory This is the directory in which relative path name searches begin. It is also called the current directory, or the current working directory, identified by invoking the command pwd.

workstation A compact, graphics-oriented computer, generally high-speed and high-capacity, designed for use in a variety of tasks requiring high performance.

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