HP 9000 rp4410 and HP 9000 rp4440 User Service Guide

hp ®

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About This Document

This document provides information and instructions for servicing the HP 9000 rp4410 and rp4440 servers.

The document printing date and part number indicate the current document edition. Minor changes may be made at any time without changing the production date. The document part number changes when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure you receive the updated or new editions, subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found on the HP website at:

http://www.docs.hp.com.

Intended Audience

This document is intended to provide technical product and support information for authorized service providers, system administrators, and HP support personnel.

This document is not a tutorial.

New and Changed Information in This Edition

This edition has been updated with the latest styles and formatting.

Publishing History

Table 1 lists the publishing history details for this document.

Table 1 Publishing History Details

Document Manufacturing Part Number	Operating Systems Supported	Supported Product Versions	Publication Date
A9950-96011-ed5	HP-UX 11i v1 HP-UX 11i v2 HP-UX 11i v3	HP 9000 rp4410 and rp4440	October 2009
A9950-96011-ed4	HP-UX 11i v1 HP-UX 11i v2 HP-UX 11i v3	HP 9000 rp4410 and rp4440	September 2008
A9950-96011	HP-UX 11i v1 HP-UX 11i v2 HP-UX 11i v3	HP 9000 rp4410 and rp4440	April 2007
A9950-96001 A9950-96002	HP-UX 11i v1	HP 9000 rp4410 and rp4440	April 2005
N/A	HP-UX 11i v1	HP 9000 rp4410 and rp4440	July 2003

Document Organization

This guide is divided into the following chapters:

Chapter 1   **Overview:** Provides views and descriptions of the server.

Chapter 2   **System Specifications:** Server details such as system configuration, physical specifications, and requirements.

Chapter 3	**Installing the System:** Unpacking, installation, and preparation for booting the operating system.
Chapter 4	**Booting and Shutting Down the Operating System:** Provides procedures to boot and shut down the operating system.
Chapter 5	**Troubleshooting:** Provides diagnostics and basic troubleshooting methodology.
Chapter 6	**Removing and Replacing Components:** Provides instructions and procedures on how to remove and replace server components.
Appendix A	**Replacement Parts:** Provides a list of available customer self-repair parts.
Appendix B	**Utilities:** Provides information on the utilities on the server such as Boot Console Handler (BCH) and iLO MP.
Appendix C	**Physical and Environmental Specifications:** Provides temperature and airflow information for minimum, typical, and maximum configurations for the server. It also lists the server and rack weights and dimensions.

Typographic Conventions

This document uses the following conventions.

WARNING!   A warning lists requirements that you must meet to avoid personal injury.

CAUTION: A caution provides information required to avoid losing data or avoid losing system functionality.

IMPORTANT: Important messages provide essential information to explain a concept or to complete a task.

NOTE: A note highlights useful information such as restrictions, recommendations, or important details about HP product features.

TIP: Tips provide you with helpful hints for completing a task. A tip is not used to give essential information, but can be used, for example, to provide an alternate method for completing the task that precedes it.

Book Title	The title of a book. On the web and on the Instant Information CD, it can be a hot link to the book itself.
KeyCap	The name of a keyboard key. **Return** and **Enter** both refer to the same key.
Emphasis	Text that is emphasized.
Bold	Text that is strongly emphasized.
Bold	The defined use of an important word or phrase.
ComputerOut	Text displayed by the computer.
UserInput	Commands and other text that you type.
Command	A command name or qualified command phrase.
Option	An available option.
Screen Output	Example of computer screen output.
[]	The contents are optional in formats and command descriptions. If the contents are a list separated by |, you must select one of the items.
{}	The contents are required in formats and command descriptions. If the contents are a list separated by |, you must select one of the items.

...	The preceding element can be repeated an arbitrary number of times.
		Separates items in a list of choices.

HP-UX Release Name and Release Identifier

Each HP-UX 11i release has an associated release name and release identifier. The *uname*(1) command with the `-r` option returns the release identifier.

Table 2 shows the releases available for HP-UX 11i operating system.

Table 2 HP-UX 11i Releases

Release Identifier	Release Name	Supported Processor Architecture
B.11.20	HP-UX 11i v1.5	PA-RISC
B.11.22	HP-UX 11i v1.6	PA-RISC
B.11.23	HP-UX 11i v2	PA-RISC, Intel, Itanium
B.11.31	HP-UX 11i v3	PA-RISC, Intel, Itanium

Related Documents

You can find other information on HP server hardware management and diagnostic support tools in the following publications.

Website for HP Technical Documentation: `http://docs.hp.com`

Server Hardware Information: `http://docs.hp.com/en/hw.html`

Diagnostics and Event Monitoring: Hardware Support Tools   Complete information about HP hardware support tools, including online and offline diagnostics and event monitoring tools, is available on the HP website at:

`http://docs.hp.com/hpux/diag/`

This site has manuals, tutorials, FAQs, and other reference material.

Website for HP Technical Support: `http://us-support2.external.hp.com/`

Books about HP-UX Published by Prentice Hall   This website lists the HP books that Prentice Hall currently publishes: `http://www.hp.com/hpbooks/`

- *HP-UX 11i System Administration Handbook*
  `http://www.hp.com/hpbooks/prentice/ptr_0130600814.html`
- *HP-UX Virtual Partitions*
  `http://www.hp.com/hpbooks/prentice/ptr_0130352128.html`

HP books are available worldwide through bookstores, online booksellers, and office and computer stores.

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Please send comments to: `netinfo_feedback@cup.hp.com`.

Please include title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document. Also, please include what we did right so we can incorporate it into other documents.

1 Overview

The HP 9000 rp4410 and the HP 9000 rp4440 servers are designed to be easy to install, service, and maintain. They deliver performance, reliability, and availability in a compact, rack-dense design to meet the most demanding enterprise-level computing requirements.

A rack-dense 4U form-factor maximizes the number of servers for each rack, up to 10 systems for each HP 10000 G2 series rack (42U). They fit easily into the HP 10000 G2 series rack and into many third-party racks using side-mounted slides and a cable management arm that you can install quickly without tools.

You can equip the servers with up to eight 800 MHz or 1.0 GHz PA-8900 processors with 1.5 MB of on-chip L1 cache for each processor and 64 MB of shared L2 cache for each processor module, up to 128 GB RAM, and six PCI-X I/O expansion slots.

The blue server identification LED can be activated locally or remotely for easy physical identification of problem hardware, and the QuickFind diagnostic LED panel speeds problem diagnosis by identifying defective or mismatched hardware components.

HP 9000 rp4410 Server

The HP 9000 rp4410 server is a PA-8900-based server in a 4U form factor. It is based on the same hardware as the HP 9000 rp4440 server, but in the rp4410 server, two of the four processor sockets are disabled using firmware, limiting it to a 2P/2C. Like the HP 9000 rp4440 server, the HP 9000 rp4410 server has full access to all 16 or 32 memory slots (for a total of up to 128 GB of memory) and full access to all six PCI-X I/O slots.

Because it has a maximum of four processors, the HP 9000 rp4410 server qualifies for Oracle Standard Edition licensing. The HP 9000 rp4410 server is available in 1P/1C, 1P/2C, and 2P/2C configurations and can be easily upgraded to an HP 9000 rp4440 server using a firmware upgrade kit.

HP 9000 rp4410 and rp4440 Server Views

Figure 1-1, Figure 1-2, and Figure 1-3 show the top, front, and rear views of the HP 9000 rp4410 and rp4440 servers.

Figure 1-1 HP 9000 rp4410/rp4440 Server (Top View)
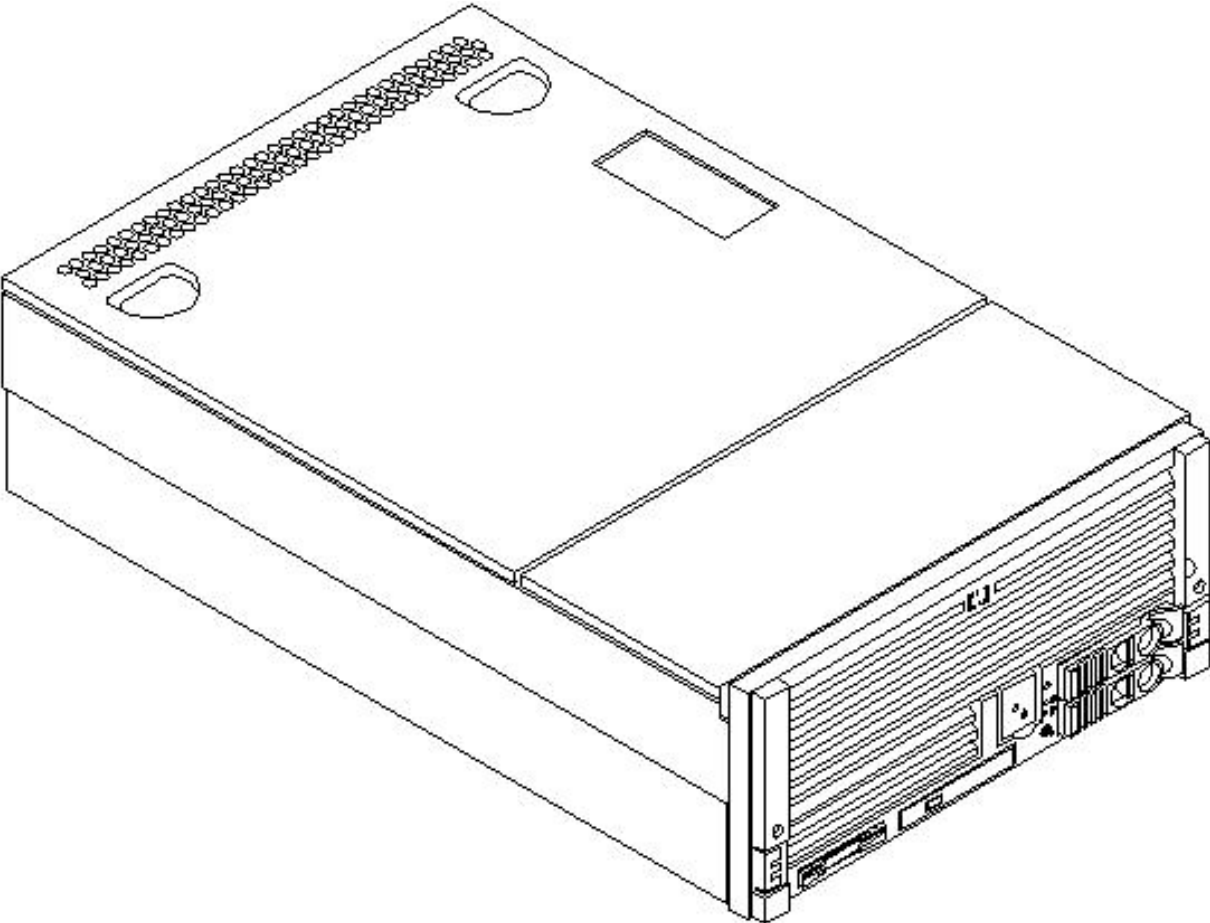
Figure 1-2 HP 9000 rp4410/rp4440 Server with Bezel Removed (Front View)
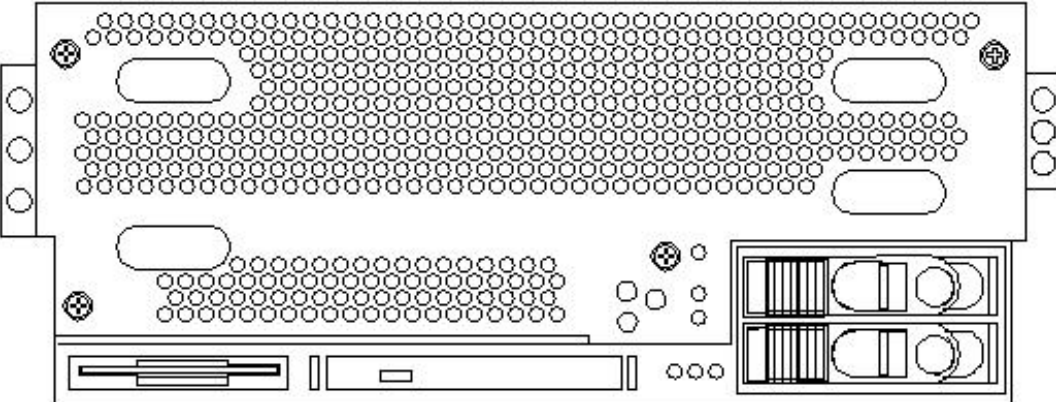
Figure 1-3 HP 9000 rp4410/rp4440 Server (Rear View)

Detailed Server Description

The following sections list information on the main subsystems within the HP 9000 rp4410 and rp4440 servers.

I/O Subsystem

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- PCI-X slots available - 8
  - Two dedicated PCI slots: Slot 1 is for SCSI; slot 2 is for LAN
  - Four hot-pluggable PCI-X 66 MHz 64-bit 3.3V 25W slots with shared busses and I/O. Slots 3 and 4 share capabilities and slots 5 and 6 share capabilities
  - Two hot-pluggable PCI-X 133 MHz 64-bit 3.3V 15W slots dedicated for core I/O
- I/O bandwidth - 4 GBs
- Pinnacle FXe PCI video card
- PCI Gigabit, Fast Ethernet Controller with Wake-on-LAN enabled/disabled with BIOS setup

Internal Core I/O

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Dual channel SCSI U320 or U160 (PA8800 only) interface or RAID, two internal 68-pin connectors, two 68-pin external connectors
- SCSI backplane configured as either one or two channels
- One internal Integrated Drive Electronics (IDE) connector for a slimline optical device (CD and DVD)
- No floppy connector
- Optional dual channel U320 RAID controller, two internal 68-pin connectors, two 68-pin external connectors (replaces SCSI interface)

External Core I/O

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Three external serial ports
- Two external USB ports
- Two SCSI U320 or U160 68-pin connectors (U160 for PA8800 only)
- One or two 10/100/1000Base-T ethernet LAN connectors for copper cable
- Two USB 2.0 ports

- Three DB-9 ports (console, UPS, and modem)
- Optional dual channel U320 RAID controller, two 68-pin external connectors (replaces SCSI interface)

Processors

The following is supported on the HP 9000 rp4410 and rp4440 servers:
- 800 MHz/1.5 GB cache or 1 GHz/1.5 GB cache per CPU
- Both processors are available with 32 MB or 64 MB L2 cache per dual processor module
- HP 9000 rp4410 server can have one processor or both processors of a single dual processor module enabled, or two processors enabled in each of two dual processor modules
- HP 9000 rp4440 server can be 1P/2C, 2P/2C, 3P/2C, or 4P/2C

Memory

The following is supported on the HP 9000 rp4410 and rp4440 servers:
- 16 DIMM slots on standard memory extender board
- 32 DIMM slots on optional memory extender board
- Maximum memory size of 128 GB (4 GB DIMMs on 32-slot memory extender board)
- Supports up to 32 Double Data Rate (DDR) registered ECC memory, in PC2100 DIMMs
- Supported DDR DIMM sizes:
    - 128 MB, 256 MB, 512 MB, 1 GB, 2 GB, and 4 GB
    - Standard 184 pins 2.5V DDR266, CL2, registered, ECC
- 133 MHz memory bus frequency, 266 MTransfers/s data, 8.5 GB/s peak data bandwidth
- DIMMs loaded by quads enable interleaved mode and chip spare
- Requires that DIMMs within each group of four (quad) be identical

Cooling

Six cooling fans with N+1 redundancy.

Power Supply Unit

The following is supported on the HP 9000 rp4410 and rp4440 servers:
- One 1200 W hot-swappable power supply
- Optional second 1200 W hot-swappable power supply for N+1 redundancy

Front Display Panel, DVD, and Diagnostic Panel

The following is supported on the HP 9000 rp4410 and rp4440 servers:
- Front panel that provides the controls and indicators commonly used for operation
- DVD+RW drive (with CD-write capability); IDE interface; 48x speed
- Optional slimline DVD drive
- Power button and LED indicators for system status
- LED-based diagnostic panel

Mass Storage

The following is supported on the HP 9000 rp4410 and rp4440 servers:
- Up to two SCSI hot-pluggable hard disk drives
- Integrated Ultra-3 SCSI dual channel controller; 80 MB/s transfer rate with two 68-pin connectors. The SCSI backplane is configured as either one or two channels

- Maximum internal storage of two 73 MB, 15K drives
- Optional integrated HP RAID controller

Firmware

Firmware consists of many individually linked binary images that are bound together by a single framework at run time. Internally, the firmware employs a software database called a device tree to represent the structure of the hardware platform and to provide a means of associating software elements with hardware functionality.

The firmware incorporates the Boot Console Handler (BCH) which provides an interface between the operating system and the platform firmware. BCH uses data tables that contain platform-related information, and boot and run-time service calls available to the operating system and its loader to provide a standard environment for booting.

The firmware supports the HP-UX 11i version 1 (or higher) operating system through the HP 9000 processor family standards and extensions, and has no operating system-specific functionality included. The operating system is presented with the same interface to system firmware, and all features are available to the operating system.

Event IDs for Errors and Events

The server firmware generates event IDs similar to chassis codes for errors, events, and forward progress to the Integrated Light-Out Management Processor (iLO MP) through common shared memory. The iLO MP interprets and stores event IDs. Reviewing these events helps you diagnose and troubleshoot problems with the server.

Dimensions and Values

Table 1-1 lists the dimensions and their values of the HP 9000 rp4410 and rp4440 servers.

Table 1-1 Server Dimensions and Values

Dimensions	Value
Height	6.8 in (17.3 cm)
Width	19 in (48.2 cm)
Depth	27.2 in (69.0 cm)
Weight	Unloaded 88 lbs (40 kg) Fully loaded 100 lbs (45.4 kg)

Controls, Ports, and LEDs

This section describes the controls, ports, and LEDs found on the front panel, rear panel, and internal locations of the HP 9000 rp4410 and rp4440 servers.

Front Panel

The front panel of the server provides the controls and indicators commonly used for operation.

Figure 1-4 shows the control panel on the server front.

Figure 1-4 Control Panel - Front View of Server (with Bezel)
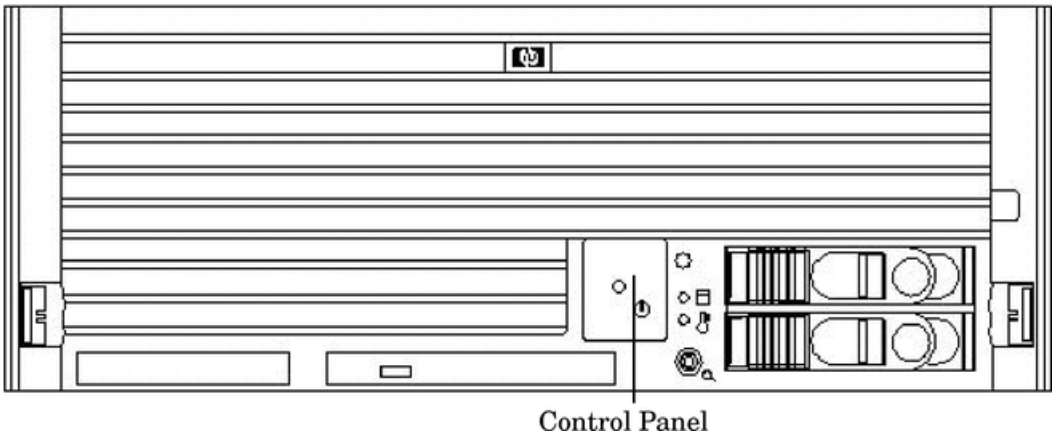
Control Panel

Figure 1-5 shows how to access the control panel. The front control panel access door is on the bezel.

Figure 1-5 Accessing the Control Panel
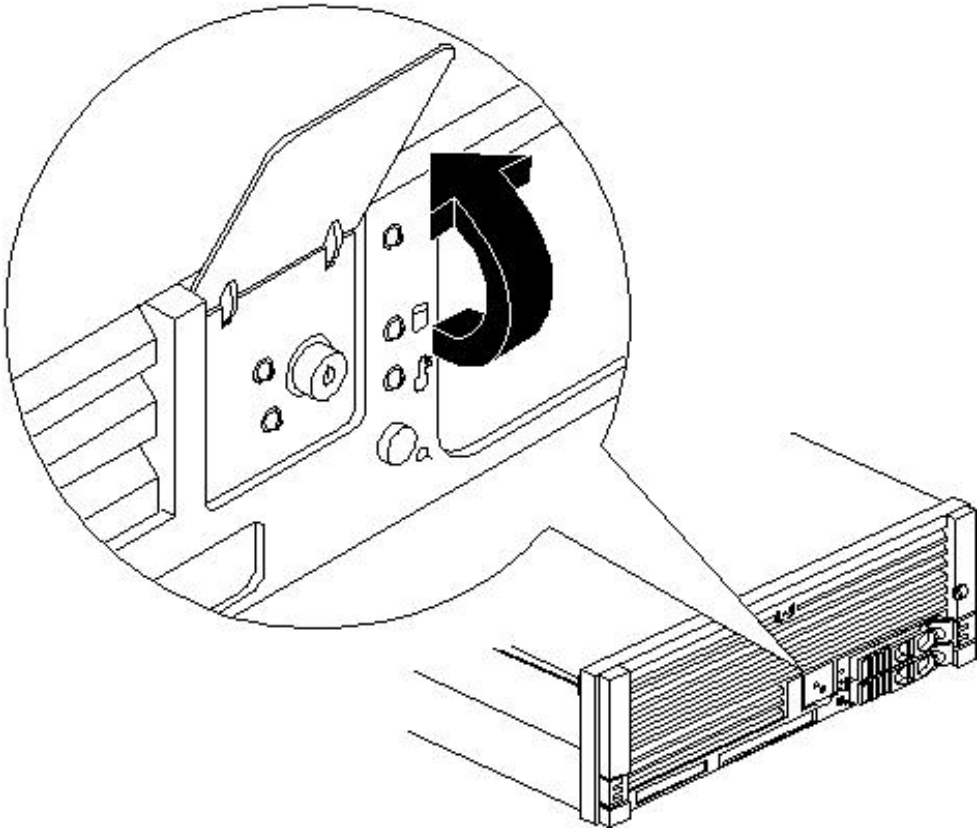
Figure 1-6 shows the control panel LEDs and buttons.

Figure 1-6 Control Panel LEDs and Buttons
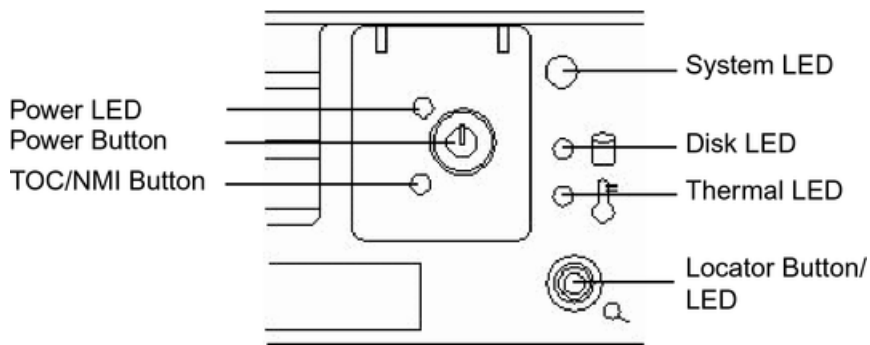
Table 1-2 lists the control panel LED status and descriptions.

Table 1-2 Control Panel LED Definitions

LED or Button	State	Flash Rate	Color	Description
System LED	Running	Steady	Green	System normal, OS up and running
System LED	Booting	Flashing at 0.5 Hz	Green	OS booting or at BCH
System LED	Attention	Flashing at 1 Hz	Yellow	• Warning-system needs attention • Redundancy lost • Component failure pending
System LED	Fault	Flashing at 2 Hz	Red	Hard fault. system halted
System LED	Off	Off	N/A	System off
Power LED	On	Steady	Green	Power normal
Power LED	On	Flashing at 1 Hz	Yellow	Housekeeping voltage present
Power LED	Off	Off	Off	Power off
Disk LED		Flashing at rate of disk activity	Green	Disk activity
Thermal LED	OK	Steady	Green	Thermal OK
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Thermal warning
Locator Button or LED		Flashing at 1 Hz	Blue	• System locator LED can be remotely or locally activated or deactivated • There is also a locator button on the rear panel of the server • Pressing either button turns both LEDs on or off and enables or disables the locator function

Table 1-3 lists the button LED definitions.

Table 1-3 Button LED Definitions

Button	Description
Power Button	Controls the power supply (turns system power on or off) if power is available to the power supply. (Controls both power supplies if two are installed).
	If power is off but power is available to the power supplies, pressing the power button does the following:
	• From zero to five seconds, turns on the power supplies and applies power to server circuits.
	• More than five seconds then released, has no effect.
	If power is on and the system is at initial system loader, pressing the power button:
	• Momentarily (less than one second) has no effect.
	• More than one second, but less than five seconds—do not use. This initiates e-buzzer functions that are not supported in the server.
	• More than five seconds then released causes an immediate hard power off.
	If power is on and the system is at BCH, pressing the power button does the following:
	• From zero to five seconds has no effect.
	• More than five seconds then released causes an immediate hard power off.
	If power is on but the OS has been shut down, pressing the power button:
	• Momentarily (less than one second) has no effect.
	• More than one second, but less than five seconds—do not use. This initiates e-buzzer functions that are not supported on this server.
	• More than five seconds then released causes an immediate hard power off.
	If the OS is running, pressing the power button does the following:
	• Momentarily (less than one second) has no effect.
	• More than one second, but less than five seconds—do not use. This initiates e-buzzer functions that are not supported on the server.
	• More than five seconds then released causes an immediate hard power off.
NMI Button	Use a paper clip to press this button. Press the non-maskable interrupt (NMI) button before restarting the system after a the system hangs. NMI provides crash dump capture capability. Obtain a system hardware status dump to use in root cause analysis and debugging. The same function is available with the CM>TC iLO MP command.

Rear Panel

The server rear panel includes communication ports, I/O ports, ac power connectors, two power supply bays, attention LED indicators for the hot-pluggable PCI boards, and the locator LED button. LEDs located on the rear panel of the server signal the operational status of the following components:

- Power supplies
- iLO MP LAN
- Gigabit Ethernet card LAN
- PCI slots 3-8

Figure 1-7 shows the rear panel LEDs.

Figure 1-7 Rear Panel LEDs
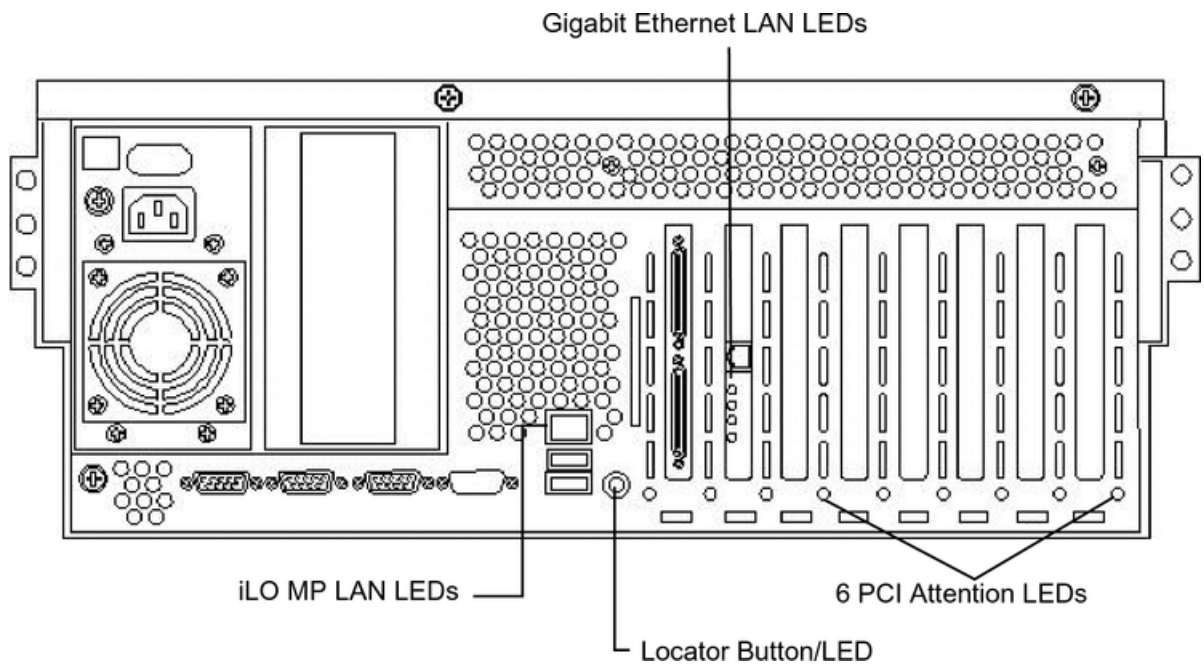
Power Supply Status LEDs

Each power supply unit has three status LEDs located on the power supply rear side. The front control panel power status LED reports a consolidated status of all the power supplies.

Figure 1-8 show the power supply status LEDs.

Figure 1-8 Power Supply Status LED
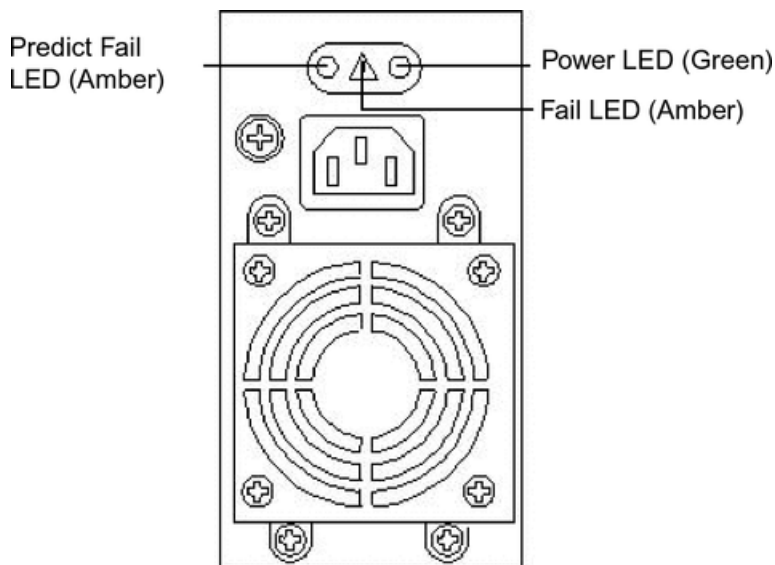
Table 1-4 lists power supply status LED information.

Table 1-4 Power Supply Status LED

Power LED (Green)	Predict Fail LED (Amber)	Fail LED (Amber)	Status
Off	Off	Off	No ac power is applied to all PSUs.
Off	Off	On	No ac power is applied to this PSU only.
Blinking	Off	Off	ac present and the standby outputs are on.

Table 1-4 Power Supply Status LED (continued)

Power LED (Green)	Predict Fail LED (Amber)	Fail LED (Amber)	Status
On	Off	Off	PSU dc outputs are on and OK.
Off	Off	On	Power supply failure.
On	Blinking	Off	Predictive failure. The PSU is about to fail because of a poorly performing fan.
On	Off	Blinking	Current limit on 48 VDC output.

iLO MP LAN LEDs

NOTE: There are two different iLO MP cards that were installed in this server. They have different LEDs on them. Both of them are shown below.

One of the iLO MP LAN cards has the amber LED on the left and the green LED on the right. It is shown in Figure 1-9. The internal iLO MP LAN uses an RJ-45 type connector. This connector has two LEDs (LAN link and LAN activity) that signal status and activity.

Figure 1-9 iLO MP LAN LEDs – Example 1
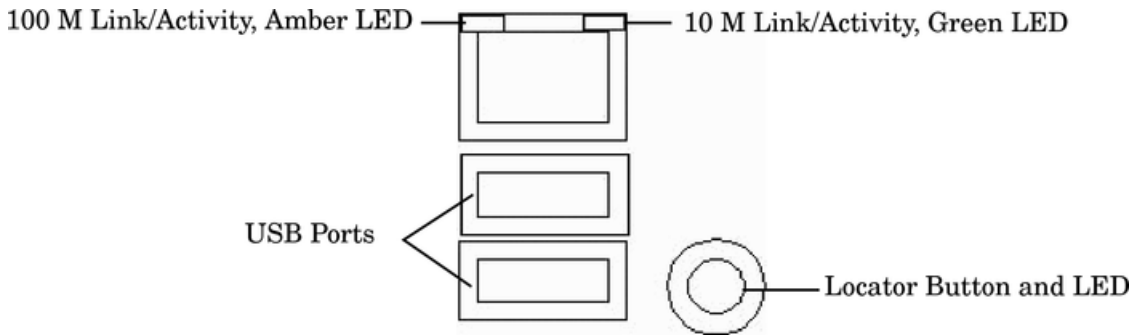
Table 1-5 provides iLO MP LED status descriptions.

Table 1-5 iLO MP LED Status Descriptions – Example 1

LED	Condition	Status
100 M amber	On	Linked at 100 MBs. No activity.
100 M amber	Blinking	Linked at 100 MBs. Activity present.
10 M green	On	Linked at 10 MBs. No activity.
10 M green	Blinking	Linked at 10 MBs. Activity present.

The other iLO MP LAN card has the green LED on the left and the amber LED on the right. Is is shown in Figure 1-10.

Figure 1-10 iLO MP LAN LEDs – Example 2
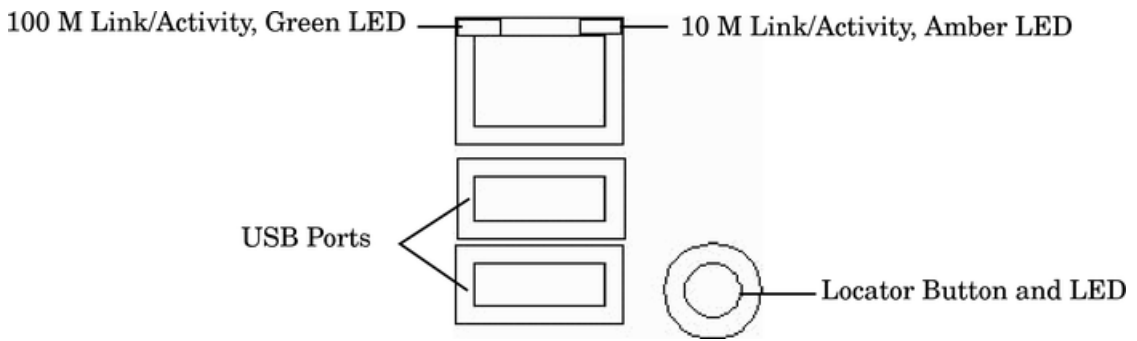
Table 1-6 provides iLO MP LED status descriptions.

Table 1-6 iLO MP LED Status Descriptions – Example 2

LED	Condition	Status
100 M green	On	Linked at 100 MBs, no activity
100 M green	Blinking	Linked at 100 MBs, activity present
10 M amber	On	Linked at 10 MBs, no activity
10 M amber	Blinking	Linked at 10 MBs, activity present

Single-Port Gigabit Ethernet LAN Card

The single-port Gigabit Ethernet LAN card uses an RJ-45 LAN connector. This connector has four LEDs (three LAN link and one LAN activity) that signal link speed and activity.

Figure 1-11 Single-Port GigE LAN Connector and LEDs
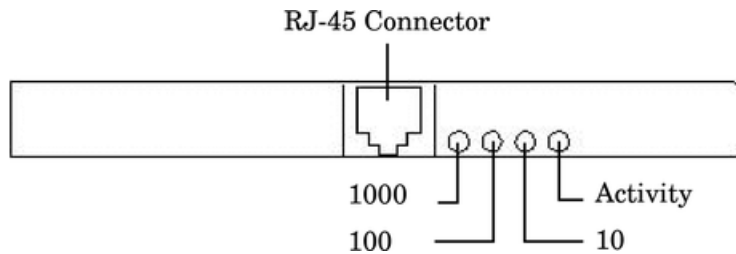
Table 1-7 lists the single-port Gigabit Ethernet LAN card LED status descriptions.

Table 1-7 Single-Port GigE LAN LED Status Descriptions

LED	Color	Condition	Status
Activity	Green	On	Linked, no activity
Activity	Green	Off	No link
Activity	Green	Blinking	Linked, activity present
1000-BaseT	Green	On	Link speed—1000 MBs
100-BaseT	Green	On	Link speed—100 MBs
10-BaseT	Green	On	Link speed—10 MBs

Figure 1-12 and Table 1-8 show the dual-port Gigabit Ethernet LAN card LEDs and status descriptions.

Figure 1-12 Dual-Port GigE LAN Card LEDs
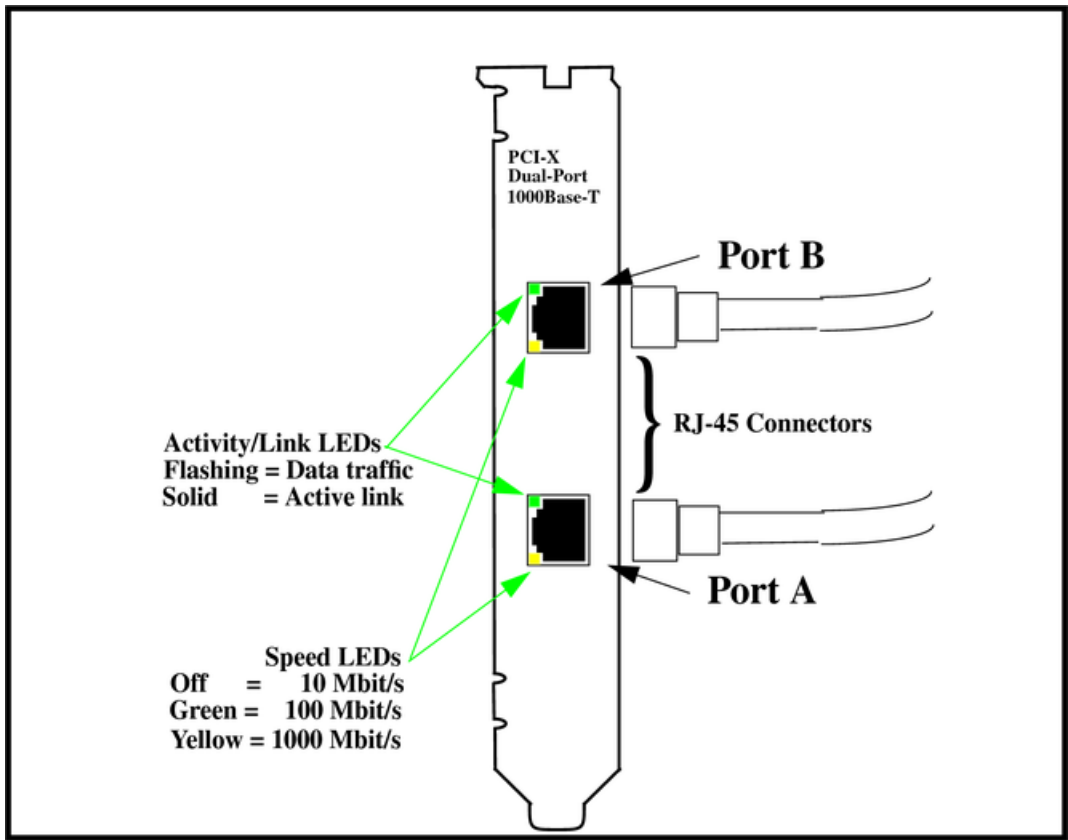
Table 1-8 Dual-Port GigE LAN Card LED Status Descriptions

LED	Condition	Status
Activity	Flashing	Linked, data traffic
Activity	Solid	Active link
Speed	Off	Link speed 10 Mbit/s
Speed	Green	Link speed 100 Mbit/s
Speed	Amber	Link speed 1000 Mbit/s

Ports and Connectors

Figure 1-13 shows the ports and connectors found on the rear panel of the server.

Figure 1-13 Server Rear View
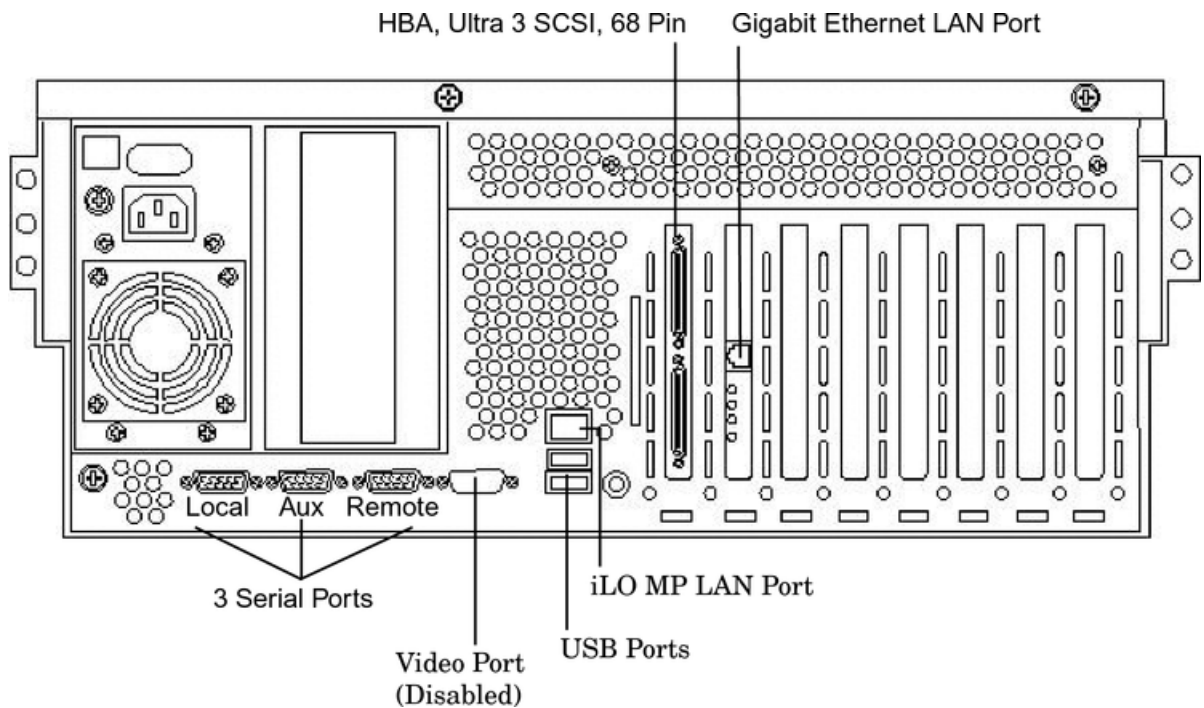
The SCSI HBA card in slot 1 and the Gigabit Ethernet card in slot 2 are factory installed.

USB Ports

Figure 1-14 and Table 1-9 show the USB port connector and pinouts.

Figure 1-14 USB Port Connector
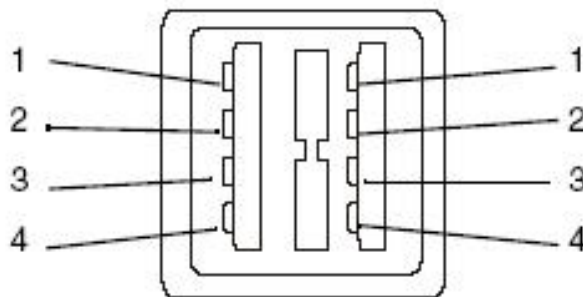
Table 1-9 USB Pinouts

Pin Number	Signal Description
1	+5 VDC
2	MR
3	PR
4	Ground

VGA Port

The VGA (video) port is disabled on the rp4410 and rp4440 servers.

Serial Ports

Figure 1-15 and Table 1-10 show the serial port connector and pinouts.

Figure 1-15 Serial Port Connector
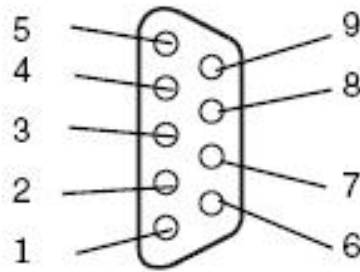
Table 1-10 Serial Port Pinouts

Pin Number	Signal Description
1	Data carrier detect
2	Receive data
3	Transmit data
4	Data term ready
5	Ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring indicator

iLO MP LAN Port

Figure 1-16 and Table 1-11 show the iLO MP LAN port connector and pinouts.

Figure 1-16 iLO MP LAN Port
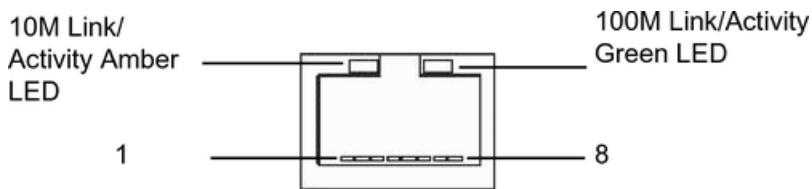
Table 1-11 iLO MP LAN Port Pinouts

Pin Number	Signal Description
1	TXP
2	TXN
3	RXP
4	Not used
5	Not used
6	RXN
7	Not used
8	Not used

Gigabit Ethernet LAN Port

Figure 1-17 and Table 1-12 show the Gigabit Ethernet LAN port connector and pinouts.

Figure 1-17 Gigabit Ethernet LAN Port
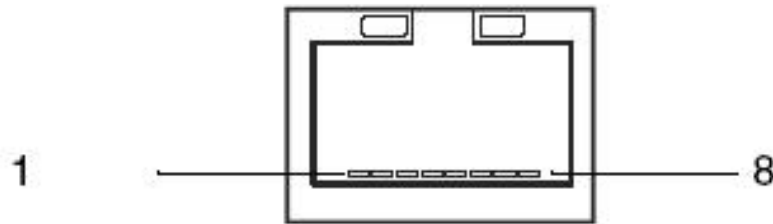
Table 1-12 Gigabit Ethernet LAN Port Pinouts

Pin Number	Signal Description
1	RXP
2	RXN
3	TXP
4	Not used
5	Not used
6	TXN
7	Not used
8	Not used

SCSI Port, Ultra 3, 68-Pin

Two Ultra 3, 68-pin SCSI connectors are located on the HBA located in PCI slot 1. The upper connector supports SCSI channel A and the lower connector supports SCSI channel B.

Figure 1-18 and Table 1-13 show the SCSI port connector and pinouts.

Figure 1-18 SCSI Port, Ultra 3, 68-Pin
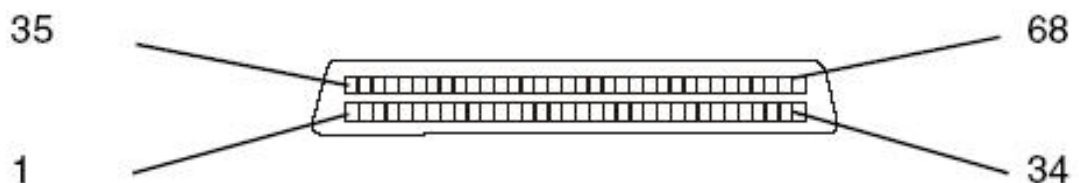
Table 1-13 SCSI Port Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1	S1 (+DB 12)	35	S35 (–DB 12)
2	S2 (+DB 13)	36	S36 (–DB 13)
3	S3 (+DB 14)	37	S37 (–DB 14)
4	S4 (+DB 15)	38	S38 (–DB 15)
5	S5 (+DB P 1)	39	S39 (–DB P 1)

Table 1-13 SCSI Port Pinouts *(continued)*

Pin Number	Signal Description	Pin Number	Signal Description
6	S6 (+DB 0)	40	S40 (–DB 0)
7	S7 (+DB 1)	41	S41 (–DB 1)
8	S8 (+DB 2)	42	S42 (–DB 2)
9	S9 (+DB 3)	43	S43 (–DB 3)
10	S10 (+DB 4)	44	S44 (–DB 4)
11	S11 (+DB5)	45	S45 (–DB 5)
12	S12 (+DB 6)	46	S46 (–DB 6)
13	S13 (+DB 7)	47	S47 (–DB 7)
14	S14 (+DB P)	48	S48 (–DB P)
15	S15	49	S49
16	S16 (DIFFSENS)	50	S50
17	S17 (TERMPWR)	51	S51 (TERMPWR)
18	S18 (TERMPWR)	52	S52 (TERMPWR)
19	S19 (RESERVED)	53	S53 (RESERVED)
20	S20	54	S54
21	S21 (+ATN)	55	S55 (–ATN)
22	S22	56	S56
23	S23 (+BSY)	57	S57 (–BSY)
24	S24 (+ACK)	58	S58 (–ACK)
25	S25 (+RST)	59	S59 (–RST)
26	S26 (+MSG)	60	S60 (–MSG)
27	S27 (+SEL)	61	S61 (–SEL)
28	S28 (+C/D)	62	S62 (–C/D)
29	S29 (+REQ)	63	S63 (–REQ)
30	S30 (+I/O)	64	S64 (–I/O)
31	S31 (+DB 8)	65	S65 (–DB 8)
32	S32 (+DB 9)	66	S66 (–DB 9)
33	S33 (DB 10)	67	S67 (–DB 10)
34	S34 (DB 11)	68	S68 (–DB 11)

Additional Controls and LEDs

Storage devices have additional LEDs showing their status.

Hot-Pluggable Disk Drive LEDs

Figure 1-19 and Table 1-14 show the hot-pluggable disk drive LED indicators and definitions.

Figure 1-19 Hot-Pluggable Disk Drive LED Indicators
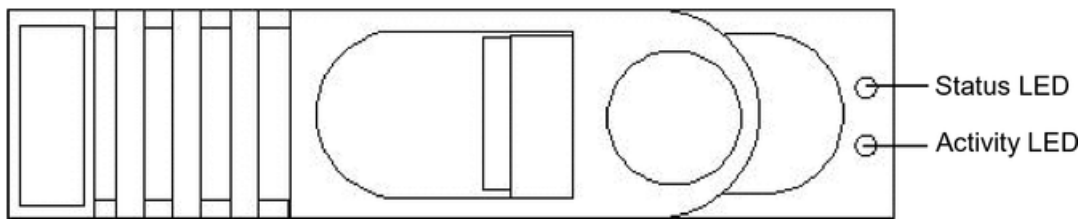
Table 1-14 Hot-Pluggable Disk Drive LED Definitions

LED	State	Description
Activity LED	Flashing green	Drive is active
Status LED	Solid green	Drive is operating (power applied)

DVD Drives

The server is delivered with one DVD drive. DVD-R and DVD-RW drives are optional. Each of these devices has one activity LED.

Figure 1-20 and Table 1-15 show the DVD drive and DVD drive LED definitions.

Figure 1-20 DVD Drive

Eject Button   Activity LED   Emergency Eject
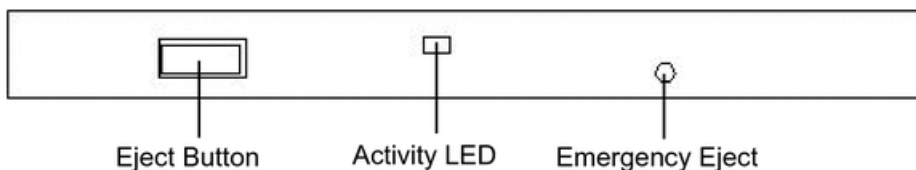
Table 1-15 DVD Drive LED Definitions

LED	State	Description
Activity LED	Flashing green	Drive is active

QuickFind Diagnostic Panel

The QuickFind diagnostic panel has 27 single color LEDs and one multi-color LED for temperature. The LEDs are normally off. The appropriate LED is turned on when an error is detected or a replacement part is required.

Accessing the QuickFind Diagnostic Panel

You can access the QuickFind diagnostic panel by removing the top cover. Use the QuickFind diagnostic panel as an aid in troubleshooting. (See "QuickFind Diagnostic Panel LEDs" (page 140).)

Figure 1-21 shows the QuickFind diagnostic panel.

Figure 1-21 QuickFind Diagnostic Panel
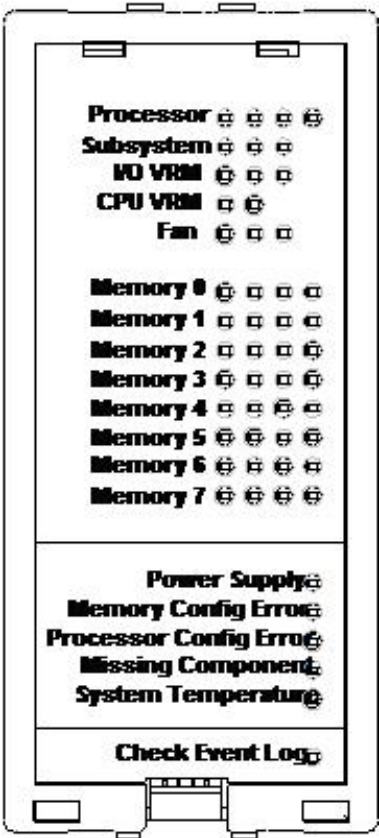
I/O Baseboard LED Indicators

The following indicators are located on the I/O baseboard:

- LEDs
- Sensors
- Reset button
- Attention button

Figure 1-22 shows the I/O baseboard LEDs, buttons, and sensors and Table 1-16 lists their definitions.

Figure 1-22 I/O Baseboard LEDs, Buttons, and Sensors
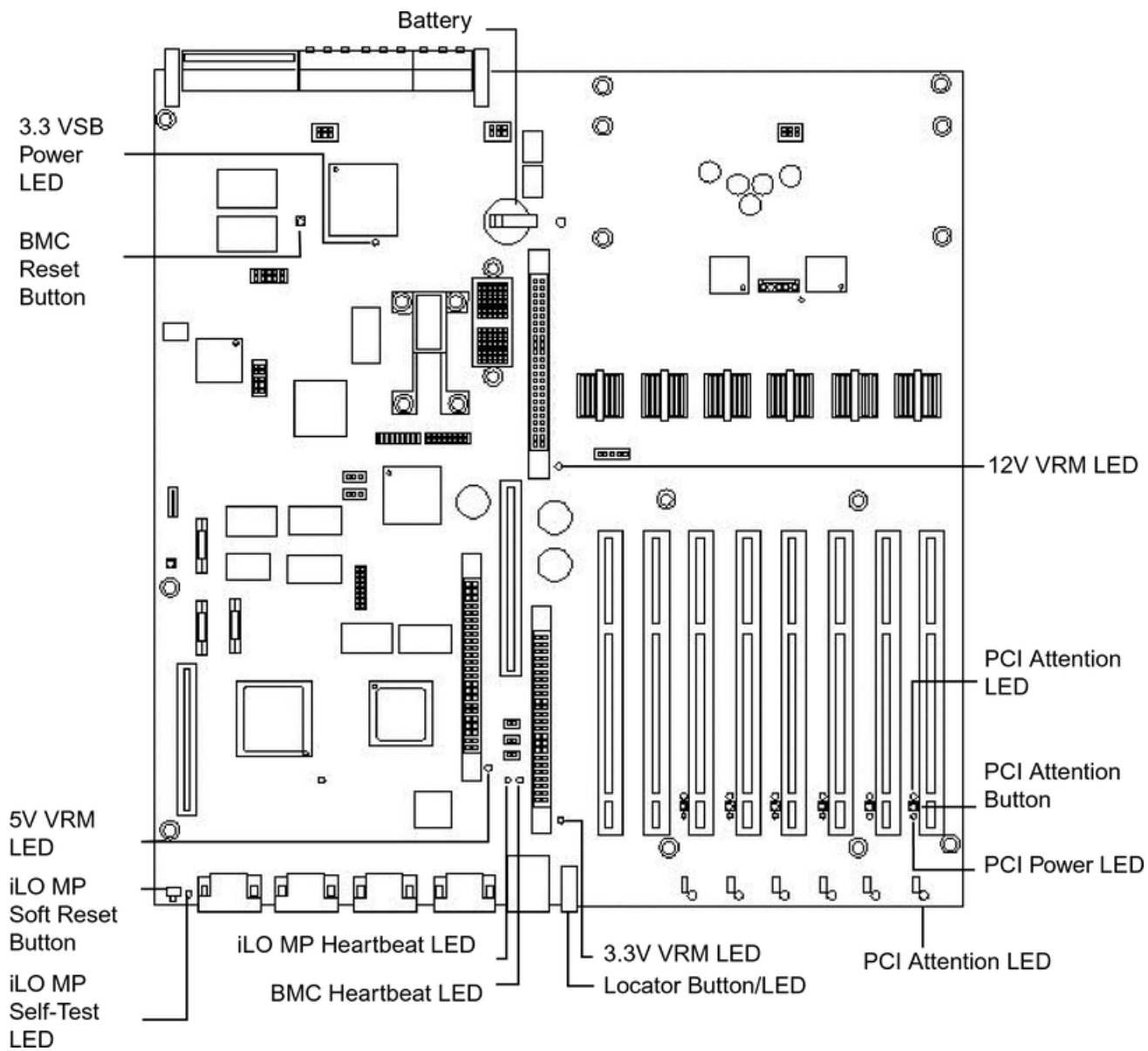
Table 1-16 I/O Baseboard LEDs, Buttons, and Sensors

LED/Button	Color	Status	Condition
12 V VRM Power LED	Green	On	12 V VRM is functioning
5V VRM Power LED	Green	On	5 V VRM is functioning
3.3 V VRM Power LED	Green	On	3.3 V VRM is functioning
iLO MP Heartbeat	Green	Blinking	The iLO MP is functioning correctly
iLO MP Self Test LED	Amber	On Off	The iLO MP is executing the internal self test The iLO MP passed the internal self test
BMC Heartbeat	Green	Blinking	The baseboard management controller (BMC) is functioning correctly
3.3 VSB Power LED	Green	On	Standby power is available
iLO MP Soft Reset Button	N/A	Press	Resets the iLO MP values

Powering the Server On and Off

This section provides information on how to power off and power on the server.

Power States

The server has three power states:

- Standby power
- Full power
- Off

To achieve the standby power state, plug the power cord into the appropriate receptacle on the rear of the server. The front panel power button is not turned on. Full power occurs when the power cord is plugged into the appropriate receptacle and either the power is activated through the iLO MP `PC` command, or the power button is activated. In the off state, the power cords are not plugged in.

Table 1-17 lists the server power states.

Table 1-17 Power States

Power States	Power Cable Plugged Into Receptacle?	Power Activated Through the iLO MP `PC` Command; or Front Panel Power Button Activated?	Standby DC Voltage Applied?	DC Voltage Applied?
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

NOTE: If the power restore feature is set to **Always On** through the iLO MP `PR` command, the server automatically powers on to the full power state.

Powering On the Server

Power on the server to full power using the following methods if the server is in the standby power state:

- iLO MP `PC` command
- Power button

Powering On the Server Using the iLO MP

NOTE: If the power restore feature is set to **Always On** through the iLO MP `PR` command, the server automatically powers on to the full power state.

To power on the server using the iLO MP, follow these steps:

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Initiate a console session, and access the **MP Main Menu**.
3. To enable command mode, enter `CM`.
4. To use the remote power control command, enter `PC`.
5. To power on the server, enter `ON`.
6. To confirm the action, enter **YES** when prompted.
7. Start the operating system.

Powering On the Server Manually

> **NOTE:** If the power restore feature is set to **Always On** through the iLO MP PR command, the server automatically powers on to the full power state.

To manually power on the server, follow these steps:

1. Plug all the power cables into the receptacles on the rear panel of the server.
2. To start the server, press the power button.
3. Start the operating system.

Powering Off the Server

Power off the server using the following methods if the server is in the standby or full power state:

- iLO MP PC command
- Power button

Powering Off the Server Using the iLO MP

To power off the server using the iLO MP, follow these steps:

1. Gracefully shut down the operating system.
2. Initiate a console session, and access the **MP Main Menu**.
3. Enter CM to enable command mode.
4. To use the remote power control command, enter PC.
5. To power off the server, enter OFF.
6. To confirm the action, enter**YES** when prompted.

> **IMPORTANT:** The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

7. Unplug all power cables from the receptacles on the rear panel of the server.

Powering Off the Server Manually

To manually power off the server, follow these steps:

1. Gracefully shut down the operating system.
2. To power off the server, press the power button.

> **IMPORTANT:** The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

3. Unplug all the power cables from the receptacles on the rear panel of the server.

2 System Specifications

This chapter provides information on the basic system configuration, physical specifications, and requirements for the HP 9000 rp4410 or rp4440 server.

System Configuration

Table 2-1 lists the minimum and maximum configuration options for the HP 9000 rp4410 and rp4440 servers.

Table 2-1 Minimum and Maximum Server Configurations

Component	rp4410	rp4440
Microprocessors	One or two dual-core processor modules, each containing two PA RISC 800 MHz/1.5 MB cache or 1 GHz/1.5 MB cache. The CPUs are available with 32 MB or 64 MB L2 cache. A single CPU or all installed CPUs can be activated.	Up to four dual-core processor modules, each containing two PA RISC 800 MHz/1.5 MB cache or 1 GHz/1.5 MB cache. The CPUs are available with 32 MB or 64 MB L2 cache. All installed CPUs (2, 4, 6, or 8) are activated.
Memory	Supports up to 16 Double Data Rate (DDR) registered ECC memory, in PC2100 DIMMs. Up to 32 DDR DIMMs can be optionally used. Maximum memory is 128 GB. Supported DDR DIMM sizes: 256 MB and 512 MB, 1 GB, 2 GB, and 4 GB.	Supports up to 16 Double Data Rate (DDR) registered ECC memory, in PC2100 DIMMs. Up to 32 DDR DIMMs can be optionally used. Maximum memory is 128 GB. Supported DDR DIMM sizes: 256 MB, 512 MB, 1 GB, 2 GB, and 4 GB.
HDDs	2-36 GB, 15K RPM Ultra320 SCSI hot-plug disks or 2-73 GB, 15K RPM Ultra320 SCSI hot-plug disks or 2-146 GB, 10K RPM Ultra320 SCSI hot-plug disks.	2-36 GB, 15K RPM Ultra320 SCSI hot-plug disks or 2-73 GB, 15K RPM Ultra320 SCSI hot-plug disks or 2-146 GB, 10K RPM Ultra320 SCSI hot-plug disks.
SCSI	Integrated Ultra-3 SCSI dual channel controller; 80 Mb/s transfer rate with two external 68-pin connectors.	Integrated Ultra-3 SCSI dual channel controller; 80 Mb/s transfer rate with two external 68-pin connectors.
LAN	PCI GB Fast Ethernet controller.	PCI GB Fast Ethernet controller.
PCI Slots	Two dedicated for LAN and SCSI; four 64-bit PCI-X slots, 66 MHz, 3.3V slots; and two 64-bit PCI-X slots, 133 MHz, 3.3V slots.	Two dedicated for LAN and SCSI; four 64-bit PCI-X slots, 66 MHz, 3.3V slots; and two 64-bit PCI-X slots, 133 MHz, 3.3V slots.
Core I/O	Three serial ports, two USB ports, integrated RJ-45 LAN.	Three serial ports, two USB ports, integrated RJ-45 LAN.
DVD	DVD-R/CD drive, IDE interface, 48x speed.	DVD-R/CD drive, IDE interface, 48x speed.
External storage	Two external SCSI ports.	Two external SCSI ports.
Power supply	One power supply standard. A second power supply (optional) for 1+1 configuration.	One power supply standard. A second power supply (optional) for 1+1 configuration.

Dimensions and Values

Table 2-2 provides dimensions and values of HP 9000 rp4410 and rp4440 servers.

Table 2-2 Server Dimensions and Values

Dimension	Value
Height	6.8 in (17.3 cm)
Width	19 in (48.2 cm)
Depth	27.2 in (69.0 cm)

Table 2-2 Server Dimensions and Values *(continued)*

Dimension	Value
Weight	Unloaded 88 lbs (40 kg) Fully loaded 100 lbs (45.4 kg)
Height	6.8 in (17.3 cm)

Grounding

The site building must provide a safety ground or protective earth for each ac service entrance to all cabinets.

Install a protective earthing (PE) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

Electrical Specifications

This section provides electrical specifications for the server.

AC Power Cords

lists the power cables available for use with the HP 9000 rp4410 and rp4440 servers.

Table 2-3 Power Cords

Part Number	Description	Country
8120-5341	Power Cord C15/S Africa 2.5m black CA ASSY 917	South Africa
8120-1351	Power Cord C13/BS-1363 2.3m black CA ASSY 900	United Kingdom Hong Kong Singapore
8120-1369	Power Cord C13/AS-3112 2.0m gray CA ASSY 901	Australia
8120-1689	Power Cord C13/CEE 7 2.0m black CA ASSY 902	Europe
8120-2104	Power Cord C13/SEV 12 2.0m black CA ASSY 906	Switzerland
8120-6814	Power Cord OPT-912 3-COND 2.25-M-LG 912	Denmark
8120-0698	Power Cord C13/6-15P 0.0m black CA ASSY 904 / 918	North America (250#V) Japan
8120-6800	Power Cord OPT-919 3-COND 2.3-M-LG 919	Israel
8120-8390	Power Cord C15/CEI 23-16 2.5m black CA ASSY 920	Argentina
8120-8389	Power Cord C15/CEI 23-16 2.5m black CA ASSY 921	Chile
8120-8376	Power Cord C13/GB-1002 2.236m gray CA ASSY 922	China
8121-0668	Power Cord OPT-927 3-COND 2.3-M-LG FLNT 927	South America
8120-6514	C13/C14 Jumper cord	All

Circuit Breaker

The marked electrical size for the server is eight amps. The recommended circuit breaker size is 12 amps per line cord (2 maximum) for North America. For countries outside North America,

consult the local electrical authority that has jurisdiction for the recommended circuit breaker size.

System Power Specifications

The following tables provide information to help determine the amount of ac power needed for your computer room.

Table 2-4 lists the ac power requirements for the server.

Table 2-4 System Power Specifications

Specification	Value
Nominal input voltage	200 – 240 VAC
Minimum operating voltage	180 VAC
Maximum operating voltage	264 VAC
Frequency range (minimum – maximum)	50 – 60 Hz
Number of phases	1
Maximum input current	8 A RMS
Maximum inrush current (maximum configuration)	**rp4410** 100 A (peak), 55 A (average) 0 msec – 1 msec 55 A (peak), 33 A (average) 1 msec – 2 msec 5 A (peak), 22 A (average) 2 msec – 10 sec 25 A (peak), 15 A (average) 10 msec – 150 msec **rp4440** 100 A (peak), 55 A (average) 0 msec – 1 msec 55 A (peak), 33 A (average) 1 msec – 2 msec 5 A (peak), 22 A (average) 2 msec – 10 sec 25 A (peak), 15 A (average) 10 msec – 150 msec
Dropout carry through time at minimum line voltage	20 ms
Power factor correction	>0.95 at all loads of 90% – 100% of supply rating >0.75 at all loads of 50% – 90% of supply rating
Ground leakage current	<1.1 mA per line cord

Table 2-5 list maximum and typical power requirements for the HP 9000 rp4410 and rp4440 servers.

Table 2-5 System Power Requirements

Power Required (50-60 Hz)	Watts	VA	Comments
Maximum configuration[1]	1368	1440	Maximum theoretical
Typical configuration[2]	1065	1125	Typical

1 Maximum power is the sum of the worst case power consumption values of every subsystem in the HP 9000 rp4410 or rp4440 server. To calculate the worst case power consumption for your facility installation, use these values.

2 Typical power consumption values were measured while running power intensive applications. These values are generally lower than maximum power numbers because all the subsystems in the server rarely draw maximum power simultaneously and for long durations.

Power and Cooling

Table 2-6 lists power and cooling values associated with servers which contain the listed components. These power and cooling values are considered typical and not maximum for the configurations shown.

Table 2-6 lists the typical configuration power values for HP 9000 rp4410 and rp4440 servers.

Table 2-6 Typical Configuration Power Values

CPU Qty	Memory Gigabytes	PCI Cards (assuming 10W each)	DVDs	Hard Disk Drives	Core I/O	Bulk Power Supplies	Typical Power (Watts)	Typical Cooling (BTU/Hr)
1	1 GB (4 DIMMs 256 MB each)	0	0	1	2	2	410	1399.74
2	32 GB[1] (32 DIMMs, 1 GB each)[2]	0	0	1	1	1	540	1843.56
2	32 GB[1] (32 DIMMs, 1 GB each)[2]	6	1	2	2	2	700	2389.80
4	32 GB[1] (32 DIMMs, 1 GB each)[2]	0	1	2	2	2	895	3055.53
4	32 GB[1] (32 DIMMs, 1 GB each)[2]	6	1	2	2	2	975	3328.65
4	32 GB[1] (8 DIMMs, 4 GB each)	0	1	2	2	2	915	3121.98
4	128 GB[1] (32 DIMMs, 4 GB each)[2]	6	1	2	2	2	3600	12283.2

1   The maximum memory capacity is 128 GB.

2   These memory configurations require the optional 32-DIMM slot memory extender board. The standard memory extender board has 16-DIMM slots.

Environmental Specifications

This section provides the temperature and humidity requirements, noise emission, and air flow specifications for the server.

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5°C to 35°C (+40°F to +95°F) at sea level. The maximum allowable temperature is de-rated 1°C per 1,000 feet of elevation above 5,000 feet above sea level up to 30°C at 10,000 feet. For optimum reliability and performance, the recommended operating range is 20°C to 25°C and 40% – 55% relative humidity.

Ambient intake air temperature is often different from ambient room temperature, You should measure the operating temperature and humidity directly in front of the cabinet cooling air intakes rather than just checking ambient room conditions.

Environmental Temperature Sensor

The server includes internal sensors that monitor input air temperature and server operating temperatures. The ambient air temperature is measured using a sensor placed on the system I/O

board. Data from the sensor is used to control the fan speed and to initiate system overtemperature shutdown.

Nonoperating Environment

The system is designed to withstand ambient temperatures between -40°C to 70°C under nonoperating conditions.

Cooling

This section provides information on the cooling systems in the server.

CPU and Memory Cooling

The server incorporates front to back airflow across the processor and memory extender boards and through the HDD backplane. Two 127 mm dual fan assemblies, mounted vertically in the center of the chassis, pull air through the processor and memory section and push air through the PCI section. Each processor and memory dedicated dual fan assembly is controlled by smart fan control circuits embedded in the system I/O board. The smart fan control circuit receives fan control input from the system fan controller in the I/O board, and returns fan status information to the system fan controller. The smart fan circuit controls the power and the pulse-width-modulated control signal to the fan and monitors the speed indicator back from each of the fans. The fan status LED is driven by the smart fan circuit. The fan status LED is located on the diagnostic board inside the system.

Bulk Power Supply Cooling

Cooling for the bulk power supplies is provided by one 120 mm dual fan assembly and one externally mounted 60 mm power supply fan. Air is pushed into both power supply bays by the 120 mm fan assembly and exhausted out the rear by the 60 mm fan (one per power supply).

Air flows out of the rear of the chassis with minimal leakage into the cell airflow plenum.

NOTE: A power supply filler is required in the unused power supply slot to maintain proper airflow throughout the system.

PCI and Mass Storage Section Cooling

Two dual fan assemblies located at the center of the chassis provide airflow for all the PCI slots. Air flows over the processor and memory extender boards and into the PCI section. The fans are controlled by the system temperature and run at the speed necessary to maintain proper internal temperature throughout the chassis. The air is pulled through openings in the front cover and the mass storage devices and is pushed through the PCI card cage. Perforations between and above the PCI card cage enable proper exhaust ventilation to maintain the required temperature rating of the PCI cards.

CAUTION: For maximum cooling effects, ensure that the chassis ventilation holes are not blocked or covered after installation.

Figure 2-1 shows the airflow through the server.

Figure 2-1 Airflow Through HP 9000 rp4410 and rp4440 Servers
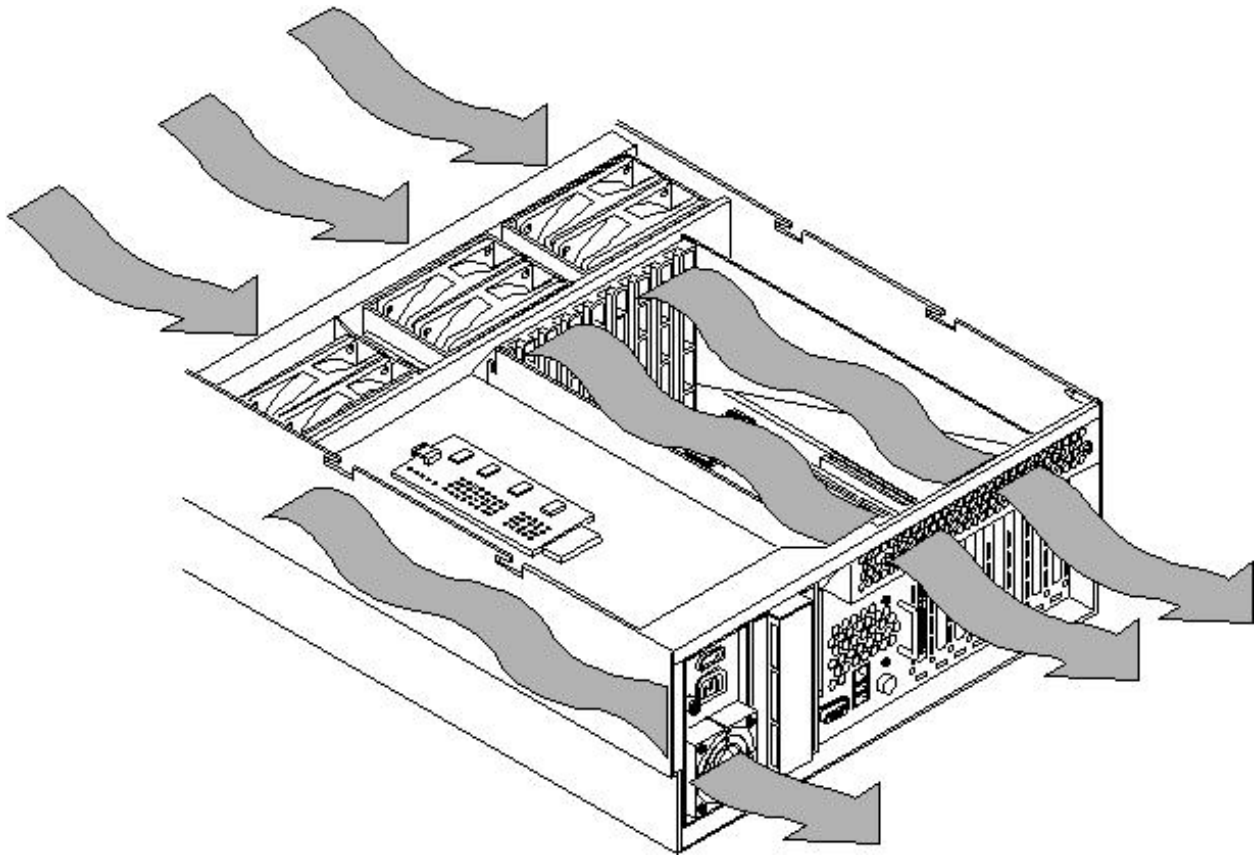
Acoustic Noise Specification

The acoustic noise specification for the HP 9000 rp4410 or rp4440 server is 53 db LpA (sound pressure level at bystander position in a dedicated computer room environment temperature of <25°C).
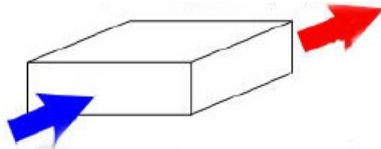
Physical and Environmental Specifications

Table 2-7 provides temperature and airflow information for minimum, typical, and maximum configurations for the HP 9000 rp4410 and rp4440 servers. It also lists the server and rack weights and dimensions.

Table 2-7 Physical and Environmental Specifications

	Condition				Weight			Overall Server (W x D x H)	
	Typical Heat Release	Airflow, Nominal	Airflow, at Maximum Ambient degrees C[1]						
	180-264 VAC				Server Alone	Rack	Pedestal	Rack	Pedestal
Min. Config.	410 Watts		297 m3/hr	250 CFM	425 m3/hr	88 lbs (40 kg)	100 lbs (45.4 kg)	115 lbs (53 kg)	W: 19 in (48.2 cm) D: 27.2 in (69.0 cm) H: 6.8 in (17.3 cm)	W: 10.3 in (26.1 cm) D: 27.4 in (69.5 cm) H: 20.9 in (53.0 cm)
Max. Config.	1368 Watts	175 CFM								
Typical Config.	1065 Watts									

Table 2-7 Physical and Environmental Specifications *(continued)*

	Condition			Weight			Overall Server (W x D x H)	
	Typical Heat Release	**Airflow, Nominal**	**Airflow, at Maximum Ambient degrees C**[1]					
	180-264 VAC			**Server Alone**	**Rack**	**Pedestal**	**Rack**	**Pedestal**
ASHRAE Class 1	Airflow cooling scheme (front to rear)		Min./ Config.	One CPU, one power supply, 1 GB DIMM, zero DVD, one HDD, zero PCI cards, one core I/O.				
			Max. Config.	Four CPUs, two power supplies, 128 GB DIMM, one DVD, two HDD, six PCI cards, two core I/O.				
			Typical Config.	Two CPUs, two power supplies, 16 GM DIMM, one DVD, two HDD, two PCI cards, one core I/O.				

1   Derate maximum dry bulb temperature 1 degree per 300 meters above 900 meters.

3 Installing the System

This chapter provides information on how to install the system.

Introduction

The HP 9000 rp4410 and rp4440 servers are 1P/1C, 1P/2C, 2P/2C, 3P/2C, or 4P/2C servers based on the PA-RISC processor family architecture. The server accommodates up to 32 DIMMs and internal peripherals including hard disks and a DVD drive. Its high availability features include hot-swappable fans, hot-swappable power supplies, hot-pluggable disk drives, and hot-pluggable PCI-X cards. The supported operating system is HP-UX 11i v1 (and higher HP-UX versions that support PA-RISC systems).

Server Views

Figure 3-1, Figure 3-2, and Figure 3-3 show the top, front, and rear views of the HP 9000 rp4410 and rp4440 servers.

Figure 3-1 HP 9000 rp4410 and rp4440 Servers (Top View)
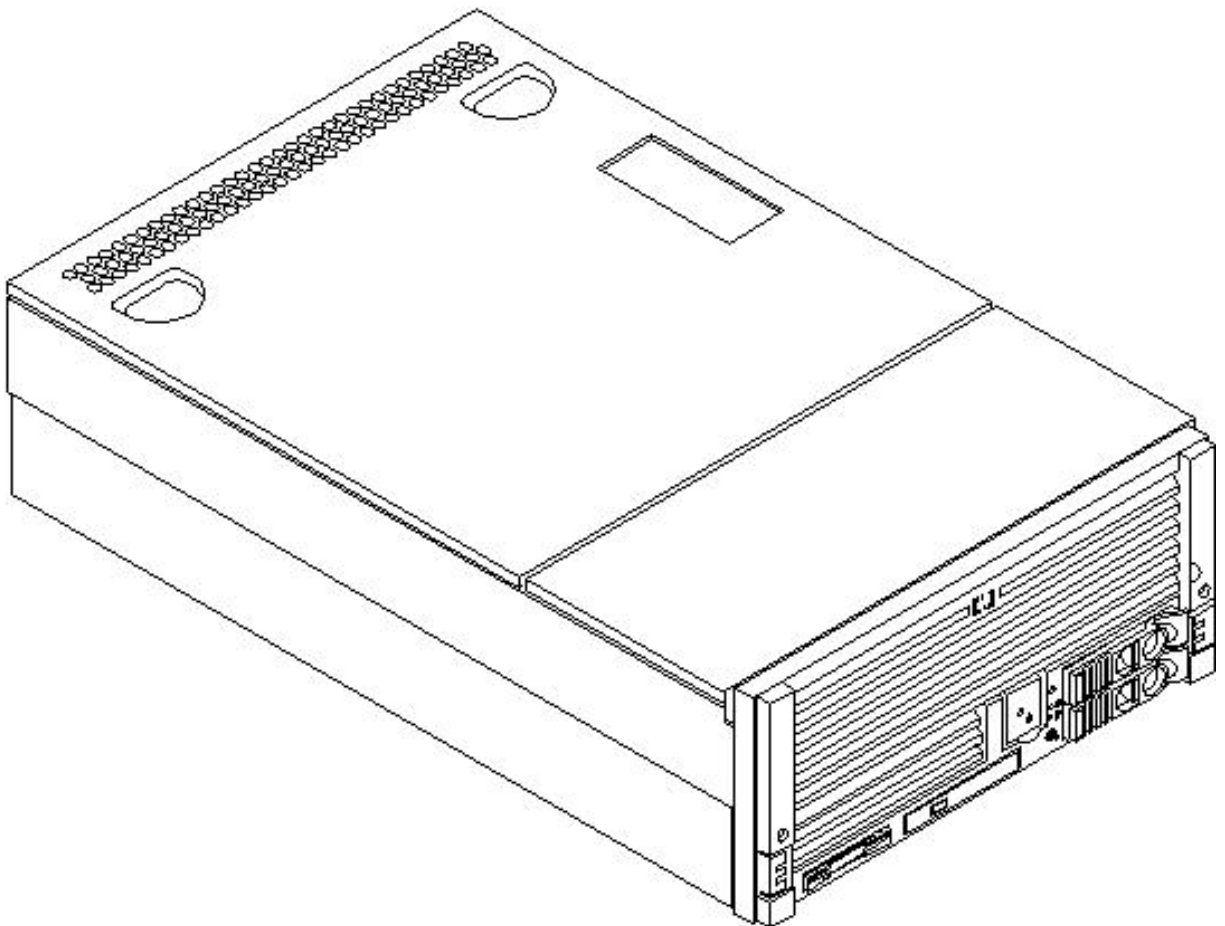
Figure 3-2 HP 9000 rp4410 and rp4440 Servers with Bezel Removed (Front View)
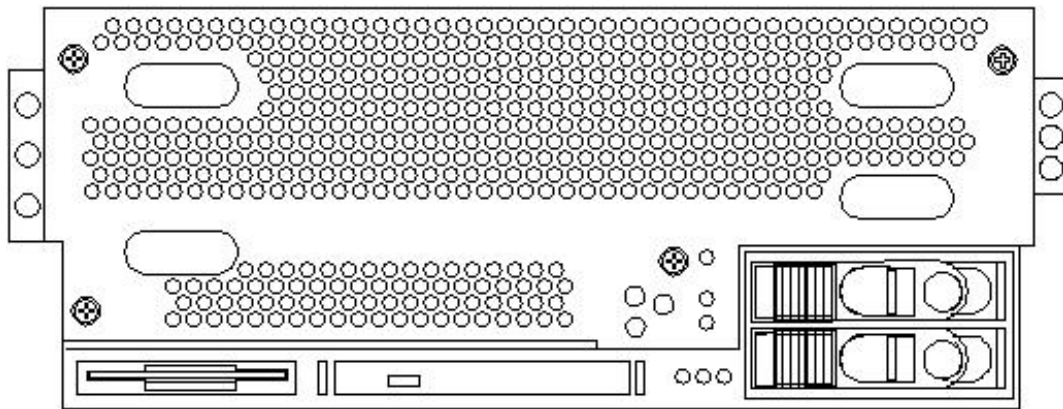
Figure 3-3 HP 9000 rp4410 and rp4440 Servers (Rear View)

Detailed Server Description

The following sections list information on the main subsystems within the HP 9000 rp4410 and rp4440 servers.

I/O Subsystem

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- PCI-X slots available - 8.
  - Two dedicated PCI slots: Slot 1 is for SCSI; slot 2 is for LAN.
  - Four hot-pluggable PCI-X 66 MHz 64-bit 3.3V 25W slots with shared busses and I/O. Slots 3 and 4 share capabilities and slots 5 and 6 share capabilities.
  - Two hot-pluggable PCI-X 133 MHz 64-bit 3.3V 15W slots dedicated for core I/O.
- I/O bandwidth - 4 GBs.
- Pinnacle FXe PCI video card.
- PCI Gigabit, Fast Ethernet Controller with Wake-on-LAN enabled/disabled with BIOS setup.

Internal Core I/O

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Dual channel SCSI U320 or U160 (PA8800 only) interface or RAID, two internal 68-pin connectors, two 68-pin external connectors.
- SCSI backplane configured as either one or two channels.

- One internal Integrated Drive Electronics (IDE) connector for a slimline optical device (CD and DVD).
- No floppy connector.
- Optional dual channel U320 RAID controller, two internal 68-pin connectors, two 68-pin external connectors (replaces SCSI interface).

External Core I/O

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Three external serial ports.
- Two external USB ports.
- Two SCSI U320 or U160 68-pin connectors (U160 for PA8800 only).
- One or two 10/100/1000Base-T ethernet LAN connectors for copper cable.
- Two USB 2.0 ports.
- Three DB-9 ports (console, UPS, and modem).
- Optional dual channel U320 RAID controller, two 68-pin external connectors (replaces SCSI interface).

Processors

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- 800 MHz/1.5 GB cache or 1 GHz/1.5 GB cache per CPU.
- Both processors are available with 32 MB or 64 MB L2 cache per dual processor module.
- HP 9000 rp4410 server can have one processor or both processors of a single dual processor module enabled, or two processors enabled in each of two dual processor modules.
- HP 9000 rp4440 server can be 1P/2C, 2P/2C, 3P/2C, or 4P/2C.

Memory

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- 16 DIMM slots on standard memory extender board.
- 32 DIMM slots on optional memory extender board.
- Maximum memory size of 128 GB (4 GB DIMMs on 32-slot memory extender board).
- Supports up to 32 Double Data Rate (DDR) registered ECC memory, in PC2100 DIMMs.
- Supported DDR DIMM sizes:
  — 128 MB, 256 MB, 512 MB, 1 GB, 2 GB, and 4 GB
  — Standard 184 pins 2.5V DDR266, CL2, registered, ECC
- 133 MHz memory bus frequency, 266 MTransfers/s data, 8.5 GB/s peak data bandwidth.
- DIMMs loaded by quads enable interleaved mode and chip spare.
- Requires that DIMMs within each group of four (quad) be identical.

Cooling

Six cooling fans with N+1 redundancy.

Power Supply Unit

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- One 1200 W hot-swappable power supply.
- Optional second 1200 W hot-swappable power supply for N+1 redundancy.

Front Display Panel, DVD, and Diagnostic Panel

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Front panel that provides the controls and indicators commonly used for operation.
- DVD+RW drive (with CD-write capability); IDE interface; 48x speed.
- Optional slimline DVD drive.
- Power button and LED indicators for system status.
- LED-based diagnostic panel.

Mass Storage

The following is supported on the HP 9000 rp4410 and rp4440 servers:

- Up to two SCSI hot-pluggable hard disk drives.
- Integrated Ultra-3 SCSI dual channel controller; 80 MB/s transfer rate with two 68-pin connectors. The SCSI backplane is configured as either one or two channels.
- Maximum internal storage of two 73 MB, 15K drives.
- Optional integrated HP RAID controller.

Firmware

Firmware consists of many individually linked binary images that are bound together by a single framework at run time. Internally, the firmware employs a software database called a device tree to represent the structure of the hardware platform and to provide a means of associating software elements with hardware functionality.

The firmware incorporates the Boot Console Handler (BCH), which provides an interface between the operating system and the platform firmware. BCH uses data tables that contain platform-related information, and boot and run-time service calls available to the operating system and its loader to provide a standard environment for booting.

The firmware supports the HP-UX 11i version 1 (and higher HP-UX versions that support PA-RISC systems) operating system through the HP 9000 processor family standards and extensions, and has no operating system-specific functionality included. The operating system is presented with the same interface to system firmware, and all features are available to the operating system.

Event IDs for Errors and Events

The server firmware generates event IDs similar to chassis codes for errors, events, and forward progress to the iLO MP through common shared memory. The iLO MP interprets and stores event IDs. Reviewing these events helps you diagnose and troubleshoot problems with the server.

Dimensions and Values

Table 3-1 lists the dimensions and values of the HP 9000 rp4410 and rp4440 servers.

Table 3-1 Server Dimensions and Values

Dimension	Value
Height	6.8 in (17.3 cm)
Width	19 in (48.2 cm)
Depth	27.2 in (69.0 cm)
Weight	Unloaded 88 lb (40 kg) Fully loaded 100 lb (45.4 kg)

Safety Information

Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages might be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

To ensure safe handling of components, prevent injury, and prevent damage to the server, follow the safety conventions listed below:

- When removing or installing any server component, follow the instructions provided in this guide.
- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.
- If installing a hot-pluggable component, complete the required software intervention before removing the component.
- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle before proceeding.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources are disconnected from the server before removing or installing server hardware unless you are removing or installing a hot-swappable or hot-pluggable component.

Voltages are present at various locations within the server whenever a dc power source is connected. This voltage is present even when the main power switch is turned off.

Failure to observe this warning can result in personal injury or damage to equipment.

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge build up, such as wool or synthetic materials.
- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1609).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.

Installation Sequence and Checklist

To ensure successful installation of the server, follow the steps in Table 3-2 sequentially.

Table 3-2 Installation Sequence Checklist

Step	Description	Completed
1	Unpack and inspect the server shipping container. Inventory the contents using the packing slip.	
2	Install additional components shipped with the server.	
3	Install the server into a rack or pedestal mount.	
4	Connect cables to the server.	
4a	Connect DC input power cable.	
4b	Connect the LAN core I/O cable.	
5	Set up the console.	
6	Power on the server.	
7	Access the console.	

Table 3-2 Installation Sequence Checklist (continued)

Step	Description	Completed
8	Boot the operating system.	
9	Verify the server configuration.	

Unpacking and Inspecting the Server

This section describes procedures you perform before installation. Ensure that you have adequately prepared your environment for the new server, received the components that you ordered, and verified that the server and its containers are in good condition after shipment.

Verifying Site Preparation

Verifying site preparation is essential for a successful server installation and includes the following tasks.

1. Gather LAN information and determine the two separate IP addresses for the iLO MP LAN and the system LAN.
2. Establish a method to connect to the server console.
3. Verify electrical requirements and ensure that grounding specifications and power requirements are met.
4. Validate server physical space requirements.
5. Confirm environmental requirements.

Inspecting the Shipping Containers for Damage

HP shipping containers protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. Shipping damage constitutes moderate to severe damage, such as punctures in the corrugated carton, crushed boxes, or large dents. Normal wear or slight damage to the carton is not considered shipping damage. If you find shipping damage to the carton, contact your HP customer service representative immediately.

Unpacking the Server

To unpack a non-racked server, follow these steps:

NOTE: When moving a non-racked server, HP recommends the use of a lifter, such as a RonI Company model 17000 SP 400 lifting device.

1. Use the instructions printed on the outside top flap of the carton.
2. Remove the banding and the outer carton from the server pallet.
3. Remove all inner accessory cartons and the top foam cushions, leaving only the server.

IMPORTANT: Inspect each carton for shipping damage as you unpack the server.

Checking the Inventory

The sales order packing slip lists all of the equipment shipped from HP. To verify that all of the equipment has arrived, check the sales order packing slip with what is in the cartons.

NOTE: To identify each item by part number, see the sales order packing slip.

Returning Damaged Equipment

If the equipment is damaged, contact your HP customer service representative immediately. The service representative initiates appropriate action through the transport carrier or the factory and assists you in returning the equipment.

Unloading the Server with a Lifter

WARNING! Use caution when using a lifter. Because of the weight of the server, you must center the server on the lifter forks before lifting it off the pallet to avoid injury.

To unload the server from the pallet using a lifter, follow these steps:

1. Unpack the server. See "Unpacking the Server" (page 56).
2. Unroll the bottom corrugated tray corresponding to the side on which the lifter will be placed, and slide the server as close to that edge of the pallet as possible.
3. Break off any foam packaging that can prevent the lifter from being fully inserted under the server.

IMPORTANT: Do not remove the foam packaging from the corners of the server. This foam is required to elevate the server and enable the forks of the lifter to be placed under the server.

4. Insert the lifter forks under the server.
5. Carefully roll the lifter forward until it is fully positioned against the side of the server.
6. Slowly raise the server off the pallet until it clears the pallet cushions.
7. Carefully roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it over to the rack.

Installing Additional Components

This section describes how to install server components that are not installed before delivery.

Service Tools Required

Service of this product can require one or more of the following tools:

*   Electrically Conductive Field Service Kit (HP part number 9300-1155)
*   1/4 inch flat blade screwdriver
*   ACX-15 Torx screwdriver
*   Special processor tool kit (HP part number 5069-5441)

Accessing a Rack-Mounted Server

The HP 9000 rp4410 and rp4440 servers are designed to be rack mounted. The following procedure explains how to gain access to a server that is mounted in an approved rack.

⚠️ **WARNING!**   Before extending the server, ensure that all anti-tip features are employed (front and rear anti-tip feet installed; adequate ballast properly placed, and so on).

Extend the Server from the Rack

📝 **NOTE:**   Ensure that there is enough area (approximately 1.5 meters [4.5 ft]) to fully extend the server from the rack and work on it.

To extend the server from the rack, follow these steps:

1. Remove the 25-mm Torx screws that fasten the server to the rack.
2. Flip out the two pull handles at either end of the front bezel and slowly pull the unit forward by the handles. The server is fully extended when the rail clips are locked in place. After the server is fully extended, the front and top covers are accessible.

Figure 3-4 shows the location of the 25-mm Torx screws.

Figure 3-4 Accessing T-25 Screws
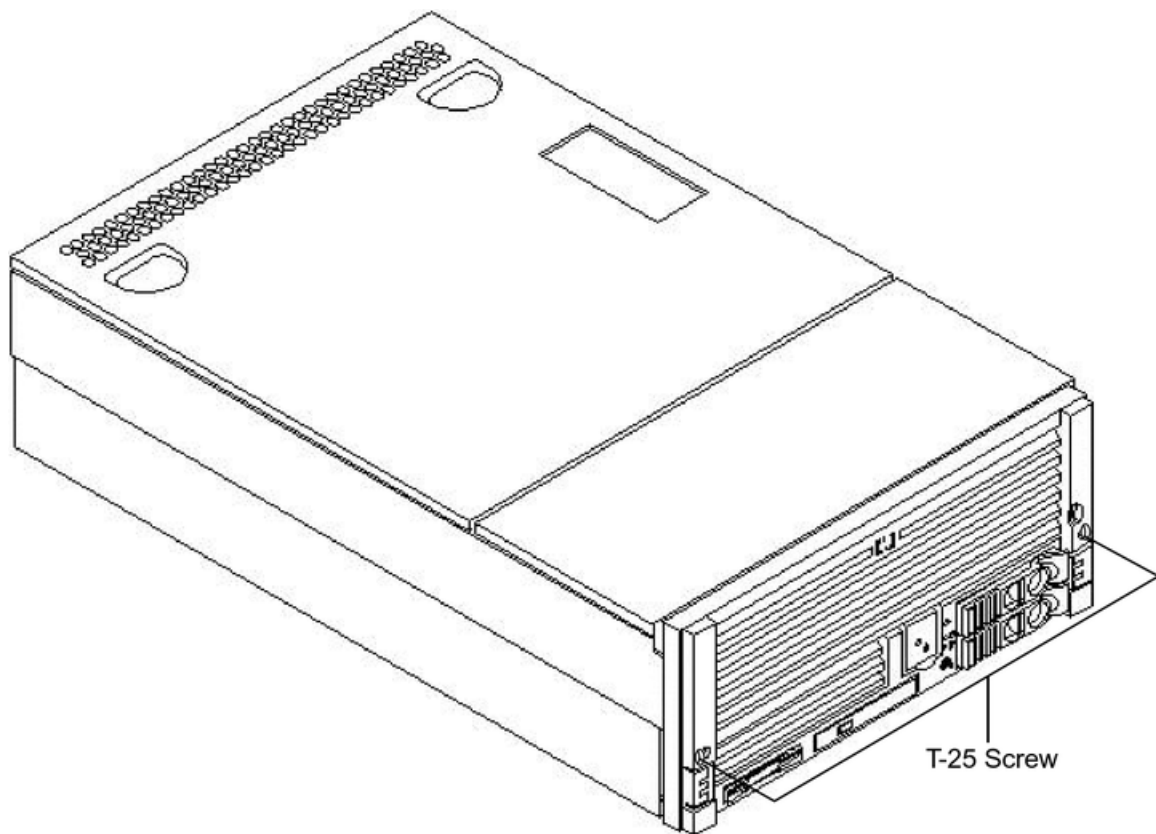
Inserting the Server Into the Rack

To insert the server into the rack, follow these steps:

1. Press the rail clips on either side of the server inward and push the server into the rack until it stops.
2. Replace the T-25 screws that fasten the server to the rack.

Accessing a Pedestal-Mounted Server

The HP 9000 rp4410 and rp4440 servers are also designed to be mounted in a pedestal (non-rack). You do not need to remove the pedestal from the server to gain access to internal components. The front bezel, front cover, and top cover can be removed with the pedestal attached to the server.

⚠ **WARNING!**   Ensure that the server is properly grounded when performing remove and replace procedures. Use an antistatic wrist strap and grounding mat similar to those found in the HP Electrically Conductive Field Service Kit.

Figure 3-5 shows a pedestal-mounted server.

Figure 3-5 Pedestal-Mounted Server
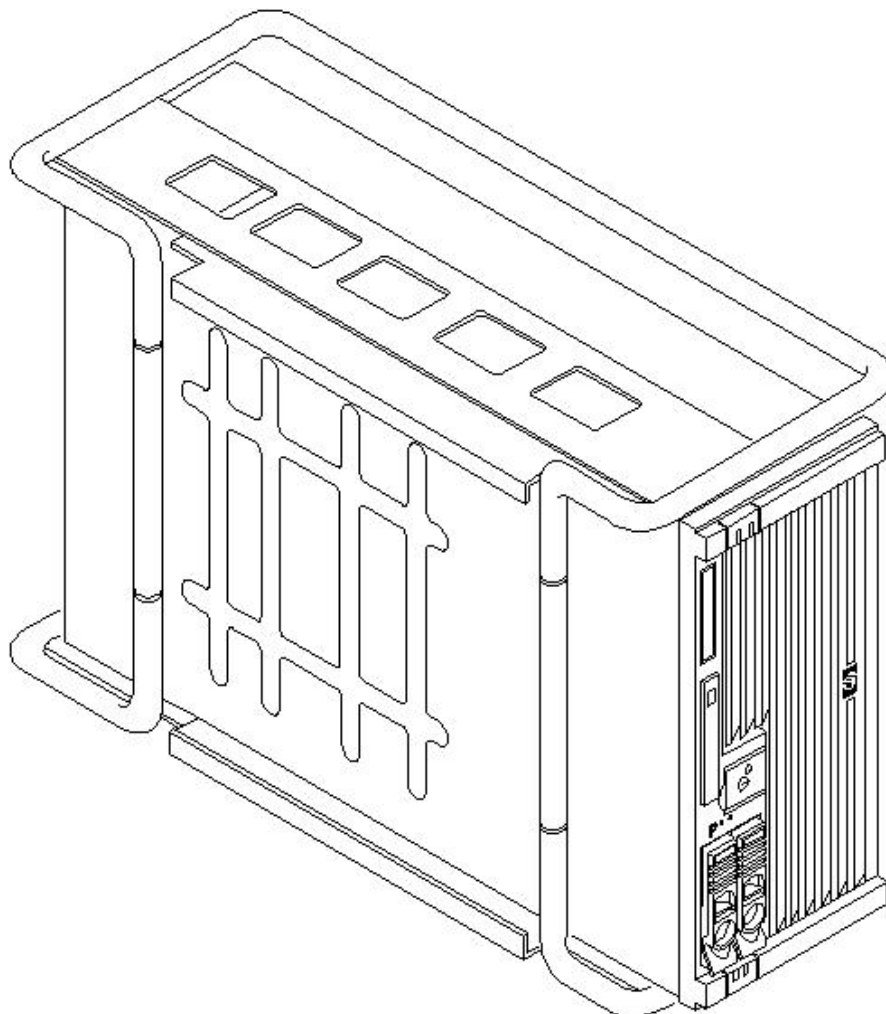
Front Panel Controls and Indicators

The front panel of the server provides controls and indicators used for common operations.

Figure 3-6, Figure 3-7, and Figure 3-8 show the front view of the server and the control panel.

Figure 3-6 Front View with Bezel
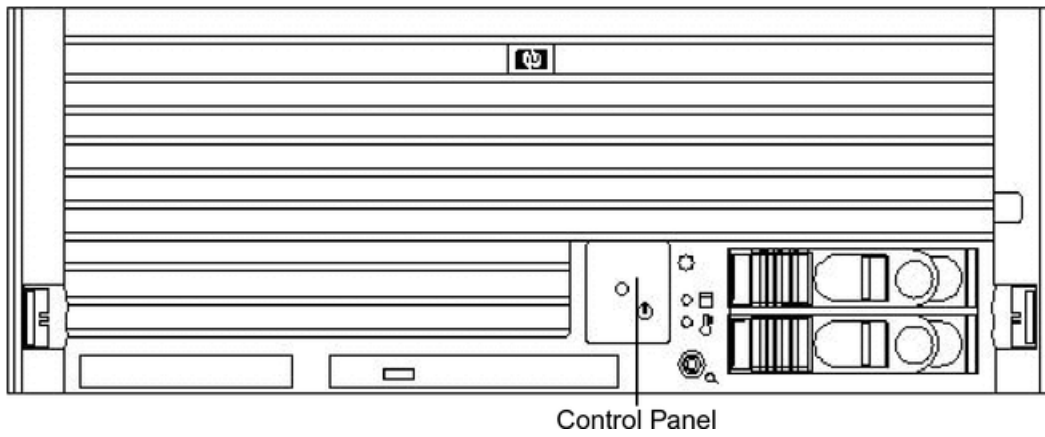
Control Panel

Figure 3-7 Accessing the Control Panel

Figure 3-8 Control Panel

Power LED
Power Button
TOC/NMI Button

System LED
Disk LED
Thermal LED
Locator Button/ LED
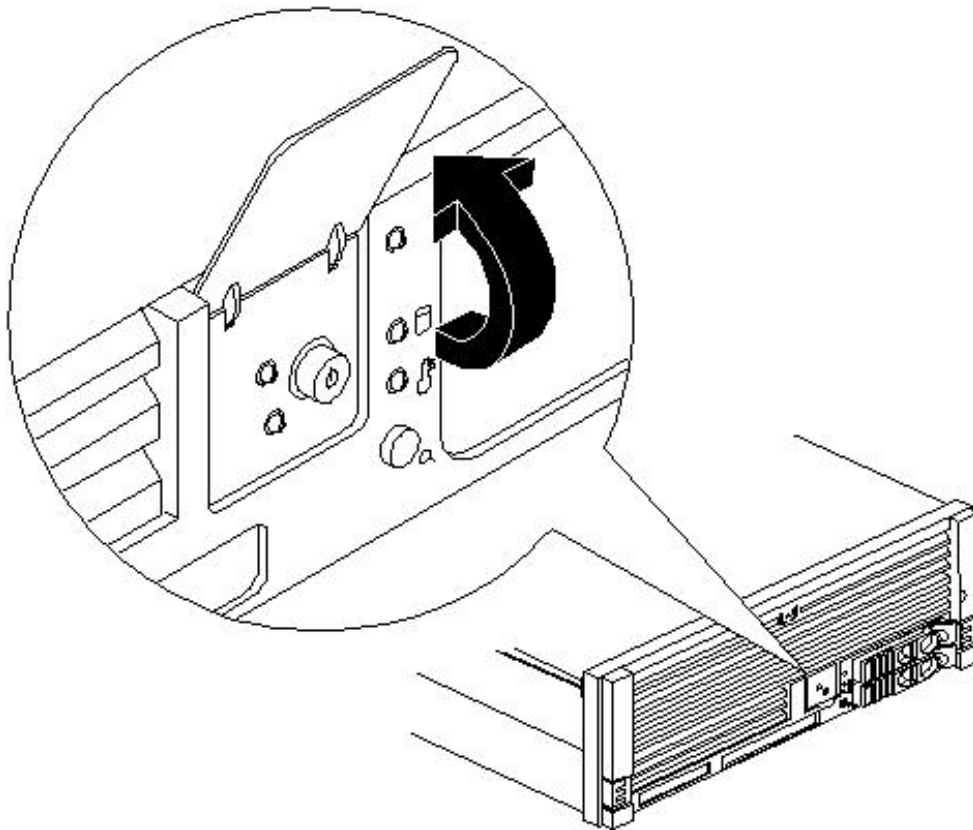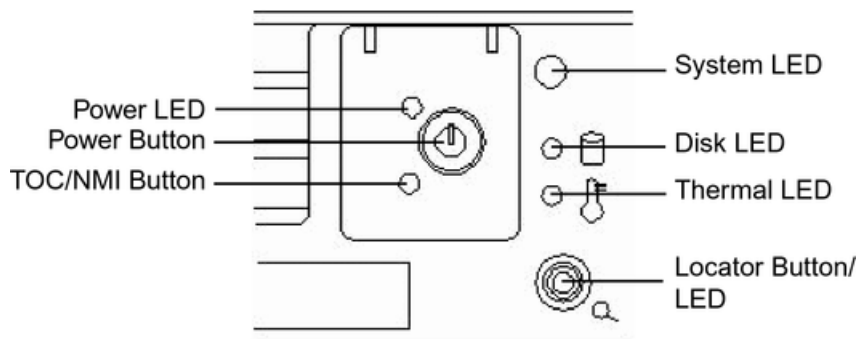
Table 3-3 and Table 3-4 list the control panel LED and button LED status and descriptions.

Table 3-3 Control Panel LED Definitions

LED/ Button	State	Flash Rate	Color	Description
System LED	Running	Steady	Green	System normal; OS up and running
System LED	Booting	Flashing at 0.5 Hz	Green	OS booting or at BCH
System LED	Attention	Flashing at 1 Hz	Yellow	Warning—System needs attention Redundancy lost, component failure pending
System LED	Fault	Flashing at 2 Hz	Red	Hard fault, server halted
System LED	Off	Off	N/A	System off
Power LED	On	Steady	Green	Power normal
Power LED	On	Flashing at 1 Hz	Yellow	Housekeeping voltage present
Power LED	Off	Off	Off	Power off
Disk LED		Flashing at rate of disk activity	Green	Disk activity
Thermal LED	OK	Steady	Green	Thermal OK
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Thermal warning
Locator Button/LED		Flashing at 1 Hz	Blue	System locator LED can be remotely or locally activated and deactivated

Table 3-4 Button LED Definitions

Button	Description
Power Button	Controls the power supply (turns system power on or off) if power is available to the power supply. (Controls both power supplies if two are installed).
	If power is off but power is available to the power supplies, pressing the power button does the following:
	• Momentarily (less than one second), turns on the power supplies and applies power to server circuits.
	• More than one second then released, has no effect.
	If power is on and the system is at initial system loader, pressing the power button:
	• Momentarily (less than one second), has no effect.
	• More than one second, but less than five seconds, do not use. This initiates e-buzzer functions that are not supported in the server.
	• More than five seconds then released, causes an immediate hard power off.
	If power is on and the system is at BCH, pressing the power button does the following:
	• Momentarily (less than one second), causes a immediate and hard power down.
	• More than one second, but less than five seconds, do not use. This initiates e-buzzer functions that are not supported in the server.
	• More than five seconds then released, causes an immediate hard power off.
	If power is on but the OS has been shut down, pressing the power button:
	• Momentarily (less than one second) has no effect.
	• More than one second, but less than five seconds, do not use. This initiates e-buzzer functions that are not supported in the server.
	• More than five seconds then released, causes an immediate hard power off.
	If the OS is running, pressing the power button does the following:
	• Momentarily (less than one second) has no effect.
	• More than one second, but less than five seconds, do not use. This initiates e-buzzer functions that are not supported in the server.
	• More than five seconds then released, causes an immediate hard power off.
NMI Button	Use a paper clip to press this button. Press the non-maskable interrupt (NMI) button before restarting the system after the system hangs. NMI provides crash dump capture capability. Obtain a system hardware status dump to use in root cause analysis and debugging.[1]

1   The same function is available with the iLO MP `CM>TC command`.

Additional Controls and Indicators

Storage devices have additional LEDs showing their status.

Hot-Pluggable Disk Drive Indicators

The hot-pluggable disk drives have two LEDs per drive, as follows:

Figure 3-9 and Table 3-5 show the hot-pluggable disk drive LED indicators and definitions.

Figure 3-9 Hot-Pluggable Disk Drive LED Indicators
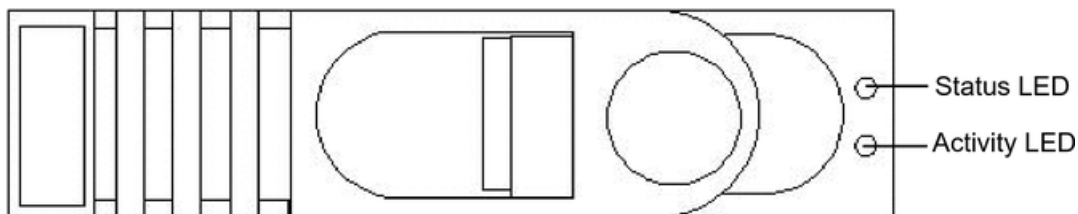
Table 3-5 Hot-Pluggable Disk Drive LED Definitions

LED	State	Description
Activity LED	Flashing green	Drive is active. The drive activity LED is green and indicates disk drive activity. This LED is controlled by the disk drive directly and turns on when a drive is accessed.
Status LED	Green	Drive is operating. The drive status LED is green when power is applied to drive circuits.

DVD, DVD-R, and DVD-RW Drives

The server is delivered with one DVD drive (DVD-R and DVD-RW optional). Each of these devices has one activity LED.

Figure 3-10 and Table 3-6 show the DVD or CD-RW/DVD LED indicators and definitions.

Figure 3-10 DVD or CD-RW/DVD LED Indicators

Eject Button   Activity LED   Emergency Eject
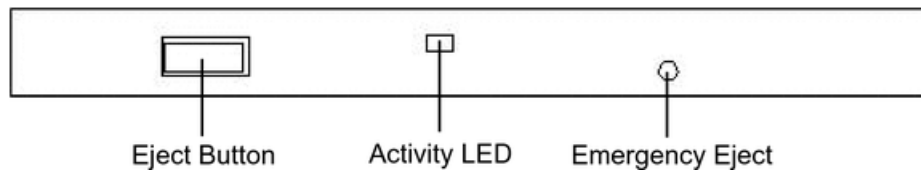
Table 3-6 DVD Drive LED Definitions

LED	State	Description
Activity LED	Flashing green	Drive is active

Front Bezel

You do not need to power off the server to remove the front bezel.

Removing the Front Bezel

To remove the front bezel, grasp the front bezel at the outer edges and pull it straight out.

Figure 3-11 Removing and Replacing the Front Bezel
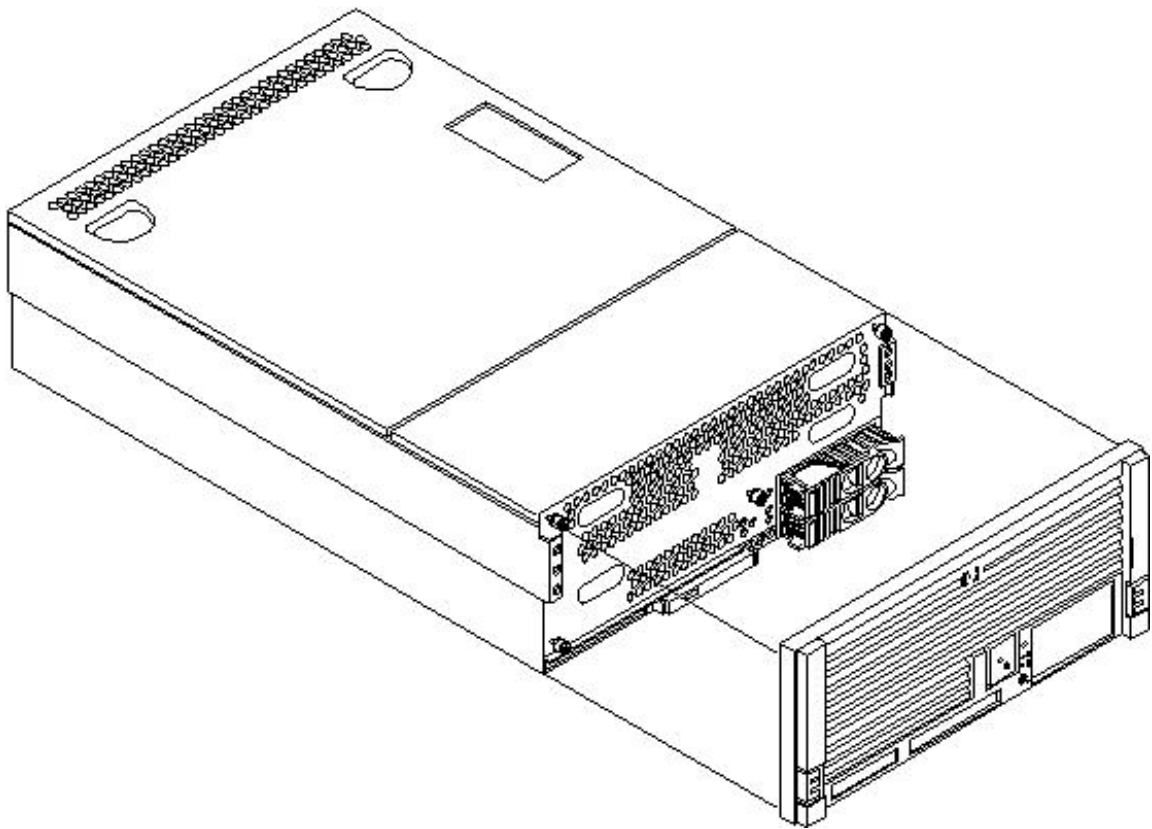
The front control panel access door is on the bezel. Opening the control panel door provides access to the following components:

- Power button
- System LEDs

Replacing the Front Bezel

To replace the front bezel, hold the bezel in the mounting position and push the bezel straight into the chassis until it snaps into place.

Front and Top Covers

⚠ **CAUTION:** Do not operate the server without the front and top covers in place. Operation of the server without the front and top covers in place makes the server susceptible to electromagnetic interference (EMI) and overheating problems that result in system failure.

Observe all electrostatic discharge (ESD) safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

📝 **NOTE:** When the front or top cover is removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed.

Removing the Front Cover

⚠ **CAUTION:** Power the server off before removing the front cover. All the components that are accessible behind the front cover are cold-swappable and require power to be off.

To remove the front cover, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Extend the Server from the Rack" (page 58))
2. Remove the front bezel. (See "Removing the Front Bezel" (page 63).)
3. Loosen the four captive thumbscrews that hold the front cover in place.

Figure 3-12 Removing and Replacing the Front Cover
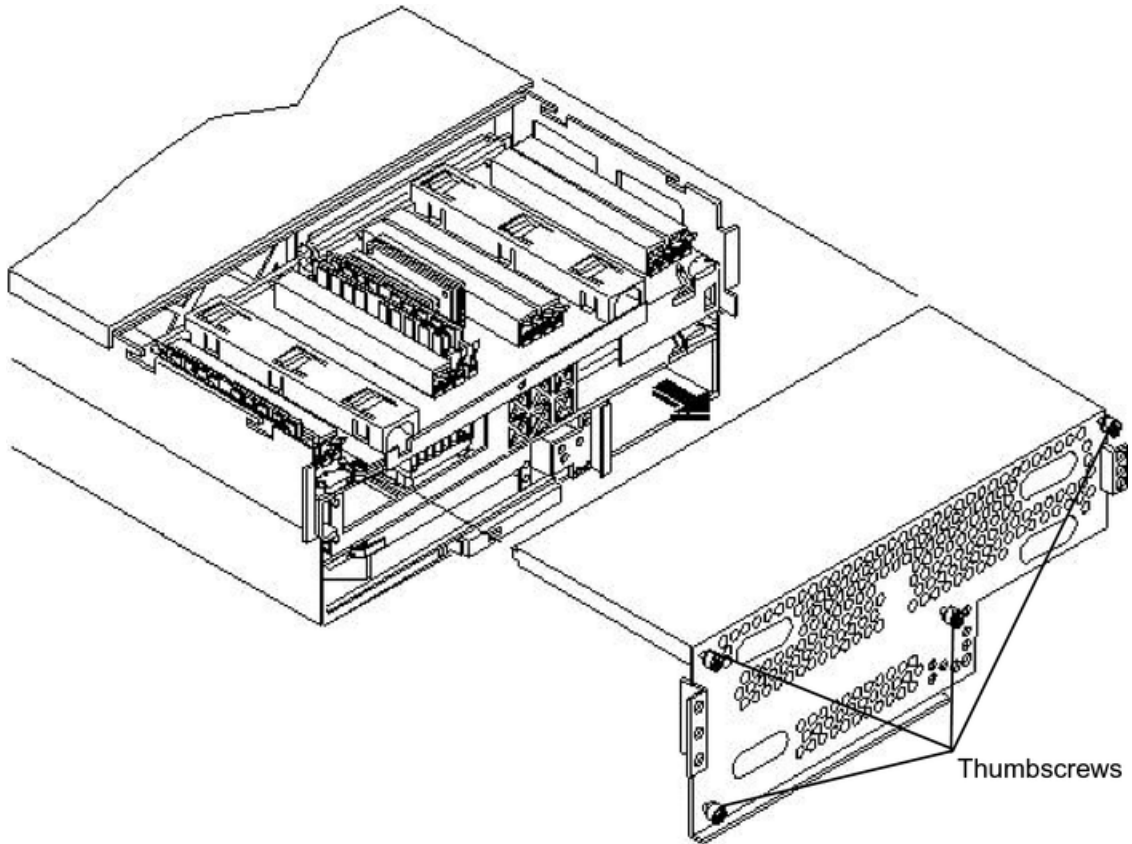
Thumbscrews

4. Raise the cover slightly, and pull the cover toward the front of the server to free the tabs from the slots in the center of the chassis.

Replacing the Front Cover

To replace the front cover, follow these steps:

1. Align the tabs at the rear of the front cover with the corresponding slots in the chassis and fully seat the tabs into the slots.
2. Tighten the four thumbscrews securely.
3. Replace the front bezel. See "Replacing the Front Bezel" (page 64).

Removing the Top Cover

To remove the top cover, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Loosen the two captive thumbscrews that hold the top cover in place.
3. Pull the cover toward the rear of the server to free the tabs from the slots in the center of the chassis and lift the cover straight up.

Figure 3-13 Removing and Replacing the Top Cover
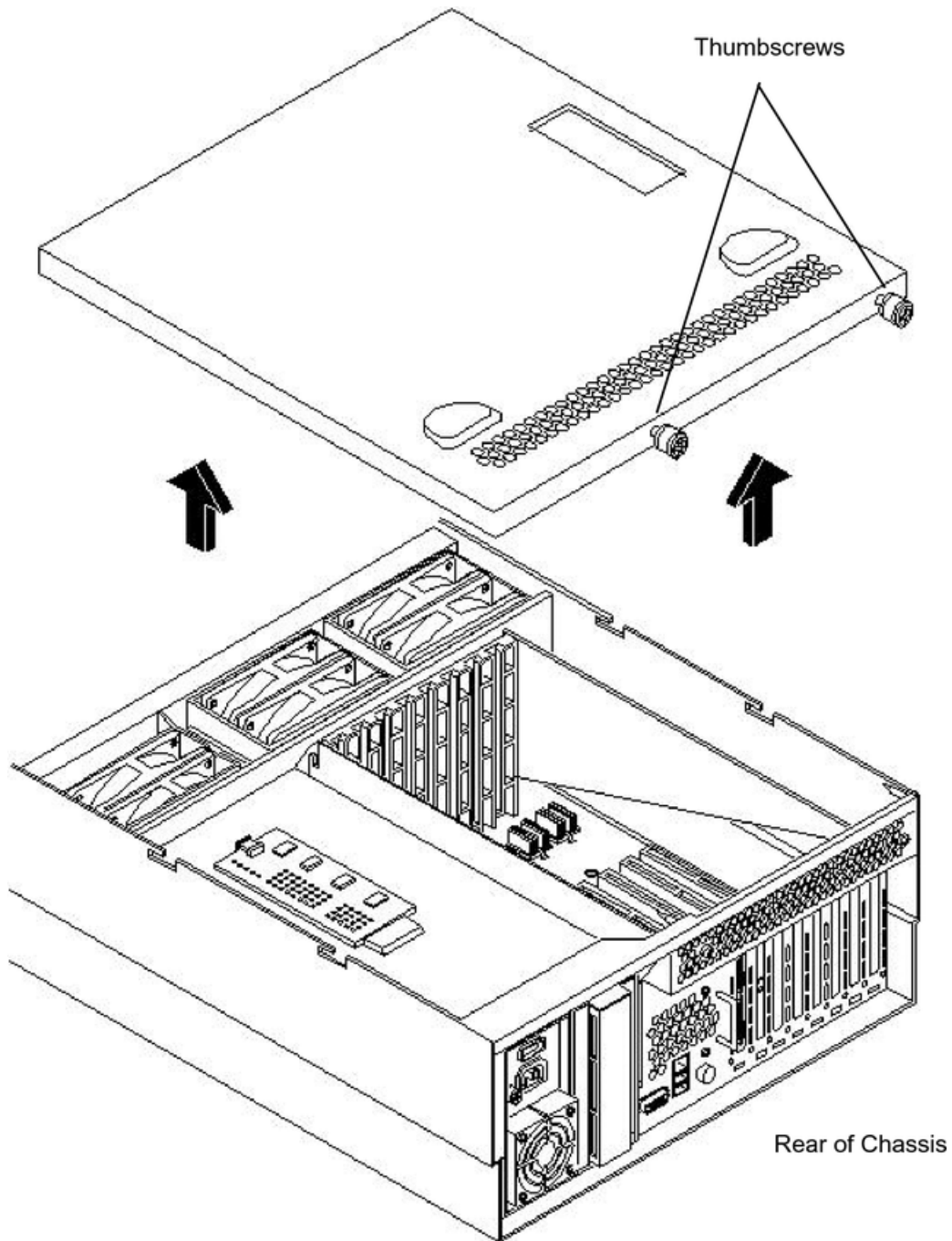
Thumbscrews

Rear of Chassis

Replacing the Top Cover

To replace the top cover, follow these steps:

1. Align the tabs at the rear of the top cover with the corresponding slots in the chassis. Fully seat the tabs into the slots and push forward until it seats.
2. Tighten the two thumbscrews securely.

Hot-Swappable Chassis Fan Units

There are three hot-swappable chassis fan units in the server.

- Fan units 0, 1, and 2 are in the center of the chassis, spanning the full chassis width.
- Fan units 0 and 1 are interchangeable and are in the left and center positions.

Figure 3-14 Hot-Swappable I/O Fans (Units 0 and 1)
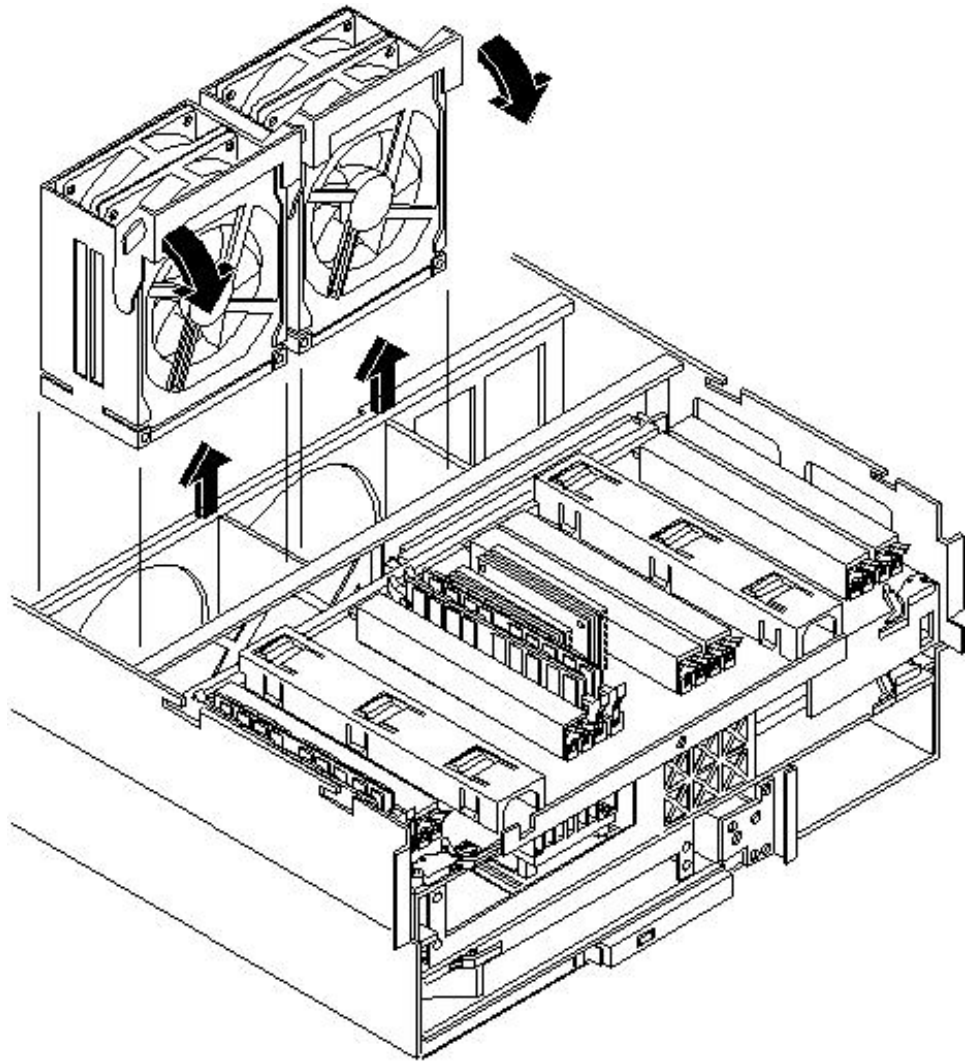
- Fan unit 2 is smaller and fits into the right-most position behind the power supply. Fan unit 2 cannot be installed in the left or center positions.

Figure 3-15 Hot-Swappable Power Supply Fan (Unit 2)
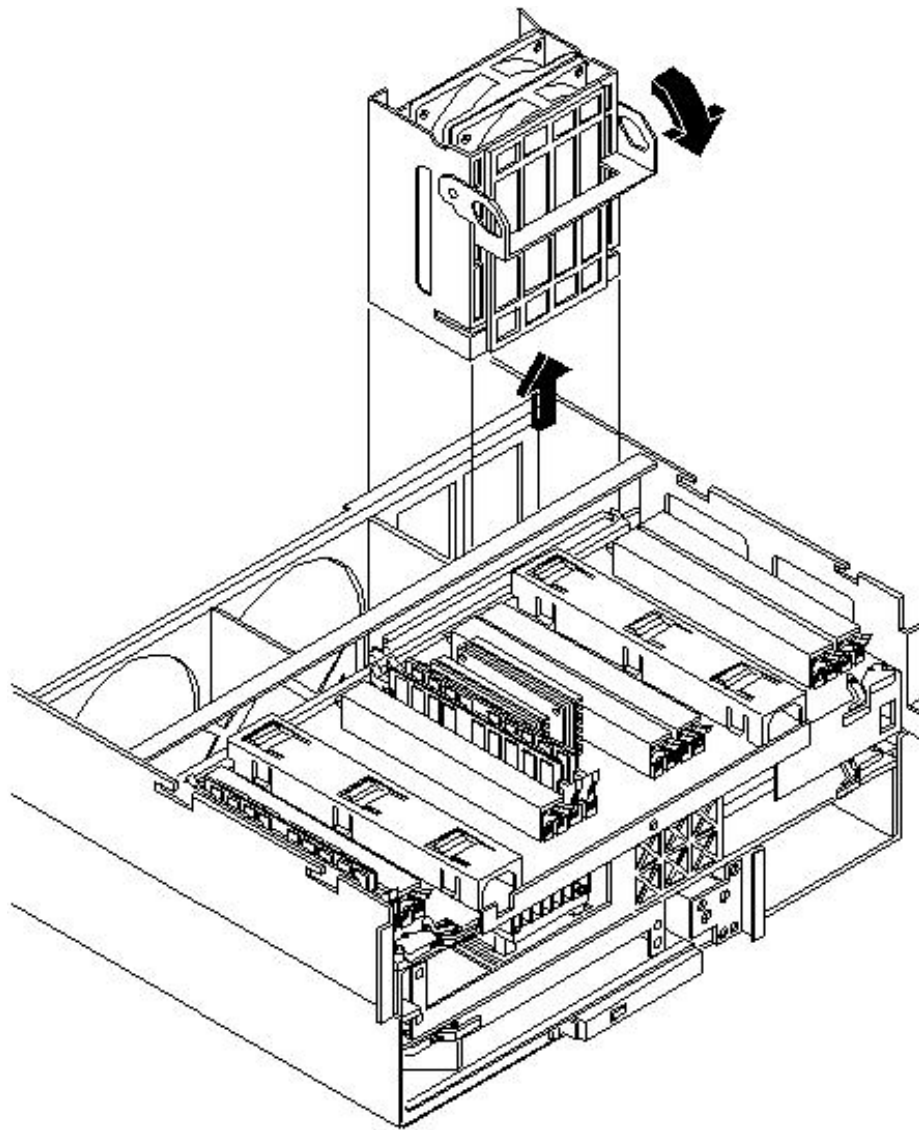
⚠ **CAUTION:**   Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

📝 **NOTE:**   A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The ac power to the server does not need to be off to remove or replace a hot-swappable chassis fan unit.

Removing a Hot-Swappable Fan Unit

To remove an I/O or power supply fan unit, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Extend the Server from the Rack" (page 58).)
2. Remove the top cover. (See "Removing the Top Cover" (page 65).)

3. Grasp the fan unit locking handle, tilt it up, and pull the fan out from the chassis. (Figure 3-15)

> 📝 **IMPORTANT:** When one fan unit is removed from the server, the remaining fan units operate at full speed for two minutes. After two minutes a soft-shutdown of the server occurs.

Replacing a Hot-Swappable Fan Unit

To replace a hot-swappable I/O or power supply fan unit, follow these steps:

1. Orient the fan unit by aligning the appropriate icon on the fan unit handle to the identical icon on the chassis wall.
2. Push the fan unit firmly into the housing and close the handle until flush to the top of the chassis. The fan unit plugs into the power outlet on the system I/O board.

> ⚠ **CAUTION:** If the fan unit handle does not close completely, it is misaligned. Remove the fan unit and check that the alignment icons are oriented correctly.

3. Check the QuickFind diagnostic panel LED indicating the replaced fan unit. See "QuickFind Diagnostic Panel LEDs" (page 123).
   - When the fan functions normally, the LED is off.
   - When the fan fails, the LED is lit.
4. Replace the top cover. See "Replacing the Top Cover" (page 66).

I/O Baseboard Assembly

> ⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the I/O baseboard assembly.
>
> Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

> ⚠ **CAUTION:** Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.
>
> Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the I/O Baseboard Assembly

> ⚠ **CAUTION:** Before removing the I/O baseboard assembly, record all boot configuration settings displayed by the BCH `INFO ALL` command. You might need to reset the values after replacing the I/O baseboard assembly.

To remove the I/O baseboard assembly, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Remove the top cover. See "Removing the Top Cover" (page 65).
3. Remove the three chassis fan units. See "Removing a Hot-Swappable Fan Unit" (page 68).
4. Unplug all external cabling attached to the ports at the rear of the I/O chassis.
5. Unplug the internal SCSI cables attached to the top of the host bus adapter (HBA) board in PCI slot 1.

6. Lift up on the locking lever attached to the side of the power supply cage to unplug the I/O baseboard assembly from the socket on the midplane riser board.

Figure 3-16 I/O Baseboard Locking Lever
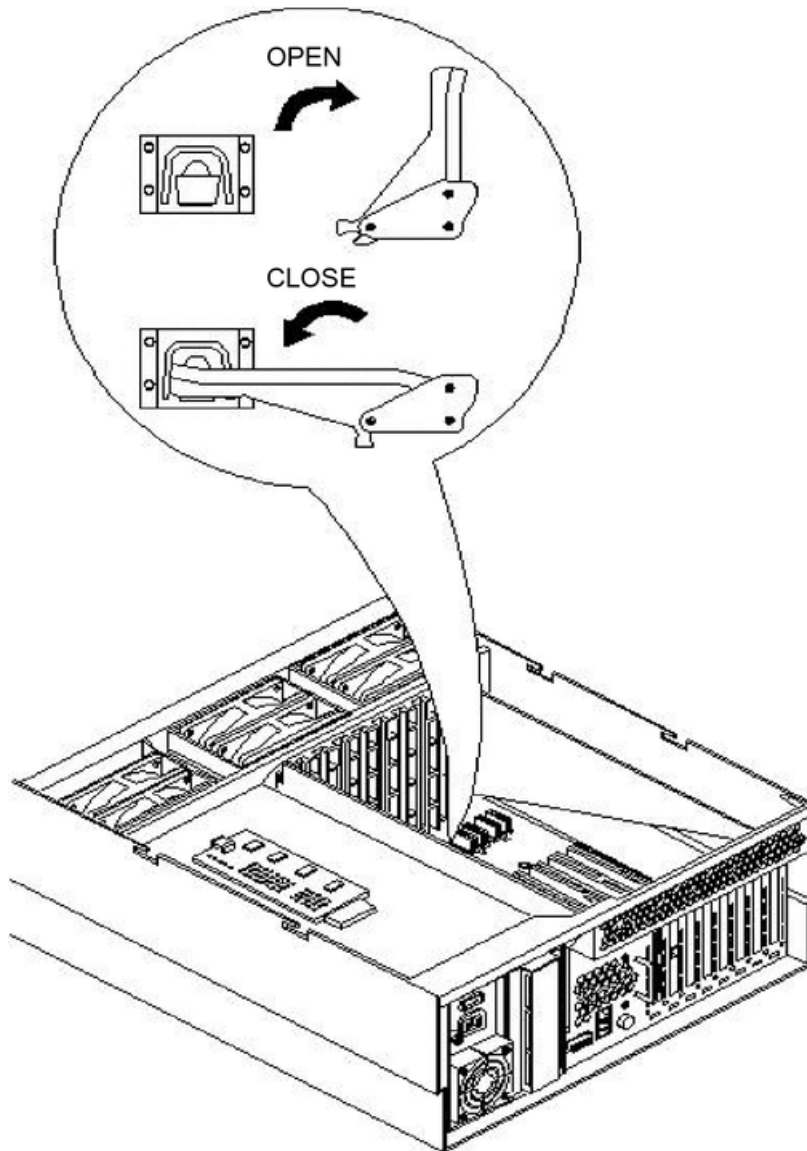
7.   Slide the system I/O baseboard assembly all the way to the rear until it is removed from chassis.

△ **CAUTION:**   The I/O baseboard assembly is large. Be careful when lifting it out of the server chassis.

Figure 3-17 I/O Baseboard Assembly Removal
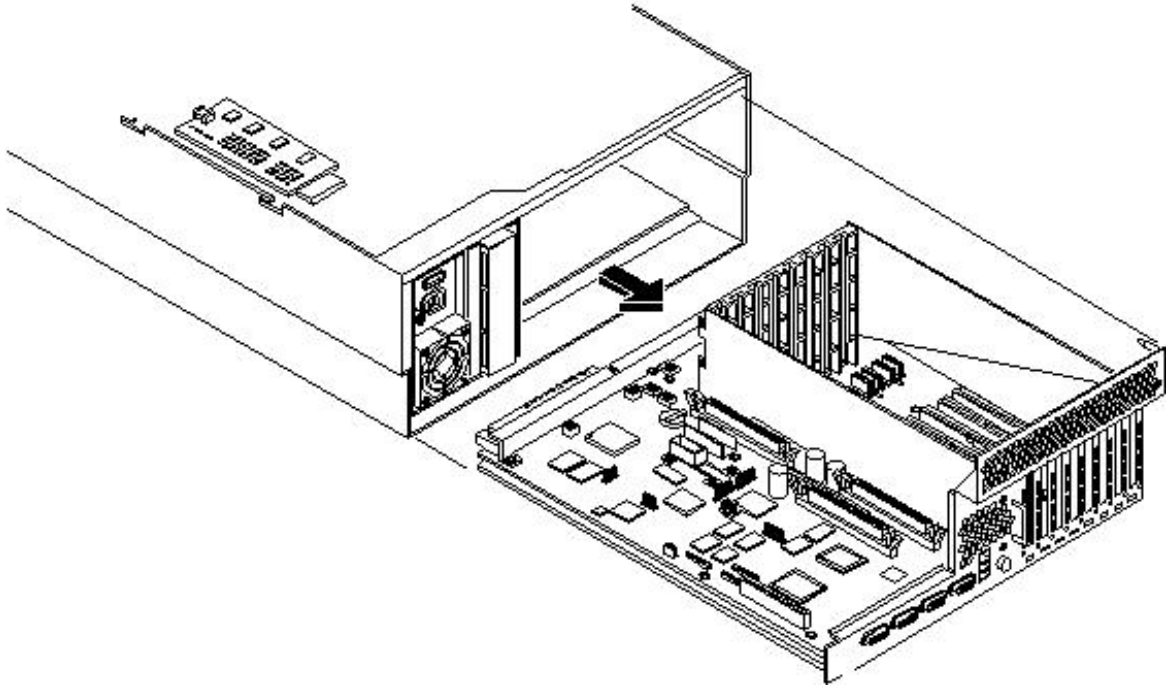
Replacing the I/O Baseboard Assembly

📝 **NOTE:**   The I/O baseboard assembly replacement procedure assumes that you are reinstalling the assembly that was previously removed from a configured server.

To replace the I/O baseboard assembly, follow these steps:

1.   Ensure that all fan modules are removed from the chassis before sliding in the I/O baseboard assembly or the fans and the I/O baseboard can be damaged.
2.   Align the I/O baseboard assembly rails with the chassis slots and slide the assembly into the chassis until it stops against the midplane riser board socket. To engage the I/O baseboard with the midplane riser board correctly, ensure the I/O baseboard locking lever is in the up position.

△ **CAUTION:**   The I/O baseboard assembly is large. Use care when sliding it into the server chassis.

3.   With the I/O baseboard flush against the midplane riser board socket, push down firmly on the locking lever until the I/O baseboard plugs all the way into the midplane riser board socket and the locking lever clicks into place on the chassis wall (Figure 3-16).
4.   Replace the three chassis fan units. See "Replacing a Hot-Swappable Fan Unit" (page 69).
5.   Plug all external cabling into the ports at the rear of the chassis.
6.   Plug the internal SCSI cables into the HBA board in PCI slot 1.
7.   Replace the top cover. See "Replacing the Top Cover" (page 66).

System Battery

This section provides information on the system battery and how to replace a system battery.

Battery Notice

This product contains a Lithium battery.

⚠ **WARNING!** Lithium batteries can explode if mistreated. Do not recharge, disassemble, or dispose of lithium batteries in a fire. Failure to observe this warning can result in personal injury or damage to equipment.

Replace with the identical or equivalent battery. Follow the manufacturer's recommendations. Dispose of used batteries according to the manufacturer's instructions.

Replacing the System Battery

△ **CAUTION:** Before replacing the system battery, record all boot configuration settings listed by the BCH INFO ALL command. You must reset these values after replacing a battery.

To remove and replace the system battery, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 65).
3. Remove the I/O baseboard assembly from the chassis. See "Removing the I/O Baseboard Assembly" (page 69).
4. Locate the system battery on the I/O baseboard.

Figure 3-18 System Battery Location on I/O Baseboard
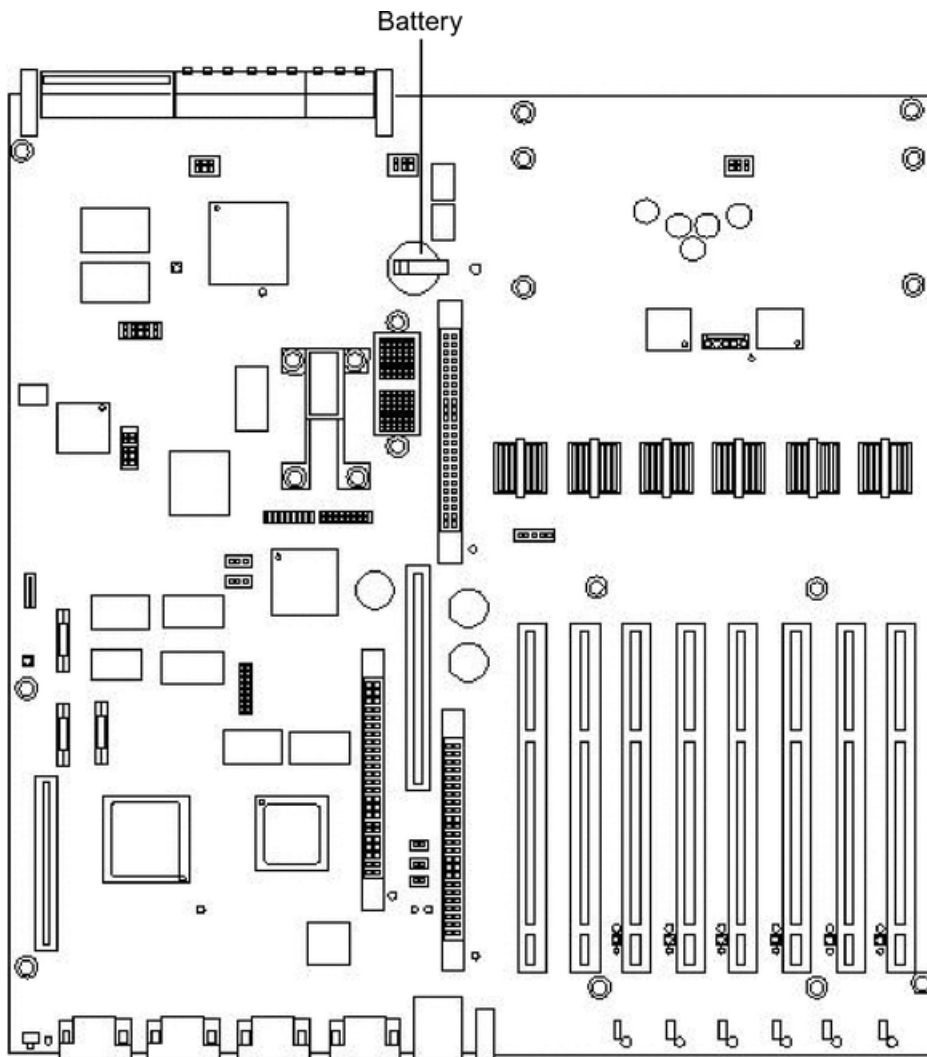
5. To remove the battery from its socket, lift up the battery holder retaining clip with a flat-head screwdriver and push on the back of the battery.

6. Lift up the battery holder retaining clip with a flat-head screwdriver and slide the new battery into the holder.

NOTE: The positive terminal of the battery is designated by the plus (+) sign. The battery is installed with the plus (+) sign facing up.

7. Replace the I/O baseboard assembly. See "Replacing the I/O Baseboard Assembly" (page 71).
8. Replace the top cover. See "Replacing the Top Cover" (page 66).
9. Use the BCH DATE command, to reset the system time and date.

    To verify that you installed the system battery correctly once you set the time and date, follow these steps:

    a. Power off the system.
    b. Unplug the power cord.
    c. Wait for a minute before turning it back on.
    d. Run the DATE command again. If the time and date are now correct, you installed the system battery correctly.

10. If necessary, reconfigure the iLO MP. See "Console Setup" (page 104).

Installing Power Supplies and Disk Drives

This section provides information about installing hot-swappable power supplies and hot-pluggable disk drives. Hot-swappable power supplies are located at the rear of the HP 9000 rp4410 and rp4440 servers, and hot-pluggable disk drives are located behind the front bezels.

⚠️ **CAUTION:** A hot-pluggable device can require interaction with the operating system before the device is safely installed into the server. Verify that the operating system supports installing disk drives while the operating system is running. If the operating system does not support this feature, shut down the operating system before attempting this procedure. Failure to observe this caution results in system failure. For more information on hot-pluggable procedures, see "Hot-Pluggable PCI/PCI-X" (page 88).

📝 **NOTE:** A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The ac power to the server does not need to be off to install a hot-swappable power supply.

Installing Hot-Swappable Power Supplies

This section provides instructions on how to install power supplies.

Power Supply Load Order

The supported configuration of an HP 9000 rp4410 or rp4440 server requires a minimum of one power supply. You can install a second, optional hot-swappable power supply, to provide N+1 capability.

The left side (viewing from the rear) hot-swappable power supply is identified as P0, and the second hot-swappable power supply is identified as P1. Each hot-swappable power supply requires a separate power cord, installed in the appropriate power cord receptacle and attached to a power cord support bracket.

⚠️ **WARNING!** Be careful when installing a hot-swappable power supply. It is heavier than it appears.

⚠️ **CAUTION:** The empty hot-swappable power supply slot P1 must remain closed with the supplied metal cover in place when a second power supply is not used. The server can be damaged due to overheating if the cover does not remain in place.

CAUTION: If the system is powered off, install the hot-swappable power supply into the server before attaching the new power cord at the rear of the system. Failure to observe this caution results in damage to the server.

To install a hot-swappable power supply, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Extend the Server from the Rack" (page 58).)
2. Remove the cable management arm from the rack slide nearest the power supplies. The cable management arm does not need to be completely removed, but moved just enough to enable access to the power supplies.
3. Remove the metal cover from slot P1. Grasp the metal cover and pull it straight out.

Figure 3-19 Metal Cover in Unused Slot P1
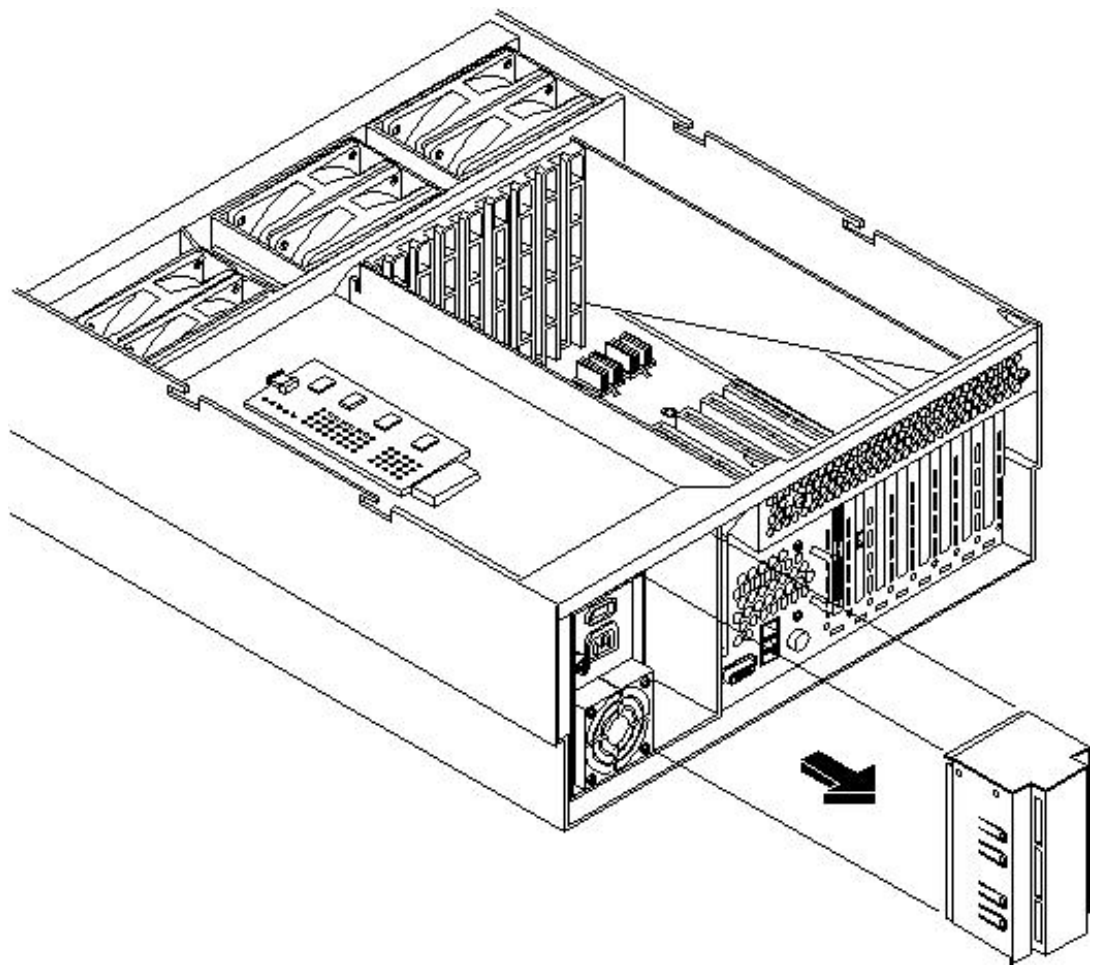
4. Supporting the power supply with both hands, slide it into slot P1 until it plugs into the socket on the internal power supply board. Hand tighten the thumbscrew.
5. Install the power cord into the power supply socket and secure it to the power cord bracket.
6. Apply power (200 - 240 VAC) to the new power supply. The LED immediately turns on.

Installing Hot-Pluggable Disk Drives

One additional hot-pluggable disk drive can be added to the server in slot 2. Always use low profile disk drives (1 inch height) in the server.

To install a hot-pluggable disk drive, follow these steps:

1. Remove the volume filler from slot 2.

Figure 3-20 Volume Filler Installation in Slot 2
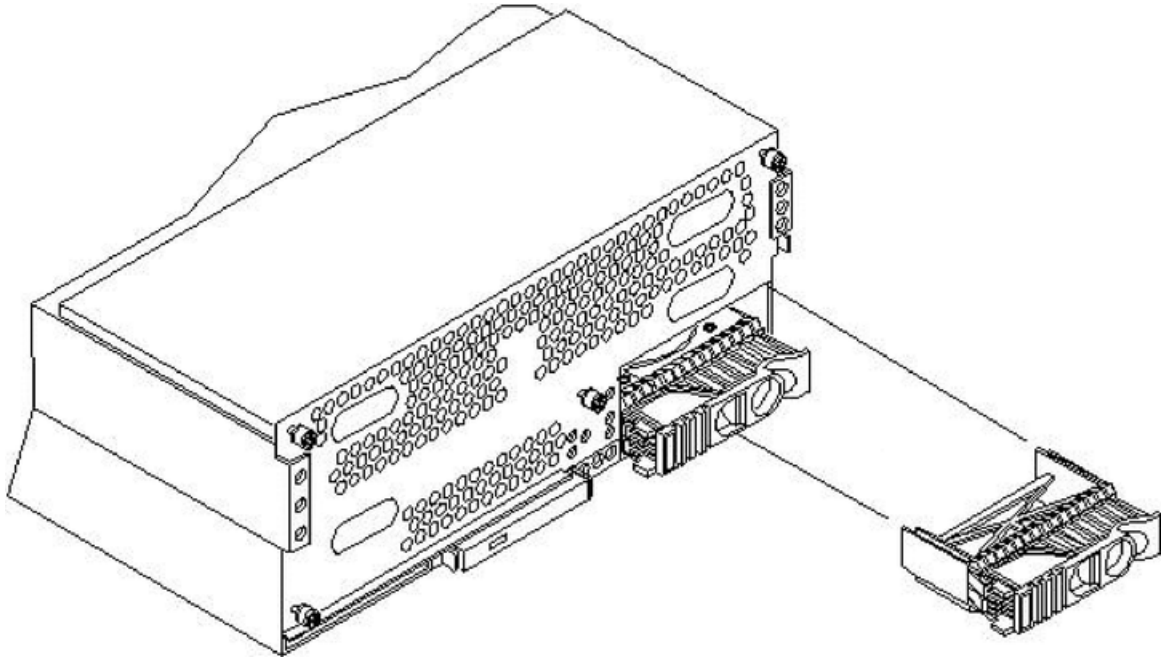
NOTE: For cooling purposes, always leave the volume filler in slot 2 if you do not use a second disk drive.

2. Slide the hot-pluggable disk drive into slot 2 until it is seated.

Figure 3-21 Installing a Disk Drive in Slot 2
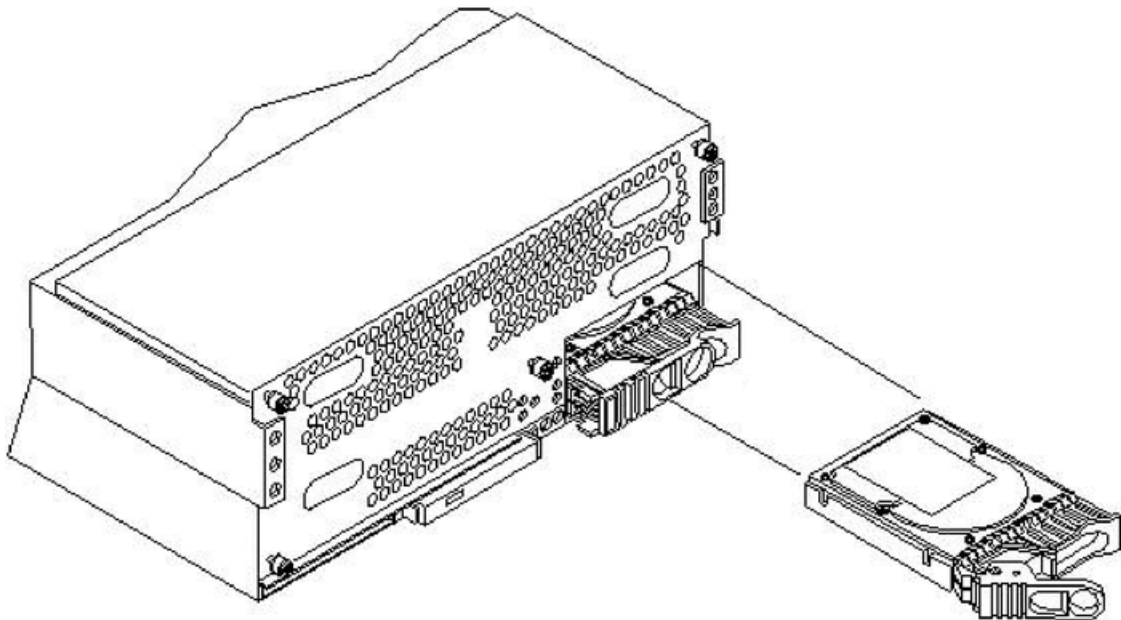
3. Close the drive ejector handle by pushing it down until it clicks. The hot-pluggable disk drive is now correctly installed.

Figure 3-22 Installing a Disk Drive in Slots 1 and 2

Slot 2—SCSI ID 1
Slot 1—SCSI ID 0
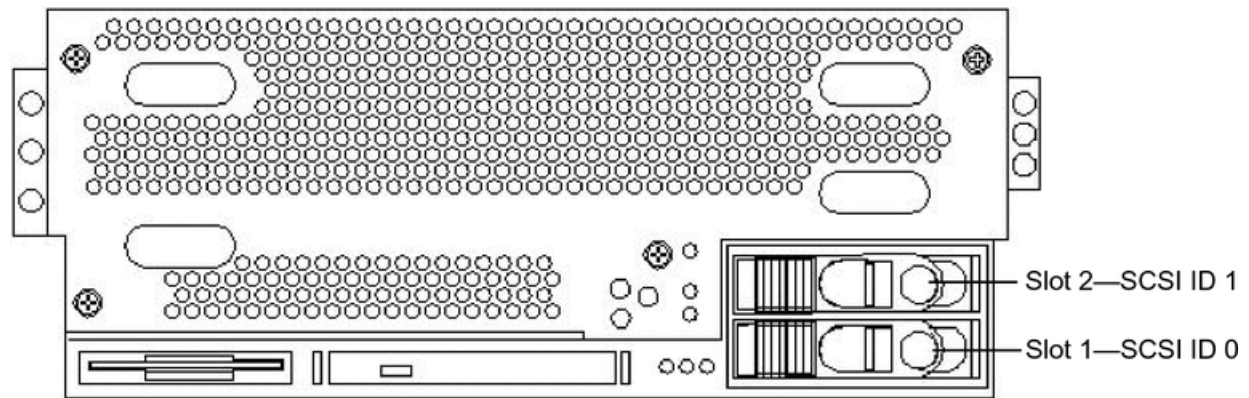
Installing Processors

This section provides information about installing processors.

⚠ **WARNING!** Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Ensure that the system is powered off and all power sources have been disconnected from the server before attempting the following procedures.

Failure to observe this warning can result in personal injury or damage to equipment.

△ **CAUTION:** Ensure that processor speed and cache size are identical for all processors. Failure to observe this caution results in performance degradation or system failure.

The easiest way to ensure compatibility is by using dual processor modules with identical part numbers.

CAUTION:

The processor extender board can be used in PA-RISC or Itanium processor based systems. A dipswitch is provided to configure processor extender board circuits. Ensure that the PA-RISC/Itanium dipswitch is set to PA-RISC for the HP 9000 rp4410 and rp4440 servers. If this switch is incorrectly set, the system does not enter into self test.

Required Tools

To install processors in the server, use the CPU Install Kit (HP part number 5069-5441). This kit consists of the following:

- Disposable ESD Kit (HP part number A3024-80004)
- CPU Install Tool (HP part number A7231-04046)

Dual Processor Modules

HP 9000 rp4410 and rp4440 servers use dual processor modules. Each module contains two processors. When only one processor is activated (a 1P/1C configuration of the HP 9000 rp4410 server), the second processor is installed but not enabled and is available for future use.

- The HP 9000 rp4410 server can contain one or two dual processor modules to provide 1P/1C, 1P/2C, or 2P/2C configurations.
- The HP 9000 rp4440 server can contain one, two, three, or four dual processor modules to provide 1P/2C, 2P/2C, 3P/2C, or 4P/2C configurations.

If you are installing fewer than the maximum number of dual processor modules, the modules must be installed in the appropriate connectors. See Table 3-7.

Processor Load Order

You can install up to four dual processor modules on the processor extender board, which is located under the front cover in the top service bay, directly under the memory extender board. If you are installing fewer than the maximum number of dual processor modules (one in the rp4410 server or fewer than four in the rp4440 server), they must be installed in the designated locations on the processor extender board.

The connectors (slots or sockets) on the processor extender board are labeled CPU0 through CPU3. CPU0 and CPU1 connectors are located on the top of the processor extender board, and CPU2 and CPU3 connectors are located on the bottom.

Table 3-7 lists the load sequence.

Table 3-7 Dual Processor Module Load Order

Server	Dual Processor Module	Connector
rp4410 or rp4440	1	CPU0
rp4410 or rp4440	2	CPU1
rp4440 only	3	CPU2
rp4440 only	4	CPU3

Removing the Processor Extender Board

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing the processor extender board.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

To remove the processor extender board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Extend the Server from the Rack" (page 58).)
2. Remove the front bezel. (See "Removing the Front Bezel" (page 63).)
3. Remove the front cover. (See "Removing the Front Cover" (page 64).)
4. Press the latch on each extraction lever located on each side of the processor extender board.

Figure 3-23 Extender Board Latches
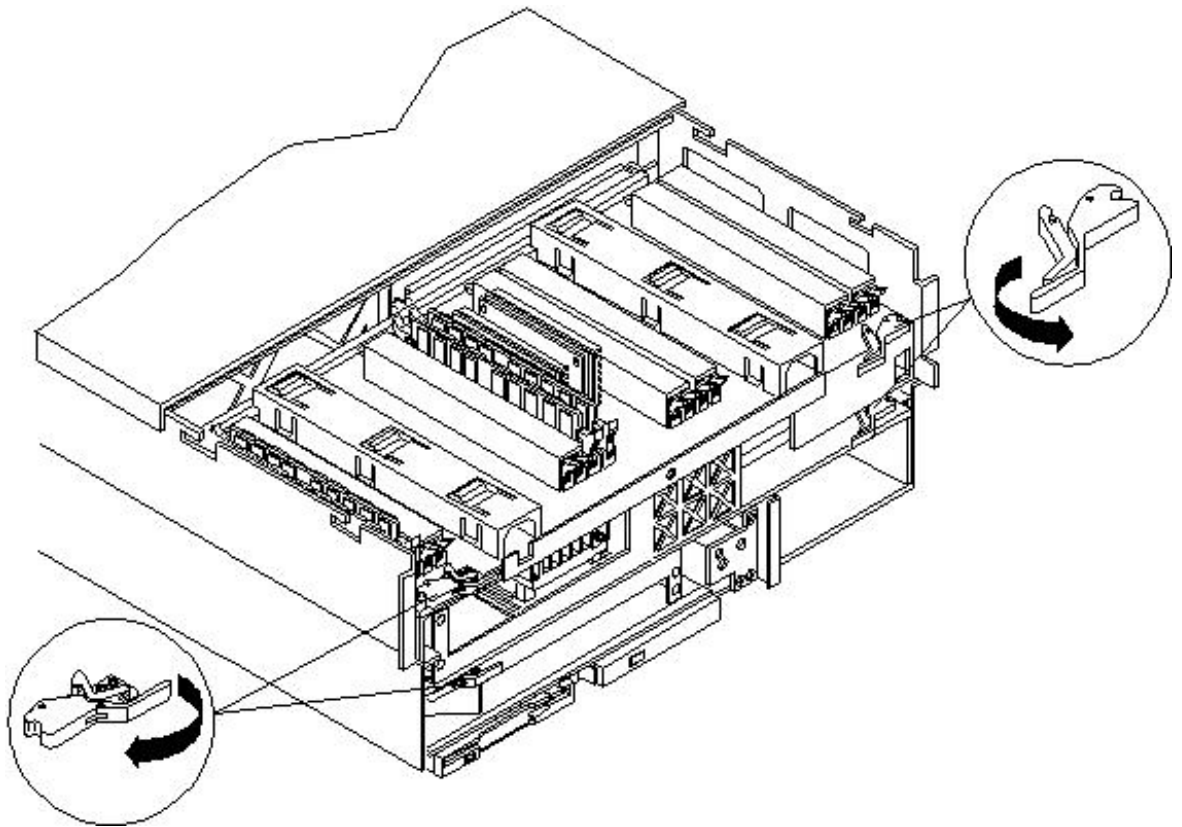
5. To unplug the processor extender board from the socket, pull out on the extraction levers located on the midplane riser board .
6. Pull out the processor extender board from the chassis.

Figure 3-24 Removing the Processor Extender Board
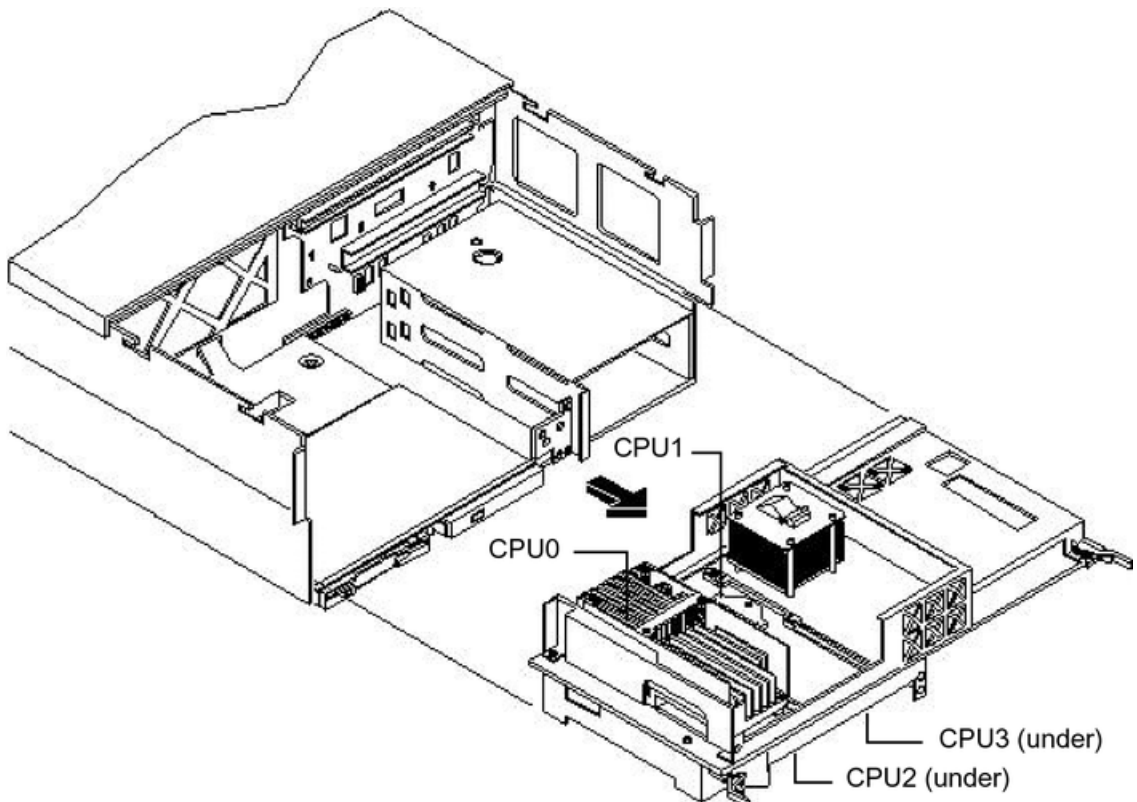
Installing a Processor on the Extender Board

> **△ CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

> **NOTE:** Before installing a processor into the server, read the following instructions carefully for a complete understanding of this process.

To install a processor on the extender board, follow these steps:

1. Locate the socket (CPU1, CPU2, or CPU3) where you will install the dual processor module. (See Figure 3-24 and see "Processor Load Order" (page 78).)
2. Ensure that the cam on the processor socket lock is in the unlocked, counterclockwise position.
3. Remove any protective packaging from the processor module.

> **NOTE:** Protective covers can be installed to protect connector pins. These covers can be saved for future use.

4. Inspect the pins of the processor to be installed. Verify that the processor pins are not bent.

5. Carefully lower the processor, without the sequencer frame, onto the processor socket. Align the pins on the bottom of the heatsink to the slots in the retention frame on the extender board.

⚠️ **CAUTION:** Do not press the processor modules into the socket. When properly aligned, the processor pins seat into the socket by themselves. You can damage the pins if you apply pressure.

CAUTION: Before locking the processor assembly into its socket, ensure that the power cable is not pinched between the heatsink and sheet metal frame of the extender board. Also, ensure that the two power cable ends attached to the dual processor module do not come unplugged from their sockets when you move the cable into place under the heatsink. See Figure 3-25 and Figure 3-26.

💡 **TIP:** Test the alignment of the assembly to the socket by gently moving the assembly back and forth with the palm of your hand—you should feel little or no side play. However, because the assembly is not yet tightened, it can tilt slightly toward the center of the extender board; this is acceptable.

Figure 3-25 Processor Cable Placed Correctly

- Heatsink
- Cable Placed Correctly Under Heatsink
- Protective Plastic Sleeve
- Sheet Metal Frame
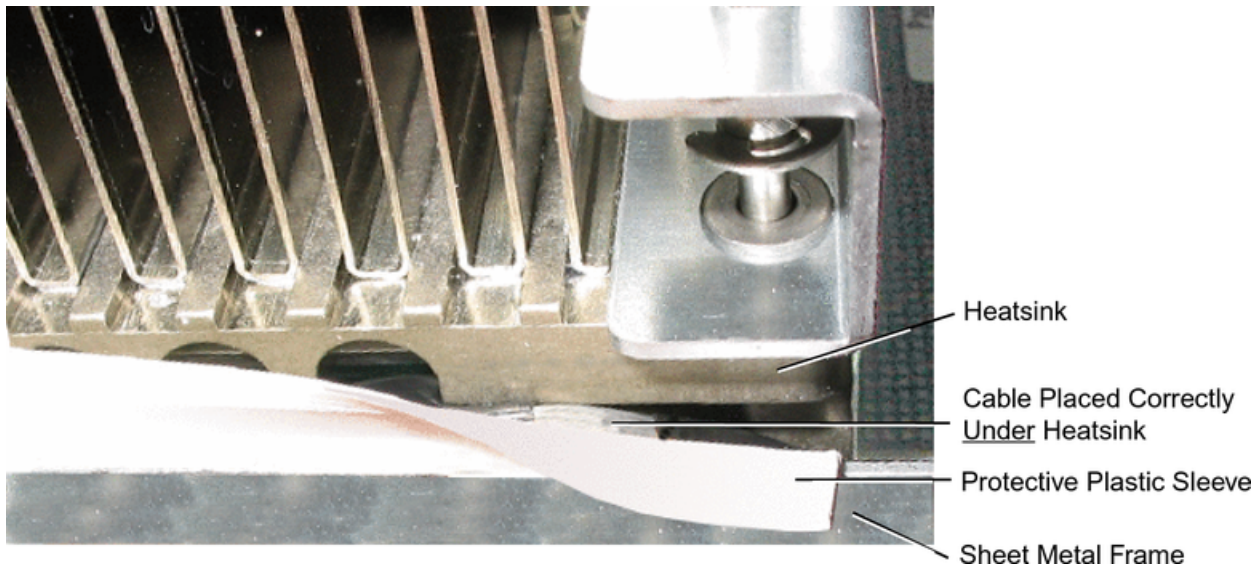
Figure 3-26 Processor Cable Placed Incorrectly

- Heatsink
- Cable Placed Incorrectly - Pinched Between Heatsink and Extender Board Frame
- Protective Plastic Sleeve
- Sheet Metal Frame
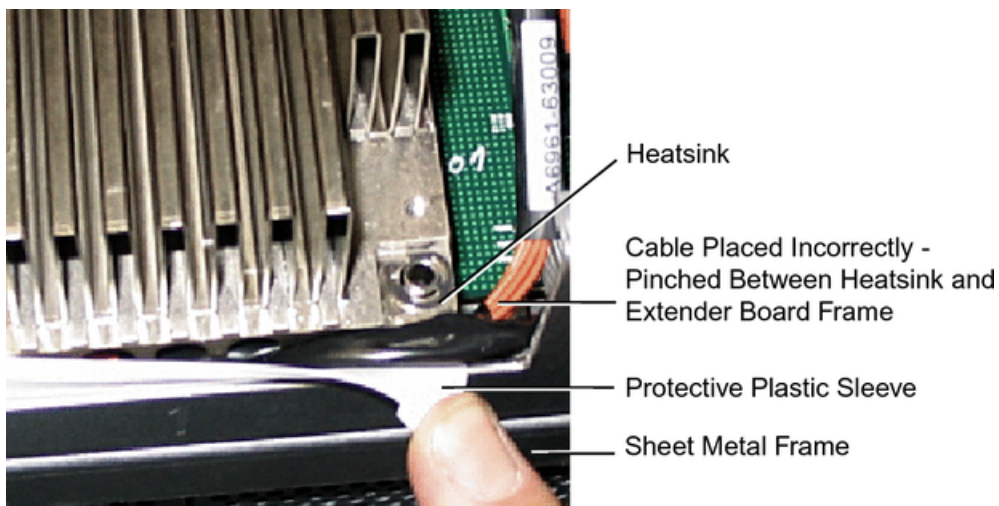
6. Lock the assembly to the socket by rotating the cam on the socket 180 degrees clockwise using the CPU Install Tool or 2.5-mm Allen wrench.

TIP: When rotating the locking cam, hold the palm of your hand on top of the assembly and exert light pressure. This ensures that the assembly stays flush and level to the socket while it is being tightened.

7. Plug the processor cable into its socket on the extender board.
8. Place the sequencer frame over the processor.
9. Hand tighten the two knurled thumbscrews on the sequencer frame.

NOTE: Do not tighten the other four shoulder screws until you have first hand-tightened the two knurled thumbscrews.

10. Using a CPU Install Tool (Torx T15 driver), tighten the four remaining T15 shoulder screws until they bottom out. Follow the tightening sequence shown in Figure 3-27.

IMPORTANT: Do not overtighten the four shoulder screws. They can shear off if overtightened. Stop tightening the shoulder screws when you feel them bottom out.

11. Using the CPU Install Tool (Torx T15 driver), finish tightening the two thumbscrews.

IMPORTANT: Do not overtighten the two thumbscrews. They can shear off if overtightened. Tightening the thumbscrews by 1/4 turn tightens them sufficiently.

Figure 3-27 Installing the Processor on the Extender Board

Tightening Sequence for 4-Shoulder
Screws is 1, 2, 3, 4

DO NOT OVERTIGHTEN (See Step 7)

2 Knurled Thumb-Screws

Torx-T15
Use Torx T15 Driver to Tighten Shoulder Screws and Thumbscrews

2.5 MM Allen Key

Power Cable Protected by Plastic Sleeve

Align Pins of Heatsink with Slots in Frame

*Slots shown are at CPU1 socket.

Processor shown is being mounted on socket CPU0 per load order.
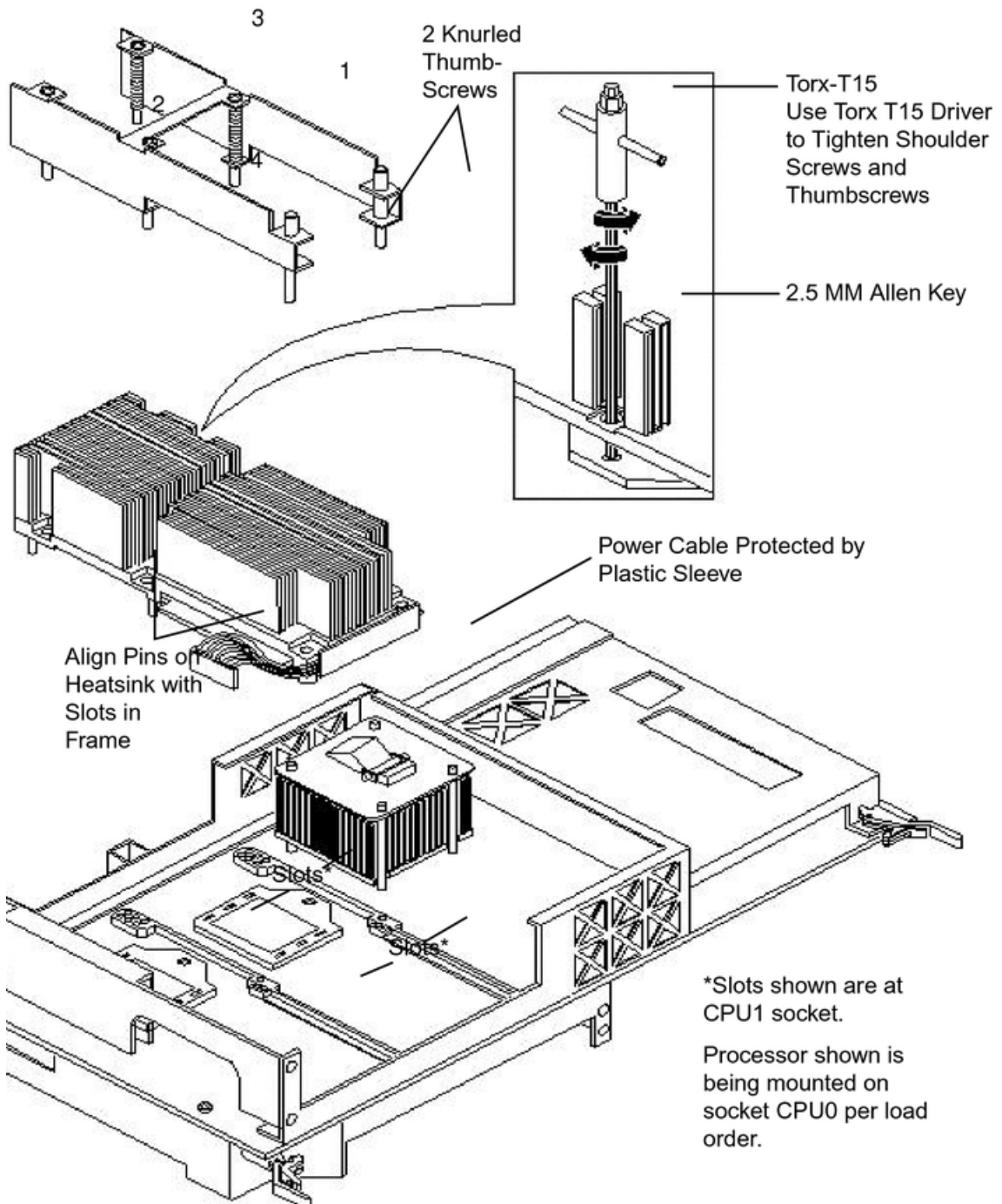
Extender Board Switches and Jumpers

The processor extender board includes switches and jumpers. These switches are factory preset and must not be altered except by an HP Service Representative.

Replacing the Processor Extender Board

To replace the processor extender board, follow these steps:

1. Ensure that the extraction levers are positioned in the outward, unlocked position.
2. Align the processor extender board with the left and right card guides.
3. Slide the processor extender board in until it begins to seat in the socket located on the midplane riser board.
4. Push the extraction levers inward to the locked position in order to fully seat the processor extender board into the midplane riser board socket.
5. Replace the front cover and front bezel.
6. Verify processor operation by using the system utilities.
   - To verify operation, use the iLO MP commands and the BCH commands.
   - To exercise the processor, use `MAKODIAG` provided by the offline diagnostic environment.

Installing Memory

The standard configuration of HP 9000 rp4410 and rp4440 servers include a 16-DIMM memory extender board. This extender board must contain a minimum of 1 GB of memory (four 256 MB DIMMs loaded in quad 0 [connectors 0A, 0B, 0C, and 0D]). (Figure 3-28)

An optional 32-DIMM memory extender board is available to replace the 16-DIMM memory extender board. This extender board must contain a minimum of 1 GB of memory (four 256 MB DIMMs loaded in quad 0 [connectors 0A, 0B, 0C, and 0D]). (Figure 3-29)

You can insert additional DIMMs into both 16- and 32-DIMM boards. When adding DIMMs, you must use a minimum of four like-sized DIMMs in the next available quad.

Supported DIMM Sizes

You can install up to 128 GB of memory in the server. Supported DIMM sizes are as follows:
- 256 MB, 512 MB, 1 GB, 2 GB, 4 GB

Dissimilar DIMM sizes can be used across the extender board, but all four DIMMs in each quad must match. For cooling purposes, you must install DIMM fillers into unused connectors.

DIMM Slot Fillers

Both the 16- and 32-DIMM extender boards must have DIMM slot filler boards placed over all unfilled DIMM connectors. As you fill DIMM quads with additional memory, you must remove the DIMM slot fillers covering the connectors. All remaining DIMM fillers in unused connectors must remain in place to maximize internal cooling.

NOTE: One DIMM filler board covers two adjacent DIMM connectors. Remove DIMM slot fillers as you add memory and you will always retain the correct configuration.

Table 3-8 and Figure 3-28 show the DIMM filler requirements and configuration for the 16-DIMM memory extender board.

Table 3-8 DIMM Filler Requirements for 16-DIMM Extender Board

DIMMs Loaded	Fillers Required[1]
4 DIMMs in quad 0	Six fillers total: Two fillers each in quads 1, 2, and 3
8 DIMMs in quads 0 and 1	Four fillers total: Two fillers in quads 2 and 3

Table 3-8 DIMM Filler Requirements for 16-DIMM Extender Board *(continued)*

12 DIMMs in quads 0, 1, and 2	Two fillers total: Two fillers in quad 3
16 DIMMs in quads 0, 1, 2, and 3	No fillers required

1   One DIMM filler board covers two adjacent DIMM connectors.

Figure 3-28 16-DIMM Memory Extender Board Minimum Configuration
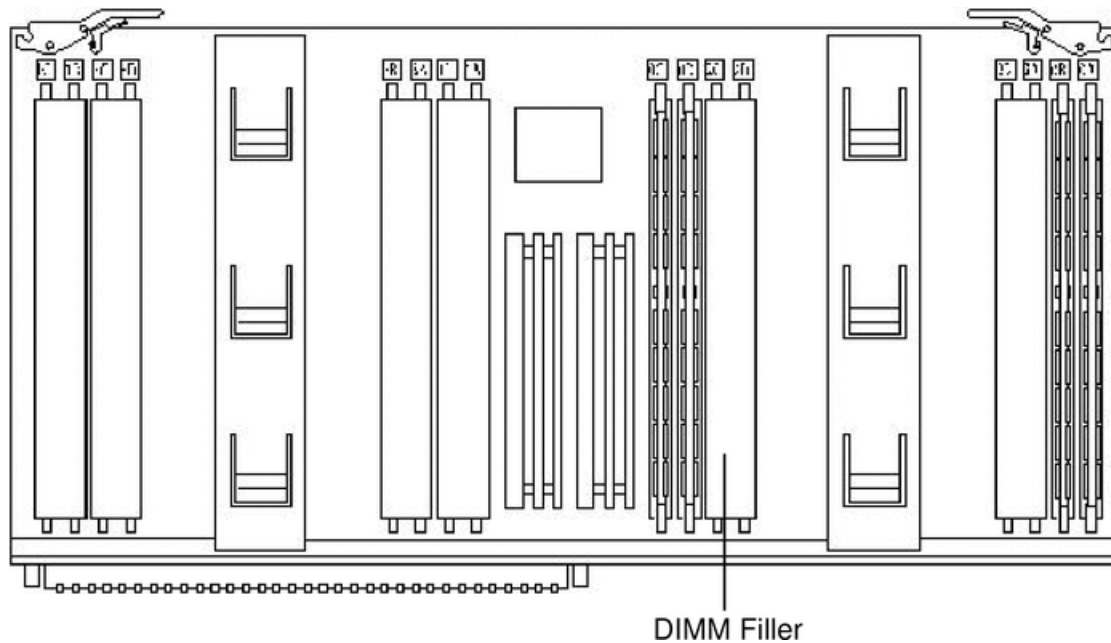
DIMM Filler

Table 3-9 and Figure 3-29 show the DIMM filler requirements and configuration for the 32-DIMM memory extender board.

Table 3-9 DIMM Filler Requirements for 32-DIMM Memory Extender Board

DIMMs Loaded	Fillers required[1]
4 DIMMs in quad 0	12 fillers total: Two fillers in quads 1, 3, 4, 5, 6, and 7 (quad 2 remains unfilled)
8 DIMMs in quads 0 and 1	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (quads 2 and 3 remain unfilled)
12 DIMMs in quads 0, 1, and 2	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (quad 3 remains unfilled)
16 DIMMs in quads 0, 1, 2, and 3	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (all quads filled)
20 DIMMs in quads 0, 1, 2, 3, and 4	Four fillers total: Two fillers in quads 5 and 7 (quad 6 remains unfilled)
24 DIMMs in quads 0, 1, 2, 3, 4, and 5	No fillers required
28 DIMMs in quads 0, 1, 2, 3, 4, 5, and 6	No fillers required
32 DIMMs in quads 0, 1, 2, 3, 4, 5, 6, and 7	No fillers required

1   One DIMM filler board covers two adjacent DIMM connectors.

Figure 3-29 32-DIMM Memory Extender Board Minimum Configuration

DIMM Filler
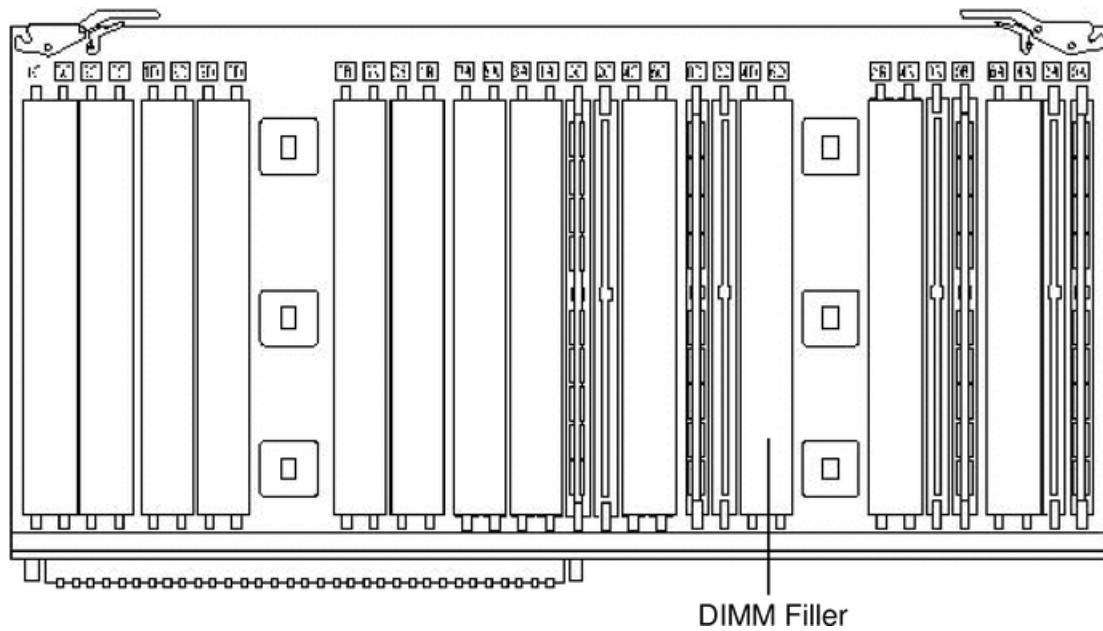
Removing a Memory Extender Board

The memory extender boards is located under the front cover.

> ⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before attempting this procedure.
>
> Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

To remove a memory extender board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Remove the front bezel from the chassis. See "Removing the Front Bezel" (page 63).
3. Remove the front cover from the chassis. See "Removing the Front Cover" (page 64).
4. Press the latches on the extraction levers located on each side of the memory extender board.
5. To unplug the memory extender board from the socket located on the midplane riser board, pull on the extraction levers.

6. Remove the memory extender board from the chassis.

Figure 3-30 Removing the Memory Extender Board
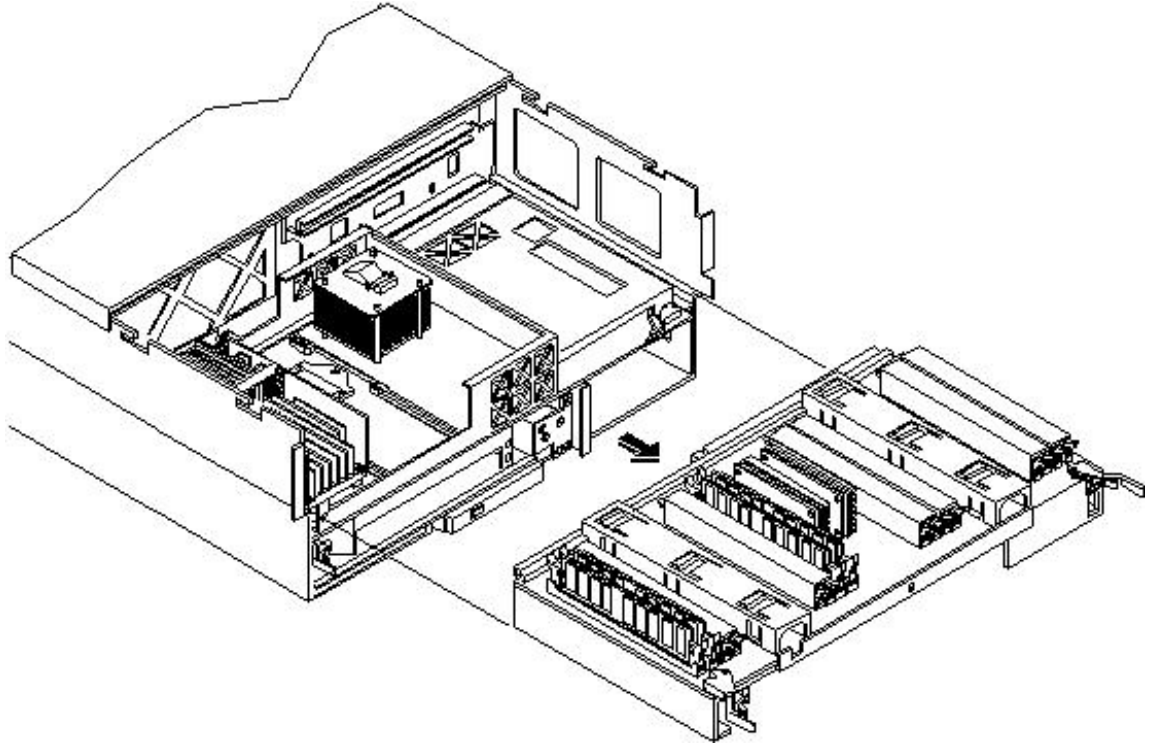
Installing DIMMs

To install DIMMs, follow these steps:

1. Align the DIMM with the socket located on the memory extender board (align the notch in the DIMM with the tab in the connector socket).

2. Firmly and evenly push on each end of the DIMM until it seats in the connector socket. Ensure that the extraction levers are in the closed position.

Figure 3-31 Inserting DIMM Into the Extender Board Connector Socket
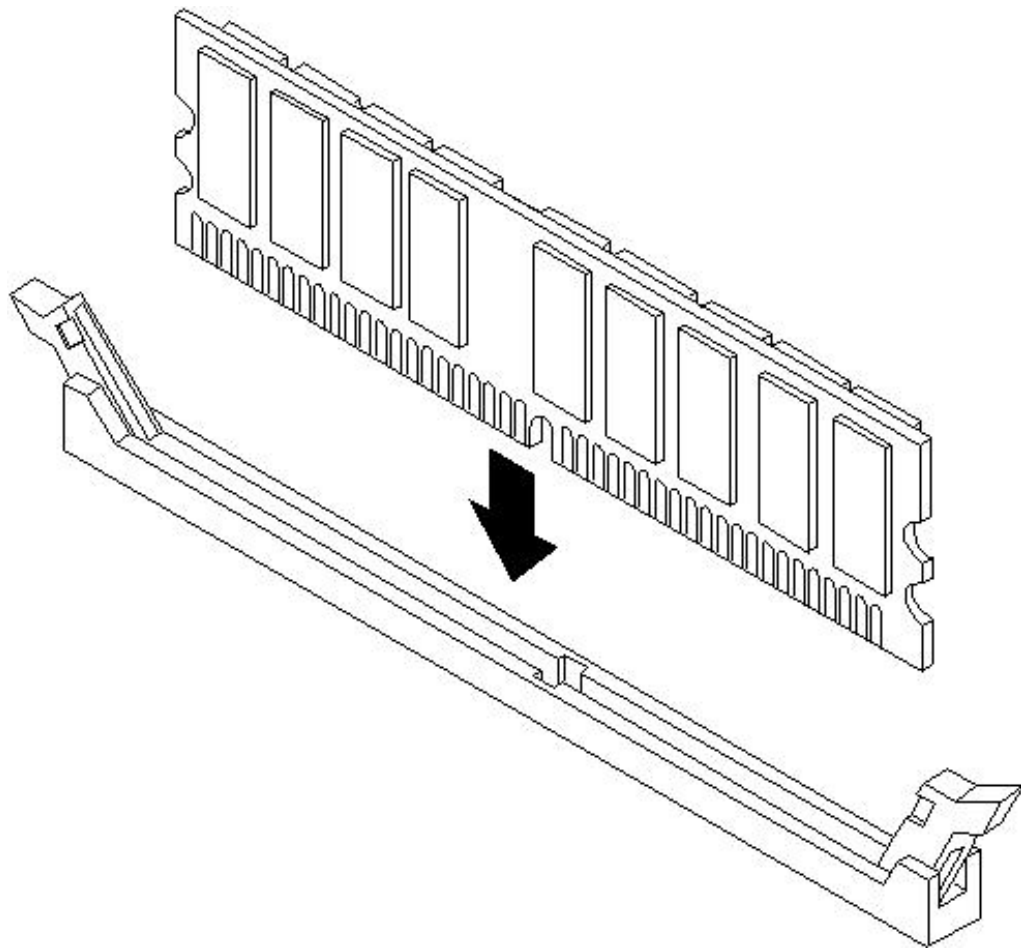
Replacing the Memory Extender Board

To replace the memory extender board, follow these steps:

1. Ensure that the extraction levers are in the outward, unlocked position.
2. Align the memory extender board with the left and right chassis guide slots.
3. Slide the memory extender board in until it begins to seat in the socket located on the midplane riser board.
4. To fully plug the memory extender board into the midplane riser board, push the extraction levers inward to the locked position.
5. Replace the front cover onto the chassis. See "Replacing the Front Cover" (page 65).
6. Replace the front bezel onto the chassis. See "Replacing the Front Bezel" (page 64).

Hot-Pluggable PCI/PCI-X

The HP 9000 rp4410 and rp4440 servers support PCI/PCI-X hot-pluggable technology and include six hot-pluggable PCI/PCI-X slots.

Hot-Pluggable PCI/PCI-X Operations

PCI/PCI-X hot-pluggable technology enables the following operations. For procedures with step-by-step instructions describing how to add, replace, delete, and locate PCI/PCI-X cards, see "Hot-Plug Procedures" (page 91).

- Online Addition (OLA)

    You can install new PCI/PCI-X expansion cards in empty slots without powering off the server.

- Online Replacement (OLR)

    You can replace a previously occupied slot with a new PCI/PCI-X expansion card by suspending the driver. This operation combines removing an active card and replacing it with an equivalent card. The existing driver for the old card must be compatible with the new card.

> △ **CAUTION:** A special OLR requirement for HP-UX 11i v1 (and higher) is that the card to be replaced must be exactly the same as the removed card. This is also called like-for-like replacement.

- PCI/PCI-X Slot Locate (Locate)

    To easily locate the PCI/PCI-X slot at which to perform a hot-pluggable operation, you can command the attention LEDs on the OLX divider and the I/O baseboard to blink and act as visual cues to the active slot location. This operation is always initiated through a software or web interface, and is optional to the operating system on the server.

PCI/PCI-X Hardware and Software Interfaces

Table 3-10 shows what hot-pluggable hardware and software interfaces are available on HP-UX 11i v1 (and higher).

Table 3-10 Hot-Pluggable Hardware and Software Interfaces and OS Availability

Hot-Pluggable PCI/PCI-X Interface	Supported
Hardware interface comprised of the following: —Attention button (doorbell) —Manual retention latch —Power LED —Attention LED —PCI/PCI-X card latch	Yes
Web GUI	Yes
Command Line Interface (CLI)	Yes (`rad` command)
System Administration Manager (SAM)	Yes (`sam` command). Performing hot-pluggable operations in SAManager is preferred. For a complete description of SAM, see the *HP-UX Reference Guide*.

PCI/PCI-X Slot Locations and Configurations

PCI/PCI-X slots are numbered from 1 through 8 in the server as shown in Figure 3-32.

Figure 3-32 Slot ID Numbering
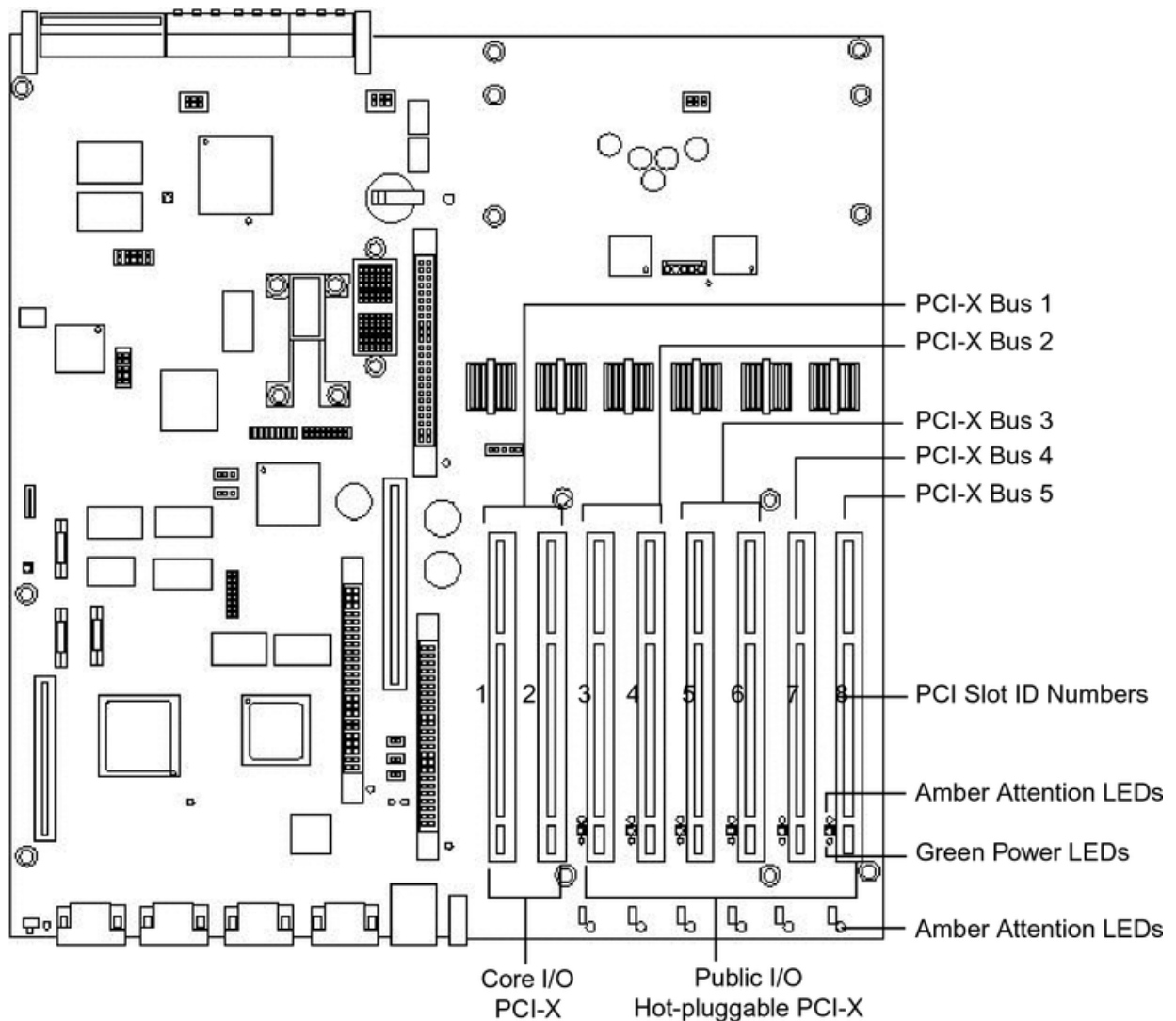
The following describes configuration requirements for slots 1 through 8:

- PCI slots 1 and 2 are dedicated for use by the core I/O cards: SCSI HBA card in slot 1 and Gigabit Ethernet LAN card in slot 2. Slots 1 and 2 are not hot-pluggable. Additional PCI/PCI-X expansion cards must not be placed in slots 1 or 2.

- Slots 3 and 4 share a PCI bus, and slots 5 and 6 share a PCI bus. The maximum capability of each of the shared slots is PCI/PCI-X 66 MHz. If a PCI/PCI-X 133 MHz card is placed in a shared slot, the PCI/PCI-X 133 MHz card runs at a maximum of 66 MHz. If different modes (PCI versus PCI-X) or slower speeds (33 MHz) are used, the slot automatically downgrades to accept the change.

  Shared slots have card compatibility restrictions. If one of the shared slots is occupied, the card being added to the second slot is limited by the configuration of the occupied slot. If the new card has a slower capability than the current bus configuration, it cannot work. If the new card has a faster capability than the current bus configuration, it only runs at the bus mode and frequency of the current bus configuration.

- Slots 7 and 8 are single slots. The maximum capability of each slot is PCI/PCI-X 133 MHz. Only slots 7 and 8 allow 133 MHz, PCI/PCI-X cards to run at full speed. These two slots are not limited by bus-mode, frequency-related incompatibilities.

Table 3-11 lists the PCI/PCI-X cards slot frequency and bus mode compatibility for shared slots.

Table 3-11 PCI/PCI-X Card Slot Frequency and Bus Mode Compatibility for Shared Slots[1]

Current PCI Bus Mode and Frequency for the Current Card in a Shared Slot	Cards to be installed			
	PCI 33 MHz	PCI 66 MHz	PCI-X 66 MHz	PCI-X 133 MHz
PCI 33 MHz	Compatible[2]	Compatible[2] New card running at 33 MHz	Compatible[2] New card running at 33 MHz	Compatible[2] New card running at 33 MHz
PCI 66 MHz	Incompatible frequency[3]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz
PCI-X 66 MHz	Incompatible frequency[3]	Incompatible bus[4]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz
PCI-X 133 MHz[5]Running at PCI-X 66 MHz)	Incompatible frequency[3]	Incompatible frequency[3]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz

1 The conditions described in this table apply only to shared slots (slots 3 and 4 on bus number 2, slots 5 and 6 on bus number 3). Slots 7 and 8 are not shared slots.

2 Compatible: card is accepted and runs at the frequency shown.

3 Incompatible frequency: card does not work.

4 Incompatible bus: Card does not work. The new card does not initialize and powers off.

5 Maximum bus mode and frequency supported on shared slots is PCI-X 66 MHz.

Hot-Plug Procedures

The hot-plug procedures described in this section use the hardware interface only. Software interface procedures are described in .

IMPORTANT: Before adding or replacing a PCI/PCI-X card, determine whether that card is critical to the server operation. If you replace a card that is still operating and it is a critical resource to the server, you can cause undesired system downtime.

OLA

Before installing a PCI/PCI-X card, ensure that the proper drivers for that PCI/PCI-X card are installed.

NOTE: If you are installing the Graphics Kit A6150B, use slots 3-8. However, DO NOT install the included USB card. The server currently supports USB and the ports are already located on the rear of the server.

If you are installing the RAID card A7143A, you must install it into slot 8. If you install this card in any other slot, it interferes with the manual retention latch (MRL) on the OLX divider in the next slot. Because of this interference, you can install only two RAID cards in the server in slot 1 and slot 8.

To add a PCI/PCI-X card into an empty slot, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Remove the top cover from the chassis. (See "Removing the Top Cover" (page 65).)
3. Choose an empty slot and pull up on the MRL located on the OLX divider approximately 75 degrees. (Figure 3-33)

CAUTION: Do not pull up on the MRL of a powered on, occupied slot or the server will crash.

Figure 3-33 PCI/PCI-X OLX Divider Layout
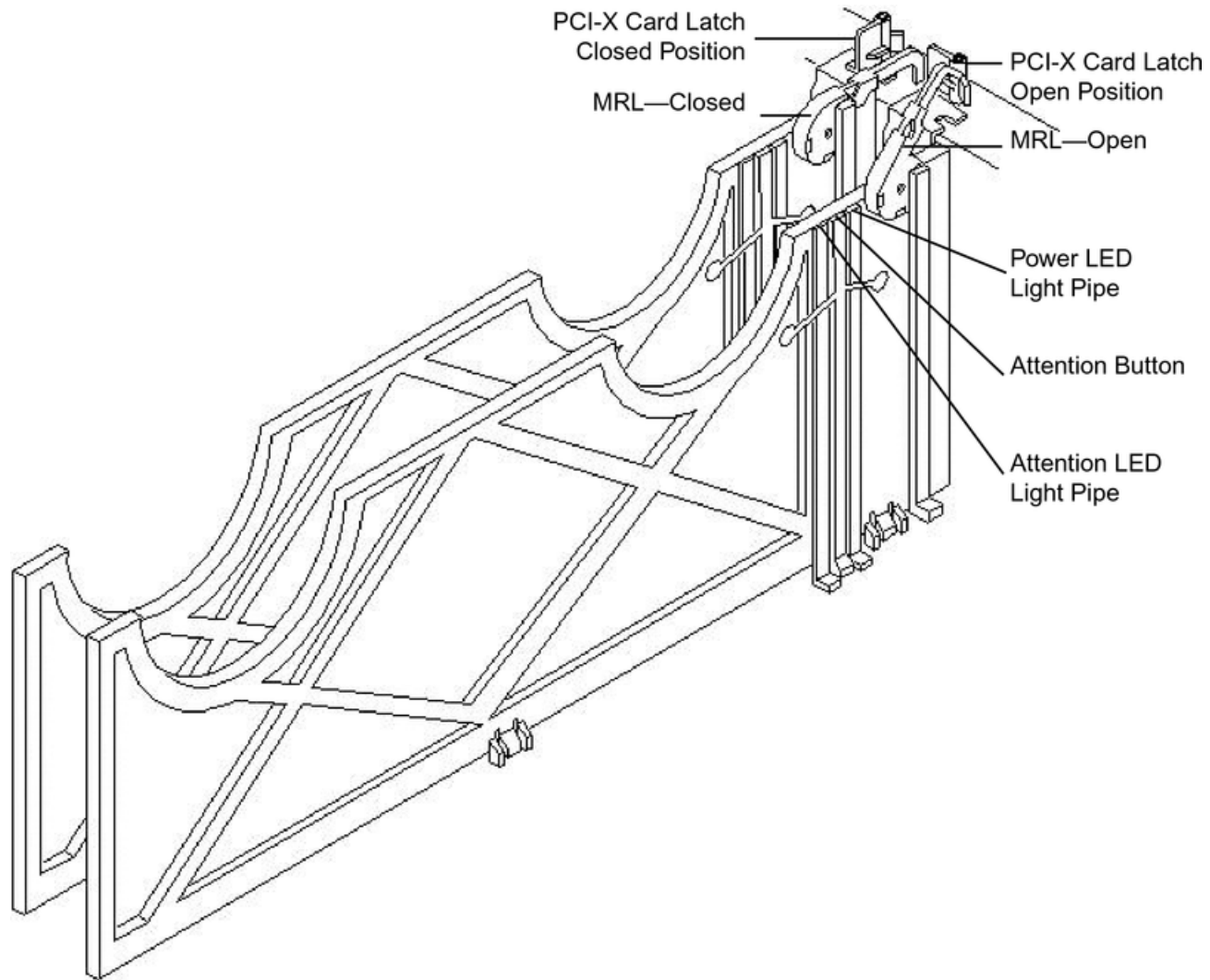
4. Ensure that the MRL and the card latch on the OLX divider are already open and insert the PCI/PCI-X card into the empty slot. (Figure 3-34)

IMPORTANT: When inserting the PCI/PCI-X card, be careful you do not accidentally touch an **Attention** button on the other OLX dividers. This initiates an undesired shutdown of another PCI/PCI-X card/slot. If you accidentally initiate slot shutdown, push the **Attention** button again within five seconds to cancel the shutdown.

NOTE: Ensure that you fully seat the card into the slot, or undesired results can occur after power is reapplied to the slot.

Figure 3-34 Inserting a PCI/PCI-X Card
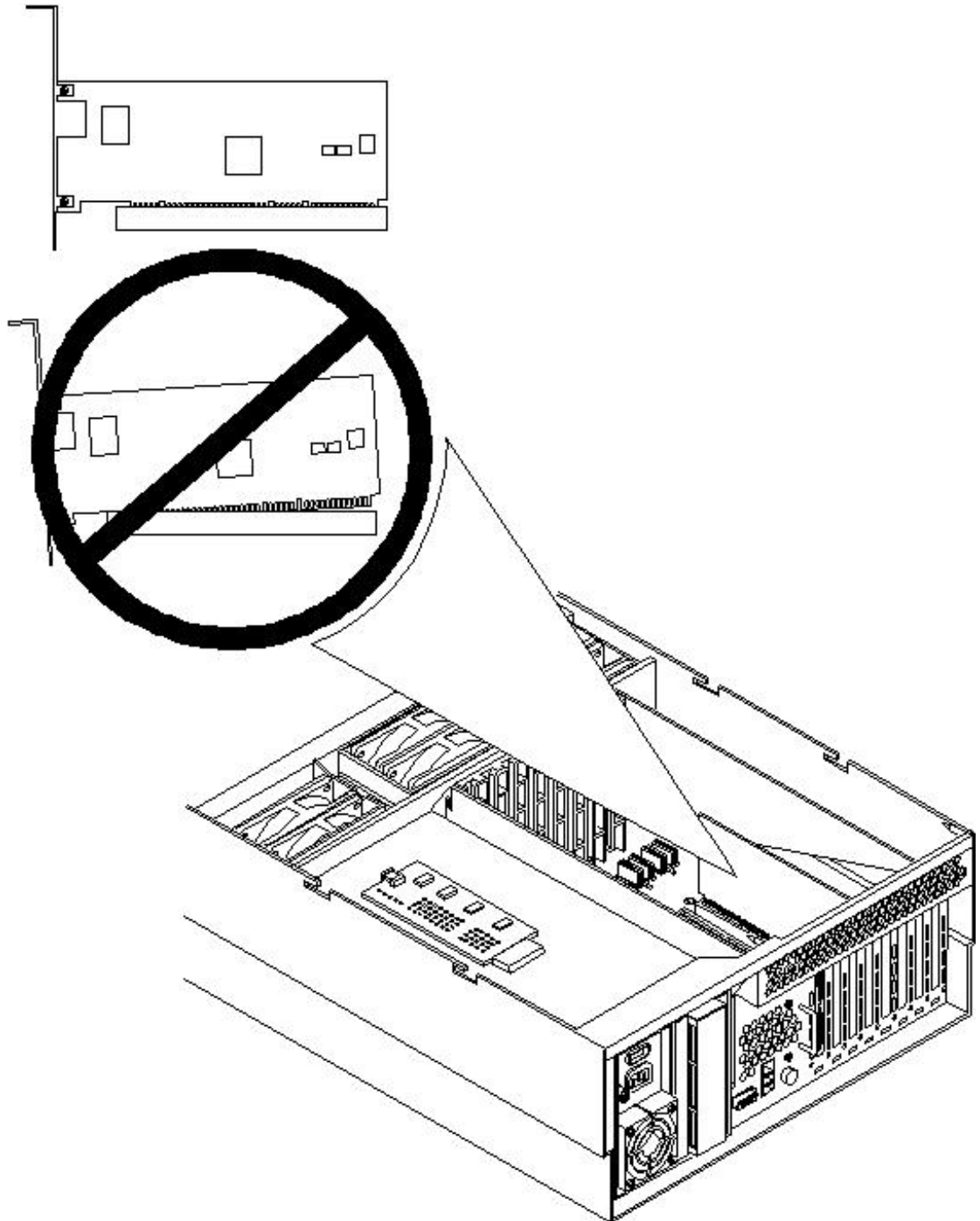
5. If the PCI/PCI-X card is full size, open the slider gate latch to access the card slot.

Figure 3-35 Slider Gate Latch
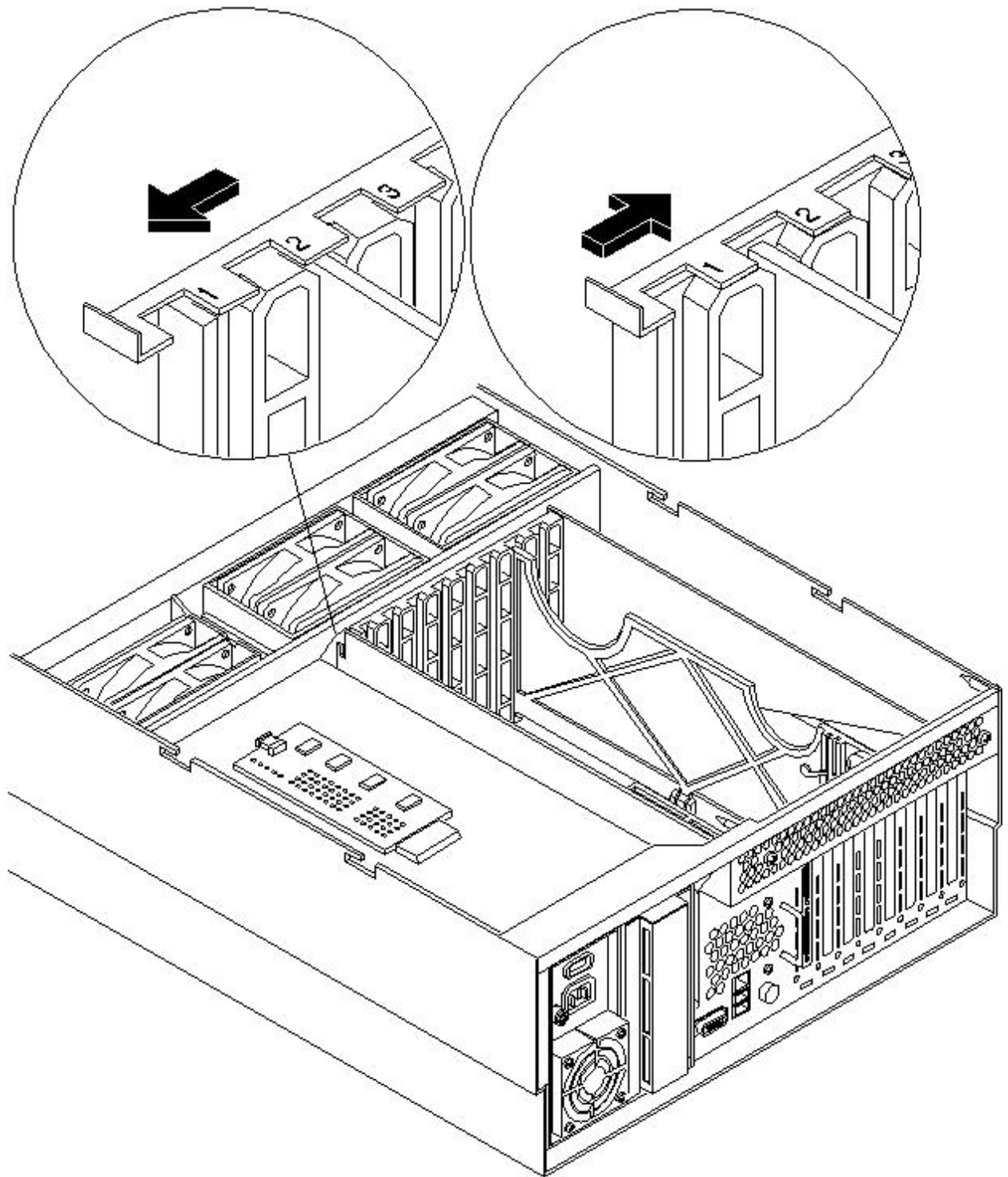
6. If the PCI/PCI-X card is full size, close the slider gate latch to secure the end of the card. (Figure 3-35)
7. Push the MRL down until it seats against the chassis wall.
8. To capture the PCI/PCI-X card and MRL into the closed position, turn the PCI/PCI-X card latch to the closed position.
9. Press the **Attention** button . The power LED starts to blink. Wait until the power LED goes from blinking to steady on.

> **NOTE:** After pushing the **Attention** button, you have five seconds to cancel the operation by pushing the **Attention** button again. After five seconds, pressing the **Attention** button initiates slot power off for OLR of the card.

10. Replace the top cover. (See "Replacing the Top Cover" (page 66).)
11. Push the server all the way back into the rack until it stops.

OLR

> **CAUTION:** For HP-UX 11i v1 (and higher), you must replace an existing card with an identical card.

To remove and replace a PCI/PCI-X card into a populated slot, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 65).
3. Disconnect all external and internal cables attached to the PCI card in the side service bay.
4. Press the **Attention** button located on the OLX divider that controls the affected slot. The power LED starts to blink. Wait until the power LED goes from blinking to steady off.

> **NOTE:** After pushing the **Attention** button, you have five seconds to cancel the operation by pushing the **Attention** button again.

5. Turn the PCI/PCI-X card latch approximately 45 degrees on the chassis until the MRL is free to pull up.
6. To turn off power to the slot, pull up on the MRL located on the OLX divider. (Figure 3-33)
7. To completely expose the PCI/PCI-X bulkhead, turn the PCI/PCI-X card latch on the chassis approximately 90 degrees.
8. If the PCI/PCI-X card is full size, open the slider gate latch to release the end of the card. (Figure 3-35)
9. Grasp the top edge of the PCI/PCI-X card and remove it from the slot.

> **NOTE:** There is no ejection lever to remove PCI/PCI-X cards as on previous server models. You must remove the PCI/PCI-X card manually. Cutouts in the OLX dividers enable access for grasping PCI/PCI-X cards.

10. Insert the new PCI/PCI-X card into the powered off slot. (Figure 3-34)

> **IMPORTANT:** When inserting the PCI/PCI-X card, be careful you do not accidentally touch an **Attention** button on the other OLX dividers. This initiates an undesired shutdown of another PCI/PCI-X card/slot. If you accidentally initiate slot shutdown, push the **Attention** button again within five seconds to cancel the shutdown.

> **NOTE:** Ensure that you fully seat the card into the slot, or undesired results can occur after power is reapplied to the slot.

11. If the PCI/PCI-X card is full size, close the slider gate latch to secure the end of the card. (Figure 3-33)
12. Push the MRL down until it seats against the chassis wall.
13. Turn the PCI/PCI-X card latch on the chassis to the closed position. This locks the PCI/PCI-X card into its slot and the MRL into the closed position.
14. Press the **Attention** button. The power LED starts to blink.

15. Wait for the power LED to stop blinking. The PCI/PCI-X card is now active.
16. Reconnect all cables.
17. Replace the top cover. (See "Replacing the Top Cover" (page 66).)
18. Push the server all the way back into the rack until it stops.

Understanding LEDs and Hardware Errors

Table 3-12 describes the hot-pluggable LED error conditions.

Table 3-12 Hot-Pluggable LED Error Conditions

Power LED (Green)	Condition	Description
	On	PCI/PCI-X slot is powered on
	Blinking	Hot-pluggable operation in progress. Do not touch the slot
	Off	PCI/PCI-X slot is powered off
Attention LED (Amber)	**Condition**	**Description**
	On	Hardware operational fault **NOTE:** If the slot is powered on, it does not power off. If the slot is powered off, it does not power on
	Blinking	Slot location is being indicated
	Off	If power to the slot is on, the slot is functioning normally

Troubleshooting PCI/PCI-X Hot-Pluggable Operations

Sometimes a PCI/PCI-X card does not come online during a hot-pluggable operation due to a frequency mismatch between the PCI/PCI-X card and the slot bus or due to other hardware errors. To determine the type of error you are experiencing, observe the LED activity described as follows:

1. PCI/PCI-X bus mode or frequency mismatch

   After you insert a PCI/PCI-X card into the slot and push the attention button, the power LED goes from blinking to steady off and stays at steady off. The system firmware has rejected the PCI/PCI-X card and indicates either bus-frequency or bus-mode mismatch.

   After pushing the attention button, wait for the full five second operation cancellation window before taking further action.

2. Hardware operation fault

   If the PCI/PCI-X card cannot be powered on during a hot-pluggable addition operation, the attention LED turns steady on and the power LED goes steady off.

3. Power draw is excessive

   If the power draw for a newly installed PCI/PCI-X card is excessive (when combined with that of the existing PCI/PCI-X expansion cards), the server powers off. If this occurs, check the power ratings of all installed PCI/PCI-X cards. A known cause of power loss is the use of more than three PCI/PCI-X RAID cards in the server.

   If the PCI/PCI-X card cannot be powered off during a hot-pluggable removal operation, the attention button turns steady on and the power LED remains steady on. A possible cause of this condition is that a user application or process is using the card you are trying to remove. Determine whether the card is in use by checking the operating system logs.

4. Slot does not power off

   If the slot does not power off during a hot-plug removal operation, do not open the MRL on the OLX divider. This action causes system failure or operating system crashes.

Converting SCSI From Simplex to Duplex

This section explains how to convert the HP 9000 rp4410 or rp4440 server from simplex to duplex operation. The process involves removing a jumper, installing a duplex PCA card, and plugging in the stowed channel B cable to the appropriate sockets.

A SCSI jumper cable bridges the two SCSI connectors on the SCSI backplane when the server is configured for simplex operation. You must remove this jumper in order to install the duplex board and to connect the SCSI B cable.

Safety Information

To ensure safe handling of components and to prevent harm to both you and the server, follow these steps:

- Use an antistatic wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before attempting this procedure.

📝 **NOTE:** Some restrictions apply to the mass storage devices that can be connected to the core I/O SCSI HBA. If you convert the server to duplex configuration, you cannot install external SCSI devices to the SCSI HBA core I/O controller.

Accessing the SCSI Backplane

Before adding the accessories required to convert the server from simplex to duplex, you must remove outer components to access the SCSI backplane.

To gain access to the SCSI backplane, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Extend the Server from the Rack" (page 58).

📝 **NOTE:** If the server is pedestal-mounted, you need not remove the pedestal to perform the simplex to duplex conversion. Proceed directly to the next step.

2. Remove the front bezel. See "Removing the Front Bezel" (page 63).
3. Remove the front cover. See "Removing the Front Cover" (page 64).
4. Remove the memory extender board. See "Removing a Memory Extender Board" (page 86).
5. Remove the processor extender board. See "Removing the Processor Extender Board" (page 78).

Converting to Duplex

To convert to duplex, follow these steps:

1. Remove the SCSI jumper cable.

Figure 3-36 Removing the SCSI Jumper Cable
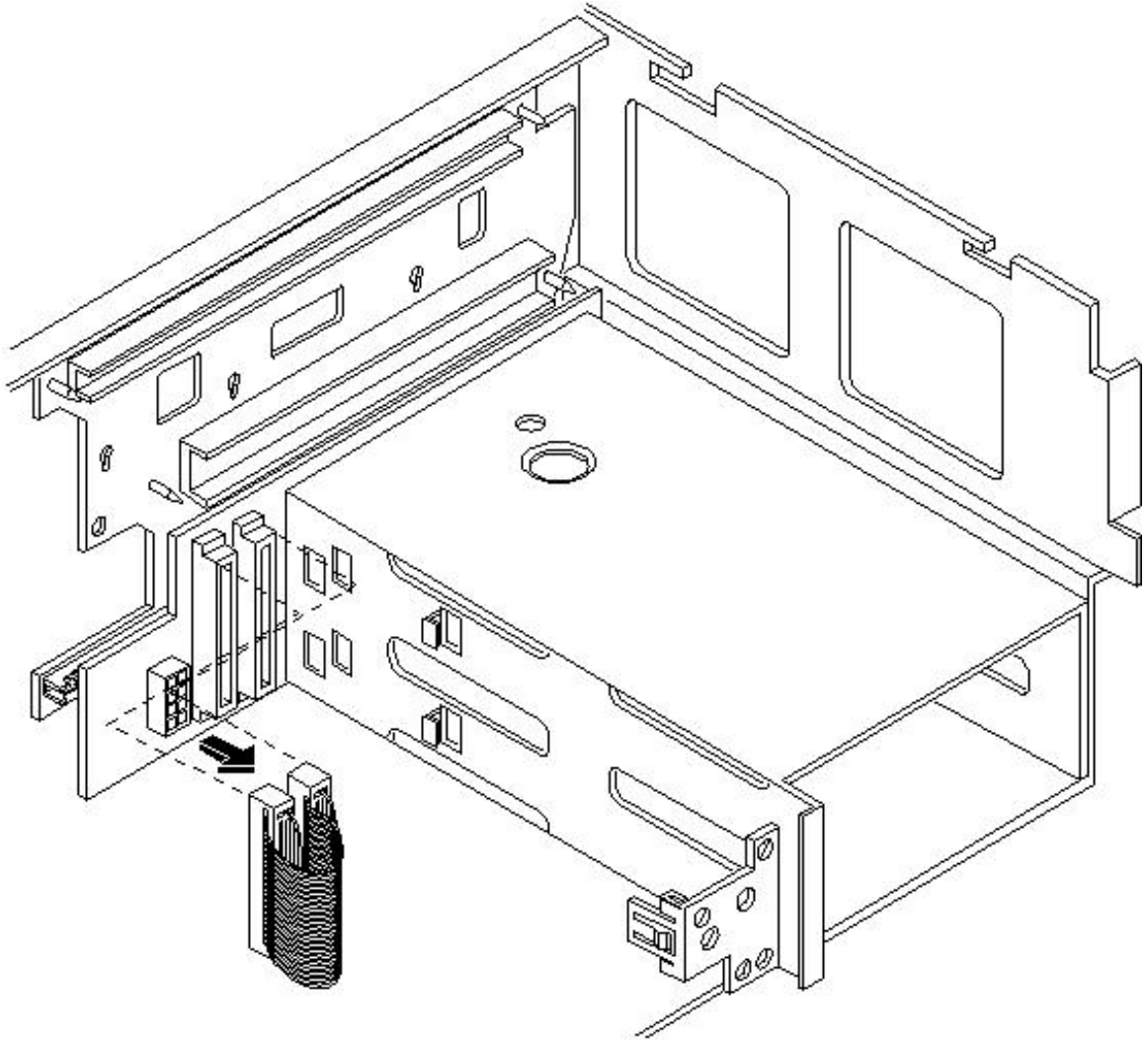
2. Install the duplex board in the SCSI connector located nearest the disk drive cage.
   a. Align the bracket tabs with the slots on the side of the disk drive cage.
   b. Press the bracket against the disk drive cage until the bracket locks into place.
   c. Align the connector of the duplex board with the connector on the SCSI backplane.
   d. Press the board connector into the backplane connector.

NOTE: In simplex mode, both hard disk drives in slot 0 and slot 1 are driven by SCSI channel A. When the duplex board is installed, the slot 1 hard disk drive is now driven by SCSI channel B. If HP-UX was previously installed and whole disk vxfs was not used, the system no longer boots.

Figure 3-37 Installing the Duplex Board
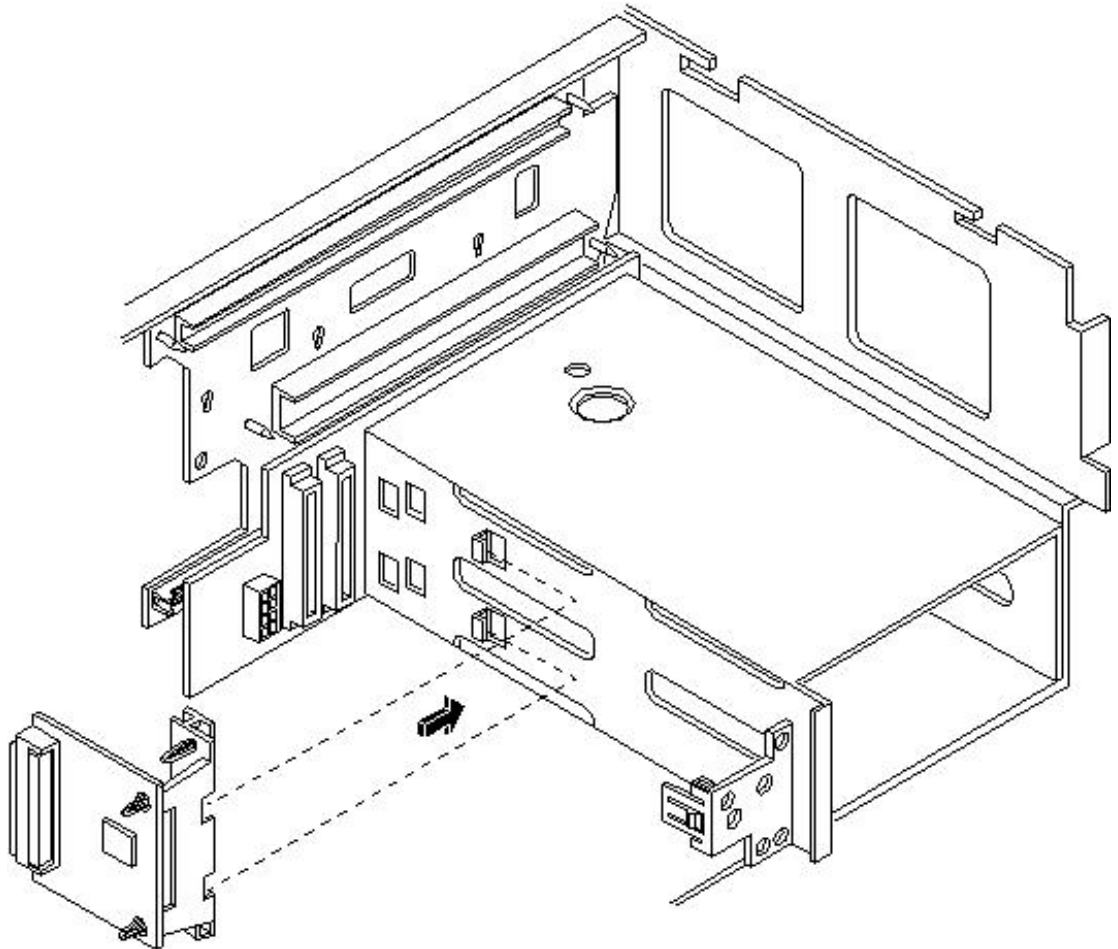
3. Secure the duplex board to the disk drive cage by the bracket and to the SCSI backplane by the SCSI connector sockets. (Figure 3-37)

4.   Install the SCSI Cable B on the SCSI backplane. (Figure 3-38)

   a.   Release the SCSI Cable B from its stowed position within the chassis.
   b.   Plug the SCSI Cable B connector into the SCSI connector located on the backplane next
        to the duplex board installed in the previous step.

Figure 3-38 Installing the SCSI Cable B to the SCSI Backplane
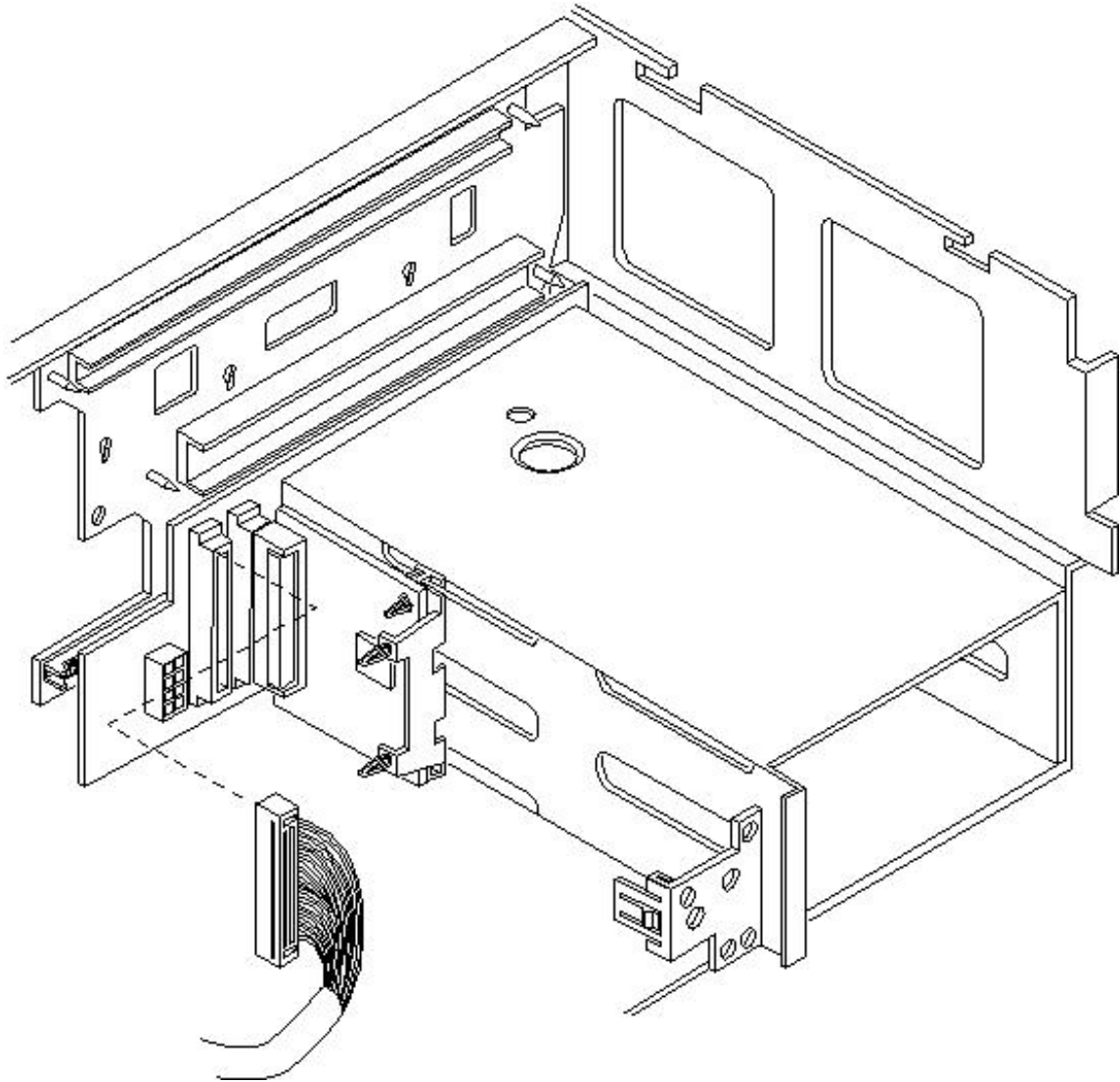
5. Connect the other end of the SCSI Cable B to the SCSI B channel connector on the SCSI adapter board. (Figure 3-39)
   a. Release the SCSI Cable B from its stowed position within the chassis.
   b. Plug the SCSI Cable B connector into the SCSI B channel connector located at the rear of the board.

Figure 3-39 Installing the SCSI Cable B to the SCSI Adapter Board
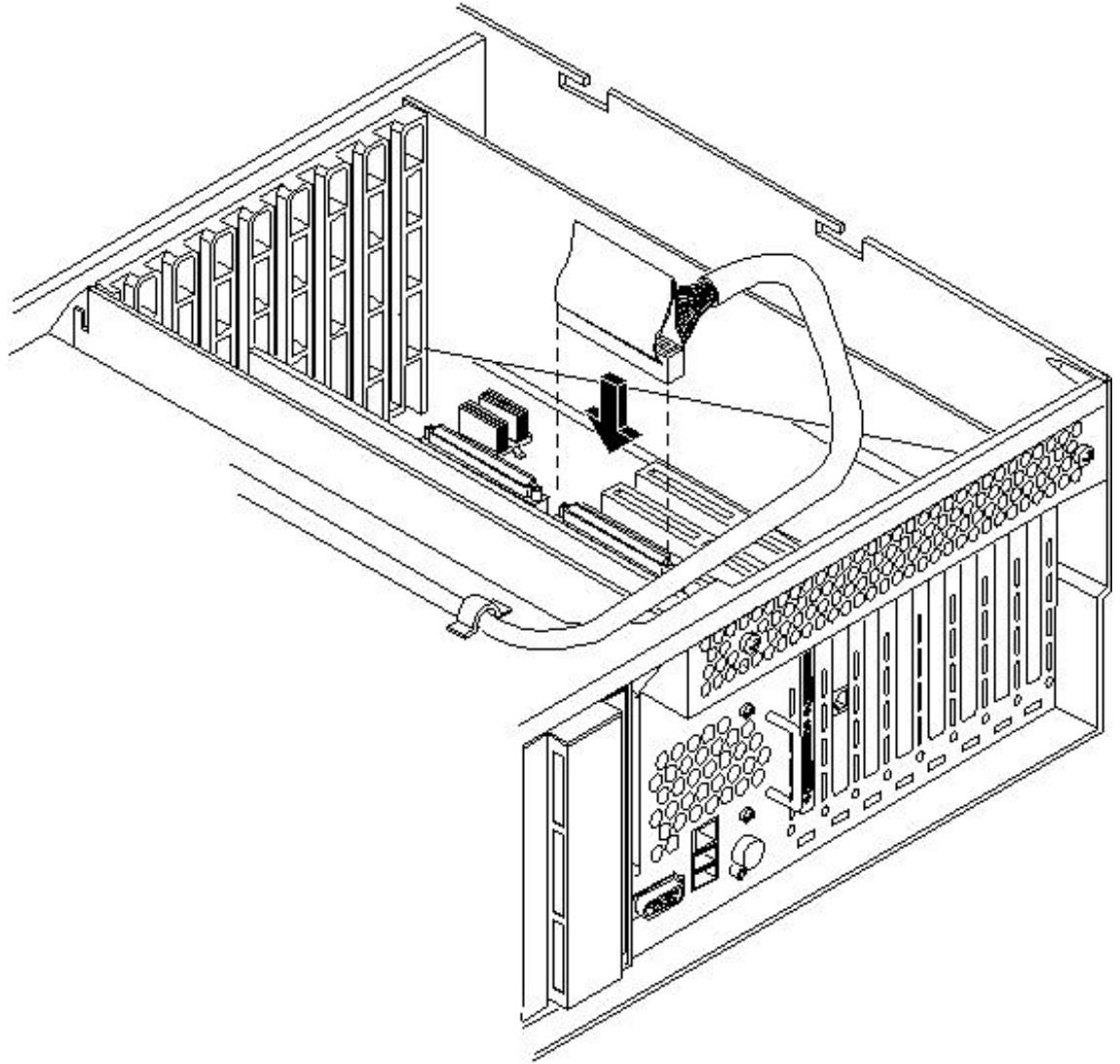
Replacing the Removed Modules

To return the server to operational configuration, follow these steps:

1. Replace the processor extender board. (See "Replacing the Processor Extender Board" (page 84).)
2. Replace the memory extender board. (See "Replacing the Memory Extender Board" (page 88).)
3. Replace the top cover. (See "Replacing the Top Cover" (page 66).)
4. Replace the front cover. (See "Replacing the Front Cover" (page 65).)
5. Replace the front bezel. (See "Replacing the Front Bezel" (page 64).)
6. If rack-mounted, slide the server back into the rack until it stops. (See "Installing the Server Into a Rack, Non-HP Rack, or Pedestal" (page 102).)

Installing the Server Into a Rack, Non-HP Rack, or Pedestal

The following information describes how to install the server into an HP rack. Information is also provided on approved non-HP rack and pedestal mount alternatives.

HP Rack

HP 9000 entry class servers that are installed into racks are shipped with equipment mounting slides. The *Mid-Weight Slide Kit*, (HP part number 5065-7291) is provided with each set of slides. Follow the steps in the kit installation guide to determine where and how to place the server into the rack.

The following are additional instructions for installing the server into the rack:

1. The cable management arm (CMA) is factory-configured to mount on the left side of the server (as viewed from the rear of the chassis). You must switch the CMA from a left- to a right-mount configuration. To ensure easy removal of the power supplies, mount the CMA on the right side of the server.
2. You must remove two T120 screws from the server bezel; one screw from the same location on each side of the server. The screws are located behind the pull handles.

Non-HP Rack

Use the *Mounting in non-HP racks* guide for evaluating the installation of HP equipment in non-HP racks. The guide provides information to help you determine if you need to qualify whether you can install, maintain, and service any HP equipment in a non-HP rack. The guide is located on the HP website at:

http://www.hp.com/racksolutions

Select `Mounting information` from the menu and select the guide titled *Mounting in non-HP racks*.

Pedestal Mount

If you ordered the server as rackless, it has a pedestal pre-installed at the factory.

If the server is a rack mount and you want to change it to a pedestal mount (rackless), you need an HP 9000 rp4440 Server Rackless Mount Kit. This kit comes with an installation guide titled *Converting Your Rack Server to a Rackless Mount* (HP part number A6979-96001).

To convert a rack-mount server to a pedestal-mount server, see *Converting Your Rack Server to a Pedestal Server* on the HP website at:

http://www.hp.com/

To attach the pedestal to the server, follow the instructions in the kit installation guide.

Connecting the Cables

This section describes the cables to connect to power the server and to provide LAN connectivity for the server.

AC Input Power

The HP 9000 rp4410 and rp4440 servers come with one or two power supplies installed. A power supply includes an ac input connector which is rated for 200 to 240 VAC at 13 amps. If two power supplies are installed, both power supplies must be connected separately to an ac power source.

Core I/O Connections

Each HP 9000 rp4410 and rp4440 server core I/O includes:

- Two USB ports
- One iLO MP
  - One 10/100 LAN-RJ45
  - Three serial ports
- SCSI Host Bus Adapter (HBA)
  - The SCSI HBA board is used to attach SCSI external mass storage to the system.
  - Connections to the SCSI board include the external SCSI channels for external mass storage devices.

> △ **CAUTION:** Some restrictions apply to the mass storage devices that can be connected to the core I/O SCSI HBA. External connections to the SCSI HBA core I/O controller are only supported when the internal cable between the SCSI backplane and the SCSI HBA core I/O card is disconnected. The server is shipped in simplex configuration which supports external devices. If you convert the server to duplex configuration, you cannot install external SCSI devices.

- LAN Connection
  - The LAN board provides the basic external I/O connectivity for the system
  - Connections to the LAN card include one 10/100/1000 Base-T LAN RJ45 connector

> ⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before attempting the following procedures.
>
> Voltage is present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

Applying Standby Power to the Server

To apply standby power to the server, follow these steps:

1. If the server has one power supply installed in slot P1, plug the power cord into that receptacle. Plug the other end of the power cord into an appropriate outlet.

> 📝 **NOTE:** The LED on the power supply does not illuminate in the standby power state. The LED illuminates when the server is powered on to full power. If the power restore feature is set to Always On through the iLO MP PR command, the server automatically powers on to the full power state when the power cord is plugged into the server.

2. If the server has two power supplies, plug the second power cord into the power supply in slot P2. Plug the other end of the power cord into an appropriate outlet.

Connecting to the LAN

The server has the following ports that provide network connectivity:

- iLO MP LAN port. Use this port to access the iLO MP through the LAN.
- Console/Remote/UPS port (RS-232). Use this port to access the iLO MP through the console.

Figure 3-40 shows the available LAN ports on the server.

Figure 3-40 Ports on Server Rear

The VGA port is disabled on the rp4410 and rp4440 servers.
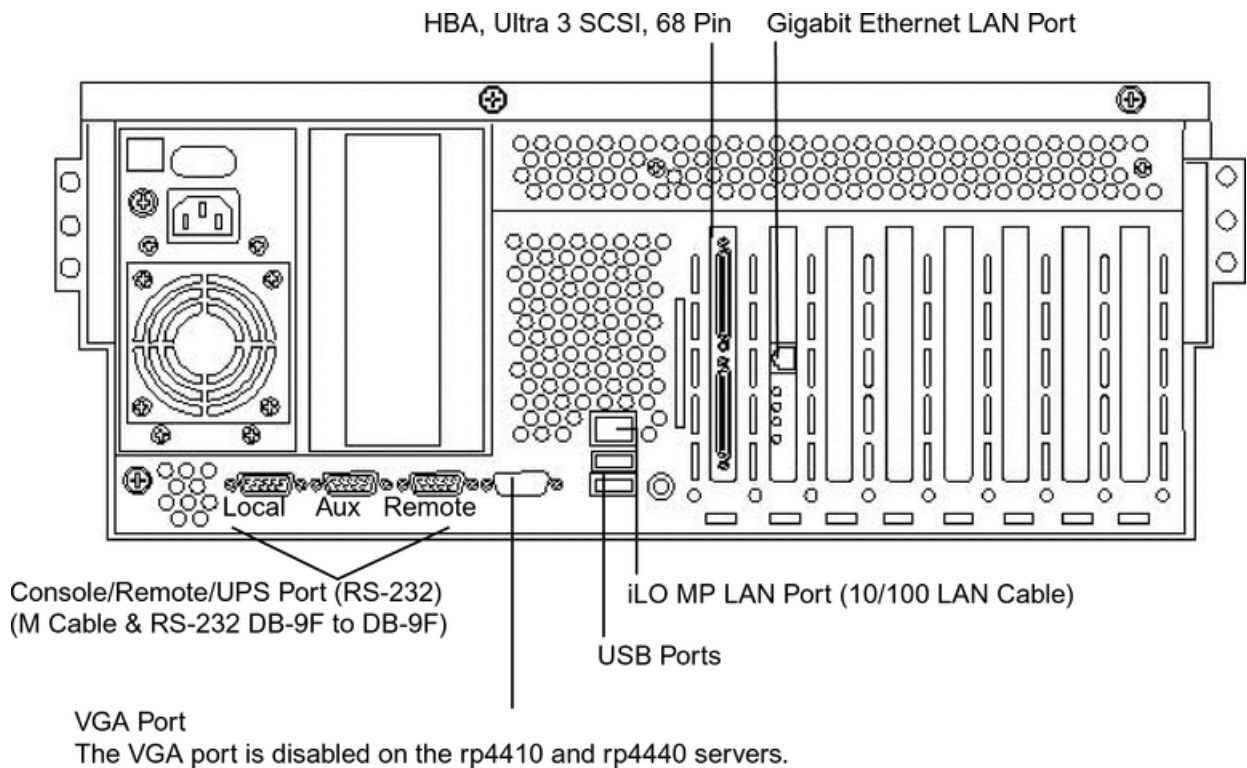
To enable general network connectivity for the server, follow these steps:

1. Obtain a valid IP address for each LAN port you plan to activate.
2. Connect the LAN cable from an available LAN port into a live connection on the network.

Console Setup

This section describes how to set up and start a console session on the server.

Setting Up the Console

Setting up the console includes the following steps:

*   Determine the physical access method to connect cables. There are two physical connections to the iLO MP:
    —   LAN
    —   Local RS-232 serial port
*   Configure the Integrity iLO MP and assign an IP address if necessary. Though there are several methods to configuring the LAN, DHCP with DNS is the preferred method. DHCP with DNS comes pre-configured with default factory settings, including a default user account and password. Other options include:
    —   ARP Ping
    —   Local RS-232 serial port
    —   Remote/modem port

Setup Checklist

To assist with the iLO MP setup process, use the checklist in Table 3-13.

Table 3-13 Setup Checklist

	Step	Action	X
Standard Setup			
1	Preparation	1. Determine a LAN configuration method and assign an IP address if necessary. 2. Determine an access method to select and connect the cables.	
2	Configure the iLO MP LAN	Choose one of the following methods to configure the LAN for iLO MP access: • DHCP with DNS • ARP Ping • RS-232 serial port	
3	Log on to the iLO MP	Log in to the iLO MP from a supported web browser or command line using the default user name and password.	
4	Change default user name and password	Change the default user name and password on the administrator account to your predefined selections.	
5	Set up user accounts	Set up the user accounts if you are using the local accounts feature.	
6	Set up security access	Set up the security access settings.	
Advanced Setup			
1	Activate Advanced Pack Features	Activate advanced features by entering a license key.	

Setup Flowchart

To assist in the Integrity iLO MP setup process, use this flowchart as a guide.

Figure 3-41 iLO MP Setup Flowchart
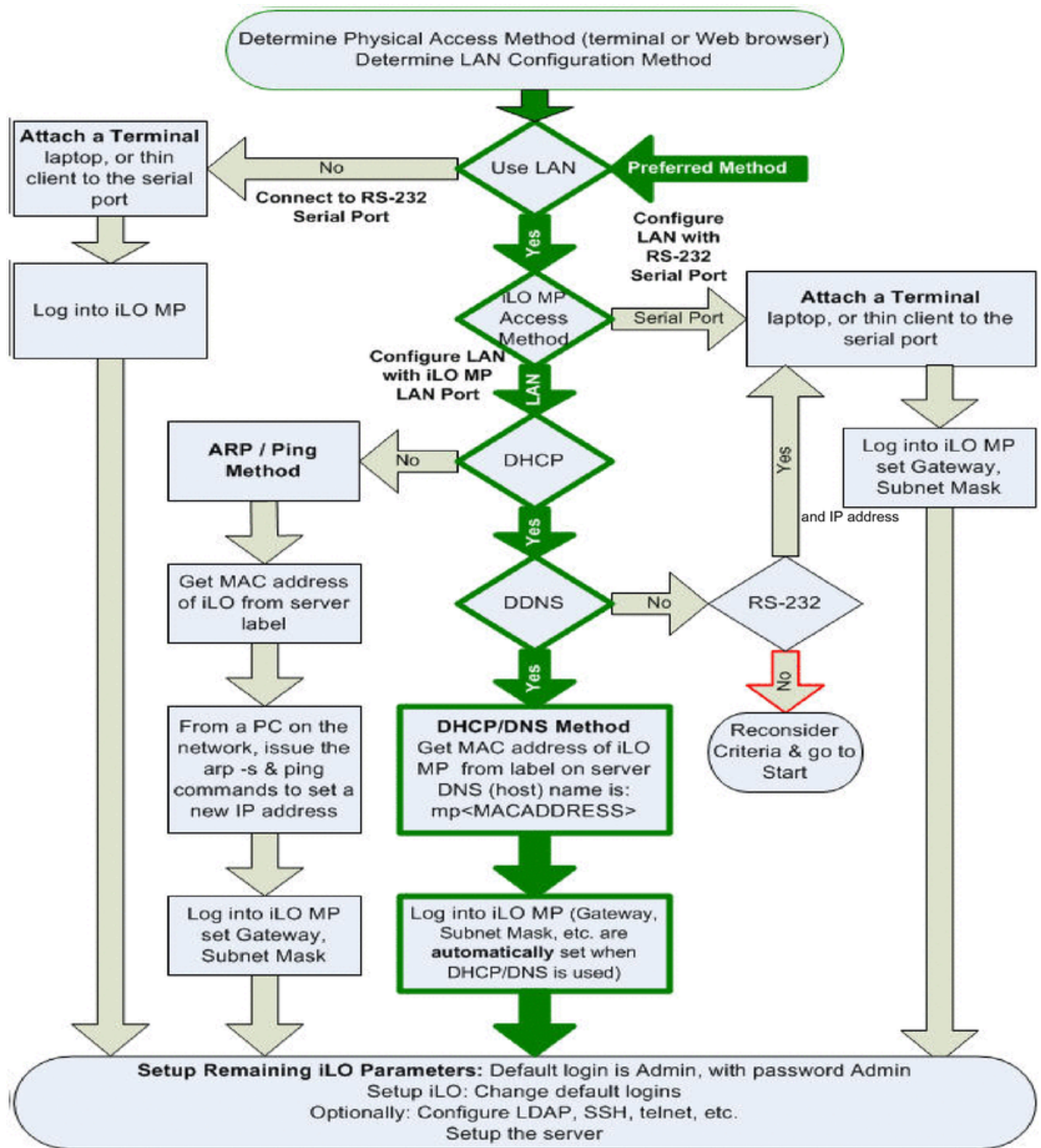
Preparation

Before you can configure the iLO MP LAN, you must perform the following tasks:
- Determine the physical access method to select and connect cables.
- Determine the iLO MP LAN configuration method and assign an IP address if necessary.

Determining the Physical iLO MP Access Method

Before you can access the iLO MP, you must first determine the correct physical connection method. The iLO MP has a separate LAN port from the system LAN port. It requires a separate

LAN drop, IP address, and networking information from that of the port used by the operating system.

Table 3-14 lists the appropriate connection method, required connection components, and connectors to the host console. Use Table 3-14 to determine your physical connection method.

Table 3-14 Console Connection Matrix

Operating System	Console Connection Method	Required Connection Components
HP-UX	LAN port	10/100 LAN cable
	Local RS-232 serial port Remote/modem port	1. RS-232 DB-9F to DB-9F straight cable 2. Console device (for example, a laptop or ASCII terminal)

Determining the iLO MP LAN Configuration Method

To access the iLO MP through the iLO MP LAN, the iLO MP must acquire an IP address. The way the iLO MP acquires an IP address depends on whether DHCP is enabled or disabled on the server, and if DHCP and DNS services are available to the server. See Table 3-15 for possible scenarios.

Once you have determined the iLO MP access, you must determine how you will configure the iLO MP LAN to acquire an IP address using the following methods:

- DHCP/DNS through the iLO MP LAN: use the DNS name on the toe-tag on the server
- Setting up a static IP number using a laptop with DHCP services and the iLO MP LAN
- ARP Ping to set a static IP using a laptop and the iLO MP LAN
- Local RS-232 serial port and a serial console
- Remote/modem port

Table 3-15 provides all the possible scenarios. Use this table to help you select the appropriate LAN configuration method to obtain an IP address.

Table 3-15 LAN Configuration Methods

DHCP	DNS	RS-232 Serial Port (iLO MP LC command)	LAN Configuration Method
Yes	Yes	No	DHCP
Yes	Yes	Yes	DHCP, RS-232 serial port, or remote/modem port
No	No	No	ARP Ping
No	Yes	No	ARP Ping
No	Yes	Yes	ARP Ping, RS-232 serial port, or remote/modem port
Yes	No	Yes	RS-232 serial port, or remote/modem port
No	No	Yes	RS-232 serial port, remote/modem port, or ARP Ping
Yes	No	No	Cannot set up the LAN. Reconsider your criteria.

Once you have determined how you will configure the iLO MP LAN in order to acquire an IP address, you must configure the iLO MP LAN using the selected method.

Configuring the iLO MP LAN Using DHCP and DNS

DHCP automatically configures all DHCP-enabled servers with IP addresses, subnet masks, and gateway addresses. All HP 9000 entry class servers with iLO MP are shipped from the factory with DHCP enabled.

TIP: HP recommends using the DHCP and DNS method to simplify access to the iLO MP.

When you use DHCP and DNS, connect to the iLO MP by entering the DNS name in the browser rather than an IP address only if the following conditions apply:

- DHCP must be enabled (DHCP is enabled by default).
- You are using a DHCP server that provides the domain name and the primary DNS server IP address.
- The primary DNS server accepts dynamic DNS (DDNS) updates.
- The primary DNS server IP address has been configured through the DHCP server.

To configure the iLO MP using DHCP and DNS, follow these steps:

1. Obtain the factory-set DNS name from the toe-tag on the server. The DNS name is 14 characters long, consisting of the letters mp followed by the 12 characters of the MAC address, for example: mp0014c29c064f. This address is assigned to the iLO MP hardware. The iLO MP has a unique MAC address that identifies the hardware on the network.
2. Connect the LAN cable from the server to an active network port.
3. Apply ac power to the server (if not already done).
4. Open a browser, telnet, or SSH client and enter the DNS name. The **iLO MP Log In** window opens.
5. Log in to the iLO MP. See "Logging In to the iLO MP" (page 110).

Configuring the iLO MP LAN Using ARP Ping

The Address Resolution Protocol (ARP) and Packet Internet Grouper (Ping) utility uses ARP packets to ping, or discover, a device on the local network segment. The IP address you assign to the server must use the same network segment, or subnet, as the computer assigning the address. ARP does not work across routed or switched networks.

ARP Ping operational issues include the following:

- You can use ARP Ping regardless of the status of DHCP, unless an IP address has ever been acquired using DHCP.
- When ARP Ping is successful, DHCP status is disabled.
- Some DHCP server options can cause the apparent issuance of ARP Ping to the iLO MP which will negate the DHCP/DDNS method.
- The PC and the server must be on the same physical subnet.
- When a new server is first booted, DHCP is automatically available (factory-set default); but ARP Ping does not start until three minutes after the iLO MP is booted. This applies to every subsequent boot of the iLO MP until an IP address is obtained by DHCP or has been assigned using the LC command, or ARP Ping succeeds.

There are two ways to use the ARP Ping utility:

- Connect a PC to the network that is on the same physical subnet as the server and run the ARP Ping commands from the PC.
- Locate an existing server on the network, log into it, and run the ARP Ping commands from the server.

Table 3-16 lists the ARP Ping commands.

Table 3-16 ARP Ping Commands

Command	Description
arp -s	This command assigns an IP address to the iLO MP MAC address. This ARP table entry maps the MAC address of the iLO MP LAN interface to the static IP address designated for that interface.
ping	This command tests network connections. It verifies that the iLO MP LAN port is configured with the appropriate IP address.

The following procedure explains how to use the ARP Ping utility using a PC that is connected to the network that is on the same physical subnet as the server.

To configure a static IP address using the ARP Ping utility, follow these steps:

1. Obtain the iLO MP MAC address. To set the IP address using ARP, you must know the MAC address of the iLO MP LAN. You can find the MAC address of the iLO MP LAN on a label on the server.

    IMPORTANT: Make sure you obtain the MAC address to the iLO MP LAN and not the MAC address to the server core LAN.

2. Verify that an active LAN cable on the local subnet is connected to the iLO MP LAN port on the server.
3. Access a PC on the same physical subnet as the server.
4. Open a DOS window on the PC.
5. At the DOS prompt, enter **arp -s** to assign the IP address to the DNS name.

    arp -s *<IP address you assign to the iLO MAC address> <iLO MAC address>*

    For example:

    arp -s 192.0.2.1 00-00-0c-07-ac-00

6. At the DOS prompt, enter **ping** followed by the IP address to verify that the iLO MP LAN port is configured with the appropriate IP address. The destination address is the IP address that is mapped to the iLO MAC address. Perform this task from the PC that has the ARP table entry.

    ping *<IP address you assigned to the iLO MAC address>*

    For example:

    ping 192.0.2.1

7. Connect to the iLO MP LAN using this IP address.
8. To connect to the iLO MP from a host on the local subnet and finish setting up the LAN parameters (gateway and subnet), use the web or telnet access.

Configuring the iLO MP LAN Using the RS-232 Serial Port

The following procedure shows how to configure the iLO MP LAN using the RS-232 serial port.

IMPORTANT: Do not configure duplicate IP addresses on different servers within the same network. Duplicate server IP addresses conflict and the servers cannot connect to the network.

The LC command enables you to configure an IP address, DNS name, subnet mask, and gateway address.

IMPORTANT: To access the iLO MP, use the LC command to ensure you have a console connection through the RS-232 serial port or a network connection through the LAN.

To assign a static IP address using the LC command, follow these steps:

1. Ensure the emulation software device is properly configured. The terminal emulation device runs software that interfaces with the server. The software emulates console output as it would appear on an ASCII terminal screen and displays it on a console device screen.
2. To ensure the emulation software is correctly configured, do the following:
   a. Verify that the communication settings are configured as follows:
      - 8/none (parity)
      - 9600 baud
      - None (receive)
      - None (transmit)
   b. Verify that the terminal type is configured appropriately. Supported terminal types are as follows:
      - hpterm
      - vt100
      - vt100+
      - vt-utf8

   IMPORTANT: Do not use hpterm and vt100 terminal types at the same time.

   There are many different emulation software applications. Consult the help section of your emulation software application for instructions on how to configure the software options.

3. To determine the required connection components and the ports used to connect the server to the console device, use Table 3-14.
4. Connect the cables.
   a. Connect the DB-9 end of the RS-232 serial port female-to-female cable to the console RS-232 serial port.
   b. Connect the other end of the DB-9 female-to-female cable to the console device.
5. Start the emulation software on the console device.
6. Log in to the iLO MP. See "Logging In to the iLO MP" (page 110).
7. At the **MP Main Menu**, enter `CM` and press **Enter** to select command mode.
8. At the command mode prompt, enter `LS` and press **Enter**. The screen displays the default LAN configuration values.
9. Write down the default values or log the information to a file for future troubleshooting.
10. To disable DHCP, use the `LC` command.
    a. From the `LC` command menu, enter `D` and press **Enter**.
    b. To change the DHCP status from Enabled to Disabled, follow the instructions on the screen.
    c. To reset the iLO MP, enter `XD  -R`.
11. To enter information for the IP address, host, subnet mask, gateway parameters, and so on, use the `LC` command.
12. To reset the iLO MP, enter `XD  -R`.
13. After the iLO MP resets, log in to the iLO MP again and enter `CM` at the `MP>` prompt.
14. To confirm that DHCP is disabled and display a list of updated LAN configuration settings, enter `LS`.

Logging In to the iLO MP

To log in to the iLO MP, follow these steps:

1. Access the iLO MP using the LAN, RS-232 serial port, telnet, SSH, or web method. The iLO MP login prompt displays.

2. Log in using the default the iLO MP user name and password (**Admin**/**Admin**). The **MP Main Menu** screen displays.

    For security reasons, HP strongly recommends that you modify the default settings during the initial login session. See

    Following is the **MP Main Menu** screen:

    ```
    MP MAIN MENU:
            CO: Console
           VFP: Virtual Front Panel
            CM: Command Menu
            CL: Console Logs
            SL: Show Event Logs
            HE: Main Menu Help
             X: Exit Connection
    ```

    This example shows the **MP Main Menu** accessed through the local serial port. The list of commands displayed on the screen can be different depending on the method of access to the iLO MP.

    When logging in using the local or remote RS-232 serial ports, the login prompt may not display if another user is logged in through these ports. To access the **MP Main Menu** and the iLO MP prompt (MP>), use **Ctrl-B**.

Additional Setup

This section provides additional information to help you set up the iLO MP.

Modifying User Accounts and Default Password

The iLO MP comes pre-configured with default factory settings, including a default user account and password. The two default user accounts at initial login are:

*   All Rights (Administrator) level user:

    login = **Admin**

    password = **Admin**

*   Console Rights (Operator) level user:

    login = **Oper**

    password = **Oper**

📝 **NOTE:**   User account and password are case sensitive.

📝 **IMPORTANT:**   For security reasons, HP strongly recommends that you modify the default settings during the initial login session.

Make the following changes using any of the iLO MP user interfaces.

To modify default account configuration settings, follow these steps:

1. Log in as the administrator. You must log in as the administrator in order to modify default user configuration settings.
2. To modify default passwords, follow these steps:
    a. Access the **MP Main Menu**.
    b. Enter **CM** at the MP> prompt.
    c. Enter **UC** at the MP:CM> prompt and follow the prompts to modify default passwords.

3. To set up user accounts, follow these steps:
   a. Access the **MP Main Menu**.
   b. Enter `CM` at the `MP>` prompt.
   c. Enter `UC` at the `MP:CM>` prompt and follow the prompts to modify user accounts.

Setting Up Security

For greater security and reliability, HP recommends that iLO MP management traffic be on a separate dedicated management network and that only administrators be granted access to that network. This not only improves performance by reducing traffic load across the main network, it also acts as the first line of defense against security attacks. A separate network enables administrators to physically control which workstations are connected to the network.

HP strongly recommends that you modify the default settings during the initial login session and determine the security access required and what user accounts and privileges are needed. To control user access, create local accounts or use directory services. See "Modifying User Accounts and Default Password" (page 111).

Security Access Settings

> ⚠ **CAUTION:** When DHCP is enabled, the system is vulnerable to security risks because anyone can access the iLO MP until you change the default user name and password.
>
> HP strongly recommends you assign user groups and rights before proceeding.

Determine the security access required and user accounts and privileges needed. The iLO MP provides options to control user access. Select one of the following options to prevent unauthorized access to the iLO MP:

- Change the default user name and password. See "Modifying User Accounts and Default Password" (page 111).
- Create local accounts. You can store up to 19 user names and passwords to manage iLO MP access. This is ideal for small environments such as labs and small-to-medium sized businesses.
- Use directory services. Use the corporate directory to manage iLO MP user access. This is ideal for environments with a large number of frequently changing users. If you plan to use directory services, HP recommends leaving at least one local account enabled as an alternate method of access.

Accessing the Host Console

This section describes the different ways to access the host console of the server.

Accessing the Host Console With the TUI - CO Command

This section describes the steps to access the host console using the text user interface (TUI).

To access the host console through the iLO MP, follow these steps:

1. Log in using your user account name and password at the login page.
2. At the iLO MP login prompt (`MP>`), enter the `CO` command to switch the console terminal from the **MP Main Menu** to mirrored/redirected console mode. All mirrored data is displayed.
3. To return to the iLO MP command interface, enter **Ctrl-B**, or **Esc +** and press **Enter**.

Interacting with the iLO MP Using the Web GUI

Web browser access is an embedded feature of the iLO MP.

The iLO MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by the operating system.

Before starting this procedure, you must have the following information:
- DNS name for the iLO MP LAN. This is found on the toe-tag on the server.
- Host name (used when messages are logged or printed).

To interact with the iLO MP through the web GUI, follow these steps:

1. Open a web browser and enter the DNS name for the iLO MP. The iLO MP login page opens.

Figure 3-42 Web Login Page
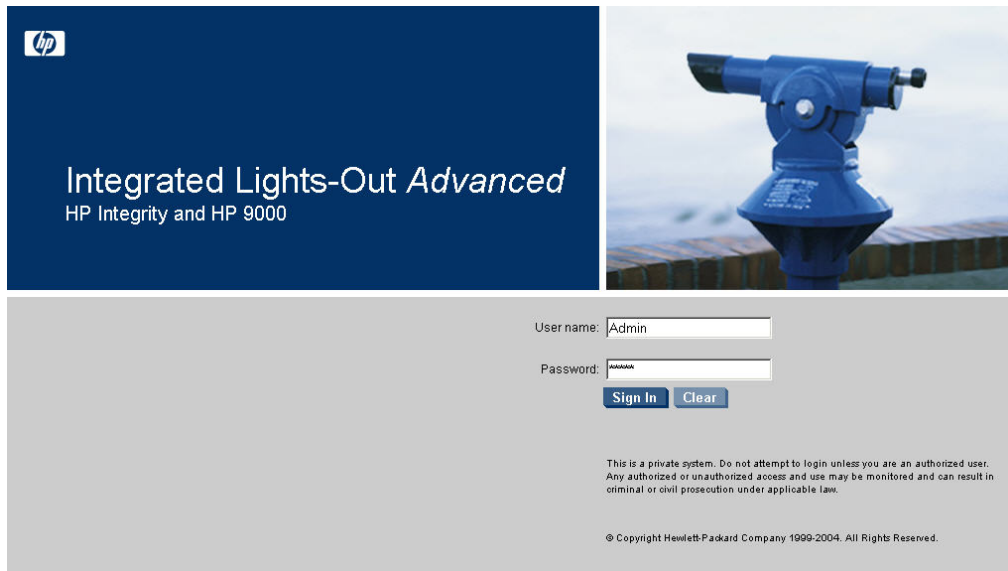
2. Log in using your user account name and password at the login page.
3. Click **Sign In**. The **Status Summary** page displays after login.

Figure 3-43 Status Summary Page
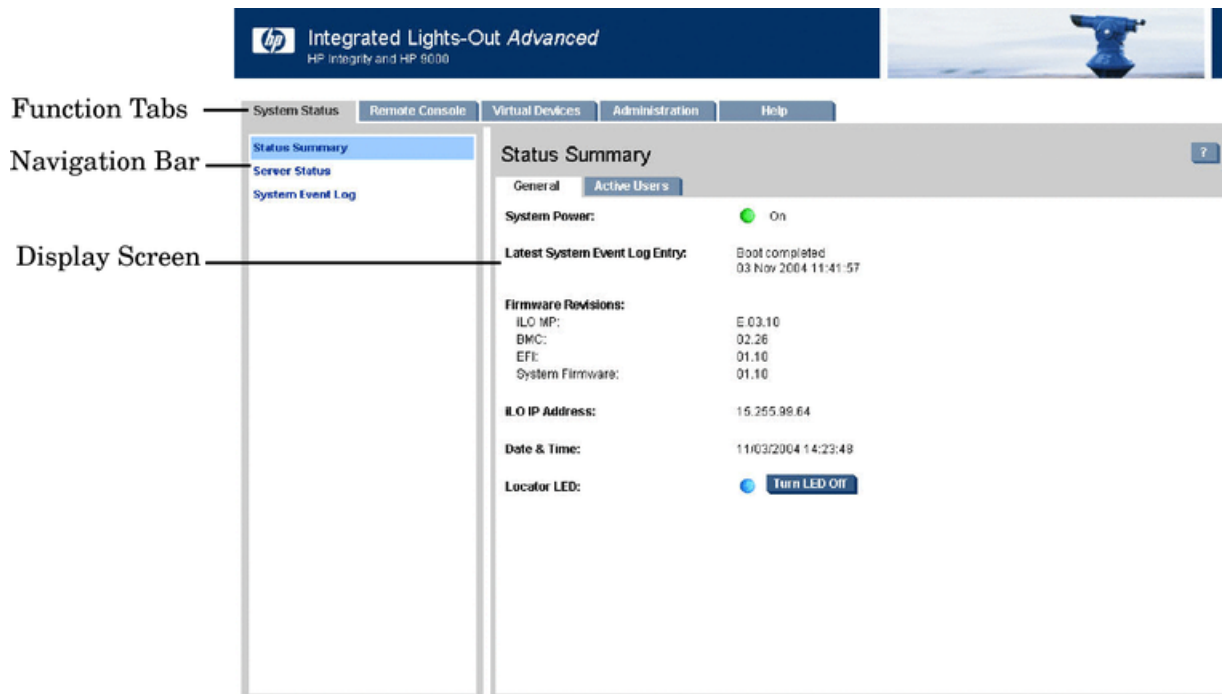
4. Select the web interface functions by clicking the **Function** tabs at the top of the page. Each function lists options in the **Navigation Bar** on the left side of the page.
5. Click an option link to display data in the **Display** screen.

6. To update the display , click **Refresh**.

The iLO MP web interface has a robust help system. To launch iLO MP help, click the **Help** tab in the **Display** screen or click the question mark key (**?**) at the top right corner of each page to display help about that page.

Accessing the Graphic Console Using VGA

> **IMPORTANT:** Onboard VGA graphics capability is not supported. You must install the A6150 graphics card to enable VGA grpahics support. See "Enabling VGA Graphics Capability" (page 114).

The graphics capability of your HP 9000 rp4410 or rp4440 server is not supported. The 15 pin VGA port on the back of your HP server is covered and does not function. DO NOT attempt to attach a monitor to this port. Because the graphics chip associated with this port is onboard the iLO MP card and cannot be turned off, you get an UNCLAIMED UNKNOWN message if you run the ioscan command. This is normal and can be ignored.

Following is a screen shot of the ioscan screen:

```
root@myhost> ioscan -fH 0/7/2/0
Class I H/W Path Driver S/W State H/W Type Description
==================================================================
unknown -1 0/7/2/0 UNCLAIMED UNKNOWN PCI Display (10025159)
root@myhost>
```

To enable the VGA graphics capability, continue with the next section.

Enabling VGA Graphics Capability

To enable graphics capability on your HP 9000 rp4410 or rp4440 server you must install the supported A6150B graphics PCI card kit in one of the open PCI slots.

Installing Your A6150B Graphics Card

If you ordered the A6150B graphics card kit for installation into a HP 9000 rp4410 or rp4440 server, install the graphics card to activate graphics capability. Do not install the USB card; it is not supported. USB capability is already incorporated into your rp4410 or rp4440 server, and the USB ports are located on the rear panel.

To install the A6150 graphics card, see "Installing a PCI Card Offline" (page 190).

Connecting a Monitor Using the VGA Port

To connect a monitor to the VGA port on the rear of the server, follow these steps:

> **NOTE:** You cannot access the iLO MP using VGA.

This method requires three elements:

- Monitor (with a VGA connector)
- Keyboard (with a USB connector)
- Mouse (with a USB connector)

> **IMPORTANT:** The server console output does not display on the console device screen until the server boots to the **BCH Main Menu**. Start a console session using the RS-232 serial port method to view console output before booting to the **BCH Main Menu** or to access the iLO MP.

To access the graphic console with VGA, follow these steps:

1. Remove the VGA port cover on the rear of the server.

2. Connect the monitor, keyboard, and mouse cables.
   a. Connect the monitor VGA cable to the appropriate VGA port on the server.
   b. Connect the keyboard USB cable to the appropriate USB port on the server.
   c. Connect the mouse USB cable to the appropriate USB port on the server.
3. Power on the server. The BCH **Main Menu** prompt displays.

   The graphic console output displays on the monitor screen.

Powering the Server On and Off

This section provides information and procedures for powering on and powering off the server.

Power States

The server has three power states:
- Standby power
- Full power
- Off

Table 3-17 lists the server power states.

Table 3-17 Power States

Power States	Power Cable Plugged Into Receptacle?	Power Activated through the iLO MP PC Command; or Front Panel Power Button Activated?	Standby dc Voltage Applied?	dc Voltage Applied?
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

📝 **NOTE:** If the power restore feature is set to `Always On` through the iLO MP `PR` command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

Powering On the Server

Power on the server to full power using the following methods if the server is in the standby power state:
- iLO MP `PC` command
- Power button

Powering On the Server Using the iLO MP PC Command

📝 **NOTE:** If the power restore feature is set to **Always On** through the iLO MP `PR` command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

To power on the server using the iLO MP `PC` command, follow these steps:

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Initiate a console session, and access the **MP Main Menu**.
3. To enable command mode, enter `CM`.
4. To use the remote power control command, enter `PC`.
5. To power on the server, enter `ON`.
6. to confirm the action, enter **YES** when prompted.

7. Start the operating system.

Powering On the Server Manually

> **NOTE:** If the power restore feature is set to `Always On` through the iLO MP `PR` command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

To manually power on the server, follow these steps:
1. Plug all power cables into the receptacles on the rear panel of the server.
2. To start the server, press the power button.
3. Start the operating system.

Powering Off the Server

Power off the server using the following methods if the server is in the standby or full power state:
- iLO MP `PC` command
- Power button

Powering Off the Server Using the iLO MP PC Command

To power off the server using the iLO MP `PC` command, follow these steps:
1. Gracefully shut down the operating system.
2. Initiate a console session, and access the **MP Main Menu**.
3. To enable command mode, enter `CM`.
4. To use the remote power control command, enter `PC`.
5. To power off the server, enter `OFF`.
6. To confirm the action, enter **YES** when prompted.

> **CAUTION:** The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

7. Unplug all power cables from the receptacles on the rear panel of the server.

Powering Off the Server Manually

To manually power off the server, follow these steps:
1. Gracefully shut down the operating system.
2. To power off the server, press the power button.

> **CAUTION:** The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

3. Unplug all power cables from the receptacles on the rear panel of the server.

Booting the Operating System

This section covers procedures for booting and shutting down an operating system on the server.

Supported Operating System

The only supported operating system on the HP 9000 rp4410 and rp4440 servers is HP-UX 11i Version 1 (and higher HP-UX versions that support PA-RISC systems).

Booting and Shutting Down HP-UX

This section describes booting and shutting down HP-UX on the HP 9000 rp4410 and rp4440 servers.

- To boot HP-UX, follow these steps:
  - "Standard HP-UX Booting Using Boot Console Handler" (page 117) describes the standard way to boot HP-UX. Typically this results in booting HP-UX in multi-user mode.
  - "Booting HP-UX in Single-User Mode" (page 117) describes how to boot HP-UX in single-user mode.
  - "Booting HP-UX in LVM Maintenance Mode" (page 117) describes how to boot HP-UX in Logical Volume Management (LVM) maintenance mode.
- To shut down the HP-UX operating system, see "Shutting Down HP-UX" (page 118).

Standard HP-UX Booting Using Boot Console Handler

If the autoboot function is enabled, the server boots to the installed operating system. If autoboot is not enabled, the server enters the boot console handler (BCH). The BCH enables you to control the server booting environment.

To set the boot path if HP-UX is at a path other than the primary path, follow these steps:

To boot HP-UX, follow these steps:

1. At the BCH **Main Menu**, enter **Menu> co**.
2. From the **COnfiguration Menu** > prompt, enter **pa pri xx/xx/xx**.
3. From the **COnfiguration Menu**> prompt, enter **ma**.

To boot HP-UX once you have set the primary path, follow these steps:

1. At the BCH **Main Menu**, enter **Menu> bo pri**. The following prompt displays:

   ```
   Do you wish to stop at the ISL prompt prior to booting (y/n)?
   ```

2. Enter **n**.

> **NOTE:** If the server fails to boot, you may be required to boot from a DVD that contains the operating system and other necessary software.

Booting HP-UX in Single-User Mode

To boot to HP-UX in single-user mode, follow these steps:

1. At the BCH **Main Menu**, enter command or menu> **bo pri**.

   The following message displays:

   ```
   Interact with IPL (Y, N, or Cancel)?>
   ```

2. To interact with IPL, enter **y**.
3. At the **ISL>** prompt, enter **hpux-is**.

Booting HP-UX in LVM Maintenance Mode

To boot to HP-UX in LVM maintenance mode, follow these steps:

1. At the BCH **Main Menu**, enter command or menu> **bo pri**. The following message displays:

   ```
   Interact with IPL (Y, N, or Cancel)?>
   ```

2. To interact with IPL, enter **y**.
3. At the **ISL>** prompt, enter **hpux-lm**.

Shutting Down HP-UX

To shut down HP-UX running on a server, use the `shutdown` command. You have the following options when shutting down HP-UX:

- To shut down and reboot an HP-UX system, use the `shutdown -r` command.
- To shut down and halt (power off) an HP-UX system, use the `shutdown -h` command.

For details, see the *shutdown*(1M) manpage and follow these steps:

1. From the HP-UX command line, issue the `shutdown` command to shut down the HP-UX operating system.
2. Log in to HP-UX running on the server that you want to shut down.

   You should log in to the iLO MP for the server and use the **Console** menu to access the server console. Accessing the console through the iLO MP enables you to maintain console access to the server after HP-UX has shut down.

3. Issue the `shutdown` command with the appropriate command-line options.

   The command-line options you specify dictate the way in which HP-UX shuts down, and whether the server is rebooted.

   To choose an HP-UX shutdown option for the server, use the following list:

   - To shut down HP-UX and halt (power off) the server, issue the `shutdown -h` command.

     To reboot a halted server you must power on the server by using the `PC` command at the iLO MP **Command** menu.

   - To shut down HP-UX and reboot the server, issue the `shutdown -r` command.

Verifying the Server Configuration Using the Boot Console Handler

From the BCH **Main Menu**, enter **in** to go the **Information Menu**. Use the corresponding command from the menu to verify the type and quantity of processors, memory, and I/O cards:

1. To enter the POSSE shell, enter **CO** from the **iLO MP Main Menu**. To list all the categories available in the shell, enter **help**.

   - `pr` (Processors)
   - `me` (Memory)
   - `io` (Check the PCI device information to determine if the values match the devices installed in the server)

2. Verify the parameters.
3. To return to the BCH **Main Menu**, use the `ma` command .

Troubleshooting

This section provides basic server troubleshooting information. It is designed to help you diagnose common issues that can occur during server installation.

Troubleshooting Methodology

The server was tested prior to shipping. Failures encountered during installation can be due to damage that occurred in transit. Reseating connectors can clear problems that result from rough handling. If you are installing components or assemblies, compatibility problems or incorrect installations can be the cause of the problems. If you are installing components or assemblies, check that items are correctly installed and that all connectors are fully engaged. If the unit does not power on, check the power source before proceeding.

If a problem is encountered during initial operation, remove any add-in or optional components and retest the server before continuing. Verify basic server operation before installing additional cards and configuring software and hardware for the server requirements.

Troubleshooting is based on observation of server status indications and error messages, and by checking system event logs. You can observe the LED indicators on the front and rear of the server. Error messages are displayed on local and remote consoles. System history (console, event, and history logs) is available through the iLO MP, and is accessed through the console.

Offline troubleshooting programs are available on the resource CD that is shipped with the server. To troubleshoot the server, you must be familiar with the Offline Diagnostics Environment (ODE) which runs in the Boot Console Handler (BCH). Descriptions and user information about offline troubleshooting tools are available on the web at:

http://www.docs.hp.com.

The offline tools are available for downloading at:

http://www.software.hp.com.

Troubleshooting Using the Server Power Button

The server power button on the front panel operates differently depending on how long the button is held in, and on what the system is doing when the button is pressed. To properly troubleshoot the server, you must be aware of its uses.

Table 3-18 describes what happens when the server is at BCH, and you press the power button.

Table 3-18 Server Power Button Functions When Server is On and at BCH

Action	Reaction
One to three seconds	System power turns off immediately (hard power off)
Five seconds or longer	System power turns off immediately (hard power off)

Table 3-19 describes what happens when the server is on with the operating system running, and you press the power button.

Table 3-19 Server Power Button Functions When Server is On and OS is Running

Action	Reaction
One to three seconds	System power turns off (software controlled power off)
Five seconds or longer	System power turns off immediately (hard power off)

If the server is off, and power is not connected to server power supplies, pressing the power button has no effect.

If the server is off, and power is connected to server power supplies, the front panel power LED blinks at a 1 Hz rate. In this state, standby power is available to server circuits, but main power is off.

Table 3-20 describes what happens when the server is off, and you press the power button.

Table 3-20 Server Power Button Functions When Server is Off

Action	Reaction
One to three seconds	System power turns on

Server Does Not Power On

If the server is off, and power is not connected to server power supplies, pressing the power button has no effect.

Power problems during installation are usually related to the installation process. If the server does not power on, check the LED indicators on the power supply rear panels, and follow these steps.

- If the AC power LED on the power supply on the rear panel of the server is lit, power is available to the server.
- If the AC power LED is not lit, the server is either in standby power mode, or there is a problem. Reseat the power supply. If the problem persists, remove and reseat the board within the server. If the problem persists, replace the power supply or the power supply interface board.
- If the console shows that the server is powered on, but server LEDs indicate that power is off, remove and reseat connectors on the LED status board. If the problem persists, replace the LED status board.

  If the console shows that the server is not powered on (server is off), remove and reseat connectors on the system board. If the problem persists, replace the power supply interface board, or the system board.

BCH Menu is Not Available

If you cannot access the BCH from either the main disk partition or the CD, use the following tools to help solve the problem:

- Front panel LEDs
- iLO MP
  — Console messages
  — System event logs (SEL)

Operating System Does Not Boot

If the operating system does not boot, but you are able to reach the BCH from either the main disk partition or the CD, use the following tools to help solve the problem:

- Using the BCH menu prompt, check the system logs and analyze any error messages.
- Offline Diagnostic Environment (ODE)

Operating System Boots with Problems

If the operating system is running and you are experiencing problems, use the following tools to help solve the problem:

- LEDs
- Error Messages and event logs

Intermittent Server Problems

You can usually trace intermittent problems that occur during installation to power source problems, a loose connector, or some other hardware problem. If you are experiencing intermittent problems, follow these steps:

1. Check iLO MP logs and analyze the problem. Determine if there is more than one symptom and if the problem is random.
2. Verify that the AC power source is stable.
3. Reseat all rear panel connectors.
4. Reseat all hot-swappable fans and power supplies.
5. Reseat all main memory DIMMs.
6. Reseat all cable harnesses and board connectors.

DVD Problems

DVD problems that occur during installation are usually related to faulty connections. If you are experiencing DVD problems, follow these steps:

1. Remove and reinsert the disk.
2. Replace the disk.
3. Remove and reinstall the DVD drive. Check that connectors are fully engaged.
4. Replace the DVD drive.

Hard Drive Problems

Hard drive problems that occur during installation are usually due to rough handling. The drive may not be correctly seated or may have been damaged in transit. If you are experiencing hard drive problems, follow these steps:

1. Remove and reinsert the faulty hard drive.
2. Swap the hard drive with one from another slot or with a known good spare.
3. Remove and reinstall the hard drive backplane. Check that connectors are fully engaged.
4. Replace the hard drive backplane.

Console Problems

Console problems during installations can be caused by faulty interconnections. If you are experiencing monitor, keyboard, or mouse problems, follow these steps:

1. Check the monitor controls. Adjust contrast and brightness as required.
2. Inspect all power and interconnecting cables. Check that all console connectors are fully engaged.
3. Check that all iLO MP board connectors are fully engaged.
4. Exercise the appropriate self-test features of the console software.

Downloading and Installing the Latest Version of the Firmware

HP makes every effort to provide you with the most current version of firmware. However, there can be instances when this is not the case.

To ensure you have the latest version of the firmware running on the server, download the latest version of the firmware from the web, and create a CD to install the firmware on the server.

Downloading the Latest Version of the Firmware

To download the latest version of the firmware from the HP website, follow these steps:

1. Go to: **http://www.hp.com/go/bizsupport**
2. Select **Download drivers and software**.
3. From the **Servers** category, select **PA-RISC-based servers**.
4. Select your product from the servers listed.
5. Select your operating system.
6. Select the firmware package you want to download.
7. Download the firmware package, and follow the instructions for updating the firmware included in the release notes.

Installing the Latest Version of the Firmware on the Server

To install the latest version of the firmware on the server, follow these steps:

1. Initiate a server console session.
2. Insert the CD with the copy of the latest version of the firmware.

3. Using the BCH menu prompt, boot to the drive that contains the CD with the updated firmware.
4. To update the firmware, follow the on-screen installation instructions.

Troubleshooting Using LED Indicators

If you suspect a hardware failure during installation, the system LEDs help you identify the problem. Front control panel LEDs and QuickFind Diagnostic Panel LEDs provide system and subassembly status information that assist in identifying failing items. The following sections describe these LEDs.

Front Control Panel LEDs

The front control panel LEDs show the system status at a glance. If warning or attention lights are flashing, check the QuickFind diagnostic panel for further information.

Figure 3-44 and Table 3-21 show the front control panel LED and definitions.

Figure 3-44 Front Control Panel LEDs
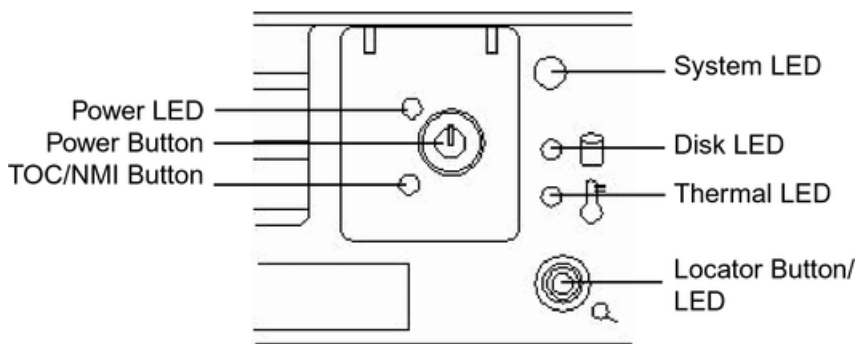
Table 3-21 Front Control Panel LED Definitions

LED/Button	State	Flash Rate	Color	Description
System LED	Running	Steady	Green	System normal—OS up and running.
System LED	Booting	Flashing at 0.5 Hz	Green	OS booting or at BCH.
System LED	Attention	Flashing at 1 Hz	Yellow	Warning—System needs attention. Redundancy lost, component failure pending. (Additional information can be found in the System Log).
System LED	Fault	Flashing at 2 Hz	Red	Hard fault, system halted.
System LED	Off	Off	N/A	System off.
Power LED	On	Steady	Green	Power normal.
Power LED	On	Flashing at 1 Hz	Yellow	Housekeeping voltage present.
Power LED	Off	Off	Off	Power off.
Disk LED		Flashing at rate of disk activity	Green	Disk activity.
Thermal LED	OK	Steady	Green	Thermal OK.
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Thermal warning.
Locator LED/button		Flashing at 1 Hz	Blue	System locator LED can be remotely or locally activated/deactivated.

QuickFind Diagnostic Panel LEDs

The QuickFind diagnostic panel is located under the top cover and is attached to the top of the power supply cage. This panel contains LEDs that illuminate to show the status of associated components and assemblies.

Table 3-22 lists the various QuickFind diagnostic panel LEDs and display combinations that you may encounter, and recommends the appropriate maintenance action.

Table 3-22 QuickFind Diagnostic Panel LED Definitions

Item	LED 0	LED1	LED2	LED3	Details
Processor	Socket 0	Socket 1	Socket 2	Socket 3	Check that recently installed items are correctly installed.
Subsystem	CPU board	Memory board	I/O board	n/a	Check that the indicated board is correctly seated.
I/O VRM	n/a	n/a	n/a	n/a	n/a
CPU VRM	n/a	n/a	n/a	n/a	n/a
Fan module	0	1	2	n/a	Check for a fan that is not functioning. Look for loose connections or missing items.
Memory bank X (0-7)	DIMM xA	DIMM xB	DIMM xC	DIMM xD	The specified DIMM has failed, Reseat or replace the memory board and DIMM. If all the LEDs for a rank (0-7) are lit and the memory config error LED is lit, then the DIMMs in the specified rank are mismatched—review the information on installing memory.
Check power supply	n/a	n/a	n/a		The faulty power supply LED (located on the power supply) is lit. Reseat the power supply.
Memory config error	n/a	n/a	n/a		The DIMMs in a rank are mismatched. Rreview the information on installing memory.
Processor config error	n/a	n/a	n/a		The processors are mismatched, Review the information on installing processors.
Missing component	n/a	n/a	n/a		A required component(s) is not detected. Check that recently installed items are correctly installed.
System temp	n/a	n/a	n/a		Make sure nothing is blocking server airflow. Check that recently installed items are correctly installed.
Check event log	n/a	n/a	n/a		An event has occurred that requires attention.

Figure 1-21 shows the QuickFind diagnostic panel.

Figure 3-45 QuickFind Diagnostic Panel
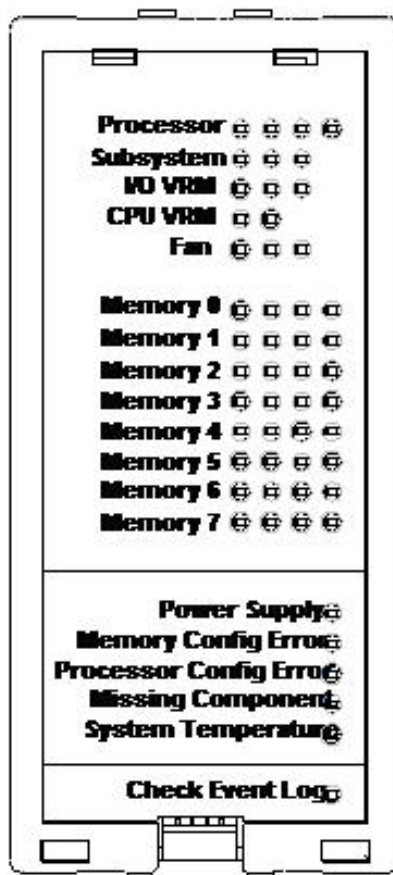
Information to Collect Before You Contact Support

Before you contact HP support, you should:

1. Check information on troubleshooting and attempt to solve the problem.
    *   Note failure symptoms and error indications (LEDs and messages) by checking the system event log.
    *   Try to determine precisely what did or did not happen.
2. Collect the following information:
    *   The model number of your server (for example, HP 9000 rp4440)
    *   The product number of your server. This is found on the identification label, which is found at the front of the unit (typically A9956A, A9951A, and so on).
    *   The serial number of your server. This is found on the identification label.
3. Become familiar with your system configuration:
    *   Are you using the LAN, RS-232, or web interface to monitor the server?
    *   How many processors, DIMMs, and PCI cards have been installed?
    *   What versions of processor, memory, and PCI cards are used and where are they installed?
    *   What accessories are installed?
4. Determine the following:
    *   Which firmware versions are in use?
    *   When did the problem start?
    *   Have recent changes been made to the system?
    *   Which operating system and version is in use?

4 Booting the Operating System

This chapter describes procedures for booting and shutting down the HP-UX operating system on the HP 9000 rp4410 and rp4440 servers.

Supported Operating System

Booting the server loads the operating system, which is essential for running all other programs.

You can only run one operating system on the server at one time.

The HP-UX 11i version 1 (and higher HP-UX versions that support PA-RISC systems) is supported on the server.

NOTE: HP-UX is the only supported operating system for single-core processors.

You can find information about the HP-UX operating system on the web at:

Server Hardware Information: `http://docs.hp.com/hpux/hw/`

Diagnostics and Event Monitoring: Hardware Support Tools Complete information about HP hardware support tools, including online and offline diagnostics and event monitoring tools, is on the HP website at `http://docs.hp.com/hpux/diag/`. This site has manuals, tutorials, FAQs, and other reference material.

Books about HP-UX Published by Prentice Hall The HP website `http://www.hp.com/hpbooks/` lists the HP books that Prentice Hall currently publishes, including the following HP-UX books:

*   *HP-UX 11i System Administration Handbook*
    `http://www.hp.com/hpbooks/prentice/ptr_0130600814.html`
*   *HP-UX Virtual Partitions*
    `http://www.hp.com/hpbooks/prentice/ptr_0130352128.html`

HP Books are available worldwide through bookstores, online booksellers, and office and computer stores.

Booting and Shutting Down HP-UX

This section describes booting and shutting down HP-UX on the HP 9000 rp4410 and rp4440 servers.

*   To boot HP-UX, follow one of these procedures:
    — "Standard HP-UX Booting Using the Boot Console Handler" (page 125) describes the standard way to boot HP-UX. Typically this results in booting HP-UX in multi-user mode.
    — "Booting HP-UX in Single-User Mode" (page 126) describes how to boot HP-UX in single-user mode.
    — "Booting HP-UX in LVM Maintenance Mode" (page 126) describes how to boot HP-UX in Logical Volume Management (LVM) maintenance mode.
*   To shut down the HP-UX operating system, see "Shutting Down HP-UX" (page 126).

Standard HP-UX Booting Using the Boot Console Handler

If the autoboot function is enabled, the server boots to the installed operating system. If autoboot is not enabled, the server enters the BCH. The BCH enables you to control the server booting environment.

To set the boot path if HP-UX is at a path other than the primary path, follow these steps:

1. At the BCH **Main Menu**, enter `Menu> co`.

2. From the **COnfiguration Menu** > prompt, enter `pa pri xx/xx/xx`.

3. From the **COnfiguration Menu**> prompt, enter `ma`.

To boot HP-UX once you have set the primary path, follow these steps:

1. At the BCH **Main Menu**, enter `Menu> bo pri`. The following prompt displays:

   `Do you wish to stop at the ISL prompt prior to booting (y/n)?`

2. Enter `n`.

> **NOTE:** If the server fails to boot, you may be required to boot from a DVD that contains the operating system and other necessary software.

Booting HP-UX in Single-User Mode

To boot to HP-UX in single-user mode, follow these steps:

1. At the BCH **Main Menu**, enter command or menu>`bo pri`. The following message displays:

   `Interact with IPL (Y, N, or Cancel)?>`

2. To interact with IPL, answer `y`.

3. At the **ISL>** prompt, type `hpux -is`.

Booting HP-UX in LVM Maintenance Mode

To boot to HP-UX in LVM maintenance mode, follow these steps:

1. At the BCH **Main Menu**, enter command or menu>`bo pri`. The following message displays:

   `Interact with IPL (Y, N, or Cancel)?>`

2. To interact with IPL, answer `y`.

3. At the **ISL>** prompt, type `hpux -lm`.

Shutting Down HP-UX

To shut down HP-UX running on a system, use the `shutdown` command. You have the following options when shutting down HP-UX:

- To shut down and reboot an HP-UX system, use the `shutdown -r` command.
- To shut down and halt (power off) an HP-UX system, use the `shutdown -h` command.

For details, see the *shutdown*(1M) manpage and follow these steps:

1. To shut down the HP-UX operating system, issue the `shutdown` command from the HP-UX command line.

2. Log in to HP-UX running on the system that you want to shut down.

   You should log in to the iLO MP for the server and use the **Console** menu to access the system console. Accessing the console through the iLO MP enables you to maintain console access to the server after HP-UX has shut down.

3. Issue the `shutdown` command with the appropriate command-line options.

   The command-line options you specify dictate the way in which HP-UX shuts down, and whether the server is rebooted.

   Use the following list to choose an HP-UX shutdown option for the server:

   - To shut down HP-UX and halt (power off) the server, issue the `shutdown -h` command.

     To reboot a halted server you must power on the server using the `PC` command at the iLO MP **Command** menu.

   - To shut down HP-UX and reboot the server, issue the `shutdown -r` command.

Verifying the Server Configuration Using Boot Console Handler

To go the **Information Menu**, enter **in** from the BCH **Main Menu**. To verify the type and quantity of processors, memory, and I/O cards, use the corresponding menu command.

To enter the POSSE shell, enter **CO** from the **iLO MP Main Menu**. To list all the categories available in the shell, enter **help**.

1.
   - `pr` (Processors)
   - `me` (Memory)
   - `io` (Check the PCI device information to determine if the values match the devices installed in the server)
2. Verify the parameters.
3. To return to the BCH **Main Menu**, use the `ma` command .

5 Troubleshooting

This chapter provides a preferred methodology (strategies and procedures) and tools for troubleshooting server error and fault conditions.

Troubleshooting Methodology

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before working within the server.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

△ **CAUTION:**   Do not operate the server for more than 10 minutes with any cover (including power supplies and disk drives) removed. If you are hot-swapping a fan, reinstall the cover within 10 minutes to prevent overheating. Otherwise, damage to system components can result due to improper airflow cooling.

To troubleshoot the server with online diagnostic tools, you must be familiar with the HP-UX operating system. You should also be familiar with the Offline Diagnostics Environment (ODE). Install both online and offline troubleshooting programs on your system before trouble is suspected. Descriptions and user information about offline troubleshooting tools are available on the HP website at **http://docs.hp.com**.

Use the online diagnostic tools if you can boot your system. Online troubleshooting programs area available on the HP-UX operating system CD.

If you cannot boot your system, run the offline troubleshooting tool from the ODE CD that ships with your server. ODE CDs are platform-specific for PA-RISC servers.

Troubleshooting System Power

This section provides information and procedures for troubleshooting system power.

Using the Front Panel Power Button

The server power button on the front panel operates differently, depending on how long the button is held in and on what the system is doing when the button is pressed. You must be aware of its uses to properly troubleshoot the system.

Table 5-1 shows the power button functions.

Table 5-1 Power Button Functions

System State	Switch Pressed Time	Result
Power connected to power supplies, system power off	One second or less More than one second	Turns system power on. No effect.
System at ISL	Less than one second More than one second but less than five seconds More than five seconds	No effect. Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp4410 and rp4440 servers. Hard shutdown.

Table 5-1 Power Button Functions *(continued)*

System State	Switch Pressed Time	Result
System at BCH	Less than one second More than one second but less than five seconds More than five seconds	Hard shutdown. Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp4410 and rp4440 servers. Hard shutdown
Power on, OS shut down	Less than one second More than one second but less than five seconds More than five seconds	No effect Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp4410 and rp4440 servers Hard shutdown.
OS running	Less than one second More than one second but less than five seconds More than five seconds	No effect. Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp4410 and rp4440 servers. Hard shutdown.

Server Does Not Successfully Power On and Remain Powered On

If the server does not successfully power on and remain powered on, check the following:

- If the server powers on and remains powered on but does not enter or pass POST and boot to the BCH or the iLO MP menu.
- The cause of this problem is not apparent from the iLO MP SEL or the FPL logs. If both these conditions are true, see "System Build-Up Troubleshooting" (page 132).

Consider the following assumptions before troubleshooting system power:

- The problem is a solid failure event (it happens every time you attempt to power on the system or initiate POST).
- There is a functioning console terminal (or a PC with appropriate terminal emulation) available and attached to the iLO MP console port.

To perform the power-on troubleshooting procedure, follow these steps:

1. If this is the first time the system has been powered on, check the incoming ac line voltage. Ensure that you have 200 to 240 VAC power applied to the power supplies. The rp4410 and rp4440 servers require 200 VAC nominal (for example, they will not operate on 100/120 VAC). Typical iLO MP SEL entries when attempting to run on 100/120 VAC are as follows:

```
Alert Level 7: Fatal

Event Log Viewer Menu:

Keyword: Type-02 096f02 618242

A/C Failed, disconnected, or out of range

Logged by: Baseboard Management Controller

Sensor: Power Unit -AC Presence

Data1: 240VA Power Down

    0x20430F39B1020040 FFFF026FCF090300
```

2. Check the front panel power LED visible through the hole in the flap covering the power button.
   - If it is flashing amber, housekeeping voltages are available. Go to step 3.
   - If it is not illuminated or flashing, housekeeping voltages are not available. Check the LEDs on the power supplies. The power supplies have three LED indicators:
     — Predict Fail amber LED to the left
     — Failed amber LED in the center (a triangle with an exclamation point)
     — Green Power LED to the right

     If the Failed LED is illuminated, you must replace the power supply. If the green Power LED is illuminated or flashing, the supply is OK and has AC voltage applied.

3. Verify whether the iLO MP is functional.

   The iLO MP is typically accessed through a terminal attached to the iLO MP LAN port on the rear bulkhead using a **Ctrl-B CR** key sequence. If the iLO MP is functional, check the status of the DC power system using the CM> PC command or the CM> PS command. If the PC or PS command output shows the current system power state to be off, try to turn the DC power on using the PC command. If the system does not turn the DC power on, or if it does not remain on, check the SEL for errors as described below. Alternatively, you can press the power button (located behind the front bezel flap) to attempt to enable the DC voltages.

4. If a terminal attached to the iLO MP LAN port does not respond to a `Ctrl-B CR` key sequence (and the terminal is running at 9600 baud, 8 data bits, No Parity, 1 Stop Bit, Xon/Xoff, and is online), the iLO MP might be hung or nonfunctional. Check the following LEDs located inside the system:

    • The iLO MP heartbeat LED.

      This green LED is located between the 3.3 V and 5 V VRMs on the I/O baseboard assembly and is visible from the rear of the system by looking through the holes in the sheet metal directly above the iLO MP LAN connector. The iLO MP heartbeat LED is on the left, closest to the power supplies. This LED flashes at 1 Hz whenever housekeeping voltages are available and the iLO MP circuitry is functional. If it is not flashing (or is solid green), the iLO MP circuitry may be nonfunctional or is not receiving housekeeping voltages.

    • The BMC heartbeat LED.

      This LED is located immediately to the right (from rear view) of the iLO MP heartbeat LED. It flashes green at 1 Hz whenever ac power is applied to the system, minimum housekeeping voltages are available, and the BMC circuitry is functional. If it is not flashing, the BMC circuitry might be nonfunctional or the internal housekeeping voltages are missing.

    • If the iLO MP heartbeat LED is not flashing but the BMC heartbeat is flashing, replace the I/O baseboard:

    • If the BMC heartbeat LED is not flashing but the iLO MP heartbeat is flashing:
      — Replace the I/O baseboard.
      — Replace the midplane board.

    • If neither heartbeat LED is flashing, internal dc housekeeping voltages might be missing. Housekeeping voltages (12_STBY) are generated by the power supplies and passed through the dc power distribution board, attached ribbon cable, and midplane board to the I/O baseboard.
      — Replace the DC power distribution board.
      — Replace the midplane board.
      — Replace the flat gray cable between the dc power distribution and midplane.
      — Replace the I/O baseboard.

If the iLO MP LAN terminal port responds to a **Ctrl-B** prompt, first examine the iLO MP System Logs (SL) and look at the SEL for any recent alerts that have an alert level of 3 or greater before replacing any hardware.

To look at the SEL, follow these steps:

1. Select TEXT mode and set the alert level to 3.
2. If there are many entries in the SEL logs and you are not sure which ones are associated with the current problem, clear the iLO MP logs.

TIP: Store the entries somewhere else first and recreate the failure.

3. Look at the SEL logs again.
4. If the SEL logs do not assist in determining the root cause of the problem, go to "System Build-Up Troubleshooting" (page 132).

System Build-Up Troubleshooting

To perform the system build-up troubleshooting procedure, follow these steps:

1. Remove all the AC power cords from the power supplies.

2. Remove the processor extender board, memory extender board, disk drives, I/O cards (if possible) and plug the AC power cords into the power supplies. The iLO MP turns on and lists the following CM> DF CRU IDs The following alert event might also appear:

```
        CRU IDs:

        --------

0002-Power Converter  0003-Power Supply 0   0004-Power Supply 1

0005-Diagnostic Panel 0006-Front Panel      0000-Motherboard


Log Entry 4: 00:00:09

Alert Level 5: Critical

Keyword: Type-02 257100 2453760

Missing CRU device - Mem Extender

Logged by: Baseboard Management Controller;

        Sensor: Entity Presence

0x2000000009020050 FF01807115250300
```

If you do not see all of the CRU IDs, concentrate on the missing CRU IDs.

> **NOTE:** A defective midplane board can cause power on or dc voltage problems. If you do not get the above alert level 5 event, but get another high level alert, replace the midplane board.

If you do show the above CRU ID entries and get the alert level 5 Missing CRU device - Mem Extender event, add the memory extender board with at least one quad of DIMMs.

3. Observe the amber power LED flashing and the red fault system LED flashing.

The output of the DF command for a system with two quads of DIMMS installed is as follows:

```
CRU IDs:

--------

0152-DIMM0D           0001-Mem Extender     0002-Power Converter

0003-Power Supply 0   0004-Power Supply 1   0005-Diagnostic Panel

0006-Front Panel      0128-DIMM0A           0136-DIMM0B

0144-DIMM0C           0160-DIMM1A           0168-DIMM1B

0176-DIMM1C           0184-DIMM1D           0000-Motherboard
```

The high level alerts listed were generated in the SEL logs. For example:

```
Log Entry   3: 23 DEC 2006 21:50:43
Alert Level 5: Critical
Keyword: Type-02 257100 2453760
Missing CRU device - CPU 0 PIROM
Logged by: Baseboard Management Controller;
          Sensor: Entity Presence
0x2041CB3DB3020040 FF20807115250300
```

If all of the CRU IDs do not appear, note the missing CRU ID. If CRU ID entries and the Alert Level 5 Missing CRU device - CPU 0 PIROM display, go to the next step.

4. Insert the processor extender board.

> **NOTE:** For this example, the processors were not removed from the processor extender board first. Also, this example shows the expected results for an rp4440 system with two processor modules installed. HP recommends having at least one processor module installed (Module 0), or slightly different Alert Messages can appear.

The system fans come on and stay on when you add the processor extender board and processors. The DF command output appears as follows:

```
CRU IDs: --------
 0001-Mem Extender    0002-Power Converter  0003-Power Supply 0
 0004-Power Supply 1  0005-Diagnostic Panel 0006-Front Panel
 0007-Disk Management 0008-Disk Backplane   0010-Processor Board
 0012-Power Pod 0     0013-Power Pod 1      0032-CPU 0 PIROM
 0033-CPU 1 PIROM     0036-Processor 0 RAM  0037-Processor 1
RAM
 0128-DIMM0A          0136-DIMM0B           0144-DIMM0C
 0152-DIMM0D          0160-DIMM1A           0168-DIMM1B
 0176-DIMM1C          0184-DIMM1D           0000-Motherboard
```

5. If all the installed hardware is functional, the system initiates POST. Go immediately into the SEL Live Logs or the VFP to ensure that POST is initiated and proceeds without error to BCH. For the rp4440 server, you do not normally see any POST forward progress messages on the console unless you are in SL live mode.

6. If POST does not start after five to ten seconds, suspect a problem with the processor extender board or the processors mounted on it. Typical symptoms of this problem are an FRB2 hang alert appearing in the SEL. Perform the following steps:

   a. Reduce the processors to one module in position 0 and retest.

   b. Replace the CPU module or swap the CPU module with one previously removed and try replacing the processor extender board.

   > **NOTE:**
   > A dipswitch on the processor extender board determines whether it runs Itanium or PA-RISC code. Be sure to check this switch position if you get an FRB2 hang and have previously replaced the processor extender board as part of the troubleshooting procedure.
   >
   > For the rp4440 server, this switch (switch block S5103 lowest-most switch block when viewed with extractor handles toward you) must be set to the right (PA-RISC).
   >
   > This switch position setting is normally physically stamped on the sheet metal cover for convenience.

7. If you get any other error at this point, re-examine the SEL events and see if they point to the root cause. If the SEL logs do not assist in pointing to the root cause, HP recommends that you get the assistance of a systems expert.

Operating System Boots

If your operating system is running and you are experiencing problems, use the following online tools to help solve your problem:

- Support Tools Manager (STM)
- Event Monitoring Service (EMS)
- iLO MP

See "Troubleshooting Using Online Support Tools" (page 135).

Operating System Does Not Boot

If the operating system does not boot, but you can reach the BCH from either the main disk partition or the CD, use the following offline tools to help solve your problem:

- Offline Diagnostic Environment (ODE)
- iLO MP

See "Troubleshooting Using Offline Support Tools" (page 137)

Troubleshooting Using Online Support Tools

The following online support tools are available from the HP-UX environment.

Support Tools Manager

Support Tools Manager (STM) is available in three user interfaces:

- GUI for X-based terminals (XSTM)
- Menu interface for ASCII terminals (MSTM)
- Command-line interface for all ASCII terminals (CSTM)

You can use the GUI and menu interfaces intuitively and you can use the command-line interface to drive STM using scripts.

You can use diagnostics to thoroughly test a device and isolate failures down to the suspected self-repair unit.

Find complete documentation on how to access and use STM on the HP website at **http://docs.hp.com**.

Under the **Topics** menu, go to **Diagnostics** and look for **Support Tools Manager**.

Event Monitoring Service

Event Monitoring Service (EMS) is the framework for monitoring hardware and reporting events. Use EMS to eliminate most undetected hardware failures that cause data loss or interruptions of system operation. You can monitor a hardware device (such as a disk) for any unusual activity (called an event). When an event occurs, it is reported by a variety of notification methods, such as email. Event detections are handled automatically with minimal involvement on your part.

The following monitors are available:

- CMC monitor
- UPS monitor
- FC hub monitor
- FC switch monitor
- Peripheral status monitor
- Memory monitor

EMS comes with the HP-UX operating system. To bring up the event monitoring main menu, run the following command at the shell prompt:

/etc/opt/resmon/lbin/monconfig

From the list of main menu selections, select the following:

```
(E) Enable Monitoring
```

iLO MP

For complete information on the iLO MP see the *HP Integrity and HP 9000 Integrated Lights-Out (iLO) Management Processor Operations Guide*.

The following information provides iLO MP troubleshooting procedures.

Accessing the iLO MP Interface and System Logs

To access the iLO MP interface and system logs, follow these steps:

1. To access the MP interface, press **Ctrl+B**.
2. Log in with proper user name and password.
3. To display the console logs, enter `cl`. The console log displays console history from oldest to newest.
4. To display the system logs, enter `sl`. The system logs consist of the following:
   - SEL
   - Forward progress log
   - Current boot log
   - Previous boot log
   - Live events log

SEL

To access the SEL, follow these steps:

1. Access the iLO MP command prompt.
2. Enter the `sl` command. The **Event Log Viewer** menu displays the following:

```
SL

Event Log Viewer Menu:

  Log Name                   Entries    % Full         Latest Timestamped Entry
  ----------------------------------------------------------------------
    E - System Event            39         3 %          01 Nov 2004 17:15:03
    F - Forward Progress      1307        32 %
    B - Current Boot           299        99 %
    P - Previous Boot            0
    C - Clear All Logs
    L - Live Events

Enter menu item or [Ctrl-B] to Quit:
```

3. To review events, enter `e`. The **Event Log Navigation** menu appears:

```
    Log Name                   Entries    % Full         Latest Timestamped Entry
    ----------------------------------------------------------------------
    E - System Event            39         3 %          01 Nov 2004 17:15:03

Event Log Navigation Help:


    +       View next block      (forward in time,  e.g. from 3 to 4)
    -       View previous block (backward in time, e.g. from 3 to 2)
    <CR>    Continue to the next or previous block
    D       Dump the entire log for capture and analysis
    F       First entry
    L       Last entry
    J       Jump to entry number
    H       View mode configuration - hex
    K       View mode configuration - keyword
    T       View mode configuration - text
    A       Alert Level Filter options
    U       Alert Level Unfiltered
    ?       Display this Help menu
    Q       Quit and return to the Event Log Viewer Menu
    Ctrl-B  Exit command and return to the MP Main Menu
```

4. To select text mode , enter `t`.
5. To dump the log to the screen, enter `d` (if desired, save this file for reference).

6. To decode the blinking state of the system LED, review the entire SEL and look at events with alert level 3 and above.

For example:

```
Log Entry 24: 14 Feb 2003 15:27:02

Alert Level 3: Warning

Keyword: Type-02 1b0800 1771520

Hot Swap Cage: SCSI cable removed

Logged by: BMC;  Sensor: Cable / Interconnect - SCSI ChExt Cable

Data1: Device Removed/Device Absent

0x203E4D0AC6020220 FFFF0008F61B0300


Log Entry 73: 00:00:12

Alert Level 3: Warning

Keyword: Type-02 050301 328449

The server's built-in sensors have detected an open chassis door.

Logged by: BMC;  Sensor: Physical Security - Chassis Open

Data1: State Asserted

0x200000000C020570 FFFF010302050300
```

Troubleshooting Using Offline Support Tools

Use the ODE CD to troubleshoot your HP 9000 rp4410 or rp4440 server by accessing the offline diagnostic environment (ODE).

ODE

Use the ODE to evaluate specific hardware components using a command line interface. To access ODE from your ODE CD, follow these steps:

1. Power on the server and insert the ODE CD.
2. Boot the system to the PDC prompt (BOOTADMIN, BCH, and so on). PDC prompts can differ on some computer models. For example:

   Main Menu: Enter command or menu>

3. List the bootable devices by entering **search**
4. Select the CD device that contains the ODE CD.

   For example: **p3**

5. Boot from that device by entering **boot p3**
6. You are asked to interact with the Initial System Loader (ISL) prompt. Enter **y**
7. From the ISL prompt, start the Offline Diagnostics Environment by entering **ODE**

Table 5-2 lists the ODE commands that are available at the ODE prompt.

Table 5-2 ODE Commands

Command	Description
`help`	Displays a list and description of the available commands.
`help<command>`	Displays additional information about the command.
`help<var>`	Displays additional information about the variable.
`ls`	Lists the ODE modules that run on your computer.
`<module_name>`	Runs an ODE module interactively.
`run<module_name>`	Runs an ODE module noninteractively.

Troubleshooting PCI/PCI-X Hot-Pluggable Operations

Sometimes a PCI/PCI-X card does not come online during hot-plugging due to a frequency mismatch between the PCI/PCI-X card and the slot bus, or due to other hardware errors. To determine the type of error you are experiencing, interpret the LED display described as follows.

Figure 5-1 shows the PCI/PCI-X LEDs.

Figure 5-1 PCI/PCI-X LEDs
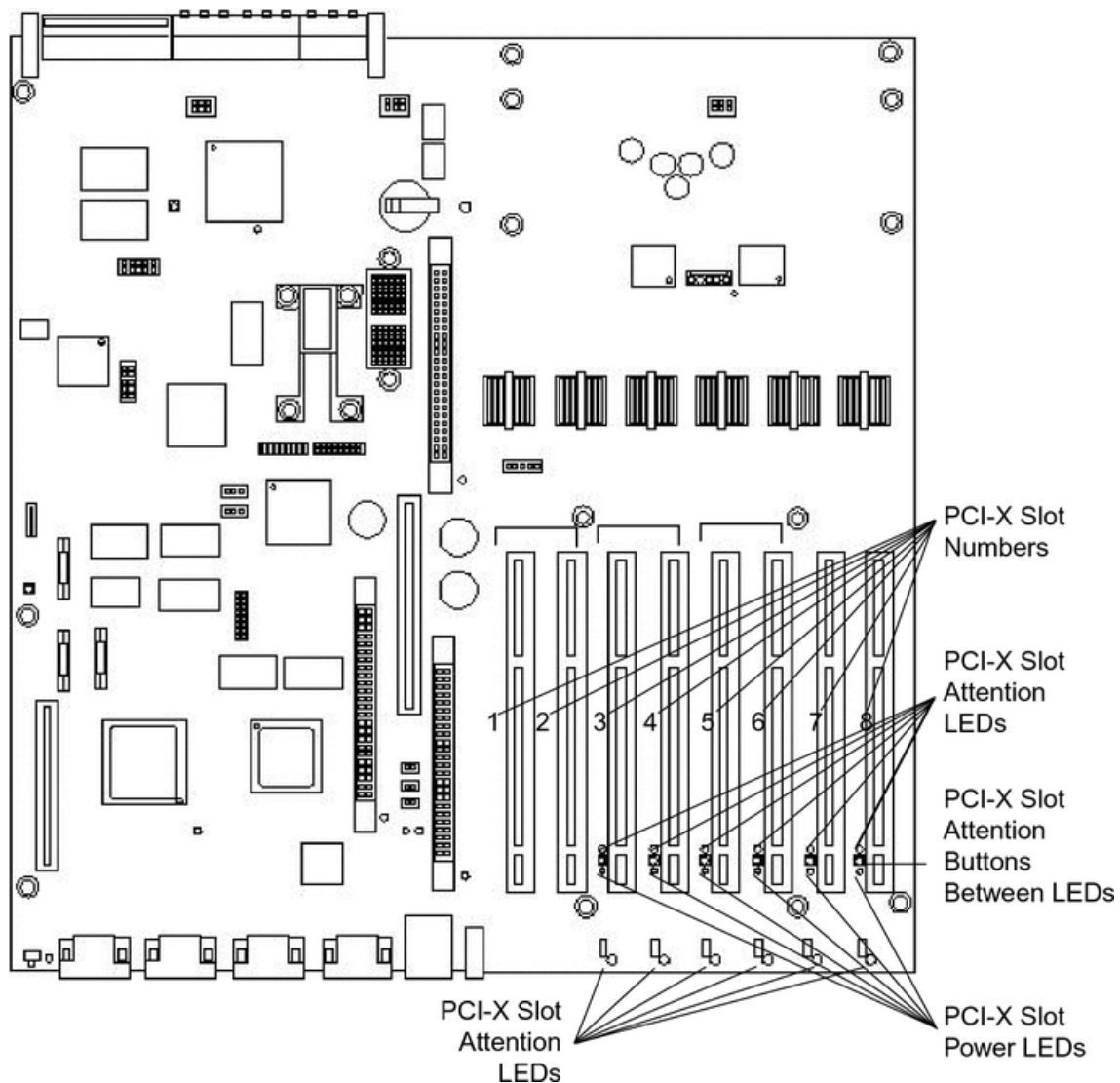
PCI/PCI-X Bus Mode or Frequency Mismatch

After you insert a PCI/PCI-X card into the slot and push the attention button, the power LED goes from blinking to steady off and stays at steady off. This means that the system firmware has rejected the PCI/PCI-X card and indicates either bus-frequency or bus-mode mismatch.

NOTE: After pushing the attention button, you must wait five seconds in the operation cancellation window before taking further action.

Hardware Operation Fault

A hardware operation fault is usually caused by an incorrectly seated or defective PCI/PCI-X card. If this occurs, the attention LED turns steady on and the power LED turns steady off.

CAUTION: If the power draw for the newly installed PCI/PCI-X card is excessive when combined with that of the existing PCI/PCI-X expansion cards, the server powers off. If this occurs, check the power ratings of all the installed PCI/PCI-X cards. A known cause of power loss is the use of more than three PCI/PCI-X RAID cards in the system.

If the PCI/PCI-X card cannot be powered off during a hot-pluggable removal operation, the attention button turns steady on and the power LED remains steady-on. A possible cause of this condition is that a user application or process is using the card you are trying to remove. You can determine if the card is in use by checking the operating system logs.

CAUTION: If your slot does not power off during a hot-pluggable removal operation, do not open the manual retention latch (MRL) on the OLX divider. This action causes system failure or operating system crashes.

Troubleshooting Using LED Indicators

The HP 9000 rp4410 and rp4440 servers have LED indicators located on the front control panel and an internal QuickFind diagnostic panel that you can use to determine what repair action is required.

Front Control Panel LEDs

The front control panel LEDs display the system status at a glance. If warning or attention LEDs are flashing, query the QuickFind diagnostic panel or iLO MP for further information.

Figure 5-2 shows the front control panel LEDs.

Figure 5-2 Front Control Panel LEDs
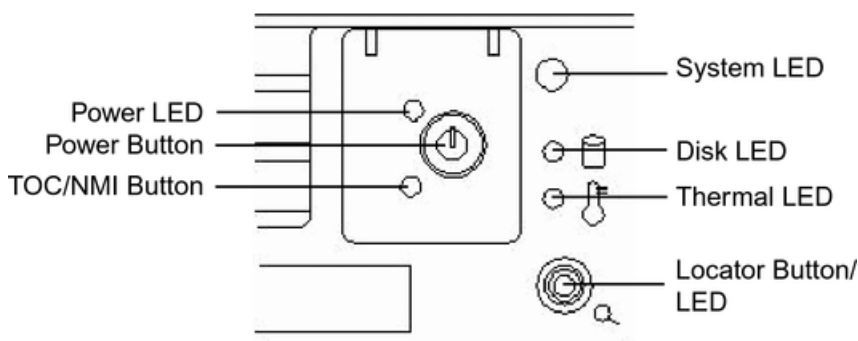
Table 5-3 lists the front control panel LED definitions.

Table 5-3 Front Control Panel LED Definitions

LED/Button	State	Flash Rate	Color	Description
System LED	Running	Steady	Green	System normal. OS up and running.
System LED	Booting	Flashing at 0.5 Hz	Green	OS booting or at BCH.
System LED	Attention	Flashing at 1 Hz	Yellow	Warning. System needs attention. Redundancy lost, component failure pending. (Additional information can be found in the System Log).
System LED	Fault	Flashing at 2 Hz	Red	Hard fault, system halted.
System LED	Off	Off	N/A	System off.
Power LED	On	Steady	Green	Power normal.
Power LED	On	Flashing at 1 Hz	Yellow	Housekeeping voltage present.
Power LED	Off	Off	Off	Power off.
Disk LED	Active	Flashing at rate of disk activity	Green	Disk activity.
Thermal LED	OK	Steady	Green	Thermal OK.
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Thermal warning.
Locator LED/button	Active	Flashing at 1 Hz	Blue	System locator LED can be remotely or locally activated/deactivated.

QuickFind Diagnostic Panel LEDs

The QuickFind diagnostic panel is located under the top cover and is attached to the top of the power supply cage. The following definitions describe the status of the various LEDs and what is wrong with the indicated component.

NOTE: LED behavior is based on firmware. For changes in LED behavior, see your server firmware release notes.

Table 5-4 lists the QuickFind diagnostic panel LED definitions.

Table 5-4 QuickFind Diagnostic Panel LED Definitions

Item	LED 0	LED 1	LED 2	LED 3	Details
Processor	Socket 0	Socket 1	Socket 2	Socket 3	If the System LED (on front panel) is in the attention or fault state and the processor LED is on, then the processor or voltage regulator has failed and the processor module in the specified socket needs to be replaced. If the thermal LED is in the warning or critical state and the processor LED is on, then the processor exceeded the warning or critical level
Subsystem	CPU board	Memory board	I/O board	n/a	A soldered voltage regulator has failed and the specified board must be replaced
I/O VRM	n/a	n/a	n/a	n/a	n/a
CPU VRM	n/a	n/a	n/a	n/a	n/a
Fan module	0	1	2	n/a	One or both fans in a fan module have failed and the module must be replaced. Fan 2 is in front of the power supplies

Table 5-4 QuickFind Diagnostic Panel LED Definitions *(continued)*

Item	LED 0	LED 1	LED 2	LED 3	Details
Memory bank X (0-7)	DIMM xA	DIMM xB	DIMM xC	DIMM xD	The specified DIMM has failed and must be replaced. If all the LEDs for a rank (0-7) are lit and the memory config error LED is lit, then the DIMMs in the specified rank are mismatched—replace mismatched DIMM
Check power supply	n/a	n/a	n/a		One of the power supplies or power supply fans have failed. Replace the power supply. The faulty power supply LED (located on power supply) lights
Memory config error	n/a	n/a	n/a		The DIMMs in a rank are mismatched. All the DIMM LEDs in the specified rank (0-7) light.
Processor config error	n/a	n/a	n/a		The processors are mismatched. Replace mismatched processor.
Missing component	n/a	n/a	n/a		A required component(s) is not installed in the system. This prevents the server from powering on.
System temp	n/a	n/a	n/a		The internal temperature of the server has exceeded the warning or critical level.
Check event log	n/a	n/a	n/a		An event has occurred that requires attention.

Figure 5-3 shows the QuickFind diagnostic panel.

Figure 5-3 QuickFind Diagnostic Panel
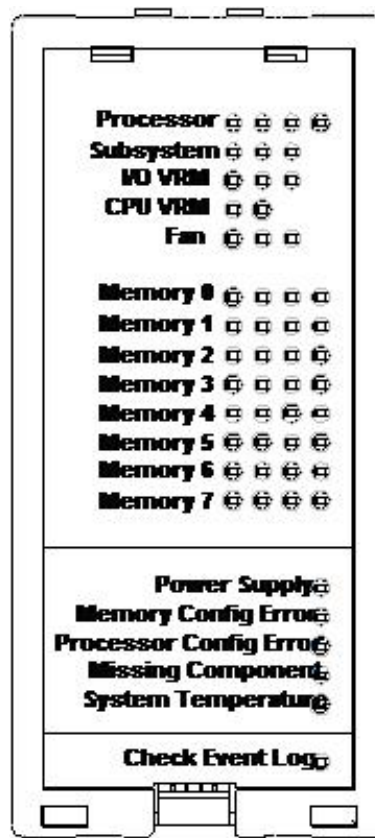
I/O Baseboard LED Indicators

Figure 5-4 shows the LEDs, sensors, and reset or attention buttons on the I/O baseboard.

Figure 5-4 I/O Baseboard LEDs, Buttons, and Sensors
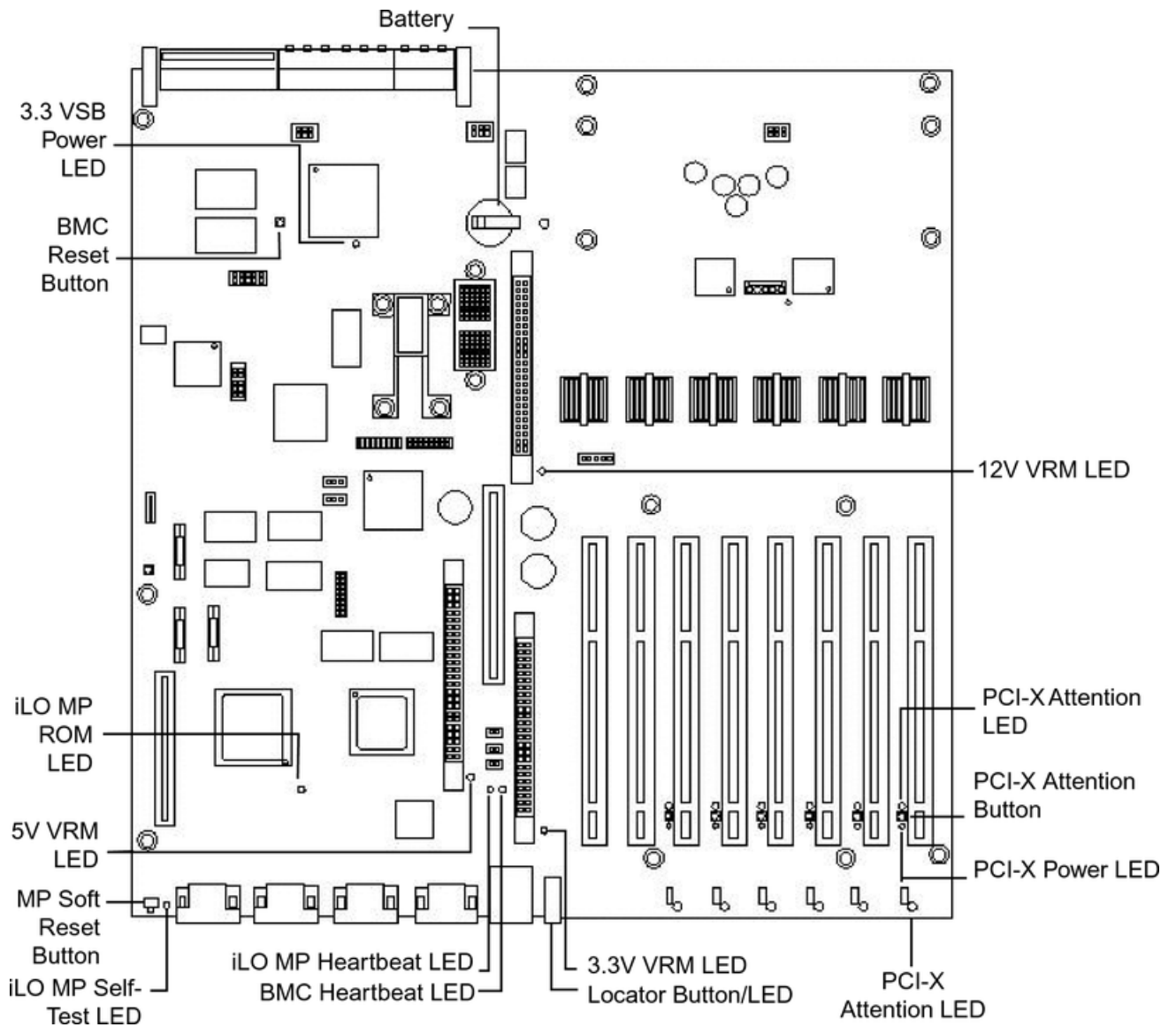
Table 5-5 lists the I/O baseboard LEDs, buttons, and sensors.

Table 5-5 I/O Baseboard LEDs, Buttons, and Sensors

LED/Button	Color	Status	Condition
12V VRM Power LED	Green	On	12V VRM is functioning.
5V VRM Power LED	Green	On	5V VRM is functioning.
3.3V VRM Power LED	Green	On	3.3V VRM is functioning.
iLO MP heartbeat	Green	Blinking	The iLO MP is functioning correctly.
iLO MP Self Test LED	Amber	On Off	The iLO MP is executing the internal self test. The iLO MP has passed the internal self test.
BMC Heartbeat	Green	Blinking	The BMC is functioning correctly.
3.3 VSB Power LED	Green	On	Standby power is available.
iLO MP Soft Reset Button	N/A	Press	Resets the iLO MP values.

Memory Extender Boards

The 32-DIMM memory extender board has two power status LEDs, 1.25 V and 1.5 V (Figure 5-5). When the LEDs are on, each respective voltage is present on the memory extender board.

The 16-DIMM memory extender board has one condition LED on each of the two VRMs. If either condition VRM LED is on, there is a problem with that VRM. You must replace the entire extender board in this case; the VRMs are not customer self-repair units.

Figure 5-5 shows the 32-DIMM memory extender board LEDs.

Figure 5-5 32-DIMM Memory Extender Board LEDs
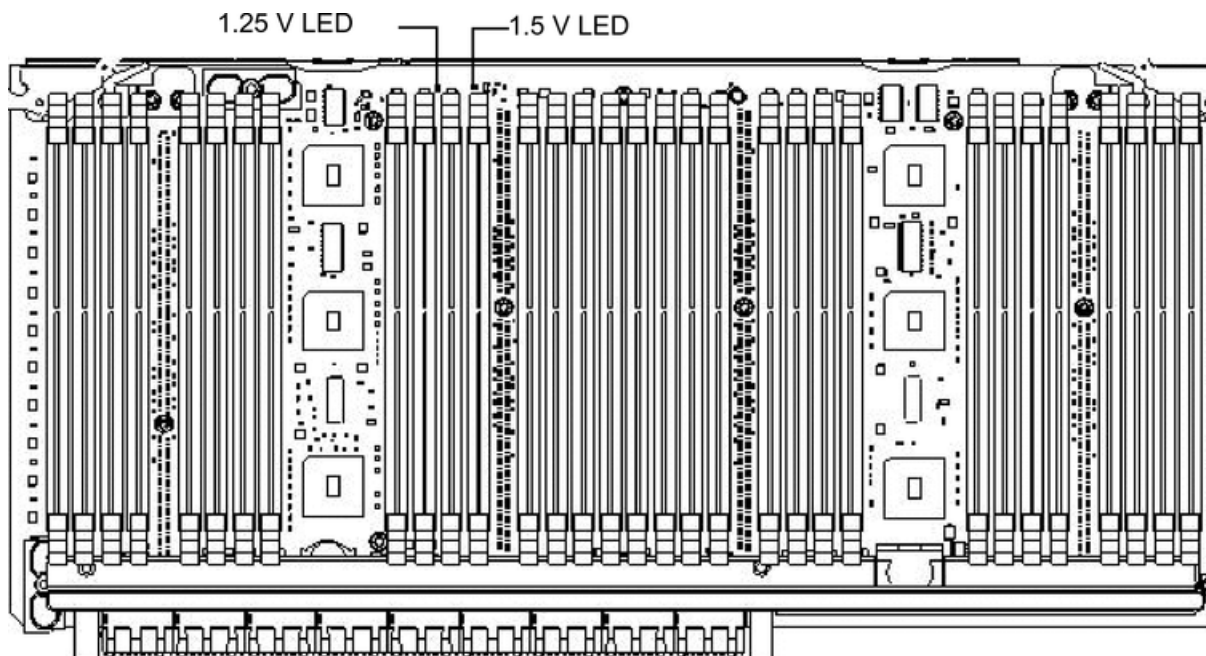
Table 5-6 lists the 32-DIMM memory extender board LED states.

Table 5-6 32-DIMM Memory Extender Board LED States

LED	Color	Status	Condition
1.25 V power	Green	On	Power OK
1.5 V power	Green	On	Power OK

Figure 5-6 shows the 16-DIMM memory extender board LEDs.

Figure 5-6 16-DIMM Memory Extender Board LEDs

VRM LEDs
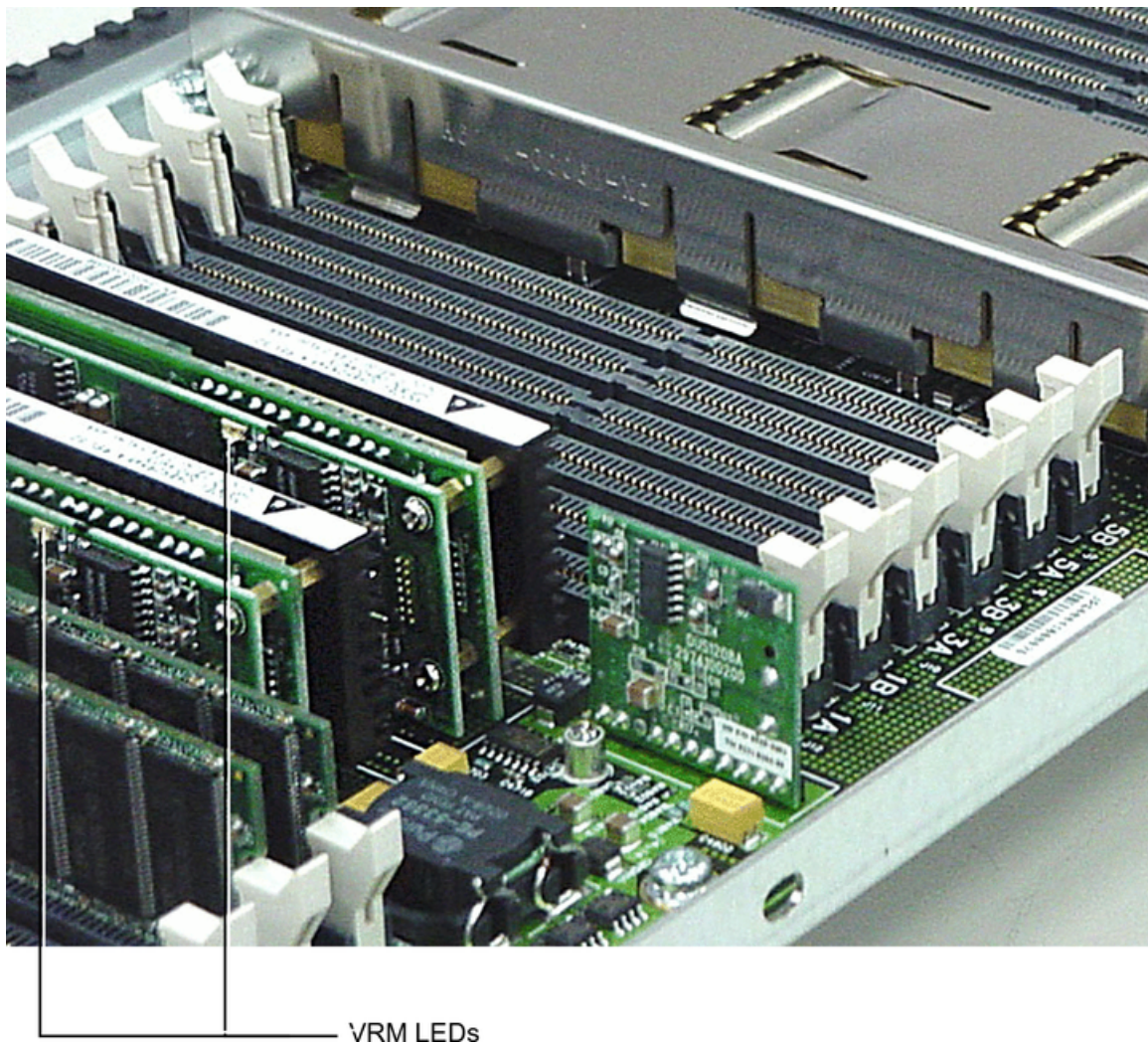
Table 5-7 lists the 16-DIMM memory extender board LED states.

Table 5-7 16-DIMM Memory Extender Board LED States

LED	Color	Status	Condition	Action
VRM status	Green	On	VRM is bad	Replace memory extender board

Disk and I/O Path Logging

Some failures result in I/O path logging. These paths help to indicate the source of the error and can be included in the error message or logged into console or event logs.

Table 5-8 describes the disk drive and PCI slot paths for the server.

Table 5-8 Internal Disk and DVD Paths

Slot	Function Associated with Path	Location	Paths
Disk slot 1 (SCSI ID = 0)	SCSI I/O for bottom removable disk	Bottom disk	0/1/1/0.0.0 (simplex mode) 0/1/1/1.0.0 Channel B (duplex mode)
Disk slot 2 (SCSI ID = 1)	SCSI I/O for top removable disk	Top disk	0/1/1/0.1.0 Channel A (duplex mode)
DVD slot	IDE I/O for DVD	DVD slot	0/0/3/0.0

Table 5-9 lists the extended core I/O paths for the core I/O slot.

Table 5-9 Extended Core I/O Paths

Function Associated with Path	Location	Paths
RS-232 connector port (communications controller)	Rear-panel bulkhead connector (labeled MP local and auxiliary)	0/0/1/0
MP local and remote ports (serial controller)	Rear-panel bulkhead connector (labeled remote)	0/0/1/1
Ultra 3 (U160/320) external SCSI port	Rear-panel SCSI connector (upper connector)	$0/1/1/1.x.y$
USB port	Upper rear-panel bulkhead connector (labeled USB1)	0/0/2/0
USB port	Lower rear-panel bulkhead connector (labeled USB2)	0/0/2/1
IDE controller	On I/O baseboard	0/0/3/0
VGA controller	Rear-panel bulkhead connector (labeled VGA)	0/0/4/0

Table 5-10 lists the PCI I/O paths.

Table 5-10 PCI I/O Paths

Slot	Function Associated with Path	Location	ACPI Paths
Slot 1 (core I/O SCSI)	Ultra 160/320 dual SCSI channel	Left-most slot (nearest to center of baseboard)	0/1/1/0 Channel A 0/1/1/1 Channel B
Slot 2 (core I/O LAN)	Gigabit LAN	2nd from left	0/1/2 0/1/2/1 (dual-port LAN only)
Slot 3	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 4)	3rd from left	0/4/1
Slot 4	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 3)	4th from left	0/4/2
Slot 5	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 6)	5th from left	0/5/1
Slot 6	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 5)	6th from left	0/5/2
Slot 7	I/O with 133 MHz/ 64-bit PCI-X card	7th from left	0/2/1
Slot 8 (right)	I/O with 133 MHz/ 64-bit PCI-X card	Right-most slot (nearest to edge of baseboard)	0/6/1

Core I/O Connections

The HP 9000 rp4410 and rp4440 servers include the following core I/O connections:

- Two USB ports
- One iLO MP
  - One 10/100 LAN-RJ45
  - Three serial ports

- SCSI HBA
  - The SCSI HBA board is used to attach SCSI external mass storage to the system.
  - Connections to the SCSI board include the external SCSI channels for external mass storage devices.

△ **CAUTION:** Some restrictions apply to external mass storage devices that you can connect to Channel B of the core I/O SCSI HBA. External connections to Channel B of the SCSI HBA controller are only supported in simplex configuration, when the internal cable between the SCSI backplane and the SCSI HBA card is disconnected. If the server is converted to the duplex configuration, you cannot connect external SCSI devices to Channel B of the SCSI HBA.

- LAN Connection
  - The LAN board provides the basic external I/O connectivity for the system.
  - Connections to the LAN card include one or two 10/100/1000 Base-T LAN RJ45 connectors.
  - New cards might be available for use in the server. See the available cards on the HP website at **http://hp.com**.

System I/O Board Switches and Jumpers

The following descriptions are for reference only.
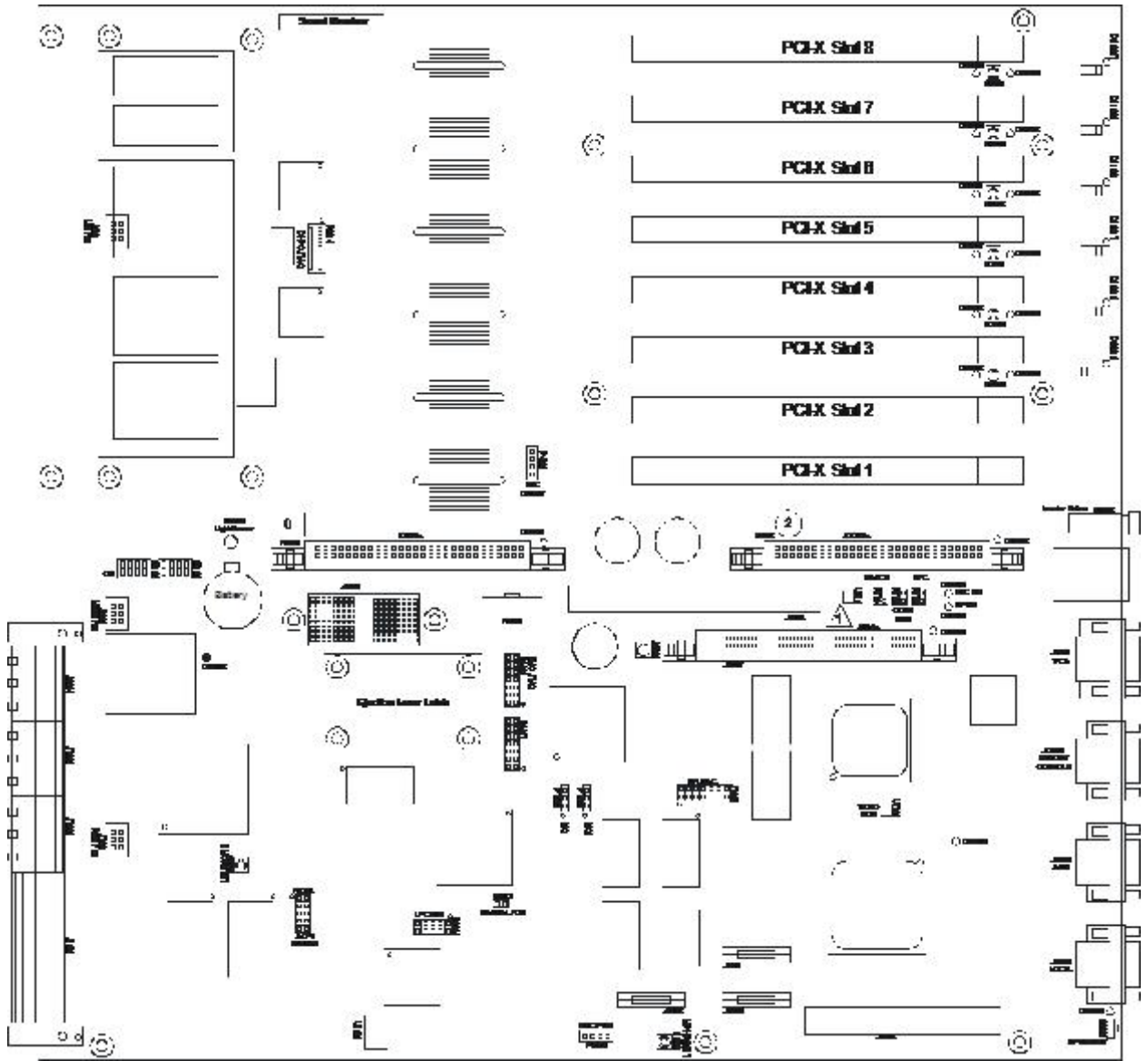
Table 5-11 lists the system I/O board indicators, connectors, and jumpers.

Table 5-11 System I/O Board Indicators, Connectors, and Jumpers

LED Indicators		Connectors		Jumpers	
Reference Designator	Function	Reference Designator	Function	Reference Designator	Function
DS0907	Slot 8 attention	P2314	Dual Hot-Plug Controller JTAG	P5704	ac range off
DS0805	Slot 8 attention	P4506	BMC Dual UART	P5705	Console mux-off
DS0806	Slot 8 power	P5301	12 V VRM module	P5708	Manufacturing/ schmoo-off
DS1922	Slot 7 attention	P5603	3.3 V VRM module	P8412	Manual power on/off
DS1810	Slot 7 attention	J6607	5 V VRM module	S5102 Pos 1	VGA enable off for the rp4410/ rp4440
DS1808	Slot 7 power	J6305	PDH monitor connector	S5102 Pos 2	N/A
DS1921	Slot 6 attention	P5401	RiLoe connector	S5102 Pos 3	N/A

Table 5-11 System I/O Board Indicators, Connectors, and Jumpers *(continued)*

LED Indicators		Connectors		Jumpers	
Reference Designator	Function	Reference Designator	Function	Reference Designator	Function
DS1811	Slot 6 attention	J5604	Scan connector	S5102 Pos 4	N/A
DS1813	Slot 6 power	P6406	BMC JTAG	S5103 Pos 1	N/A
DS2917	Slot 5 attention	P6407	BMC test header	S5103 Pos 2	N/A
DS2807	Slot 5 attention	J7605	iLO MP JTAG	S5103 Pos 3	N/A
DS2809	Slot 5 power	P7502	12C bus 2 header	S5103 Pos 4	N/A
DS2918	Slot 4 attention	P7503	12C bus 1 header	N/A	N/A
DS2808	Slot 4 attention	P8204	ACPI events	N/A	N/A
DS2806	Slot 4 power	P8304	LPC bus header	N/A	N/A
DS3916	Slot 3 attention	J9503	iLO MP data bus debug header	N/A	N/A
DS3808	Slot 3 attention	J98611	iLO MP data bus debug header	N/A	N/A
DS3809	Slot 3 power	J9602	iLO MP data bus debug header	N/A	N/A
DS5501	12 V power	P9505	IPMB bus between BMC and iLO MP	N/A	N/A
DS5808	3.3 V power	J9803	Core I/O debug connector	N/A	N/A
DS6113	3.3 VSB power	J2001	Left fan (fan 0)	N/A	N/A
DS5809	5 V power	J6002	Middle fan (fan 1)	N/A	N/A
DS5815	BMC heartbeat	J7001	Right fan (fan 2)	N/A	N/A
DS5816	iLO MP heartbeat	J6004	High-speed backplane for ropes	N/A	N/A
DS8816	iLO MP ROM error	J7003	High-speed backplane for ropes	N/A	N/A
DS9906	iLO MP self test	J7002	High-speed backplane for ropes	N/A	N/A
N/A	N/A	J9006	Low-speed backplane for ropes	N/A	N/A
N/A	N/A	J5910	Dual USB and iLO MP card LAN	N/A	N/A
N/A	N/A	J6921	DB-15 analog video	N/A	N/A
N/A	N/A	JD7901	DB-9 remote/console RS-232	N/A	N/A
N/A	N/A	J8906	DB-9 auxillary RS-232	N/A	N/A
N/A	N/A	J9905	DB-9 local RS-232	N/A	N/A
N/A	N/A	J6502	Frequency input for margin	N/A	N/A

6 Removing and Replacing Components

This chapter describes how to remove and replace hardware in the HP 9000 rp4410 and rp4440 servers. Use care to prevent injury and equipment damage when performing these procedures. Voltages can be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

Safety Information

△ **CAUTION:** Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages might be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

Follow the procedures listed below to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

- When removing or installing a hot-swappable item, follow the instructions provided in this guide.
- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.
- If installing a hot-pluggable component, complete the required software intervention before removing the component.
- If installing an assembly that is not hot-swappable nor hot-pluggable, disconnect the power cable from the external power receptacle before proceeding.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before working with the server.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.
- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP part number 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.

Required Service Tools

Service of this product may require one or more of the following tools:

- Electrically Conductive Field Service Kit (HP part number 9300-1155)
- 1/4 inch flat blade screwdriver
- ACX-15 Torx screwdriver

Accessing a Rack-Mounted Server

The HP 9000 rp4410 and rp4440 servers are designed to be rack mounted. The following procedure explains how to gain access to the server that is mounted in an approved rack. For rack installation

instructions, review the document titled *Installation Guide, Mid-Weight Slide Kit, 5065-7291*. This document can be accessed in the HP website at **http://www.hp.com/racksolutions**.

⚠ **WARNING!**   Ensure that all anti-tip features are employed before extending the server (front and rear ant-itip feet installed; adequate ballast is properly placed; and so on).

Extend the Server From the Rack

📝 **NOTE:**   Ensure that there is approximately 1.5 meters [4.5 ft] in front of the rack to fully extend the server from the rack.

To extend the server from the rack, follow these steps:

1.   Remove the 25-mm Torx screws that fasten the server to the rack.

Figure 6-1 Accessing T-25 Screws
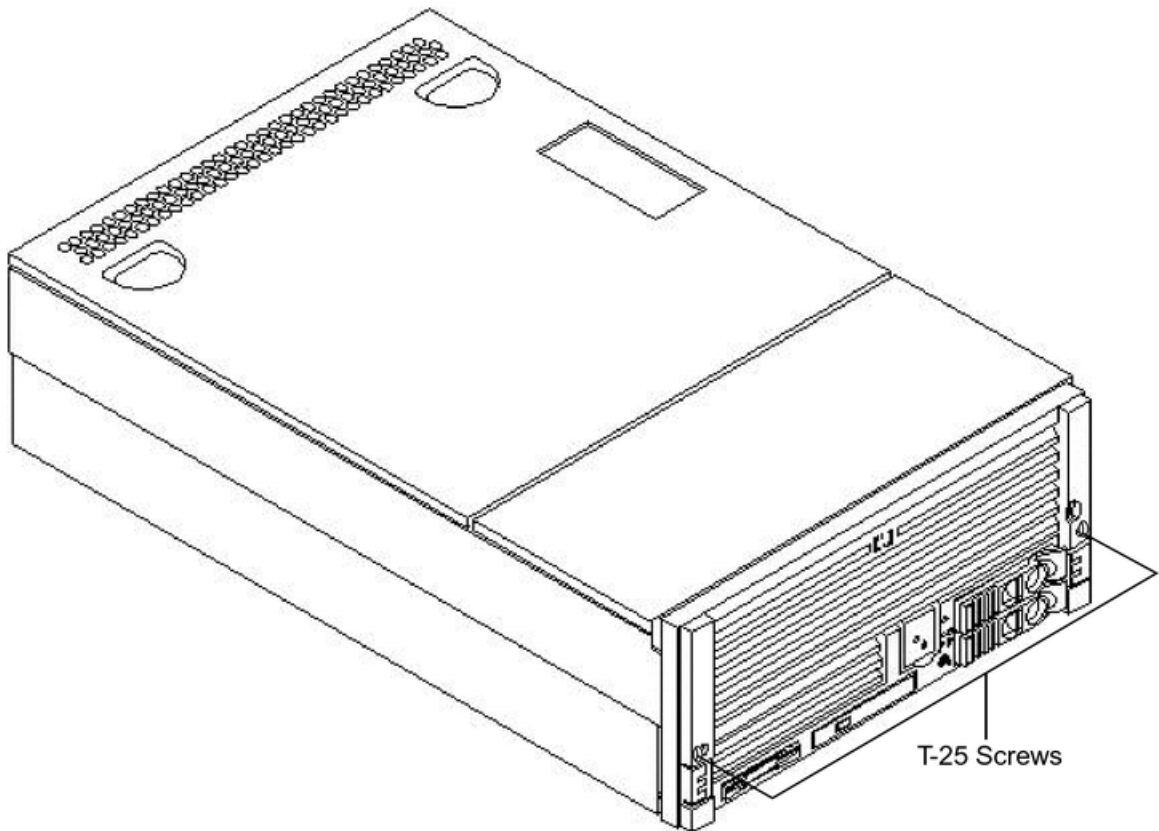
2.   Flip out the two pull handles at either end of the front bezel and slowly pull the unit forward by the handles. The server is fully extended when the rail clips are locked in place. When fully extended, the front and top covers are fully accessible.

Inserting the Server Into the Rack

To insert the server into the rack, follow these steps:

1.   Press the rail clips on either side of the server inward and push the server into the rack until it stops.
2.   Replace the T-25 screws that fasten the server to the rack.

Accessing a Pedestal-Mounted Server

The HP 9000 rp4410 and rp4440 servers are also designed for use in a stand-alone pedestal (rackless) environment. A pedestal is available for use with the server in a floor- or pedestal-mount configuration.

You do not need to remove the pedestal from the server to gain access to internal components.

The front bezel, front cover, and top cover can be removed with the pedestal attached to the server.

⚠️ **WARNING!** Ensure that the server is properly grounded when performing remove-and-replace procedures. Use an antistatic wrist strap and grounding mat similar to those found in the HP Electrically Conductive Field Service Kit.

Figure 6-2 Pedestal-Mounted Server
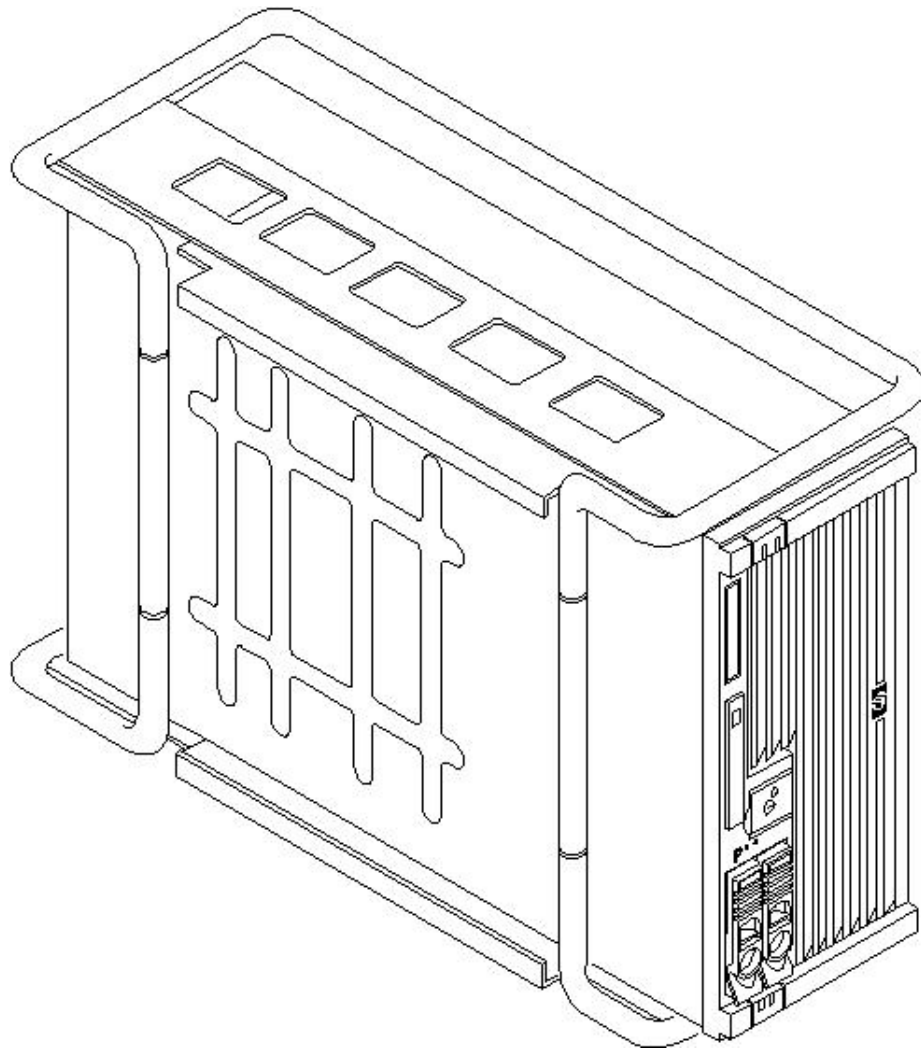
Front Bezel

The server does not need to be powered off to remove the front bezel. The front control panel access door is on the bezel.

Opening the control panel door provides access to the following components:

- Power button
- System LEDs

Removing the Front Bezel

Remove the front bezel by grasping the outer edges of the front bezel and pulling straight out.

Figure 6-3 Removing and Replacing the Front Bezel

Replacing the Front Bezel

Replace the front bezel by pushing the front bezel straight into the chassis until it snaps into place.

Front and Top Covers

⚠ **CAUTION:** Do not operate the server without the front and top covers in place. Operation of the server without the front and top covers in place makes the server susceptible to electromagnetic interference (EMI) and overheating problems that result in system failure.
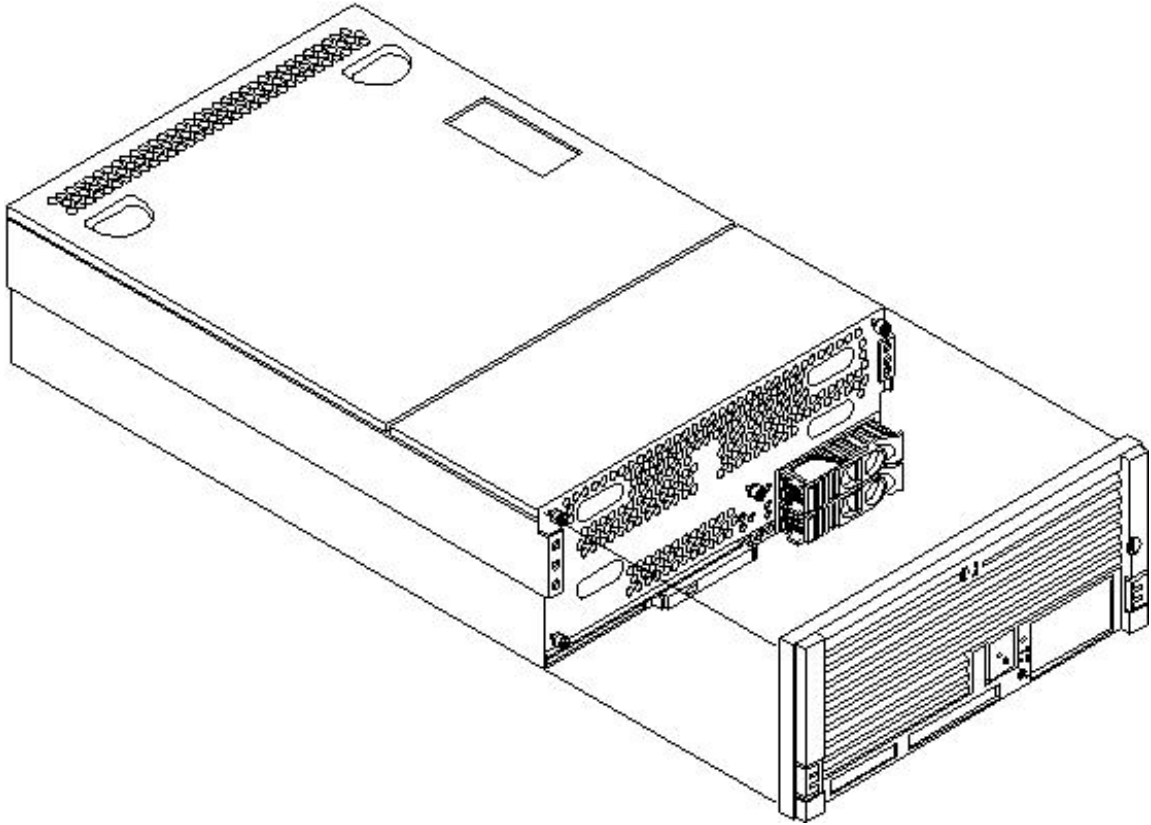
Observe all electrostatic discharge (ESD) safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

📝 **NOTE:** When the front or top cover is removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed.
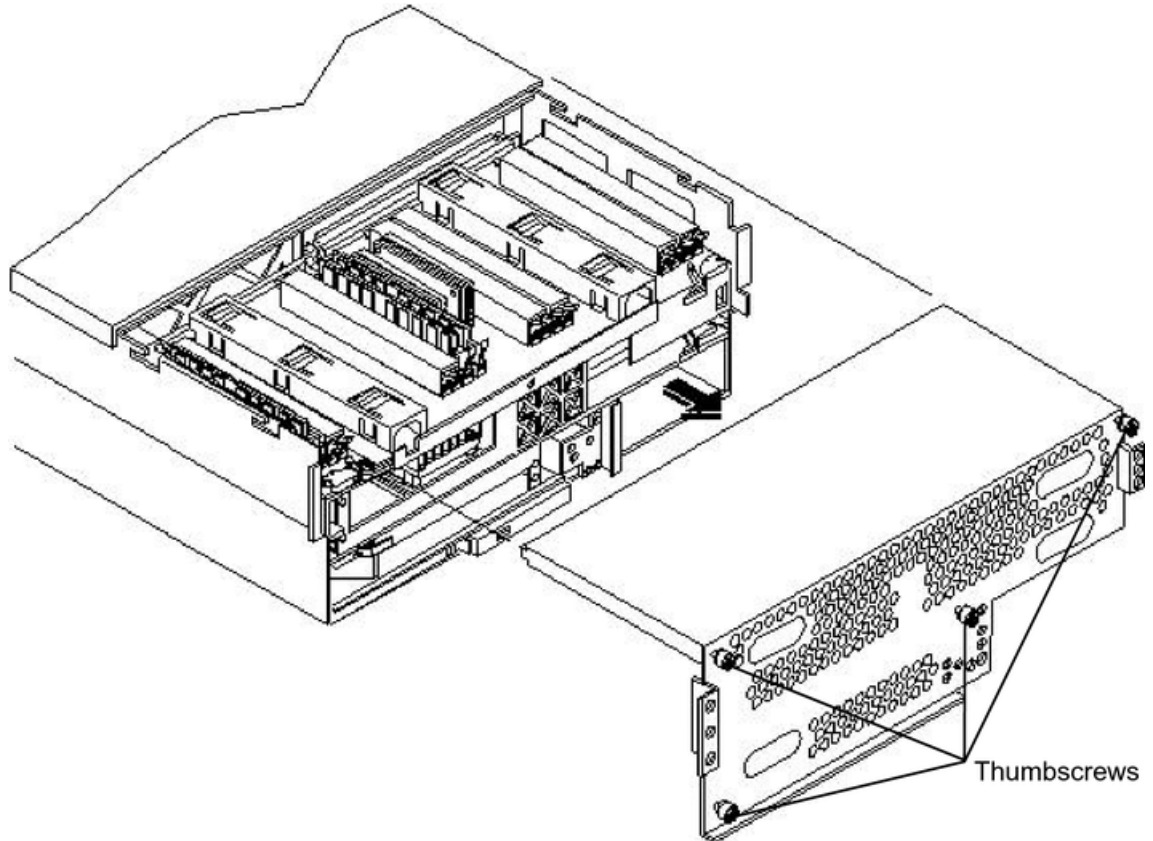
Removing the Front Cover

⚠ **CAUTION:** Power the server off before removing the front cover. All components accessible behind the front cover are cold-swappable and require power to be off.

To remove the front cover, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Using a Torx T15 driver, loosen the four captive thumbscrews that hold the front cover in place.

Figure 6-4 Removing and Replacing the Front Cover

4. Raise the cover slightly, and pull the cover toward the front of the server to free the tabs from the slots in the center of the chassis.

Replacing the Front Cover

To replace the front cover, follow these steps:

1. Align the tabs at the rear of the front cover with the corresponding slots in the chassis. Fully seat the tabs into the slots.
2. Tighten the four thumbscrews securely.
3. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

Removing the Top Cover

To remove the top cover, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Loosen the two captive thumbscrews that hold the top cover in place. (Figure 6-5)
3. Pull the cover toward the rear of the server to free the tabs from the slots in the center of the chassis and lift the cover straight up.

Figure 6-5 Removing and Replacing the Top Cover

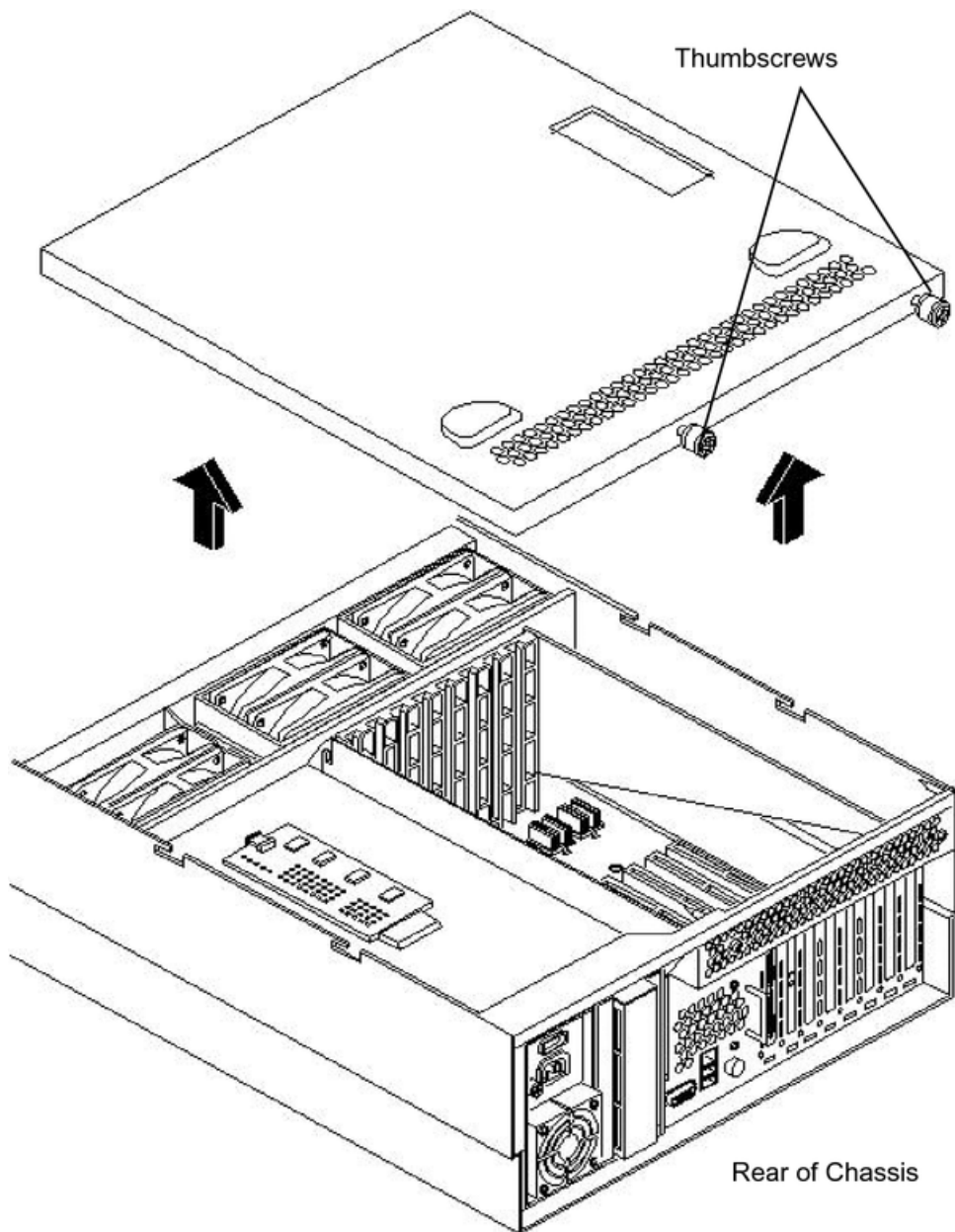## Replacing the Top Cover

To replace the top cover, follow these steps:

1. Align the tabs at the rear of the top cover with the corresponding slots in the chassis. Fully seat the tabs into the slots, and push the top cover forward until it seats.
2. Using a Torx T15 driver, tighten the two thumbscrews securely.

Memory Extender Board

The memory extender board is located directly under the front cover of the chassis. The standard memory extender board can hold up to 16 DIMMs. The optional high capacity memory extender board can hold up to 32 DIMMs.

> ⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a memory extender board.
>
> Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

> ⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Memory Extender Board

To remove a memory extender board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).

> 📝 **NOTE:** The memory extender board can be removed without removing the server from the rack.

2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Front and Top Covers" (page 152).
4. Press the latches on the extraction levers located on each side of the memory extender board.

Figure 6-6 Memory Extender Board Latches
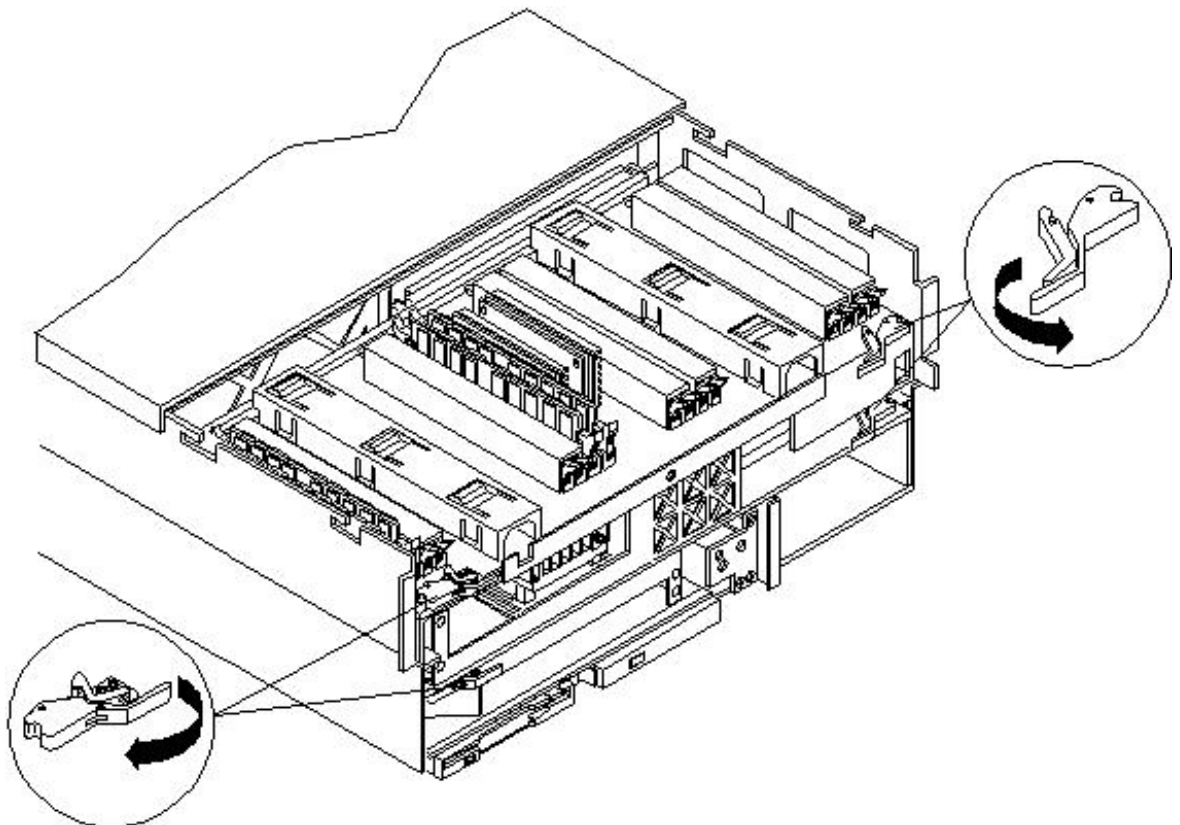
5. Pull on the extraction levers to unplug the memory extender board from the socket located on the midplane riser board and remove the memory extender board from the chassis.

Figure 6-7 Memory Extender Board

Replacing the Memory Extender Board
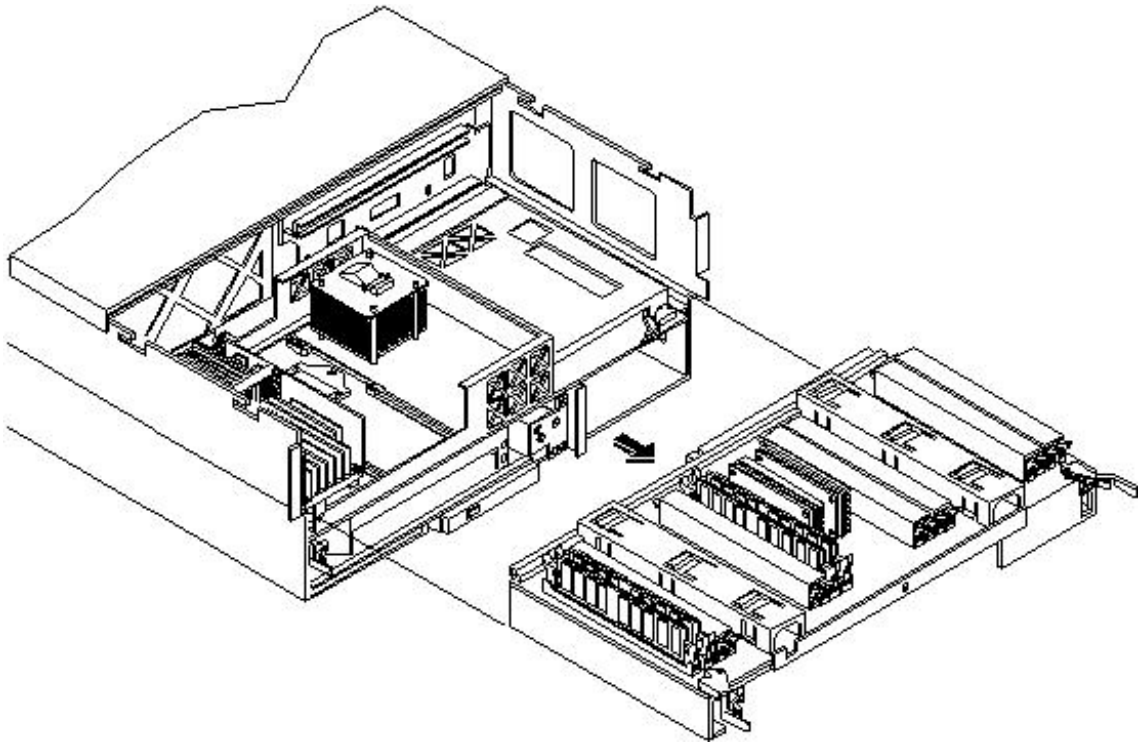
To replace the memory extender board, follow these steps:

1. Ensure that the extraction levers are in the outward, unlocked position.
2. Align the memory extender board with the front and rear chassis guide slots.
3. Slide the memory extender board in until it begins to seat in the socket located on the midplane board.
4. Push the extraction levers inward to the locked position to fully plug the memory extender board into the midplane riser board.
5. Replace the front cover. See "Replacing the Front Cover" (page 153).
6. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

System Memory DIMMs

System memory DIMMs are located on the memory extender board.

Replacing Deallocated Memory Ranks

This section provides the steps necessary to replace deallocated memory ranks.

NOTE: When replacing deallocated memory ranks on a server with system firmware version 45.11 or greater, you must perform the following procedure before replacing the deallocated memory. This procedures is necessary to ensure that the memory is properly reallocated upon server boot.

To ensure the repaired memory rank reallocates properly, follow these steps:

1. Boot to BCH.

2. To view the deconfigured quad of memory, enter the `in me` command.
3. Enter the `ser pdt clear` command.

   The following message displays followed by a 30 second delay:

   ```
   If DIMM replacement is necessary, power down the system now: Use ^B
   MP:CM> PC -OFF -NC, then pull power cord and replace DIMM. Otherwise,
   the system will automatically reboot in 30 seconds.
   ```

4. You must remove power from the system within 30 seconds.
5. For instructions on removing and replacing the memory DIMM, see Removing Memory DIMMs Installing Memory DIMMs.

Removing Memory DIMMs

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing system memory DIMMs.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

△ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

To remove system memory, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).

📝 **NOTE:** The memory extender board can be removed without removing the server from the rack.

2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Front and Top Covers" (page 152).
4. Remove the memory extender board. See "Removing the Memory Extender Board" (page 155).
5. Identify the DIMM to be removed and push the extraction levers found on either side of that DIMM slot outward to the open position. The DIMM ejects from the socket.
6. Remove the DIMM from the socket.

Installing Memory DIMMs

The standard configuration of HP 9000 rp4410 and rp4440 servers includes a 16-DIMM memory extender board. This extender board must contain a minimum of one GB of memory (four 256 MB DIMMs loaded in quad 0 [connectors 0A, 0B, 0C, and 0D]).

Table 6-1 and Figure 6-8 show the filler requirements and slot IDs for the 16-DIMM memory extender board.

Table 6-1 DIMM Filler Requirements for 16-DIMM Memory Extender Board

DIMMs Loaded	Fillers Required[1]
4 DIMMs in quad 0	Six fillers total: Two fillers in each quad 1, 2, and 3
8 DIMMs in quads 0 and 1	Four fillers total: Two fillers in each quad 2 and 3
12 DIMMs in quads 0, 1, and 2	Two fillers total: Two fillers in quad 3
16 DIMMs in quads 0, 1, 2, and 3	No fillers required

Figure 6-8 16-DIMM Memory Extender Board Slot IDs

An optional 32-DIMM memory extender board is available to replace the 16-DIMM memory extender board. This extender board must contain a minimum of one GB of memory [four 256 MB DIMMs loaded in quad 0 (connectors 0A, 0B, 0C, and 0D)].
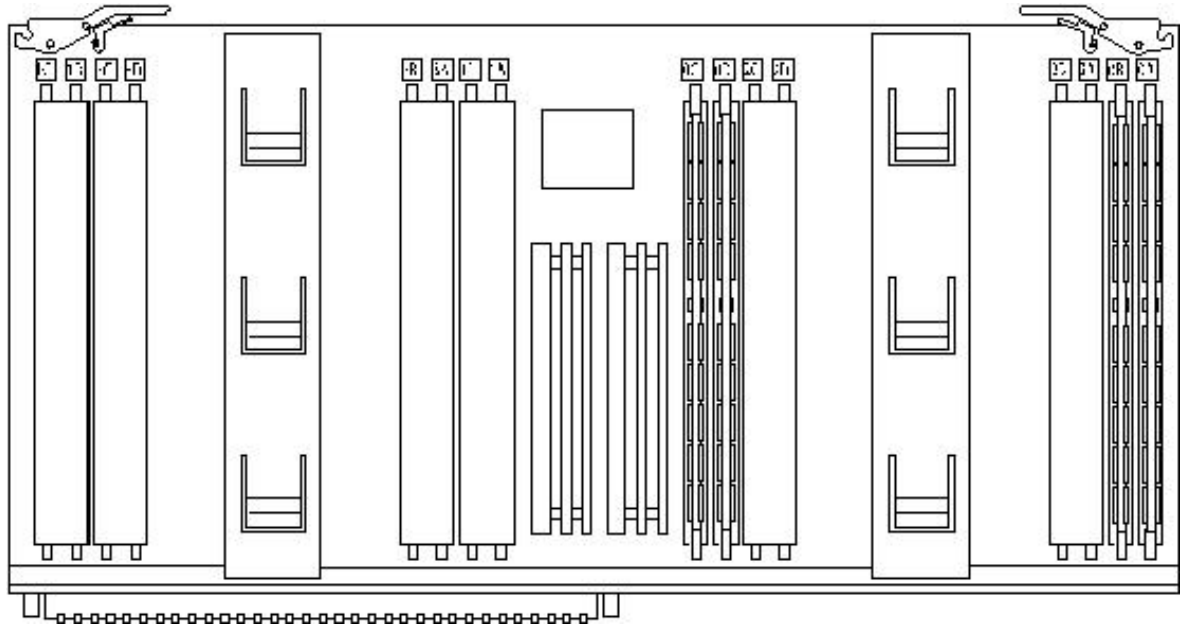
Table 6-2 and Figure 6-9 show the filler requirements and slot IDs for the 32-DIMM memory extender board.

Table 6-2 DIMM Filler Requirements for 32-DIMM Memory Extender Board

DIMMs Loaded	Fillers required[1]
4 DIMMs in quad 0	12 fillers total: Two fillers in quads 1, 3, 4, 5, 6, and 7 (quad 2 remains unfilled)
8 DIMMs in quads 0 and 1	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (quads 2 and 3 remain unfilled)
12 DIMMs in quads 0, 1, and 2	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (quad 3 remains unfilled)
16 DIMMs in quads 0, 1, 2, and 3	Eight fillers total: Two fillers in quads 4, 5, 6, and 7 (all quads filled)
20 DIMMs in quads 0, 1, 2, 3, and 4	Four fillers total: Two fillers in quads 5 and 7 quad 6 remains unfilled
24 DIMMs in quads 0, 1, 2, 3, 4, and 5	No fillers required
28 DIMMs in quads 0, 1, 2, 3, 4, 5, and 6	No fillers required
32 DIMMs in quads 0, 1, 2, 3, 4, 5, 6, and 7	No fillers required

1   One DIMM filler board covers two adjacent DIMM connectors.

Figure 6-9 32-DIMM Memory Extender Board Slot IDs
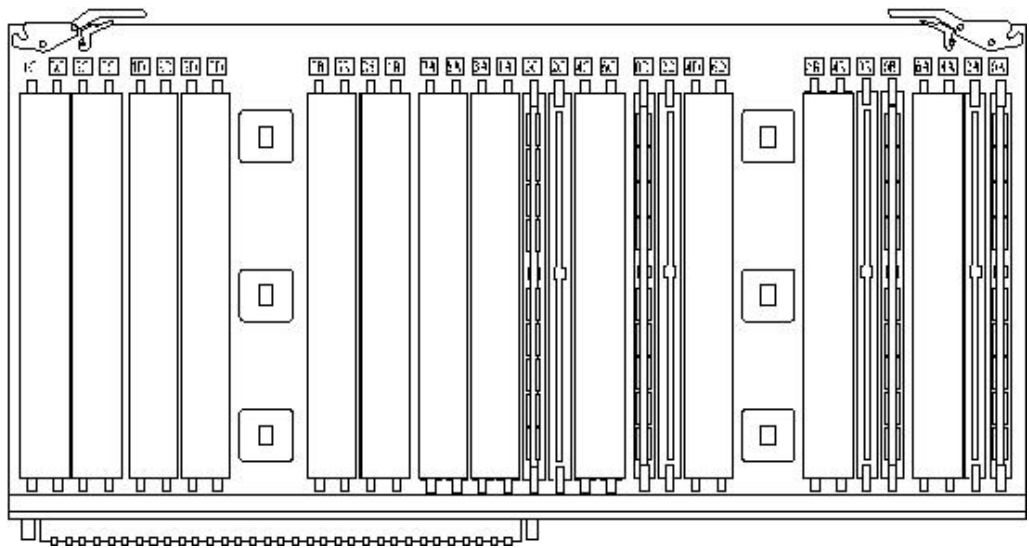
You can insert additional DIMMs into both 16- and 32- DIMM boards. When adding DIMMs, you must use a minimum of four like sized DIMMs in the next available quad.

Supported DIMM Sizes

You can install up to 128 GB of memory in the server. Supported DIMM sizes are as follows:

- 256 MB, 512 MB, 1 GB, 2 GB, 4 GB

Dissimilar DIMM sizes can be used across the extender board, but all four DIMMs in each quad must match. For cooling purposes, DIMM slot fillers must be used in some unused connectors.

DIMM Slot Fillers

Both the 16- and 32-DIMM extender boards have DIMM slot filler boards placed over all unfilled DIMM connectors. As you fill DIMM quads with additional memory you must remove the DIMM slot fillers covering the affected connectors. To maximize internal cooling, all remaining DIMM fillers in unused connectors must remain in place (Table 6-1).

NOTE: One DIMM filler board covers two adjacent DIMM connectors. Remove DIMM slot fillers as you add memory and the correct configuration will always remain.

Installing DIMMs

To install DIMMs, follow these steps:

1. Align the DIMM with the socket located on the memory extender board. Align the notch in the DIMM with the tab in the connector socket.

Figure 6-10 Inserting the DIMM into the Extender Board Connector Socket
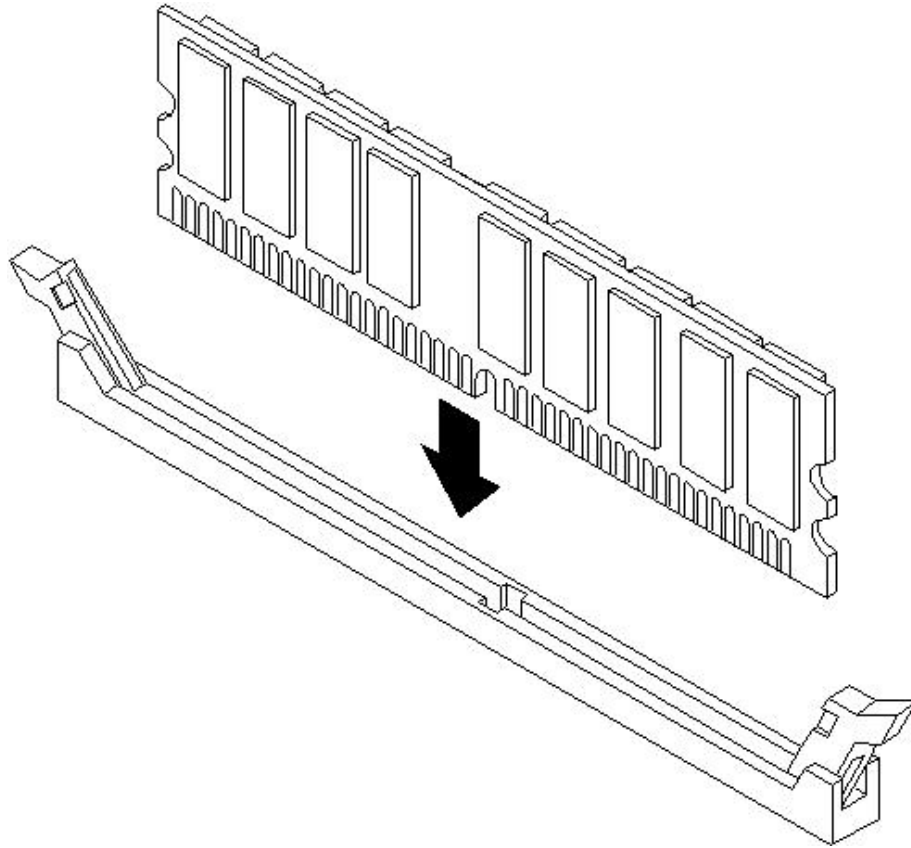
2. Firmly and evenly push on each end of the DIMM until it seats in the connector socket. Ensure that the extraction levers are in the closed position.
3. Replace the memory extender board in the chassis. See "Replacing the Memory Extender Board" (page 156).
4. Replace the front cover. See "Replacing the Front Cover" (page 153).
5. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

Processor Extender Board

The processor extender board is located under the front cover, directly beneath the memory extender board. The processor extender board can hold one to four dual processor modules.

⚠️ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the processor extender board.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠️ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Processor Extender Board

To remove the processor extender board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See .

📝 **NOTE:**   You can remove the processor extender board without removing the server from the rack.

2. Remove the front bezel. See .
3. Remove the front cover. See .
4. Press the latch on the extraction levers located on each side of the processor extender board.
5. To unplug the processor extender board from the socket located on the midplane riser board, pull out the extraction levers .

Figure 6-11 Processor Extender Board
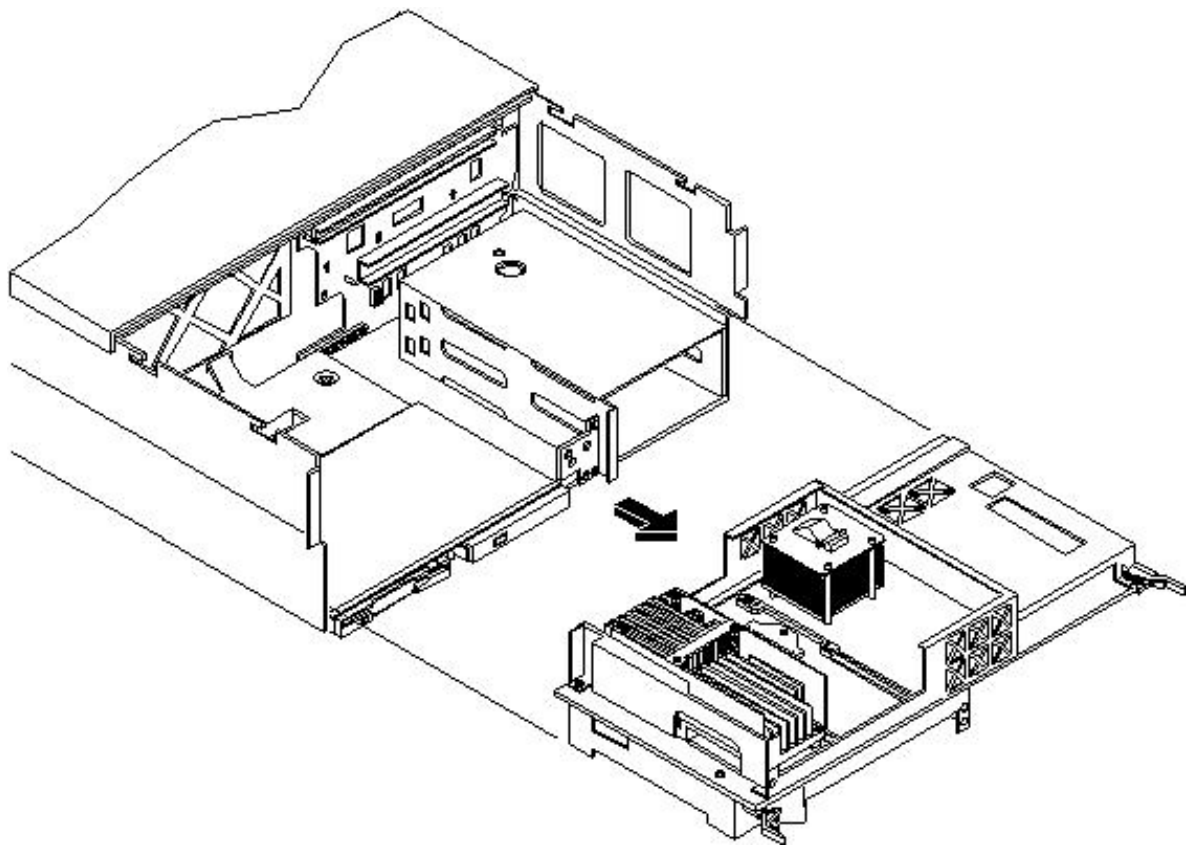
Replacing the Processor Extender Board

⚠ **CAUTION:** Your processor extender board can be used in Itanium or PA-RISC based systems. A dipswitch is provided to configure processor extender board circuits. Ensure that the dipswitch is set to PA RISC for the HP 9000 rp4410 or rp4440 servers. If this switch is set incorrectly, the system does not enter into power on self test (POST).

To replace the processor extender board, follow these steps:

1. Position the processor extender board as in Figure 6-12. There are two switch blocks.

Figure 6-12 Dipswitch Location
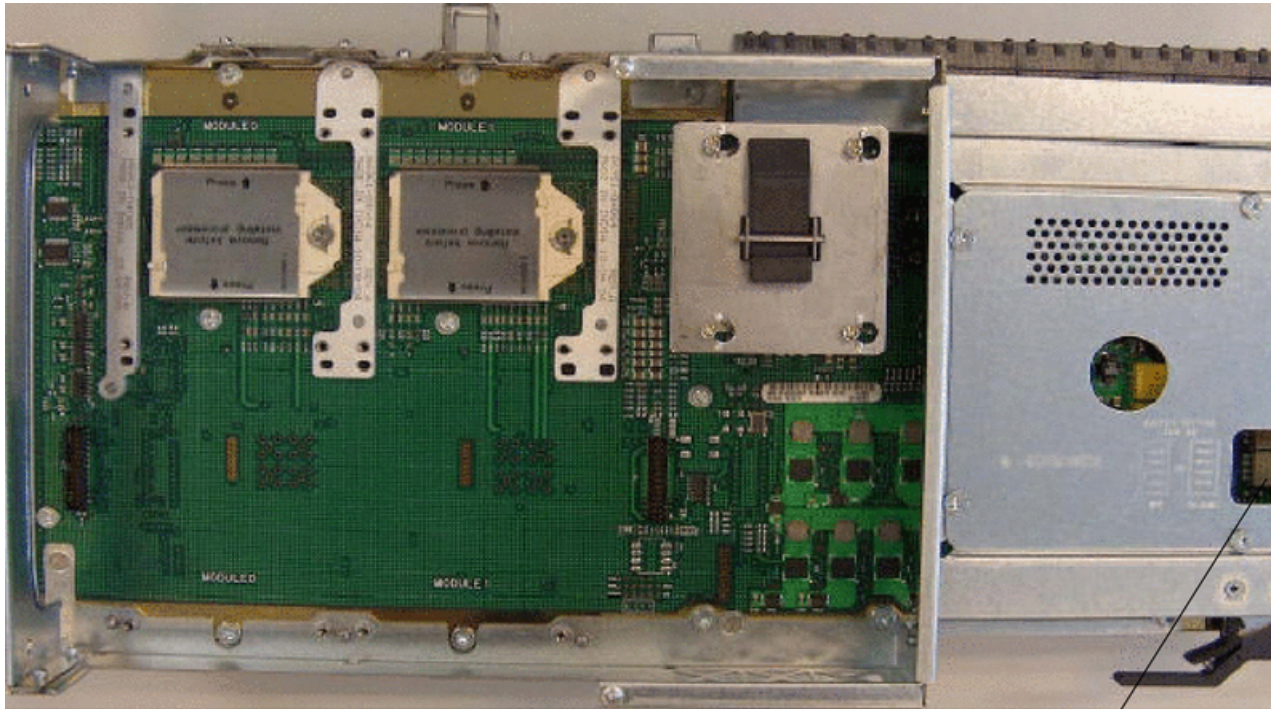
Lower switch block

2. Set the lower of the two blocks when the processor carrier is oriented with the extractor handles toward you.
   - Set the dipswitch to the right (ON) position for PA-RISC. Do not disturb switch banks 1 through 4 beneath the sheet metal.

Figure 6-13 Dipswitch Setting for S5
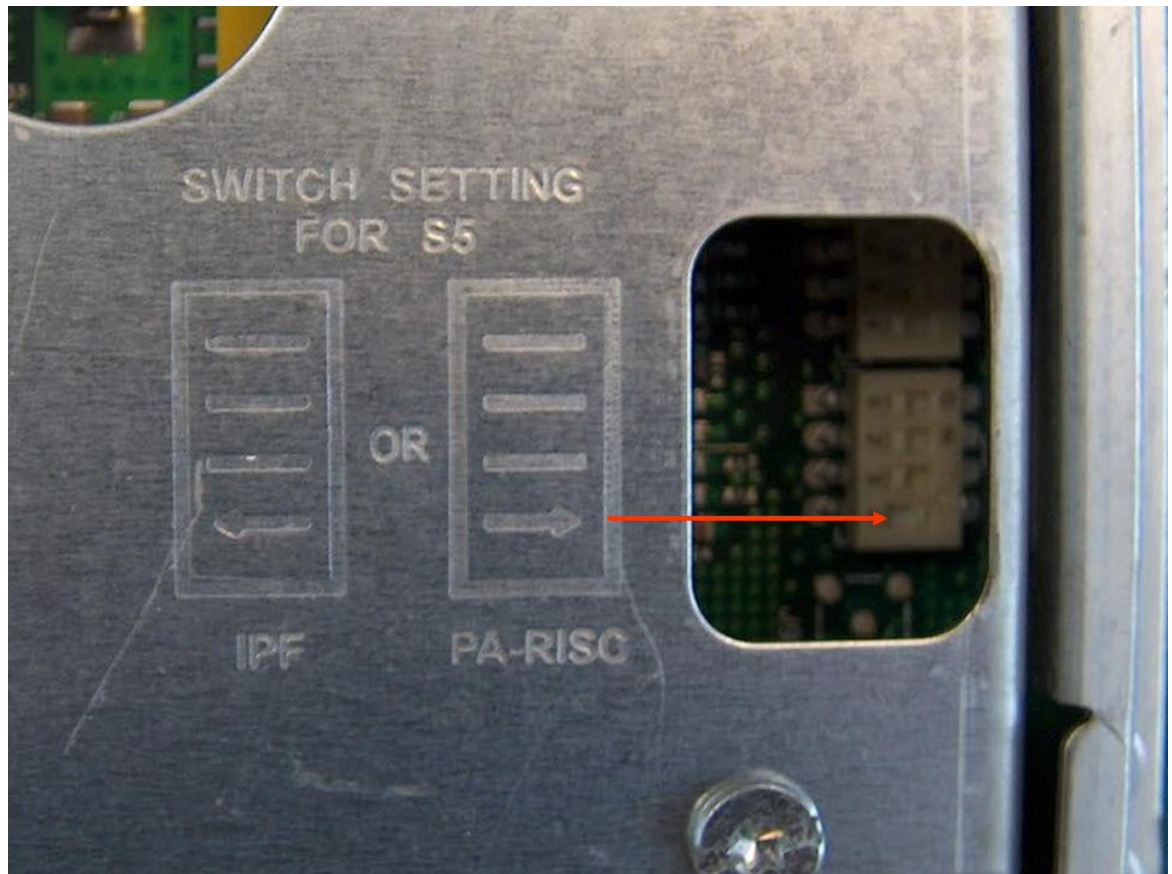
3. Align the processor extender board with the front and rear card guides.
4. Slide the processor extender board down until it begins to seat in the socket located on the midplane riser board.
5. To fully seat the processor extender board into the socket on the midplane riser board, push the extraction levers inward to the locked position.
6. Replace the front cover. See "Replacing the Front Cover" (page 153).
7. Replace the front bezel. See "Replacing the Front Bezel" (page 152).
8. Verify processor operation by using the system utilities.
   - To verify operation, use the iLO MP commands and the BCH commands.
   - To exercise the processor, use the MAKODIAG provided by the offline diagnostic environment.

Replacing Dual Processor Modules

Dual processor modules are located on the top and bottom surfaces of the processor extender board.

> ⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a processor.
>
> Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

> ⚠ **CAUTION:** Ensure that processor speed and cache size are identical for all processors. Failure to observe this caution results in performance degradation or system failure.
>
> The easiest way to ensure compatibility is to use dual processor modules with identical part numbers.

Dual Processor Modules

HP 9000 rp4410 and rp4440 servers use dual processor modules. That is, each module contains two processors. When only one processor is activated (a 1P/1C configuration of the HP 9000 rp4410 server), the second processor is installed but not enabled and is available for future use.

- The HP 9000 rp4410 server may contain one or two dual processor modules to provide 1/1C, 1P/2C, or 2P/2C configurations.
- The HP 9000 rp4440 server can contain one, two, three, or four dual processor modules to provide 1P/2C, 2P/2C, 3P/2C, or 4P/2C configurations.

If fewer than the maximum number of dual processor modules are to be installed, the modules must be installed in the appropriate connectors (see Table 6-3).

Processor Load Order

You can install up to four dual processor modules on the processor extender board, which is located under the front cover in the top service bay, directly under the memory extender board. If fewer than the maximum number of dual processor modules are to be installed (one in the HP 9000 rp4410 server or fewer than four in the HP 9000 rp4440 server), they must be installed in the designated locations on the processor extender board.

The connectors slots or sockets on the processor extender board are labeled CPU0 through CPU3. CPU0 and CPU1 connectors are located on the top of the processor extender board and CPU2 and CPU3 connectors are located on the bottom.

Table 6-3 describes the load sequence.

Table 6-3 Processor Load Order

Server	Dual Processor Module	Socket
rp4410 or rp4440	1	CPU0
rp4410 or rp4440	2	CPU1
rp4440 only	3	CPU2
rp4440 only	4	CPU3

△ **CAUTION:** Change only the user-configurable settings of the dipswitches on the processor extender board.

Removing a Dual Processor Module

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a processor.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

To remove a dual processor module from the processor extender board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Accessing a Rack-Mounted Server" (page 149).)
2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Removing the Front Cover" (page 152).
4. Remove the processor extender board from the chassis. See "Removing the Processor Extender Board" (page 161).
5. Unplug the processor cable from its socket on the extender board.
6. Using a Torx T15 driver, loosen the four T15 shoulder screws and the two knurled thumbscrews that attach the sequencer frame on the heatsink, until the sequencer frame is free.
7. Remove the sequencer frame from the heatsink.
8. Using a CPU Install Tool, unlock the assembly from the socket by rotating the cam on the socket 180 degrees counterclockwise.
9. Ensure the cam on the processor socket lock is in the unlocked, counterclockwise position.

10. Carefully remove the dual processor module from the processor socket. If protective pin covers are available, install the cover on the processor connectors to shield the connector pins. Place the dual processor module in an antistatic container.

Figure 6-14 Removing the Dual Processor Module from the Processor Extender Board

The loosening sequence for 4-shoulder screws is 1, 2, 3, 4.
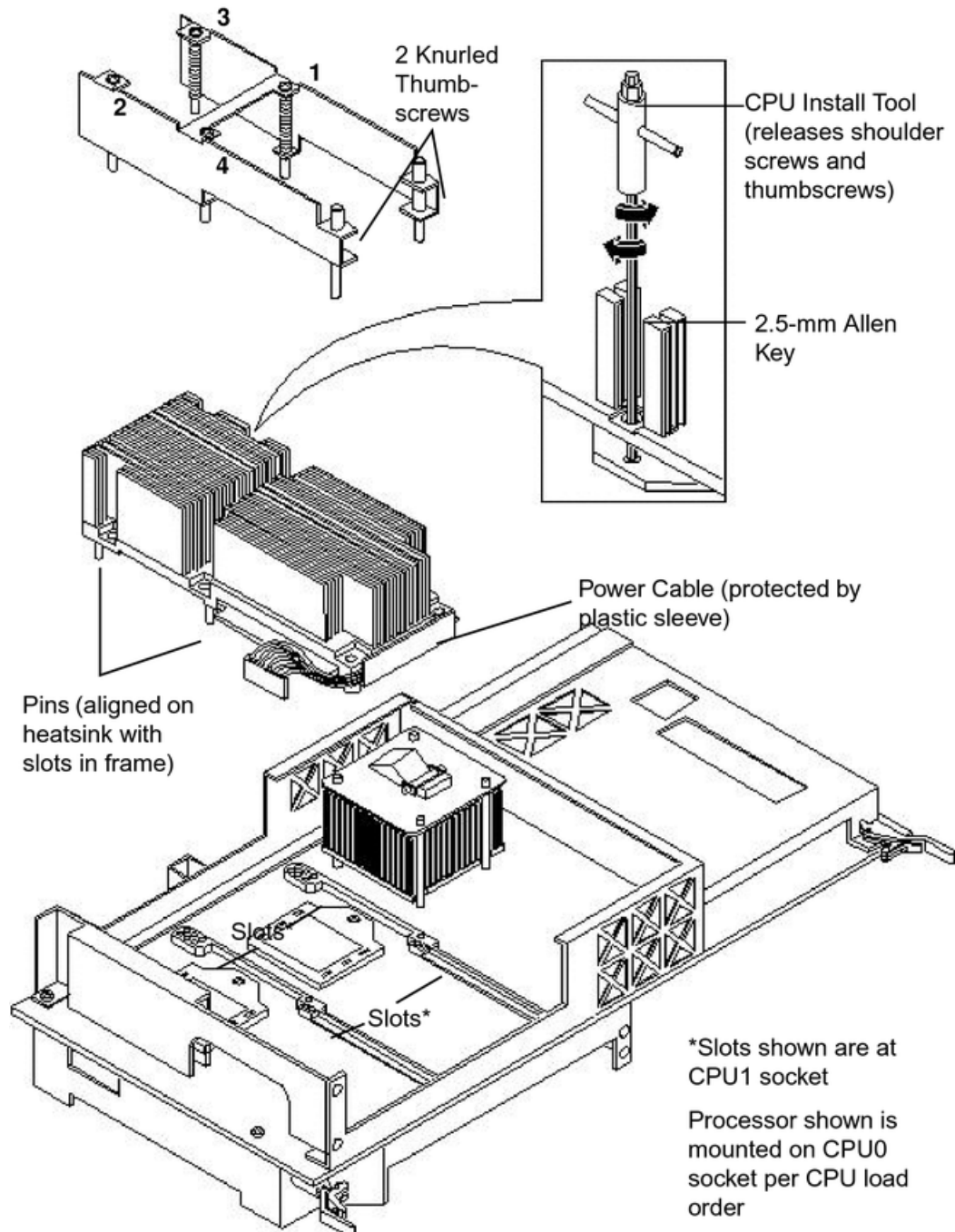
Installing a Dual Processor Module

NOTE: Before installing a dual processor module into your system, read the following instructions carefully and see Figure 6-18.

To install a dual processor module on the processor extender board, follow these steps:

1. Remove the processor extender board from the server and place it on an antistatic mat. See "Removing the Processor Extender Board" (page 161).
2. Locate the socket (CPU0, CPU1, CPU2, or CPU3) to install the dual processor module into. (Figure 6-15)

Figure 6-15 Locating the Socket in the Processor Extender Board
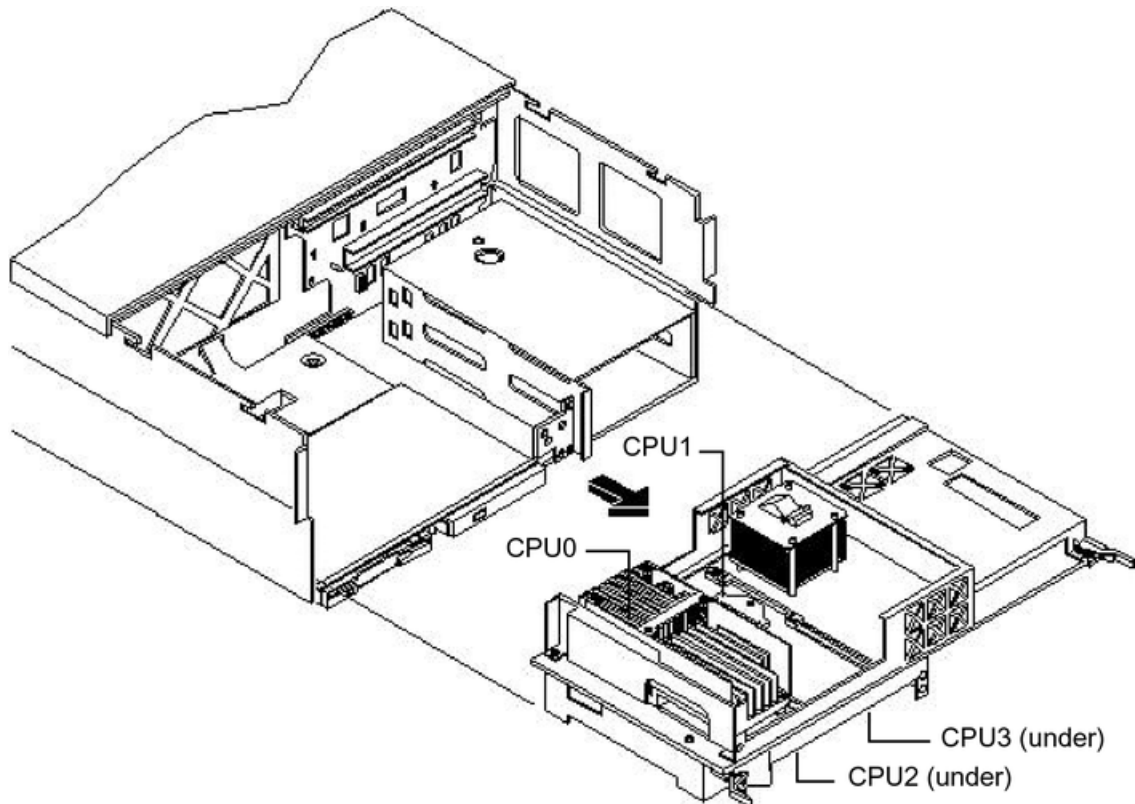
3. Ensure that the cam on the processor socket lock is in the unlocked, counterclockwise position.
4. Remove any protective packaging from the processor module.

TIP: Protective covers can be installed to protect connector pins. Save covers for future use.

---

5. Inspect the pins of the processor to be installed. Verify that the processor pins are not bent.

6. Carefully lower the processor, without the sequencer frame, onto the processor socket. Align the pins on the bottom of the heatsink to the slots in the retention frame on the extender board.

△ **CAUTION:**   Do not press the processor modules into the socket. When properly assigned, the processor pins seat into the socket by themselves. You can damage the pins if you apply pressure.

CAUTION: Before locking the processor assembly into its socket, ensure that the power cable is not pinched between the heatsink and sheet metal frame of the extender board. Also, ensure that the two power cable ends attached to the dual processor module do not come unplugged from their sockets when you move the cable into place under the heatsink (Figure 6-16 and Figure 6-17).

TIP: Test the alignment of the assembly to the socket by gently moving the assembly back and forth with the palm of your hand—feel little or no side play. However, because the assembly is not yet tightened, it can tilt slightly toward the center of the extender board—this is acceptable.

Figure 6-16 shows the processor cable placed correctly under the heatsink.

Figure 6-16 Processor Cable Placed Correctly

— Heatsink

— Cable Placed Correctly Under the Heatsink

— Protective Plastic Sleeve
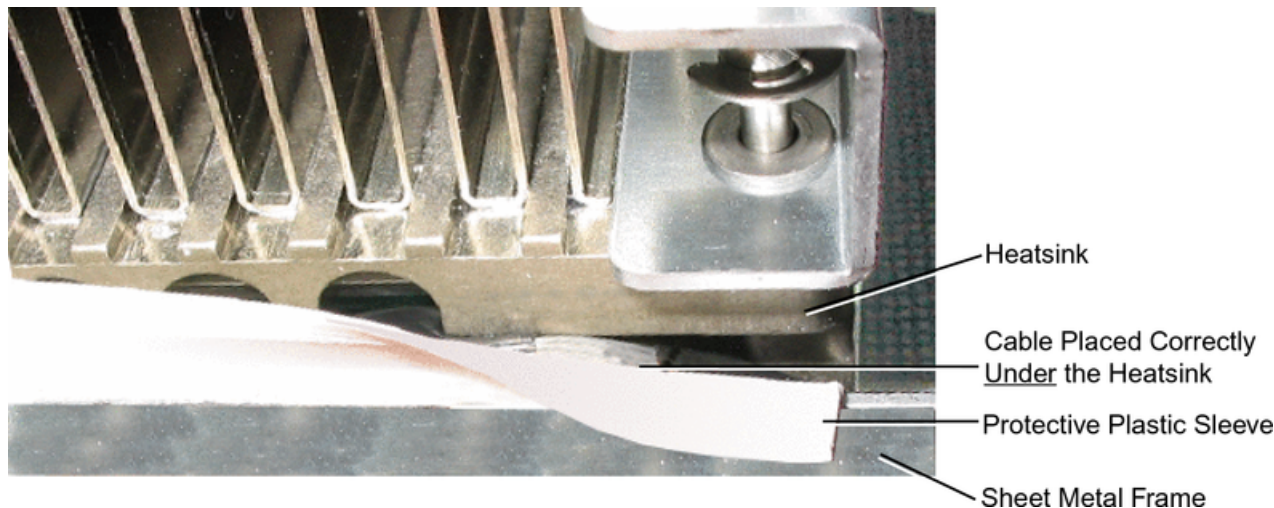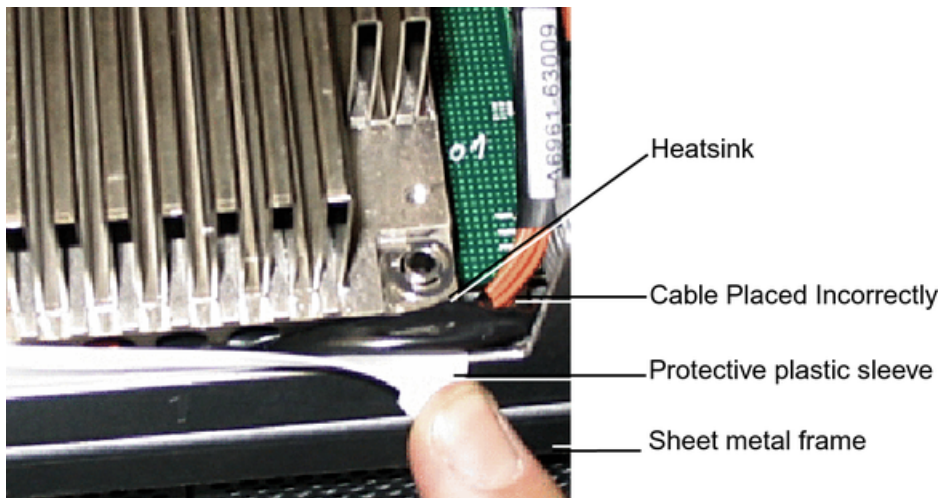
— Sheet Metal Frame

Figure 6-17 shows the processor cable placed incorrectly and is pinched between the heatsink and the extender board frame.

Figure 6-17 Processor Cable Placed Incorrectly

7. Using the CPU Install Tool 2.5-mm Allen wrench, lock the assembly to the socket by rotating the cam on the socket 180 degrees clockwise.

TIP: When rotating the locking cam, hold the palm of your hand on top of the assembly and exert light pressure. This ensures that the assembly stays flush and level to the socket while it is being tightened.

---

8. Plug the processor cable into its socket on the extender board.
9. Place the sequencer frame over the processor.
10. Using your fingers, hand-tighten the two knurled thumbscrews on the sequencer frame just until the screw stops turning.

NOTE: Do not tighten the other four shoulder screws until you have first hand-tightened the two knurled thumbscrews.

---

11. Using a CPU Install Tool (Torx T15 driver), tighten the four remaining T15 shoulder screws until they just bottom out. Follow the tightening sequence shown in Figure 6-18: " Installing the Dual Processor Module on the Processor Extender Board".

IMPORTANT: Do not overtighten the four shoulder screws. They can shear off if overtightened. Stop tightening the shoulder screws when you feel them just bottom out.

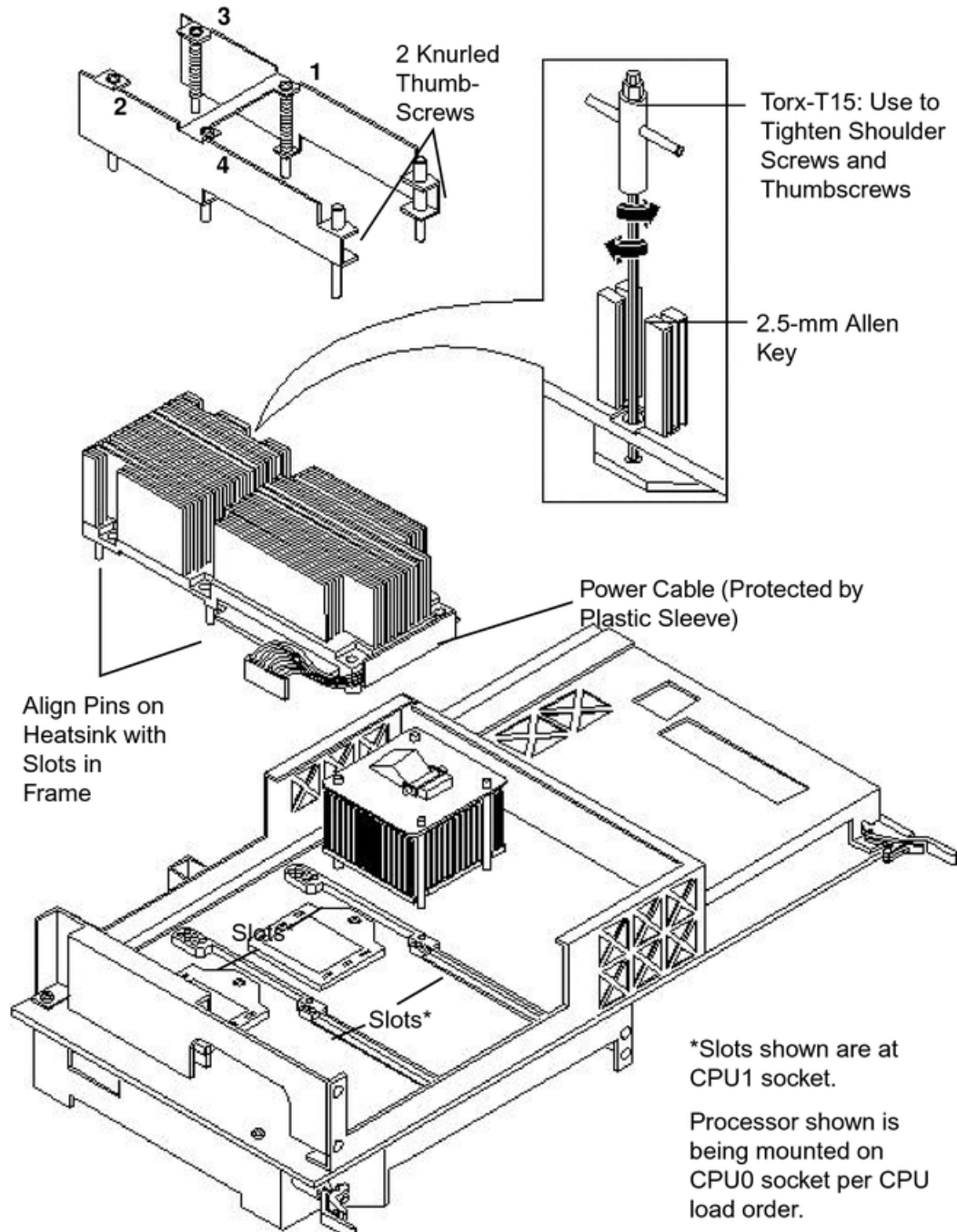12. Using the Torx T15 driver, finish tightening the two thumbscrews.

IMPORTANT: Do not overtighten the two thumbscrews. They can shear off if overtightened. Tightening the thumbscrews 1/4 turn tightens them sufficiently.

Figure 6-18 Installing the Dual Processor Module on the Processor Extender Board

Tightening sequence for 4-shoulder screws is 1, 2, 3, 4.

DO NOT OVERTIGHTEN (see step 7).

2 Knurled Thumb-Screws

Torx-T15: Use to Tighten Shoulder Screws and Thumbscrews

2.5-mm Allen Key

Power Cable (Protected by Plastic Sleeve)

Align Pins on Heatsink with Slots in Frame

Slots*

Slots*

*Slots shown are at CPU1 socket.

Processor shown is being mounted on CPU0 socket per CPU load order.

13. Replace the processor extender board in the server. See "Replacing the Processor Extender Board" (page 162).
14. Replace the front cover. See "Replacing the Front Cover" (page 153).
15. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

16. Verify processor replacement and operation by using the system utilities.)
    - To verify operation, use the iLO MP commands.
    - To verify operation, use the BCH commands.
    - To exercise the processor, use MAKODIAG provided by the ODE.

Hot-Swappable Chassis Fan Unit

There are three hot-swappable chassis fan units in the server. Fan units 0, 1, and 2 are in the center of the chassis spanning the full chassis width. Fan units 0 and 1 are interchangeable and are in the left and center positions. Fan unit 2 is smaller and only fits into the right-most position behind the power supply. The hot-swappable fans can be replaced using the procedures in this section when power is on or off.

⚠ **CAUTION:**   Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

📝 **NOTE:**   A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The ac power to the server does not need to be off to remove or replace a hot-swappable chassis fan unit.

Removing a Hot-Swappable Chassis Fan Unit

To remove a hot-swappable chassis fan unit, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover. See "Removing the Top Cover" (page 153).
3. Grasp the fan unit locking handle, tilt it up, and pull out the fan from the chassis.

**Figure 6-19 Hot-Swappable I/O Chassis Fans Removal and Replacement**
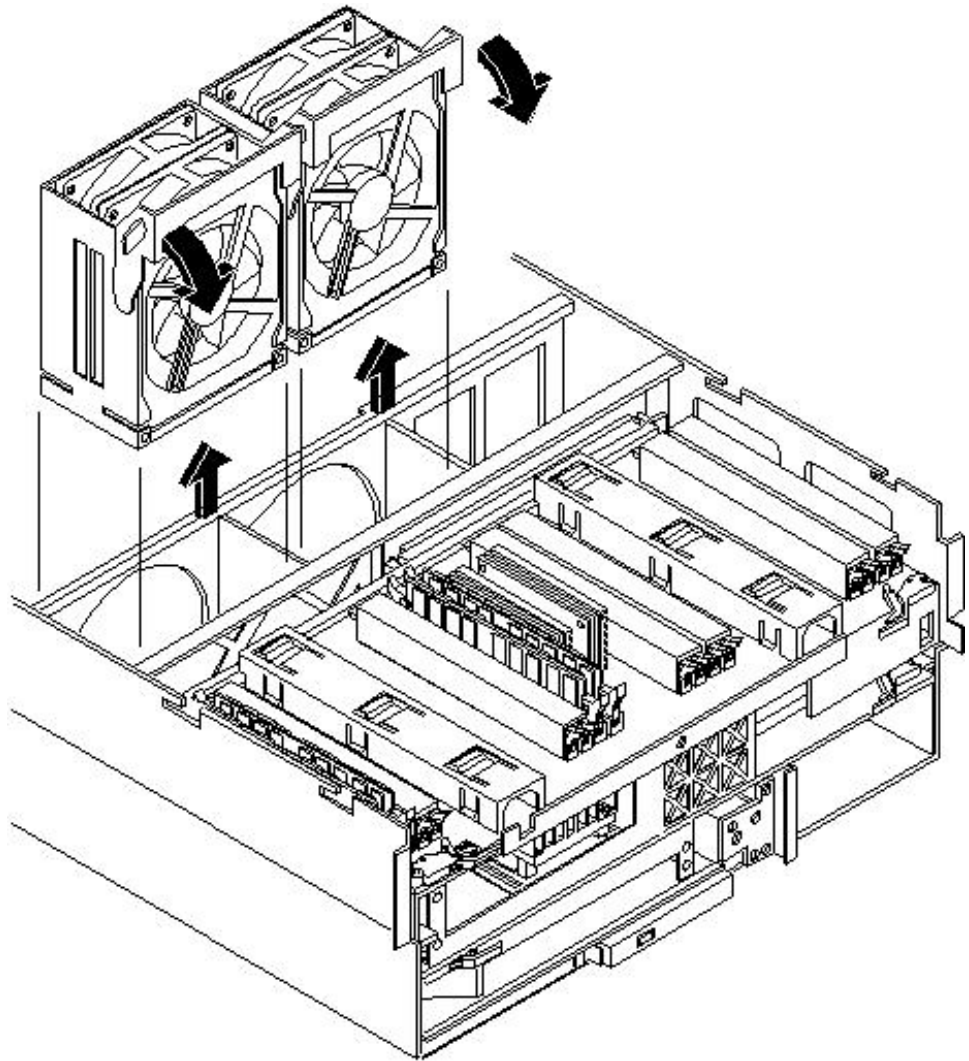
> 📝 **IMPORTANT:** When one fan unit is removed from the server, the remaining fan units operate at full speed. Operation will continue until an overtemperature condition is detected. If an overtemperature condition occurs, the server shuts down.

4. Repeat the same process for removal and replacement of the hot-swappable power supply chassis fan.

Figure 6-20 Hot-Swappable Power Supply Chassis Fan Removal and Replacement
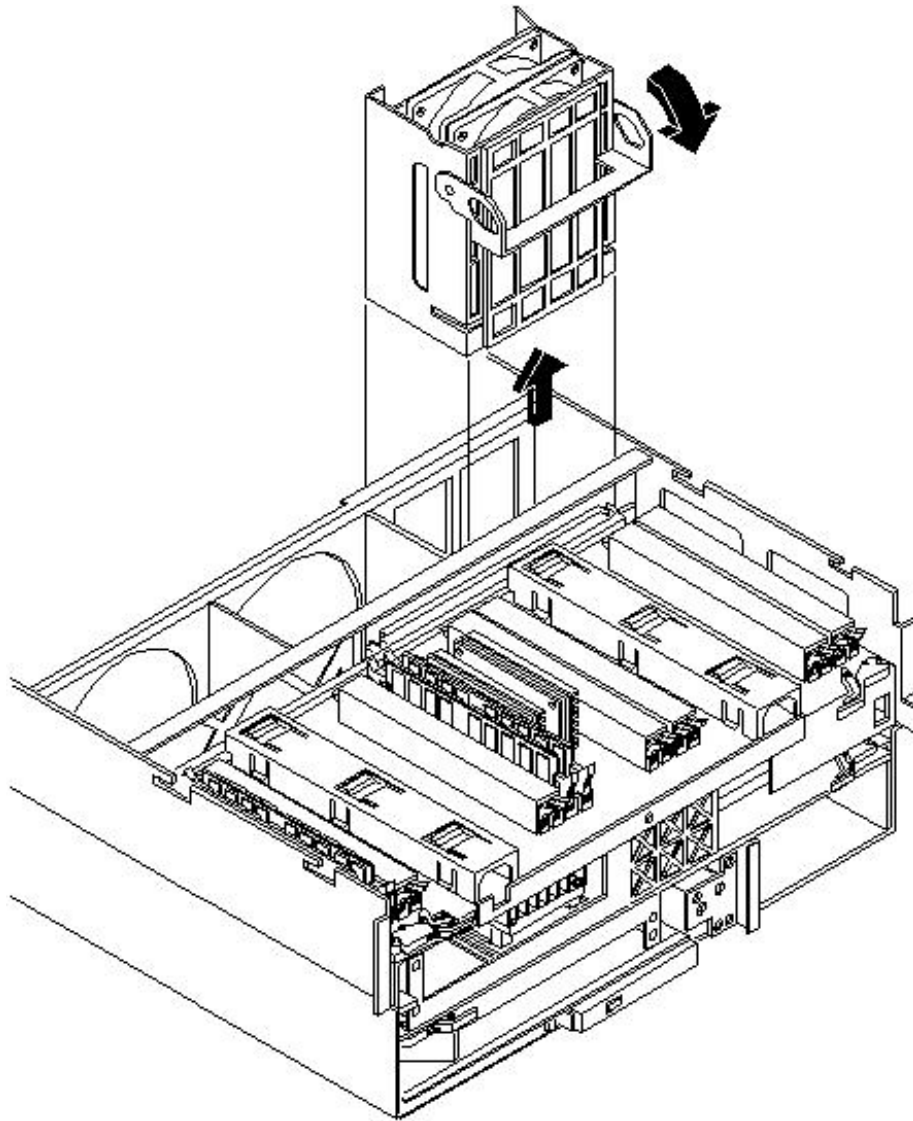
Replacing a Hot-Swappable Chassis Fan Unit

To replace a hot-swappable chassis fan unit, follow these steps:

1. Orient the fan unit by aligning the appropriate icon on the fan unit handle to the identical icon on the chassis wall. Fan units 0 and 1 have "circle" icons and fan unit 2 has a "square" icon.
2. Push the fan unit firmly into the housing and close the handle until flush to the top of the chassis. The fan unit plugs into the power outlet on the I/O baseboard.

⚠ **CAUTION:** If the fan unit handle does not close completely, it is misaligned. Remove the fan unit and check that the alignment icons are oriented correctly.

3. Check the QuickFind diagnostic panel LED indicating the replaced fan unit.
    *   When the fan functions normally, the LED is off
    *   When the fan fails, the LED is lit
4. Replace the top cover. See "Replacing the Top Cover" (page 154).

I/O Baseboard Assembly

System information is stored on the I/O baseboard assembly. If you are installing a new I/O baseboard assembly, you must write the serial number and model string information to the I/O baseboard after installation.

> ⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the I/O baseboard assembly.
>
> Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

> △ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure contact your local HP Authorized Service Provider.
>
> Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the I/O Baseboard Assembly

> 📝 **NOTE:**   PA 8900 CPUs require PDC greater than 44.21, which is loaded on A6961-67401 and A6961-69401 repair parts. A6961-67301 and A6961-69301 repair parts enables the system to boot to BCH where PDC must be updated to greater than 44.21.

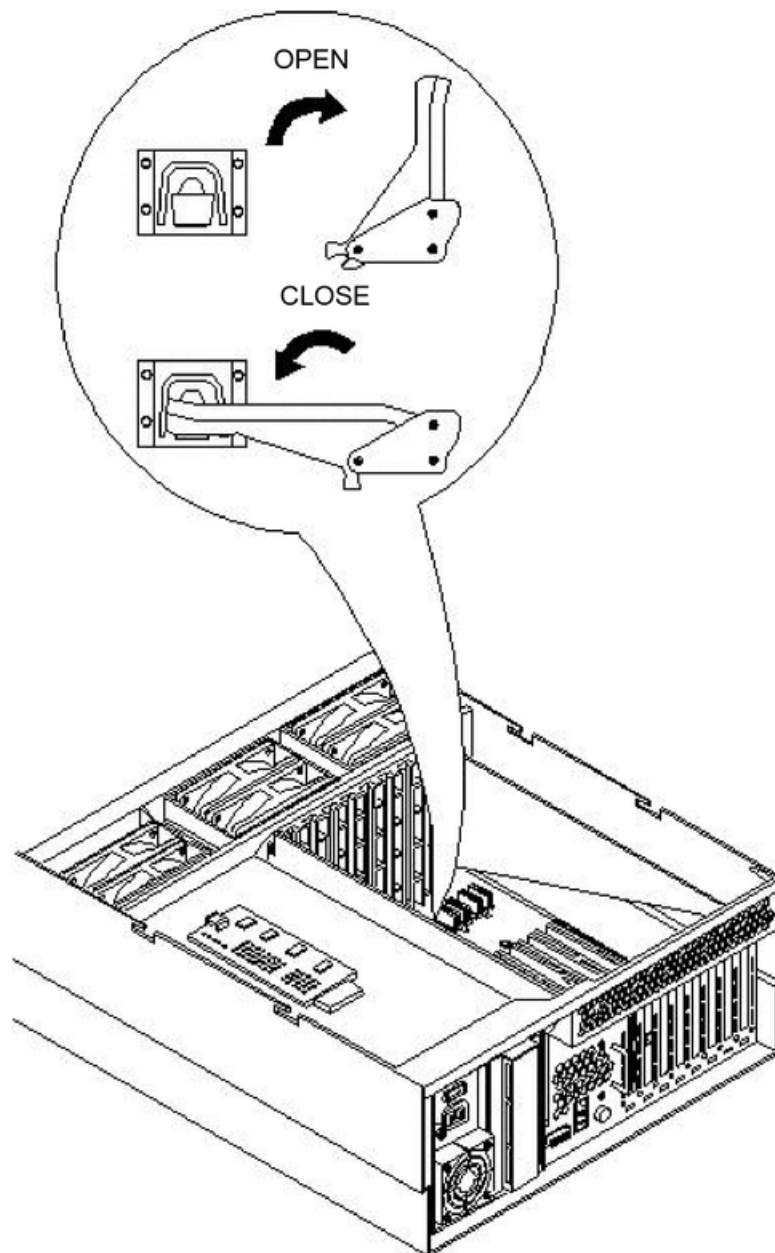To remove the I/O baseboard assembly, follow these steps:

1. Save (record) the boot configuration settings. The settings can be found using the `INFO ALL` BCH command . You may need to reset the iLO MP and boot configuration settings after replacing the I/O baseboard assembly.
2. Save iLO MP configuration settings. You can find the setting for the iLO MP LAN console access by using the iLO MP `LS` and `DNS` commands. If you purchased the iLO MP Advanced Licence pack, save the license key using the iLO MP `LM` command.
3. If rack-mounted, slide the server out from the rack until it stops. (See "Accessing a Rack-Mounted Server" (page 149).)
4. Remove the top cover. (See "Removing the Top Cover" (page 153).)
5. Remove the three chassis fan units. (See "Removing a Hot-Swappable Chassis Fan Unit" (page 172).)
6. Unplug all external cabling attached to the ports at the rear of the chassis.
7. Unplug the SCSI cables attached to the HBA board in PCI slot 1.

> △ **CAUTION:**   When unplugging the SCSI cables, note the labeling on the SCSI A and SCSI B channel cables. When plugging-in these cables, you must match each cable with its appropriate socket on the SCSI HBA. If the cables are mismatched your system may not reboot. Both cables and sockets are clearly marked with the correct channel.

8. To unplug the I/O baseboard from the socket on the midplane riser board, lift up on the locking lever attached to the side of the power supply cage.

Figure 6-21 I/O Baseboard Locking Lever

9. Slide the I/O baseboard assembly all the way to the rear until free from the chassis. To replace the I/O baseboard with a new assembly, remove the cover from the VGA port at the rear of the I/O board and save it to put onto the VGA port of the new baseboard. This VGA graphics port is not supported in the HP 9000 rp4410 or rp4440 servers.

📝 **NOTE:**   The I/O baseboard assembly is large. Be careful when lifting it out of the server chassis.

**Figure 6-22 I/O Baseboard Removal**
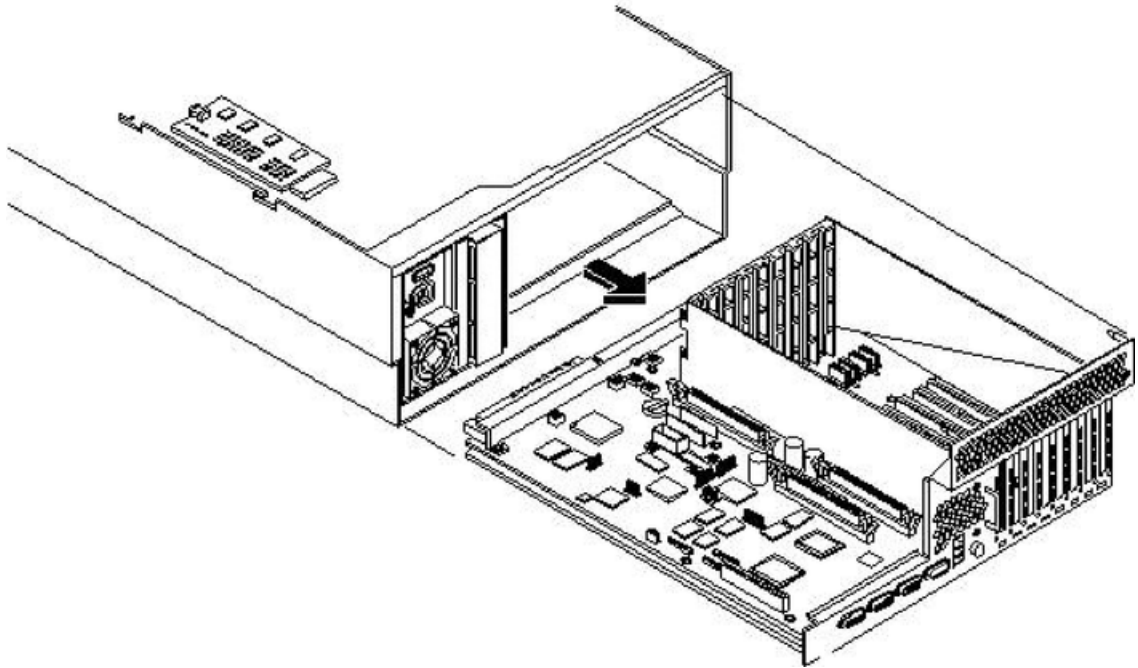
Replacing the I/O Baseboard Assembly

To replace the I/O baseboard assembly, follow these steps:

1. Before installing the replacement I/O baseboard, check the dipswitch S5102 located on top of the I/O baseboard. Dipswitch bit 1 must be in the Off position to disable the onboard Radeon graphics chip. If you do not disable the Radeon graphics chip, it appears as "unknown-unclaimed" in the `ioscan` output.
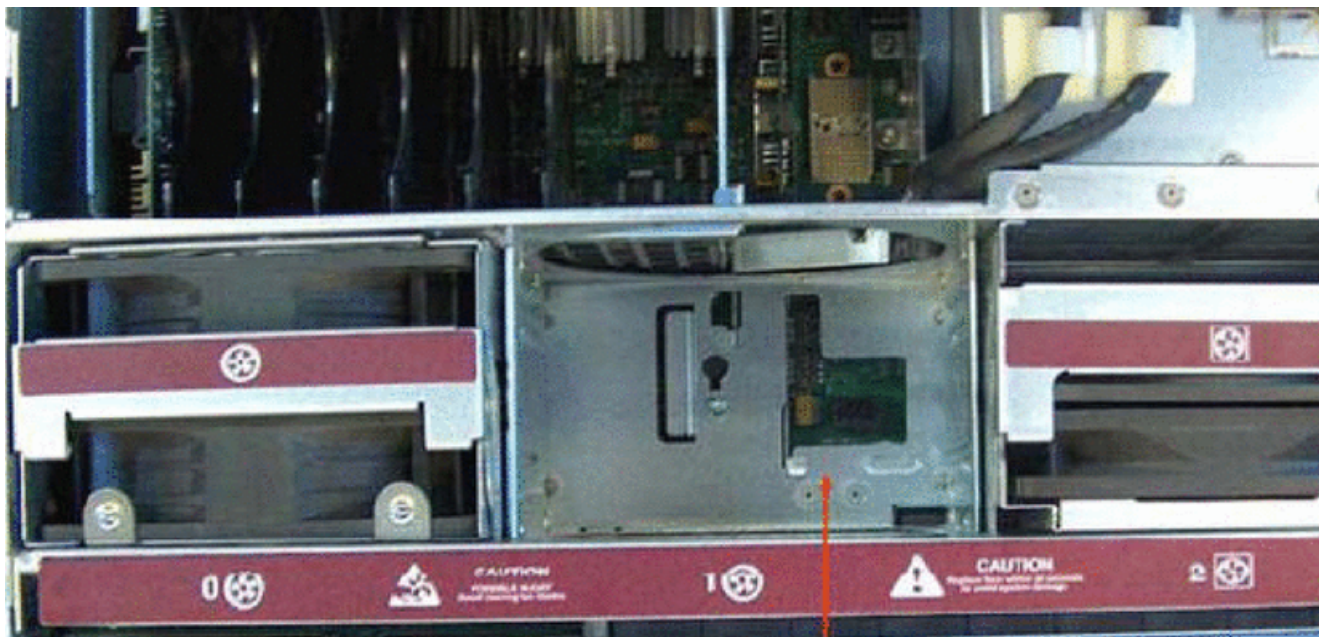
Figure 6-23 S5102 Dipswitch Setting

S5102 (Switch #1) VGA Dipswitch

Off
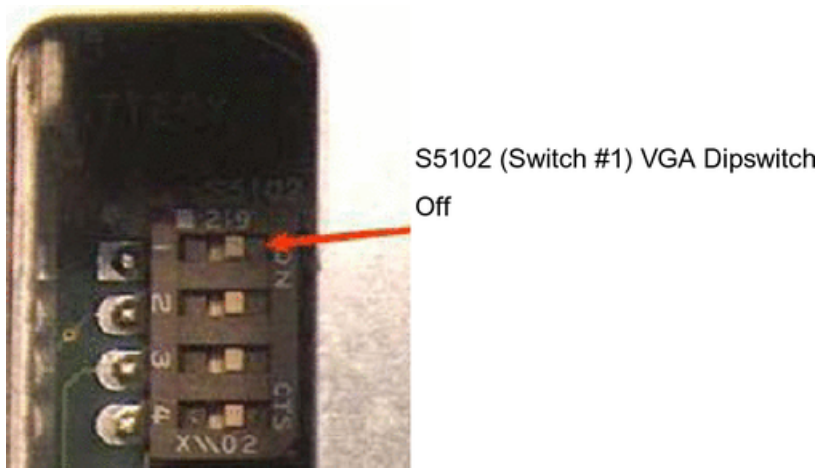
NOTE: The I/O baseboard is large. Use care when sliding it into the server chassis.

2. To disable the on-board Radeon graphics chip, set the S5102, #1 VGA dipswitch to the OFF position.

Figure 6-24 Accessing the S5102 Dipswitch

rp44x0 With Top Cover and Center Fan (Fan #1) Removed to Allow Access to I/O Baseboard VGA/CPU Dipswitches

3. Ensure that all fan modules are removed from the chassis before sliding in the I/O baseboard, or the fans and the I/O baseboard can be damaged.

4. Align the I/O baseboard assembly rails with the chassis slots and slide the assembly into the chassis until it stops against the midplane riser board socket.

△ **CAUTION:** Ensure the I/O baseboard locking lever is in the up position to engage correctly with the midplane riser board socket.

5. With the I/O board flush against the midplane riser board socket, push down firmly on the locking lever until the I/O baseboard plugs all the way into the midplane riser board socket and the locking lever clicks into place on the chassis wall (Figure 6-21).

6. Replace the three chassis fan units. See "Replacing a Hot-Swappable Chassis Fan Unit" (page 174).

7. Plug all external cables into the ports at the rear of the chassis.

△ **CAUTION:** When plugging the SCSI cables, note the labeling on the SCSI A and SCSI B channel cables. You must match each cable with its appropriate socket on the SCSI HBA. If the cables are mismatched, your system may not reboot. Both cables and sockets are clearly marked with the correct channel.

8. Plug the internal SCSI cables into the HBA board in PCI slot 1.

9. Replace the top cover. See "Replacing the Top Cover" (page 154).

10. Reconnect all power and external cables.

11. Turn on the server.

12. If you have installed a new I/O baseboard assembly, you must write the serial number and model string data to the new I/O board. To write the data to the new board, follow these steps:

    a. Locate the system serial number and note it for use in the following steps. The system serial number can be found in the following two places:

    - At the right of the front bezel, above and immediately to the right of the disk drives, locate the pull tab and extend the tab from the server to display product information. A label containing the system serial number is attached to the pull tab.
    - A label containing the system serial number is located on the right side of the chassis as you face the server.

    b. Monitor system startup on a terminal.

    c. To display the service menu, enter the SER command at the BCH prompt.

    d. To access server information, enter the **SER_INIT** command.

    - To enter the original product and serial number, use the **SERN** command.
    - For PRODUCT NUMBER, enter the appropriate number (typically A9956A, A9951A, and so on).
    - For SYSTEM SERIAL NUMBER, enter the serial number from the pull tab or from the side of the chassis.
    - For MODEL STRING, enter the model string value applicable to your system. Valid choices are as follows:
      - 9000/800rp4440 PA8800 dc
      - 9000/800rp4440 PA8900 dc
      - 9000/800rp4410 PA8900 dc- Max 4 Core
      - 9000/800rp4410#1 PA8900 dc- 1 Core

    When prompted for approval, enter **y**.

    e. To reset the system, enter the **reset** command.

    f. Reset the server time and date, and restore the iLO MP configuration settings as described in the following step.

13. If you have installed a new battery on the I/O baseboard assembly or installed a new I/O baseboard assembly, you might need to set the server time and date and restore the iLO MP configuration settings. To set the time and date and restore the iLO MP configuration settings, follow these steps:

    a. Using the system console, set the system time and date using the BCH DATE command.

    b. Using the system console, configure the iLO MP. Incorporate settings saved before removing the I/O baseboard assembly or set up the iLO MP as needed. For additional information about using the iLO MP, see the *HP Integrity and HP 9000 iLO MP Operations Guide*.

14. Verify the system board replacement and operation by using the system utilities. If you have set the time and date and configured the iLO MP, the I/O baseboard assembly is installed and operating correctly. If you have not yet set the time and date or configured the iLO MP:

    • To verify operation, use the iLO MP commands.
    • To verify operation, use the BCH commands.

Removing and Replacing the I/O Baseboard Locking Lever

The I/O baseboard locking lever is comprised of the plastic lever, a label on the lever, and a metal spring inside the lever.

To remove the I/O baseboard locking lever, follow these steps:

1. Remove the I/O baseboard assembly. See "Removing the I/O Baseboard Assembly" (page 175).
2. Use a T15 torx screwdriver to remove all three screws from the metal plate on the locking lever.
3. Lift the metal plate off the plastic locking lever (make note of how the plate is positioned on the lever).
4. Keep the metal cover and the screws together. You will use them to install the replacement lever.

To replace the I/O baseboard locking lever, follow these steps:

1. Place the metal plate on the locking lever using the position of the screw holes on the locking lever to align with the holes on the metal plate. Make sure to position the metal plate on the lever so the part of the lever with spring fits between the grove on the metal plate.
2. Line the screw hole on the metal plate that is closest to the grove with the mounting hole on the plastic lever.
3. Mount the lever on the standoff making sure to align the holes.
4. Insert and tighten the three screws.
5. Replace the I/O baseboard assembly. See "Replacing the I/O Baseboard Assembly" (page 177).

System Battery

This section provides information and procedures for replacing the system battery.

Battery Notice

This product contains a Lithium battery.

> ⚠ **WARNING!** Lithium batteries can explode if mistreated. Do not recharge, disassemble, or dispose of lithium batteries in a fire. Failure to observe this warning can result in personal injury or damage to equipment.

Replace the battery with only the identical or equivalent battery. Follow the manufacturer's recommendations. Dispose of used batteries according to the manufacturer's instructions.
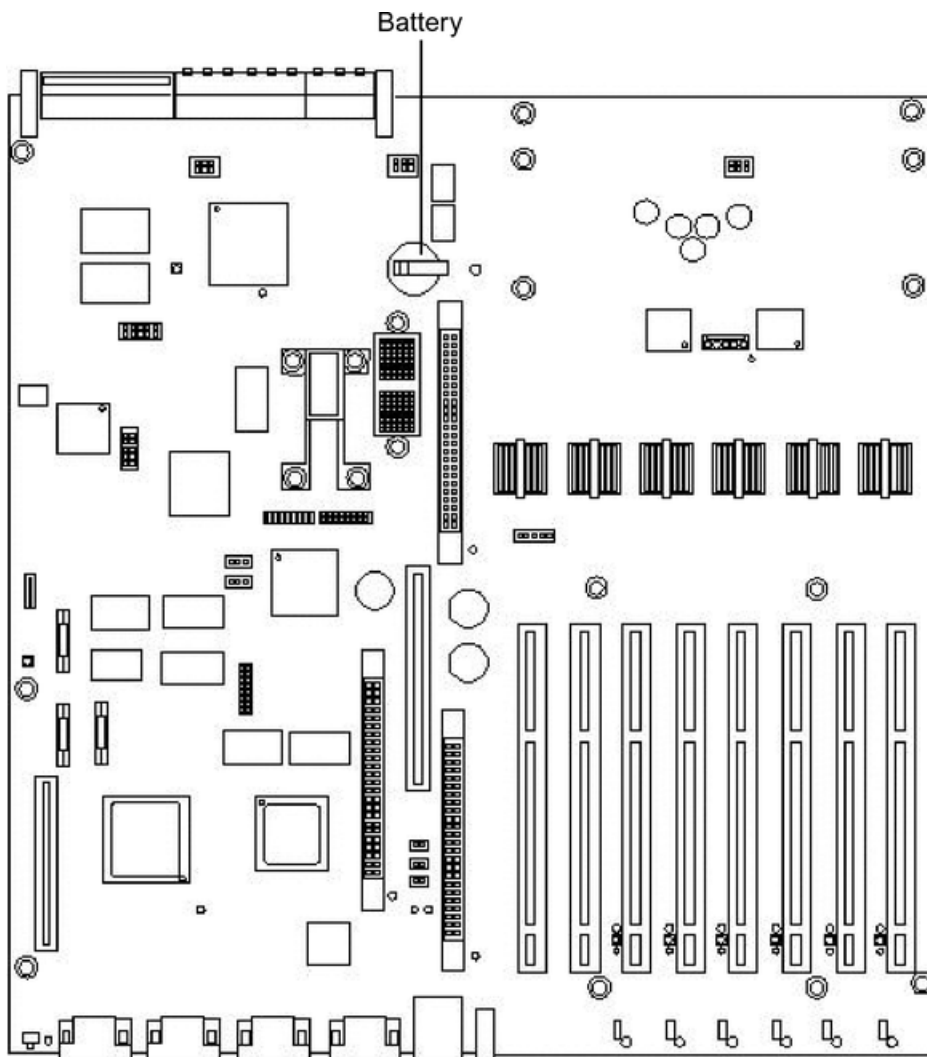
Replacing the System Battery

> ⚠ **CAUTION:** Before removing the system battery, record all boot and LAN configuration settings listed by the BCH INFO ALL command. These values need to be reset after replacing the battery.

To remove and replace the system battery, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).
3. Remove the I/O baseboard assembly from the chassis. See "Removing the I/O Baseboard Assembly" (page 175).
4. Locate the system battery on the I/O baseboard.

Figure 6-25 Battery Location on the I/O Baseboard

5. Lift up on the battery holder retaining clip with a flat head screwdriver and slide the new battery out of its socket.
6. Install the new battery by lifting up on the battery holder retaining clip with a flat head screwdriver and sliding the battery into its socket.

7. Replace the I/O baseboard assembly. See "Replacing the I/O Baseboard Assembly" (page 177).
8. Replace the top cover. See "Replacing the Top Cover" (page 154).
9. Reset the server time and date, and restore the iLO MP configuration settings. Proceed as follows:
   a. Using the system console, set the system time and date using the BCH DATE command.
   b. Using the system console, configure the iLO MP. Incorporate settings saved before removing the I/O baseboard assembly or set up the iLO MP as needed. (For additional information about using the iLO MP, see the *HP Integrity and HP 9000 iLO MP Operations Guide*).

Removing and Replacing PCI/PCI-X Cards

HP 9000 rp4410 and rp4440 servers can contain up to eight PCI/PCI-X cards. PCI/PCI-X cards are located on the I/O baseboard assembly, under the top cover. Two of these cards are dedicated to I/O functions and require that the server be powered off for card replacement. The remaining six PCI/PCI-X cards can be hot-plugged (replaced while power is on and the system is operating). This section describes hot-pluggable operations and PCI/PCI-X card replacement and addresses the following topics:

- PCI/PCI-X Configurations

  Describes PCI/PCI-X capabilities and relates card functions and capabilities to specific slots.

- Online Addition (OLA)

  Installing new PCI/PCI-X expansion cards in empty slots without powering off the server.

- Online Replacement (OLR)

  Replacing a PCI/PCI-X card without powering off the server. This action requires suspending the associated driver. The existing driver for the old card must be compatible with the new card.

CAUTION: A special OLR requirement for HP-UX 11i v1 (and higher) is that the card to be replaced must be exactly the same as the removed card. This is also called like-for-like replacement.

- PCI/PCI-X Slot Location (Locate)

  To easily locate the PCI/PCI-X slot at which to perform a hot-pluggable operation, you can command the attention LEDs on the OLX divider and the I/O baseboard to blink and act as visual cues to the active slot location. This operation is always initiated through a software or web interface, and is optional to the operating system on the server.

PCI/PCI-X Configurations

PCI/PCI-X slots are numbered from 1 through 8 in the server.

Figure 6-26 Slot ID Numbering
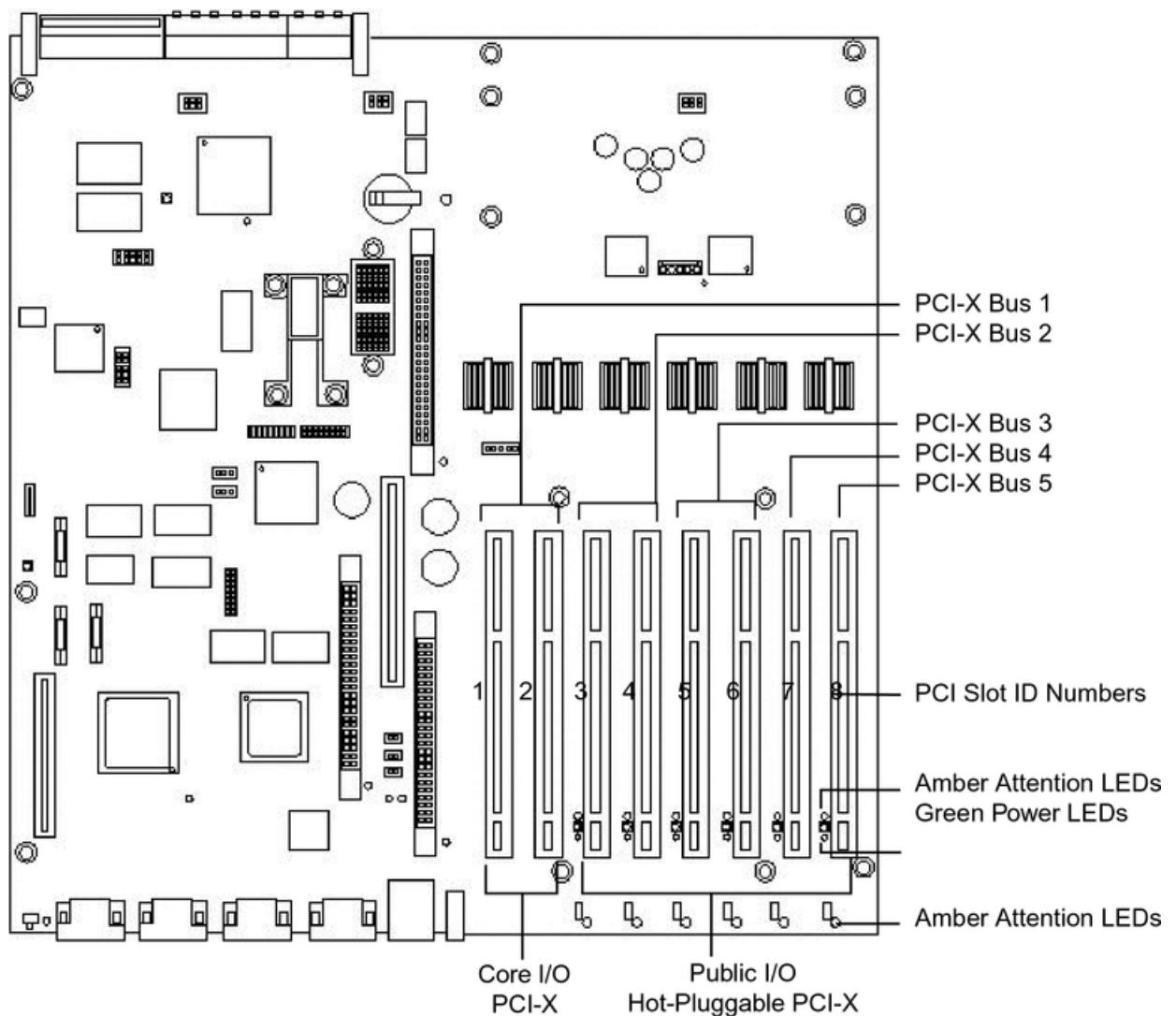
The following describes configuration requirements for slots 1 through 8:

- PCI-X slots 1 and 2 are dedicated for use by the core I/O cards: SCSI HBA card in slot 1 and Gigabit Ethernet LAN card in slot 2. Slots 1 and 2 are **not** hot-pluggable. Additional PCI/PCI-X expansion cards cannot be placed in slots 1 or 2.

- Slots 3 and 4 share a PCI-X bus, and slots 5 and 6 share a PCI-X bus. The maximum capability of each of the shared slots is PCI/PCI-X 66 MHz. If a PCI/PCI-X 133 MHz card is placed in a shared slot, the PCI/PCI-X 133 MHz card runs at a maximum of 66 MHz. If different modes (PCI versus PCI-X) or slower speeds (33 MHz) are used, the slot automatically downgrades to accept the change.

  Shared slots have card compatibility restrictions. If one of the shared slots is occupied, the card being added to the second slot is limited by the configuration of the occupied slot. If the new card has a slower capability than the current bus configuration, it cannot work. If the new card has a faster capability than the current bus configuration, it runs at the bus mode and frequency of the current bus configuration.

- Slots 7 and 8 are single slots. The maximum capability of each slot is PCI-X 133 MHz. Only slots 7 and 8 enable 133 MHz, PCI-X cards to run at full speed. These two slots are not limited by bus-mode or frequency-related incompatibilities.

Table 6-4 lists the PCI/PCI-X cards vs. slot frequency/bus mode compatibility for shared slots.

Table 6-4 PCI/PCI-X Card Slot Frequency and Bus Mode Compatibility for Shared Slots[1]

Current PCI Bus Mode and Frequency for the Current Card in a Shared Slot	Cards to be installed			
	PCI 33 MHz	PCI 66 MHz	PCI-X 66 MHz	PCI-X 133 MHz
PCI 33 MHz	Compatible[2]	Compatible[2] New card running at 33 MHz	Compatible[2] New card running at 33 MHz	Compatible[2] New card running at 33 MHz
PCI 66 MHz	Incompatible frequency[3]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz
PCI-X 66 MHz	Incompatible frequency[3]	Incompatible bus[4]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz
PCI-X 133 MHz[5]Running at PCI-X 66 MHz)	Incompatible frequency[3]	Incompatible frequency[3]	Compatible[2] New card running at 66 MHz	Compatible[2] New card running at 66 MHz

1   The conditions described in this table apply only to shared slots (slots 3 and 4 on bus number 2, slots 5 and 6 on bus number 3). Slots 7 and 8 are not shared slots.

2   Compatible: card is accepted and runs at the frequency shown.

3   Incompatible frequency: card does not work.

4   Incompatible bus: Card does not work. The new card does not initialize and powers off.

5   Maximum bus mode and frequency supported on shared slots is PCI-X 66 MHz.

PCI/PCI-X Card Path Logging

Some PCI/PCI-X failures result in I/O path logging. These paths help to indicate the source of the error and may be included in the error message or logged into console or event logs.

Table 6-5 describes the PCI I/O paths for the server.

Table 6-5 PCI I/O Paths

Slot	Function Associated with Path	Location	ACPI Path
Slot 1 (core I/O SCSI)	Ultra 160/320 dual-channel SCSI or RAID HBA	Leftmost slot (nearest to center of baseboard)	0/1/1/0 Channel A 0/1/1/1 Channel B
Slot 2 (core I/O LAN)	Single or Dual-port Gigabit LAN	2nd from left	0/1/2
Slot 3	I/O with 66 MHz 64-bit PCI-X card (shared with slot 4)	3rd from left	0/4/1
Slot 4	I/O with 66 MHz 64-bit PCI-X card (shared with slot 3)	4th from left	0/4/2
Slot 5	I/O with 66 MHz 64-bit PCI-X card (shared with slot 6)	5th from left	0/5/1
Slot 6	I/O with 66 MHz 64-bit PCI-X card (shared with slot 5)	6th from left	0/5/2
Slot 7	I/O with 133 MHz 64-bit PCI-X card	7th from left	0/2/1
Slot 8 (right)	I/O with 133 MHz 64-bit PCI-X card	Right-most slot (nearest to edge of baseboard)	0/6/1

Table 6-6 describes the PCI I/O hardware paths for the server.

Table 6-6 PCI I/O Hardware Paths

PCI Card Functionality	Mapper Path	HP-UX Path	PCI Bus Address
USB Port 1	0/0/2/0	0/0/2/0	0x00-0x1F
USB Port 2	0/0/2/1	0/0/2/1	0x00-0x1F
DVD Drive	0/0/3/0.0.0	0/0/3/0.0.0	0x00-0x1F
IDE Controller	0/0/3/0	0/0/3/0	0x00-0x1F
Internal SCSI - Slot 1 simplex configuration	0/1/1/0.0.0	0/1/1/0.0.0	0x20-0x3F
Internal SCSI - Slot 1 duplex configuration	0/1/1/0.0.0	0/1/1/0.0.0	0x20-0x3F
Internal SCSI - Slot 2	0/1/1/0.1.0	0/1/1/0.1.0	0x20-0x3F
PCI Slot 1 - Channel A SCSI	0/1/1/0	0/1/1/0	0x20-0x3F
PCI Slot 1 - Channel B SCSI	0/1/1/1	0/1/1/1	0x20-0x3F
PCI Slot 1 - Channel B external SCSI	0/1/1/1.x.y	0/1/1/1.x.y	0x20-0x3F
PCI Slot 2 - GigaBit LAN Port A	0/1/2/0	01/2/0	0x20-0x3F
PCI Slot 2 - GigaBit LAN Port B	0/1/2/1	0/1/2/1	0x20-0x3F
PCI Slot 3	0/4/1	0/4/1	0x80-0x9F
PCI Slot 4	0/4/2	0/4/2	0x80-0x9F
PCI Slot 5	0/5/1	0/5/1	0xA0-0xBF
PCI Slot 6	0/5/2	0/5/2	0xA0-0xBF
PCI Slot 7	0/2/1	0/2/1	0x40-0x7F
PCI Slot 8	0/6/1	0/6/1	0xC0-0xFF
UPS Communications Controller	0/0/1/0	0/0/1/0	0x00-0x1F
Local/Remote Serial Controller	0/0/1/1	0/0/1/1	0x00-0x1F

OLA

Before installing a PCI/PCI-X card, ensure that the proper drivers for that PCI/PCI-X card are installed.

📝 **NOTE:** If you are installing the Graphics Kit A6150B, use slots 3-8. However, do not install the included USB card. The server currently supports USB and the ports are already located on the rear of the server.

If you are installing the RAID card A7143A, you must install it into slot 8. If you install this card in any other slot, it interferes with the manual retention latch (MRL) on the OLX divider in the next slot. Because of this interference, you can install only two RAID cards in the system in slot 1 and slot 8.

To add a PCI/PCI-X card into an empty slot, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).
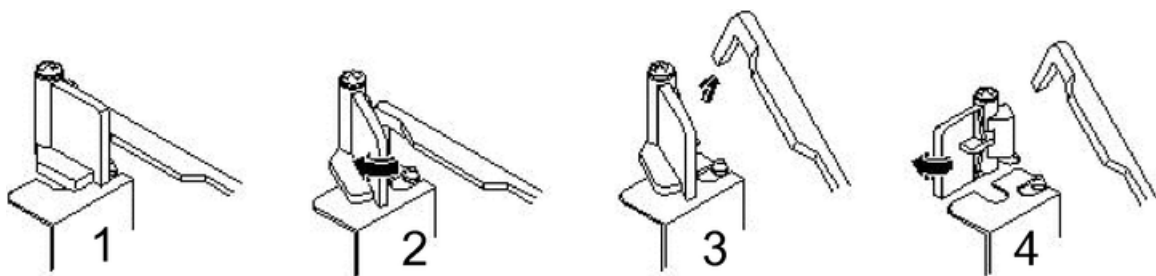
3. Select an empty slot and pull up on the MRL located on the OLX divider approximately 75 degrees.

⚠ **CAUTION:** Do not pull up on the MRL of a powered on, occupied slot or your system will crash.

Figure 6-27 PCI/PCI-X OLX Divider Layout
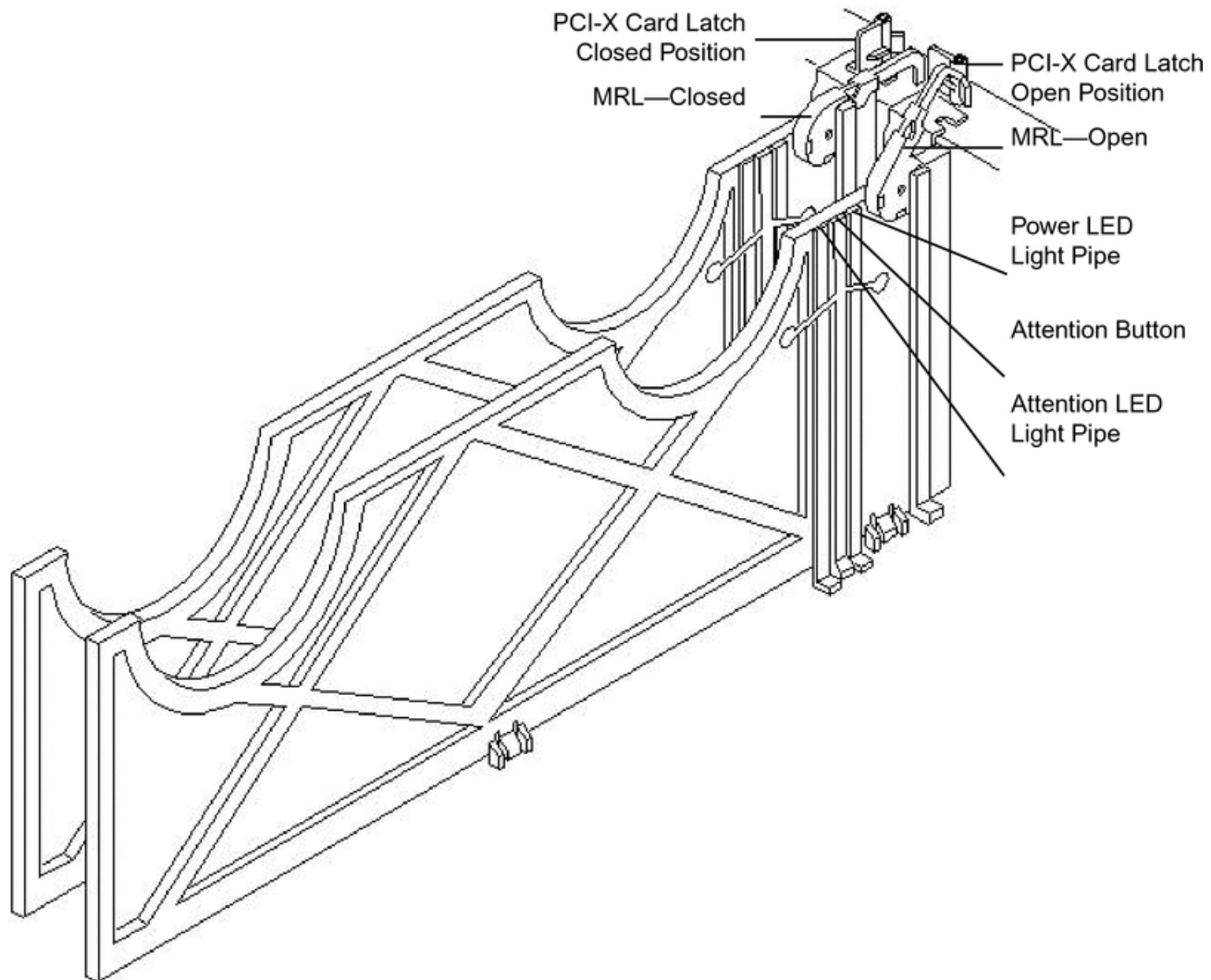
Figure 6-28 PCI-X Card Latch Opening Sequence

4. Ensure that the MRL and the card latch on the OLX divider are already open and insert the PCI/PCI-X card to be added into the empty slot.

⚠ **CAUTION:** When inserting the PCI/PCI-X card, be careful you do not accidentally touch an attention button on the other OLX dividers. This initiates an undesired shutdown of another PCI/PCI-X card/slot. If you do this, push the doorbell again within five seconds to cancel the shutdown.

📝 **NOTE:** Ensure that you fully seat the card into the slot, or undesired results can occur after power is reapplied to the slot.
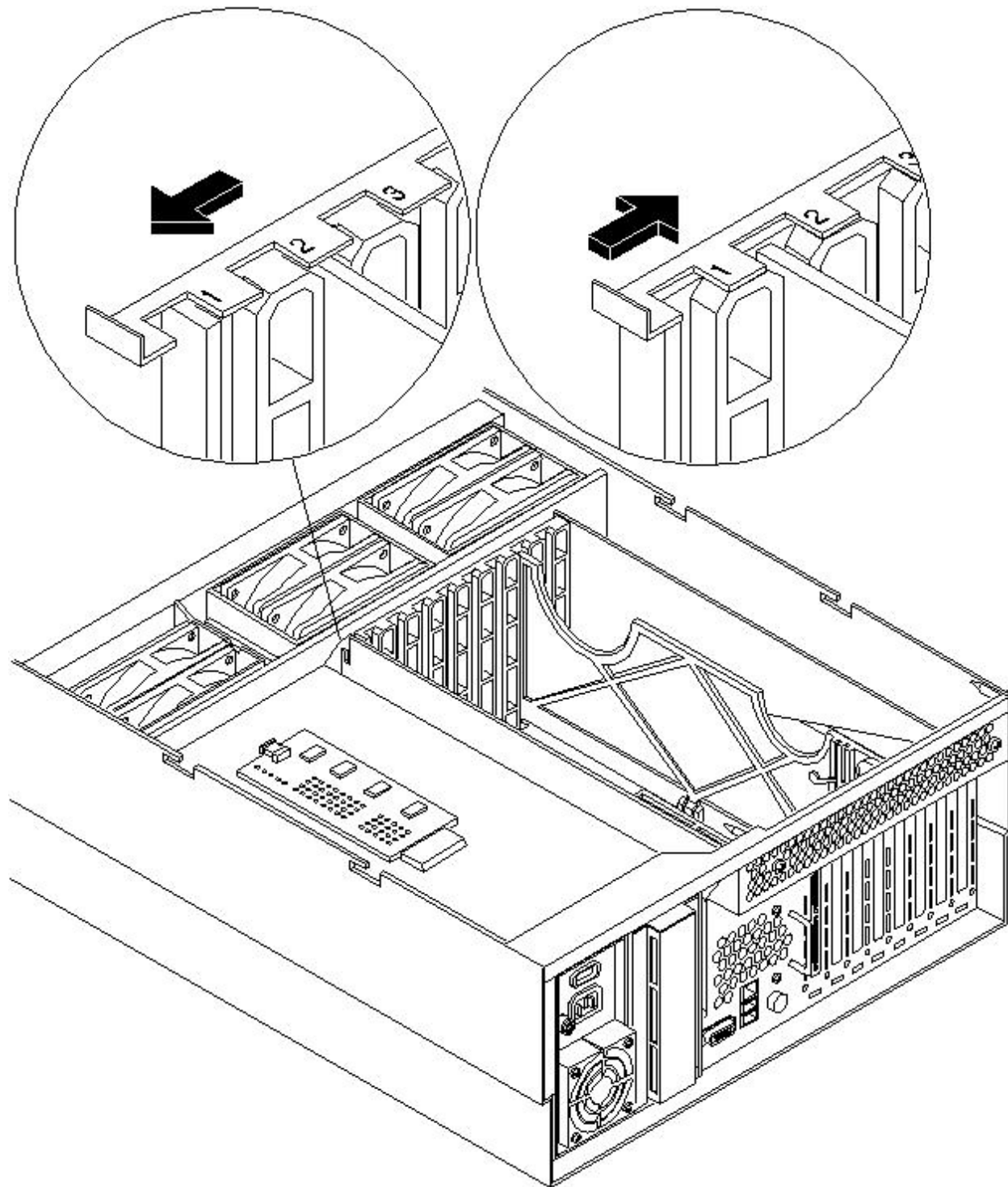
Figure 6-29 Inserting a PCI/PCI-X Card
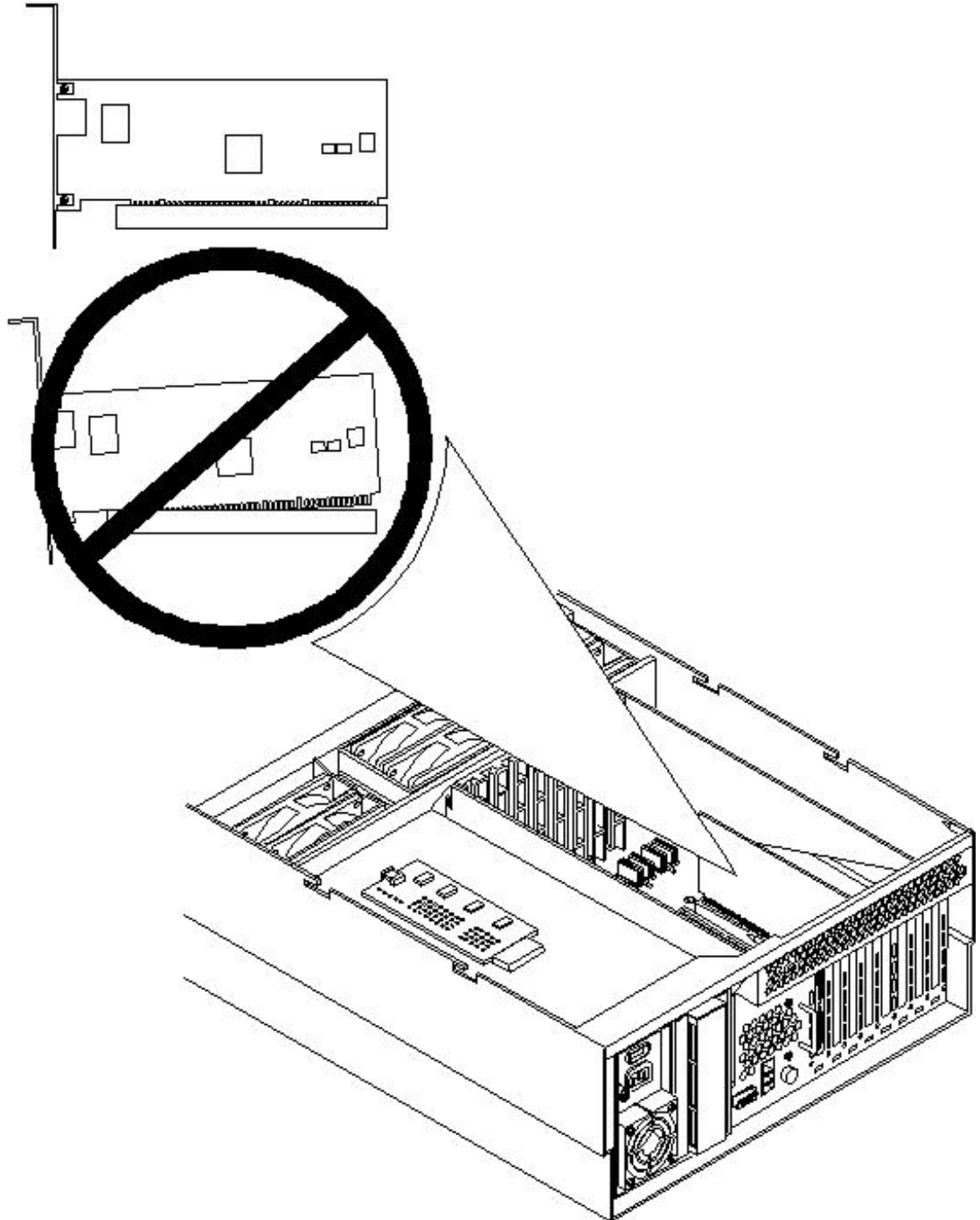
5. If the PCI/PCI-X card is full size, close the slider gate latch to secure the end of the card.

Figure 6-30 Slider Gate Latch

6. Push the manual retention latch down until it seats against the chassis wall.
7. To capture the PCI/PCI-X card and manual retention latch into the closed position, turn the PCI/PCI-X card latch to the closed position.
8. Press the attention button. The power LED starts to blink. Wait until the power LED goes from blinking to steady on.

> 📝 **NOTE:** After pushing the attention button, you have five seconds to cancel the operation by pushing the attention button again. After five seconds, pressing the attention button initiates slot power off for OLR of the card.

9. Replace the top cover. (See "Replacing the Top Cover" (page 154).)
10. Push the server all the way back into the rack until it stops.

OLR

> ⚠️ **CAUTION:** For HP-UX 11i v1 (and higher), you can only replace an existing card with an identical card.

To remove and replace a PCI/PCI-X card into a populated slot, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).
3. Disconnect all external and internal cables attached to the PCI card in the side service bay.
4. Press the attention button located on the OLX divider that controls the affected slot. The power LED starts to blink. Wait until the power LED goes from blinking to steady off.

> 📝 **NOTE:** After pushing the attention button, you have five seconds to cancel the operation by pushing the attention button again.

5. Turn the PCI/PCI-X card latch approximately 45 degrees on the chassis until the MRL is free to pull up.
6. Pull up on the MRL located on the OLX divider to turn off power to the slot. (Figure 6-27)
7. To completely expose the PCI/PCI-X bulkhead, turn the PCI/PCI-X card latch on the chassis approximately 45 degrees clockwise. (Figure 6-28)
8. If the PCI/PCI-X card is full size, open the slider gate latch to release the end of the card. (Figure 6-30)
9. Grasp the top edge of the PCI/PCI-X card and remove it from the slot.

> 📝 **NOTE:** There is not an ejection lever to remove PCI/PCI-X cards as there was on previous server models. You must remove the PCI/PCI-X card manually. Cutouts in the OLX dividers enable access for grasping the PCI/PCI-X cards.

10. Insert the new PCI/PCI-X card into the powered off slot. (Figure 6-29)
11. If the PCI/PCI-X card is full size, close the slider gate latch to secure the end of the card. (Figure 6-30)

> ⚠️ **CAUTION:** When inserting the PCI/PCI-X card, be careful you do not accidentally touch an attention button on the other OLX dividers. This initiates an undesired shutdown of another PCI/PCI-X card/slot. If you do this, push the doorbell again within five seconds to cancel the shutdown.

> 📝 **NOTE:** Ensure that you fully seat the card into the slot, or undesired results can occur after power is reapplied to the slot.

12. Push the MRL down until it seats against the chassis wall.
13. Turn the PCI/PCI-X card latch on the chassis to the closed position. This locks the PCI/PCI-X card into its slot and the MRL into the closed position.
14. Press the attention button. The power LED starts to blink.

15. Wait for the power LED to stop blinking; the PCI/PCI-X card is now active.
16. Reconnect all the cables.
17. Replace the top cover. See "Replacing the Top Cover" (page 154).
18. Push the server all the way back into the rack until it stops.

Removing a PCI/PCI-X Card Offline

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing a PCI card from the server.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:**   Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

CAUTION: Record the slot location of all PCI cards as they are removed. Depending on the operating system, replacing the PCI cards in a different location might require system reconfiguration and can cause boot failure.

To remove a PCI card from the server with power off, follow these steps:
1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover. See "Removing the Top Cover" (page 153).
3. Disconnect all external and internal cables attached to the PCI card in the side service bay.
4. Turn the PCI/PCI-X card latch on the chassis to approximately 45 degrees clockwise to free the MRL. (Figure 6-27)
5. Pull up on the MRL until it stops.
6. Turn the PCI/PCI-X card latch another 45 degrees clockwise to completely expose the PCI-PCI-X card bulkhead. (Figure 6-27)
7. If the PCI/PCI-X card is full size, open the slider gate bracket to enable PCI/PCI-X card removal. (Figure 6-39)
8. Remove the card from the slot by grasping the top edges of the card and pulling up. The notches in the OLX dividers provide access to the PCI card for removal.

Installing a PCI Card Offline

To replace a PCI card with the server power off, follow these steps:
1. Insert the card into the appropriate slot. (Figure 6-26)
2. To enable closing of the MRL, turn the PCI/PCI-X card latch on the chassis approximately 45 degrees counterclockwise. (Figure 6-27 and Figure 6-28)
3. Push down on the MRL until it stops against the chassis wall. (Figure 6-27)
4. To lock the PCI/PCI-X card into position, turn the PCI/PCI-X card latch on the chassis another 45 degrees counterclockwise.
5. If the PCI/PCI-X card is full size, close the slider gate bracket to secure the card. (Figure 6-30)
6. Reconnect all internal and external cables to the PCI/PCI-X card.
7. Replace the top cover. See "Replacing the Top Cover" (page 154).
8. Slide the server all the way back into the rack until it stops.
9. Turn on power by plugging the AC power cords into power supply units.

OLX Dividers

OLX dividers are located on the I/O baseboard assembly between the PCI cards. Six OLX dividers provide short circuit protection to the hot-pluggable PCI accessory boards by preventing inadvertent contact between boards during the replacement or addition of a board.

Additionally, each OLX divider has two light pipes that transfer illumination from one green power LED and one amber attention LED mounted on the I/O baseboard, to the top of the divider. The light pipes enables you to view the LED status when the top cover is removed.

WARNING!   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a PCI card divider.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing an OLX Divider

NOTE: An alternative method of removing OLX dividers is to remove all OLX dividers at once by removing the rack they are mounted in from the I/O baseboard assembly, then removing or replacing the individual OLX divider, and then replacing the rack back on the I/O baseboard. The OLX divider rack is attached to the I/O baseboard with four Torx T15 fasteners.

To remove an OLX divider, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover. See "Removing the Top Cover" (page 153).
3. To unlock the OLX divider from the chassis wall, pull up on the manual retention latch.

Figure 6-31 OLX Divider Removal and Replacement
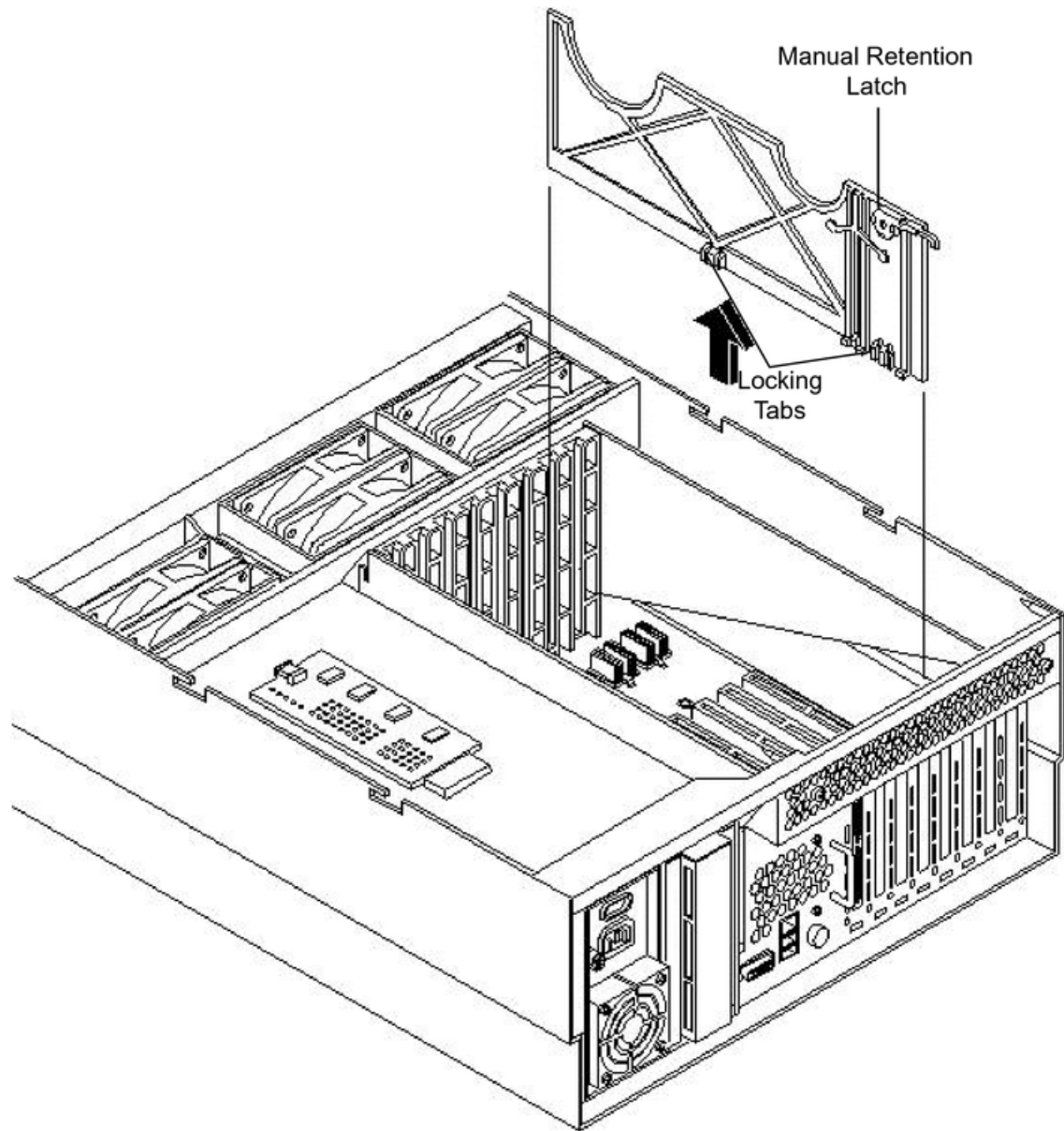
4.   To unlock the rear edge of the PCI divider, slide open the latch on the slider gate bracket.

Figure 6-32 OLX Slider Gate Bracket
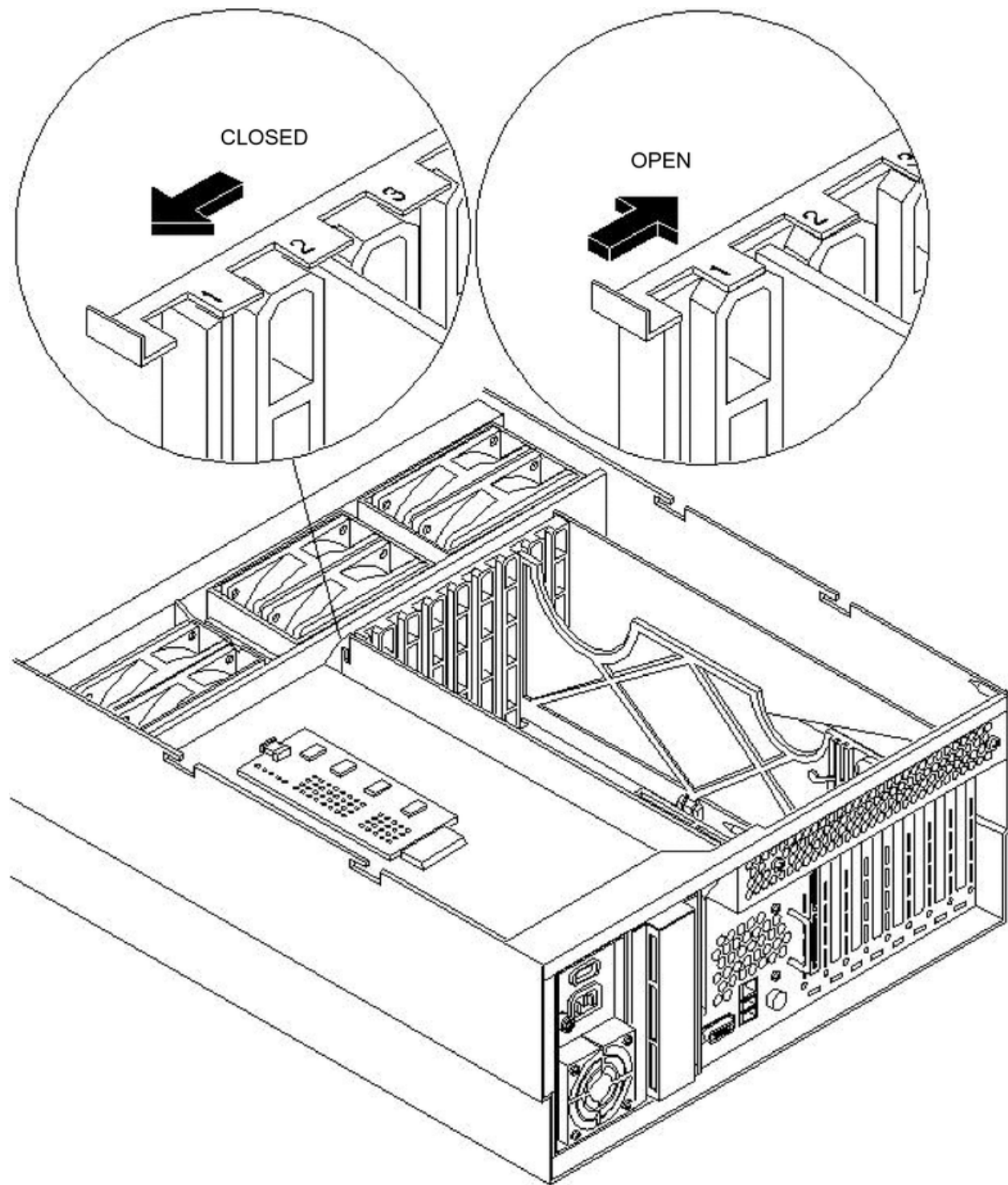
5. If you are removing the entire OLX divider rack, remove the four T15 screws attaching the rack to the I/O baseboard assembly.

6. Using your fingers, push the two tabs that attach the OLX divider to the I/O baseboard and pull the OLX divider up sharply to disengage it from the I/O baseboard.

⚠ **CAUTION:**   When extracting the OLX divider, ensure that you release the locking tabs completely or you can damage them. If you damage the tabs, the OLX divider does not seat properly when you reinsert it.

Replacing an OLX Divider

To replace an OLX divider, follow these steps:

1. Insert the OLX divider into the available slot on the I/O baseboard and push down firmly to seat it into the slot.
2. If you are replacing the entire OLX divider rack onto the I/O baseboard, replace the four T15 screws.
3. To lock the rear edge of the PCI divider, slide the latch on the slider gate bracket closed.
4. Push down on the manual retention latch until it locks into the chassis wall.
5. Replace the top cover. See "Replacing the Top Cover" (page 154).

U320 SCSI Enablement and Conversion Procedures

This section explains how to upgrade the SCSI cards to enable U320 operation and how to optionally change the SCSI configuration (duplex to simplex) in the server. The U320 enablement process involves replacing the duplex PCA card (duplex configuration only) and the SCSI backplane (simplex and duplex configurations).

You can configure the embedded backplane for internal SCSI hard disks drives in the HP 9000 rp4410 and rp4440 servers in either simplex or duplex mode.

In simplex mode, both embedded internal hard disks are on SCSI channel A. SCSI channel B can be used for external devices. Remove the cover from channel B before connecting external devices. Do not connect external devices to SCSI channel A.

In duplex mode, each hard disk is on a separate SCSI bus. Do not connect external devices to either SCSI channel A or B.

Time Required

Upgrading the server can require several hours, depending on preparatory time. Plan for an hour of system downtime. Preparatory time includes checking the upgrade kit, preparing an ESD-safe work station, and backing up your data.

Upgrade Tasks

Upgrade tasks depend on whether the server is configured for simplex or duplex operation. This section provides the high-level steps required to perform the upgrade. The actual upgrade procedures are provided below.

Simplex Configuration Upgrade

1. Back up your data
2. Shut down the server (disconnect AC power)
3. Remove server components
4. Replace SCSI backplane
5. Install server components
6. Verify the upgrade installation

Duplex Configuration Upgrade

1. Back up your data
2. Shutdown the server (disconnect AC power)
3. Remove server components
4. Remove the SCSI duplex board
5. Replace SCSI backplane
6. Install the replacement SCSI duplex board
7. Install server components
8. Verify the upgrade installation

Back Up Your Data

Before performing the server upgrade, protect yourself by backing up all data and the server OS. In the event of interruptions (for example, power failure or interference), you may need to resume operation in the old configuration before upgrading the server.

Back up your data in accordance with local procedures.

Always keep a backup copy of the current OS available for emergency use. The OS was provided on CD with the server. You can also obtain a copy from your HP-Information Resource Center (ITRC).

Removing Server Components

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing server components.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

△ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

To remove server components for upgrade, follow these steps:

1. Make sure all users are logged off and that the server is not in use.
2. Perform an orderly shutdown of the server operating system.
3. Press the power button on the server front panel. Verify that the power LED goes off.
4. Disconnect the ac power cords from the server rear panel.
5. Extend the server from the rack. See "Extend the Server From the Rack" (page 150).
6. Remove the front bezel. See "Removing the Front Bezel" (page 152).
7. Remove the front cover. See "Removing the Front Cover" (page 152).
8. Remove the memory extender board. See "Removing the Memory Extender Board" (page 155).
9. Remove the processor extender board. See "Removing the Processor Extender Board" (page 161).

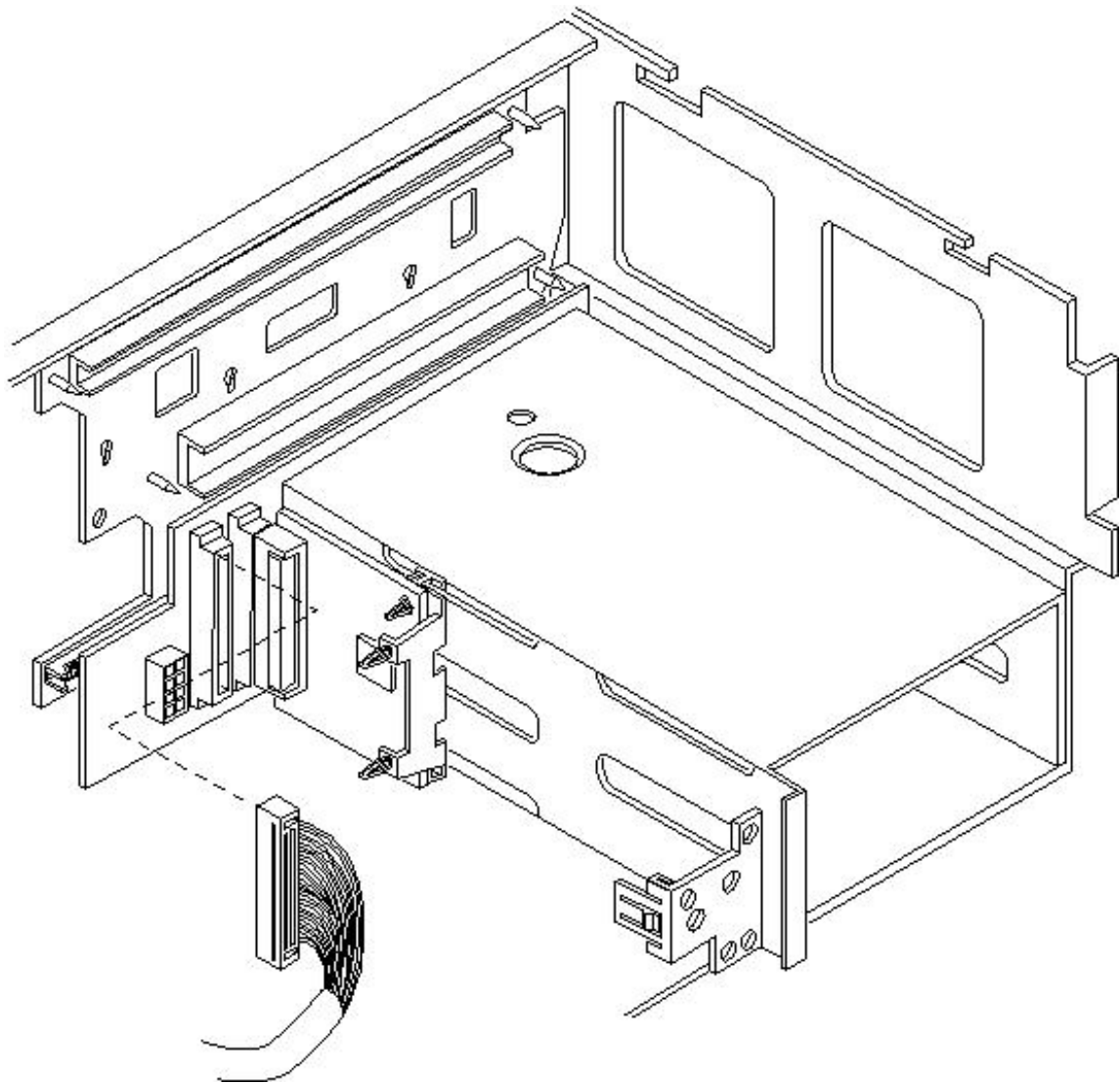## Removing the SCSI Duplex Board

The SCSI duplex board is only installed if the server is configured for duplex operation. The SCSI duplex board is secured to the disk drive cage by a bracket and connected to the SCSI backplane.

To remove the SCSI duplex board, follow these steps:

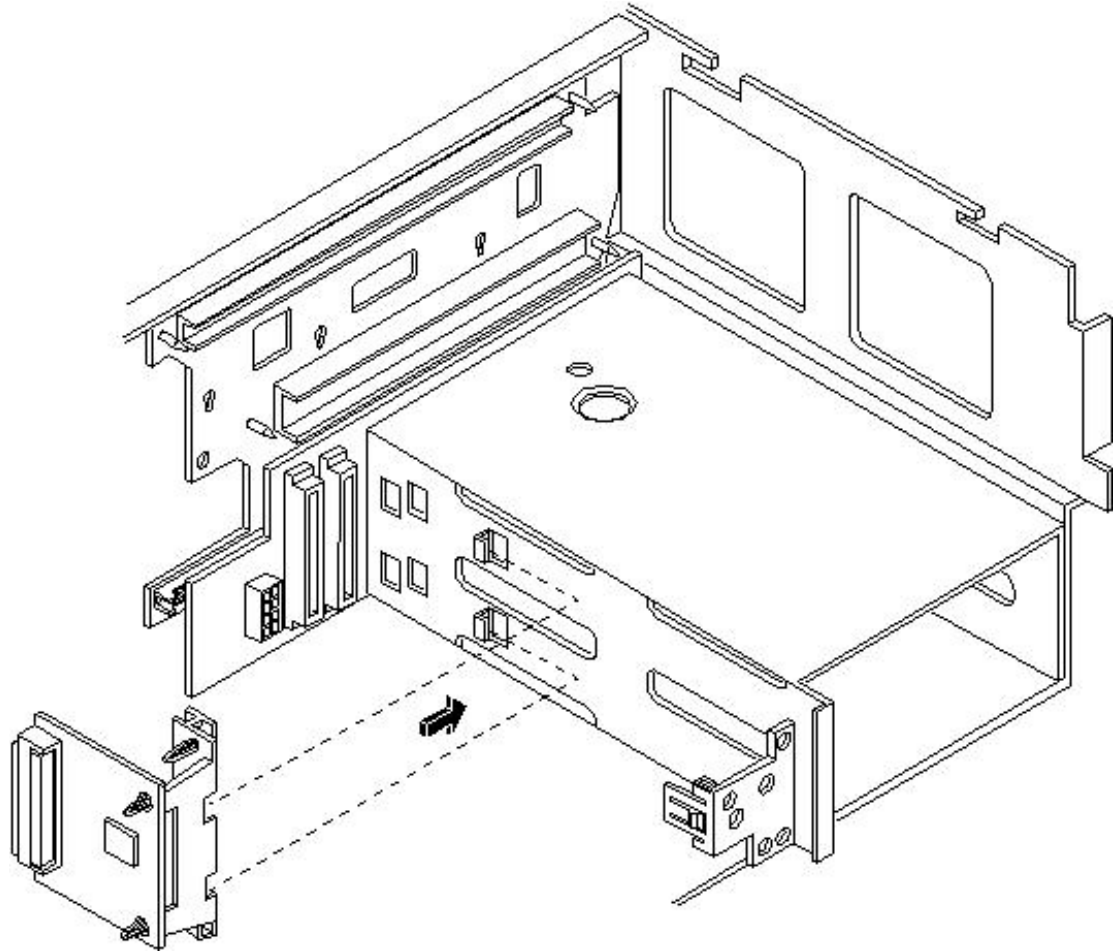1. Disconnect SCSI cable B from the SCSI backplane.

Figure 6-33 Disconnecting SCSI Cable B from the SCSI Backplane

2. To disconnect the backplane connector and release it from the disk drive cage, pull the SCSI duplex board forward.

Figure 6-34 Remove the SCSI Duplex Board

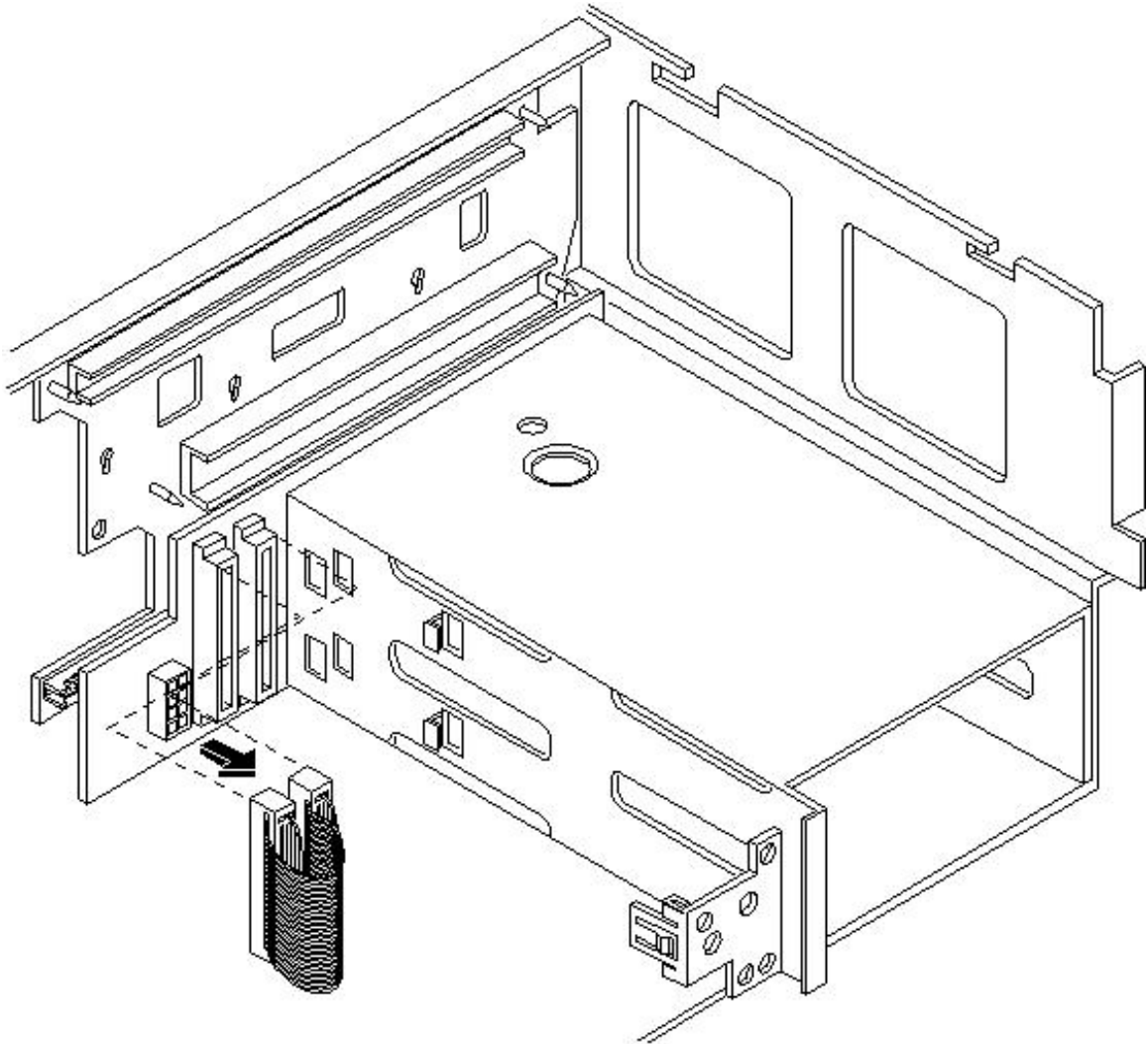## Removing the SCSI Backplane

You must replace the SCSI backplane for both simplex and duplex configurations. To remove the SCSI backplane, follow these steps:

1. Unplug the internal SCSI cables from the SCSI backplane.
2. Unplug the SCSI backplane-to-midplane riser cable from the SCSI backplane.
3. If the server is configured for simplex operation, remove the SCSI Jumper Cable (Figure 6-35).

NOTE: The SCSI jumper cable bridges the two SCSI connectors on the SCSI backplane when the server is configured for simplex operation. The SCSI jumper cable is not installed in duplex configurations.

Figure 6-35 Remove the SCSI Backplane Jumper Cable

4. Remove the disk drives. See "Removing a Hot-Pluggable Disk Drive" (page 212).
5. To unlatch the SCSI backplane from the hard disk cage, turn the swivel latch on top of the hard disk drive cage.
6. Grasp the top edge of the SCSI backplane and pull up until it releases from the keyway slots on the back of the disk drive cage.

7. Push the SCSI backplane away from the disk drive cage and lift it up and out of the chassis.

Figure 6-36 Lifting the SCSI Backplane Out of the Chassis
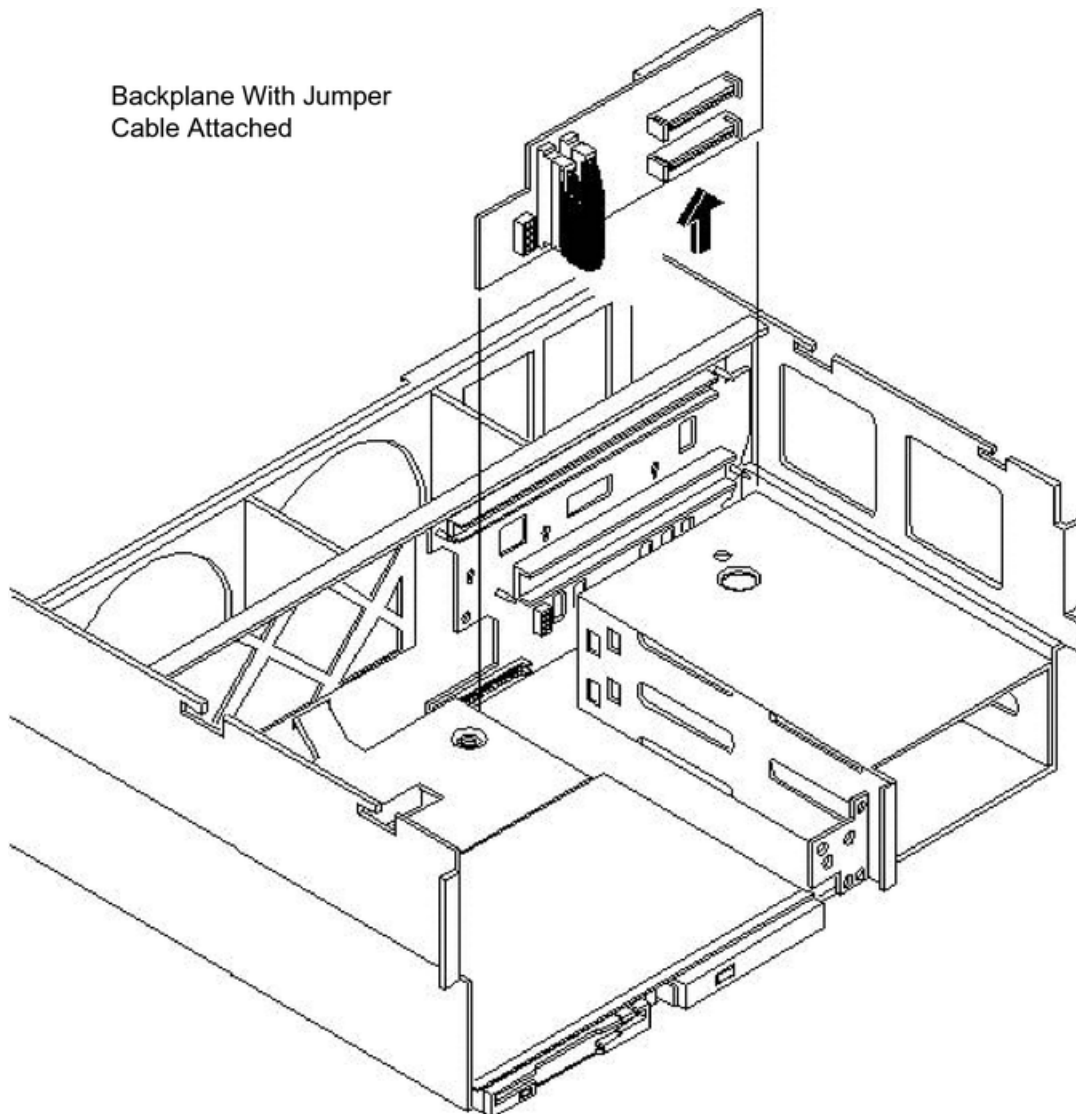
Replacing the SCSI Backplane

To replace the SCSI backplane, follow these steps:

1. Replace the SCSI backplane to the rear of the disk drive cage (HP part number A6961-04075).
2. If your system is configured for simplex operation, connect the SCSI jumper cable to the SCSI backplane connectors.
3. Plug the SCSI backplane-to-midplane cable back into the SCSI backplane.
4. Plug the internal SCSI cable into the SCSI back plane.

If the server is configured for simplex operation, continue the upgrade at "Installing the Server Components" (page 201)

Installing the SCSI Duplex Board

Install the SCSI duplex board only if your system is configured for duplex operation. To install the duplex board, follow these steps:

1. Align the bracket tabs with the slots on the side of the disk drive cage.

Figure 6-37 Aligning the Bracket Tabs on the SCSI Duplex Board
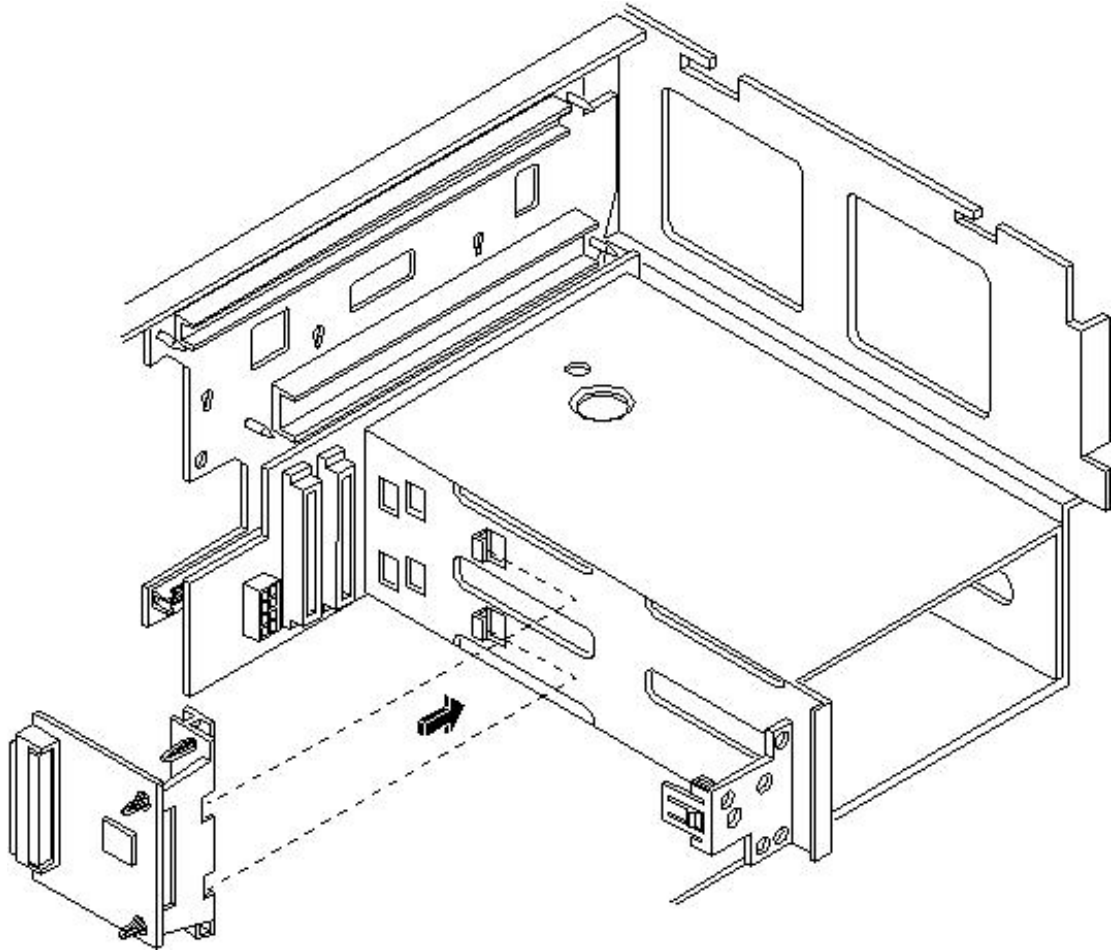
2. Press the bracket against the disk drive cage until the bracket locks into place.
3. Align the connector of the duplex board with the connector on the SCSI backplane.
4. Press the board connector into the backplane connector.
5. Plug the SCSI cable B connector into the SCSI connector located on the backplane next to the duplex board (Figure 6-33 (page 196)).
6. Connect the other end of SCSI cable B to the SCSI B channel connector on the SCSI adapter board.

Figure 6-38 Connecting SCSI Cable B to the SCSI Adapter Board
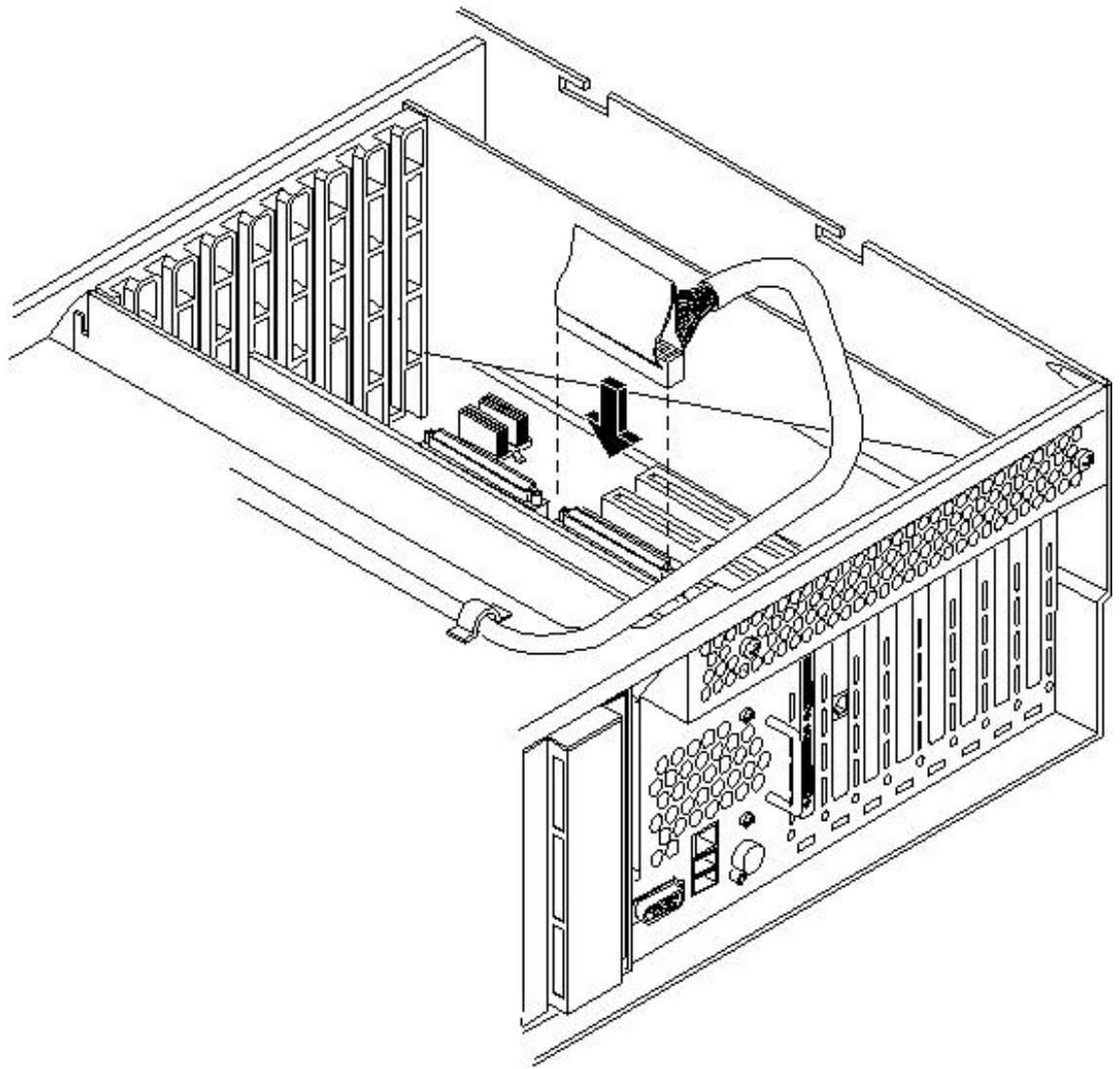
7. Close the swivel latch on top of the hot-pluggable disk drive cage.
8. Replace the two hot-pluggable disk drives into the disk drive cage.

Installing the Server Components

To Install the necessary components in the server chassis, follow these steps:

1. Install the processor extender board. See "Replacing the Processor Extender Board" (page 162).
2. Install the memory extender board. See "Replacing the Memory Extender Board" (page 156).
3. Install the front cover. See "Replacing the Front Cover" (page 153).
4. Install the front bezel. See "Replacing the Front Bezel" (page 152).

Verify the Upgrade Installation

After completing the upgrade, verify that the sever is ready for operation as follows:

1. Reconnect AC power to rear panel connectors.
2. Press the front panel power button to power on the server.
3. Wait for completion of the POST. Verify that no errors have been detected.
4. At the BCH prompt, enter the `in io` command. Verify that all installed disk drives are recognized and operating correctly.
5. Initiate the OS and monitor operation.

6. Check for error messages.
7. Check the System Event Log (SEL) for erroneous system events.

Converting SCSI From Duplex to Simplex Operation

This section explains how to convert your SCSI from duplex to simplex. The procedure requires unplugging and stowing the SCSI B cable, removing the SCSI duplex board, and installing a jumper cable on the SCSI backplane.

Safety Information

Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages might be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

To prevent harm to both you and the server,follow the listed guidelines to ensure safe handling of components:

- Use an antistatic wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before converting your server.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

Accessing the SCSI Backplane

Before adding the accessories required to convert the server from duplex to simplex, you must remove outer components to access the SCSI backplane. To gain access to the SCSI backplane, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Accessing a Rack-Mounted Server" (page 149).)

📝 **NOTE:**   If the server is pedestal mounted, you need not remove the pedestal to perform the duplex to simplex conversion. Proceed directly to the next step.

2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Removing the Front Cover" (page 152).
4. Remove the memory extender board. See "Memory Extender Board" (page 155).
5. Remove the processor extender board. See "Processor Extender Board" (page 161).
6. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).

Converting to Simplex

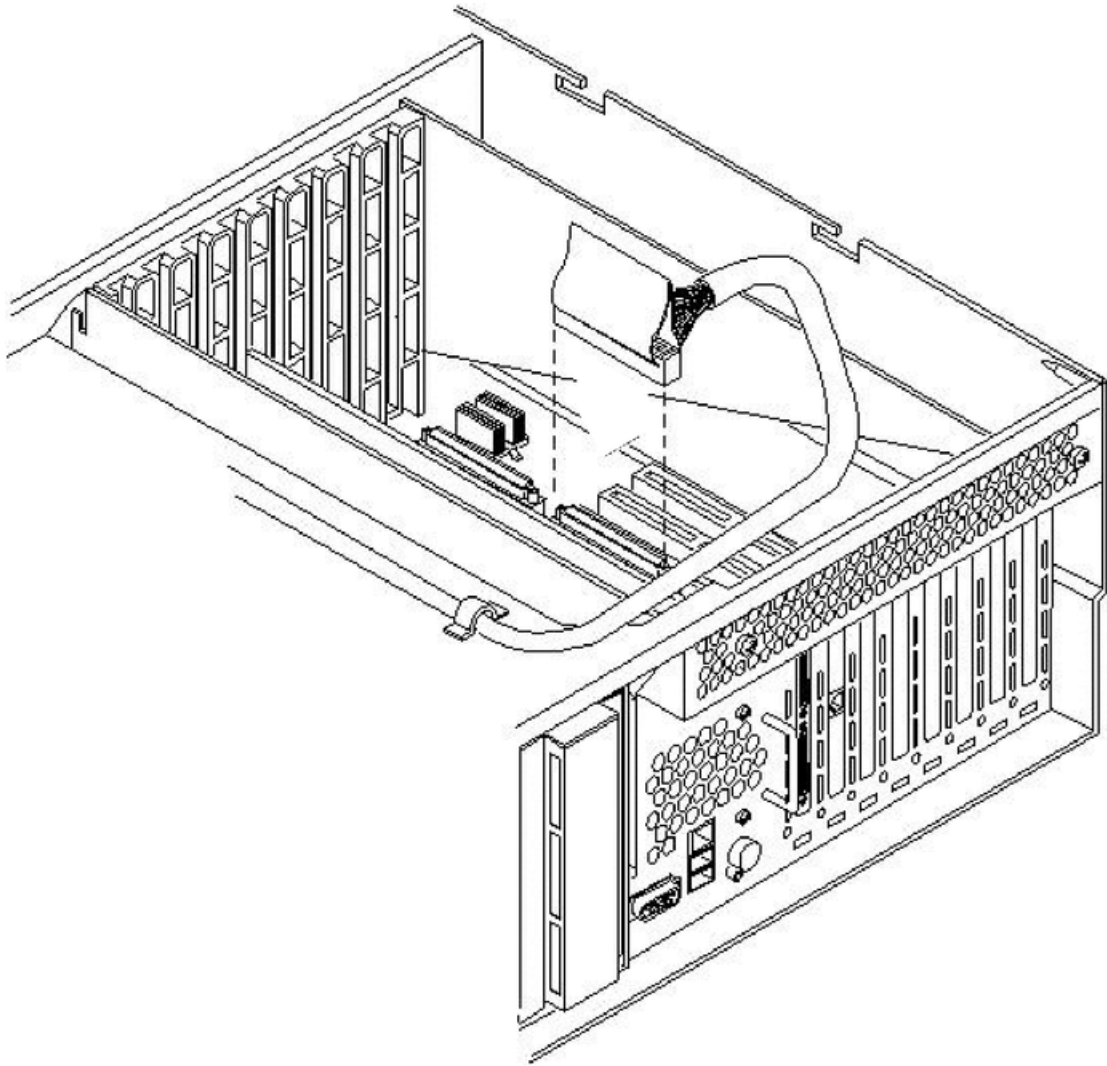To convert to simplex, follow these steps:

1. Unplug the SCSI B cable From the SCSI backplane.

Figure 6-39 Unplugging the SCSI Cable B from the SCSI Backplane
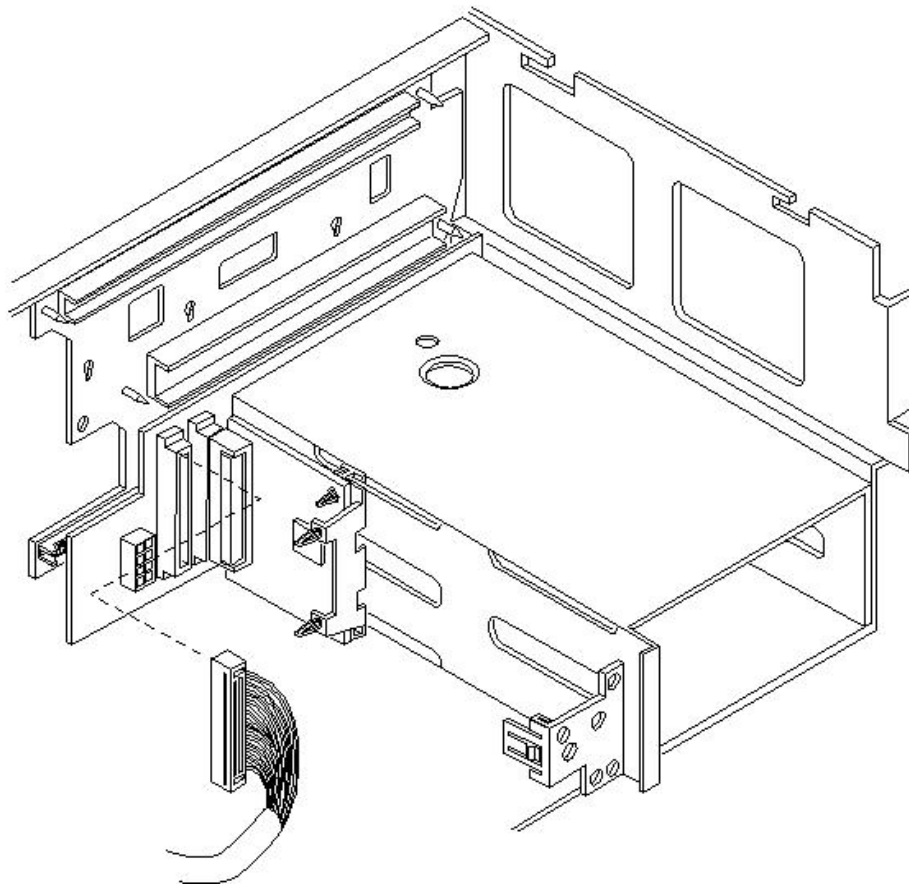
2. Unplug SCSI cable B connector from the SCSI adapter board.

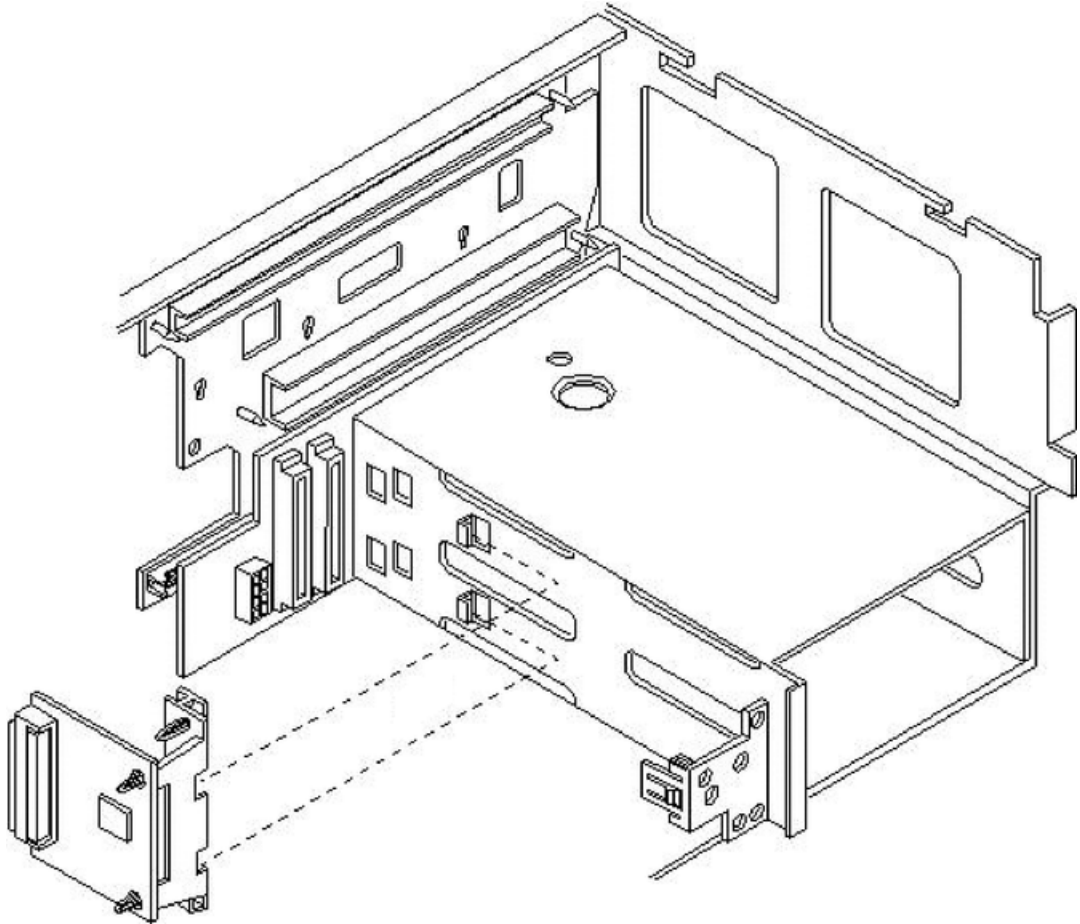**Figure 6-40 Unplug the SCSI Cable B from the SCSI Adapter Board**

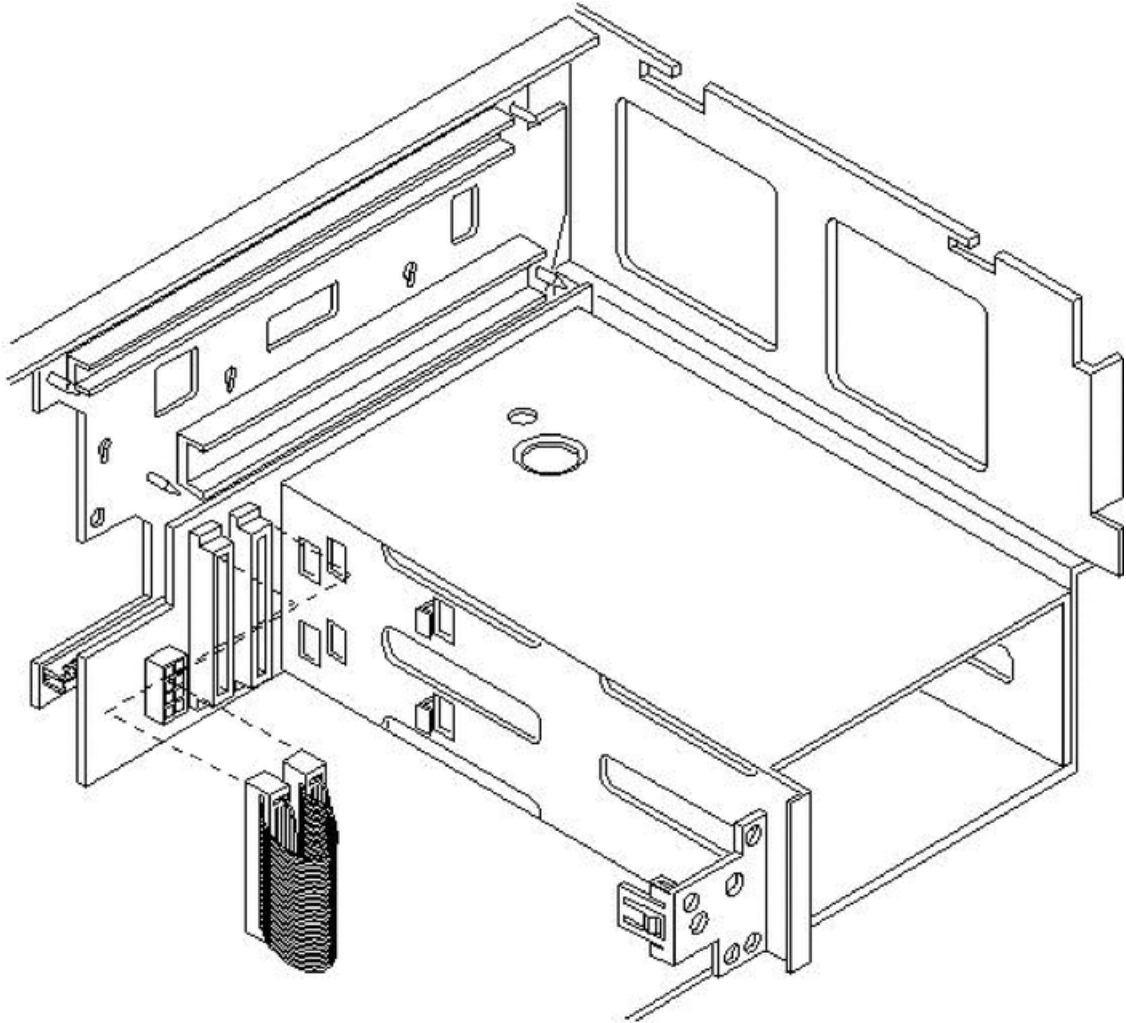3.   Secure the SCSI cable B within the chassis.

4. Remove the SCSI duplex board:
   a. Pull the SCSI duplex board forward to disconnect the backplane connector.
   b. Release it from the disk drive cage.

Figure 6-41 Removing the Duplex Board

5. Connect the SCSI jumper cable to the SCSI backplane connectors.

Figure 6-42 Installing the SCSI Jumper Cable

Installing Server Components

To install the necessary components in the server chassis, follow these steps:

1. Install the processor extender board. See "Replacing the Memory Extender Board" (page 156).
2. Install the memory extender board. See "Replacing the Processor Extender Board" (page 162).
3. Install the front and top covers. See "Front and Top Covers" (page 152).
4. Install the front bezel. See "Front Bezel" (page 151).

Verifying the Upgrade Installation

After completing the upgrade, verify that the sever is ready for operation as follows:

1. Reconnect AC power to the rear panel connectors.
2. To power on the server, press the front panel power button.
3. Wait for completion of the POST.
4. Verify that no errors have been detected.
5. At the BCH prompt, enter the `in io` command.
6. Verify that all installed disk drives are recognized and operating correctly.
7. Initiate the OS and monitor operation.
8. Check for error messages.

9. Check the SEL for erroneous system events.

Removing and Replacing Core I/O Cards

The HP 9000 rp4410 and rp4440 servers have two I/O card slots that are dedicated for core I/O cards.

Safety Information

Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages might be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

To prevent harm to both you and the server, follow the procedures listed below to ensure safe handling of components:

- Use an antistatic wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP part number 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing and replacing the core I/O cards.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

Required Service Tools

Service of this product can require one or more of the following tools:

- Electrically Conductive Field Service Kit (HP part number 9300-1155)
- 1/4 inch Flat Blade Screwdriver
- ACX-15 torx Screwdriver

PCI Slot Locations and Configurations

PCI slots are numbered from 1 through 8 in the server. The dedicated core I/O card slots are slots 1 and 2.

The following describes configuration requirements for slots 1 and 2:

- PCI slot 1 is dedicated for use by a SCSI HBA card. Slot 1 is not hot-pluggable. Additional PCI expansion cards cannot be placed in slot 1.
- PCI slot 2 is dedicated for use by a LAN card. Slot 2 is not hot-pluggable. Additional PCI expansion cards cannot be placed in slot 2.

Removing the LAN Core I/O Card

To remove the LAN core I/O card in slot 2, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).
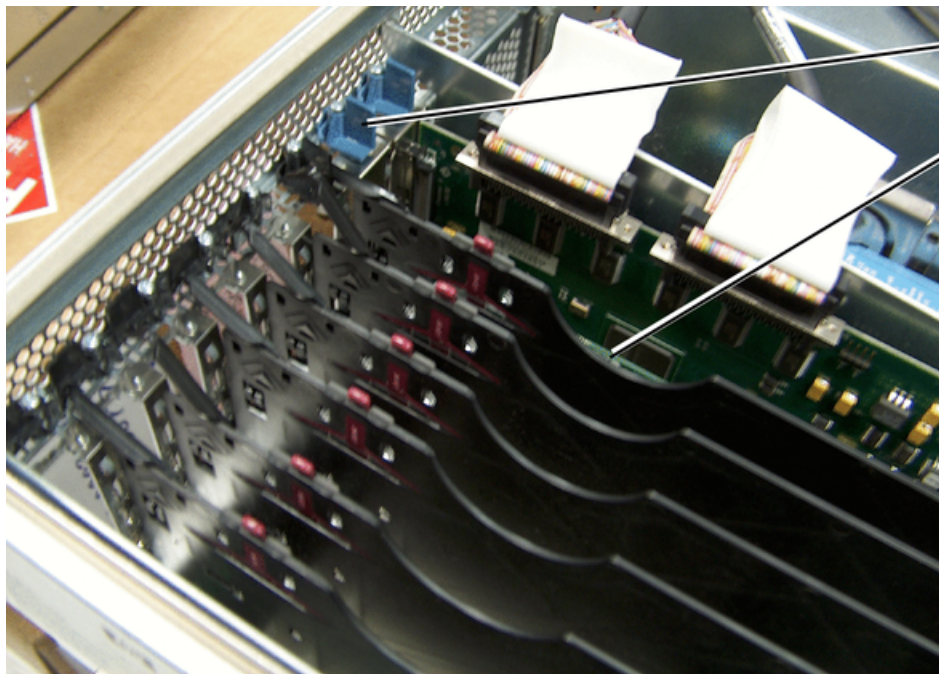3. Disconnect any LAN cables connected to the LAN core I/O card.

IMPORTANT: Before disconnecting cables, note the cable configuration. Cables must be attached to the correct connectors to ensure proper functionality.

4. Open the blue PCI card latch for slot 2 by twisting it clockwise.

Figure 6-43 LAN I/O Card Latch Location

5. Remove the LAN core I/O card. See "Removing and Replacing PCI/PCI-X Cards" (page 182).

Installing the LAN Core I/O Card
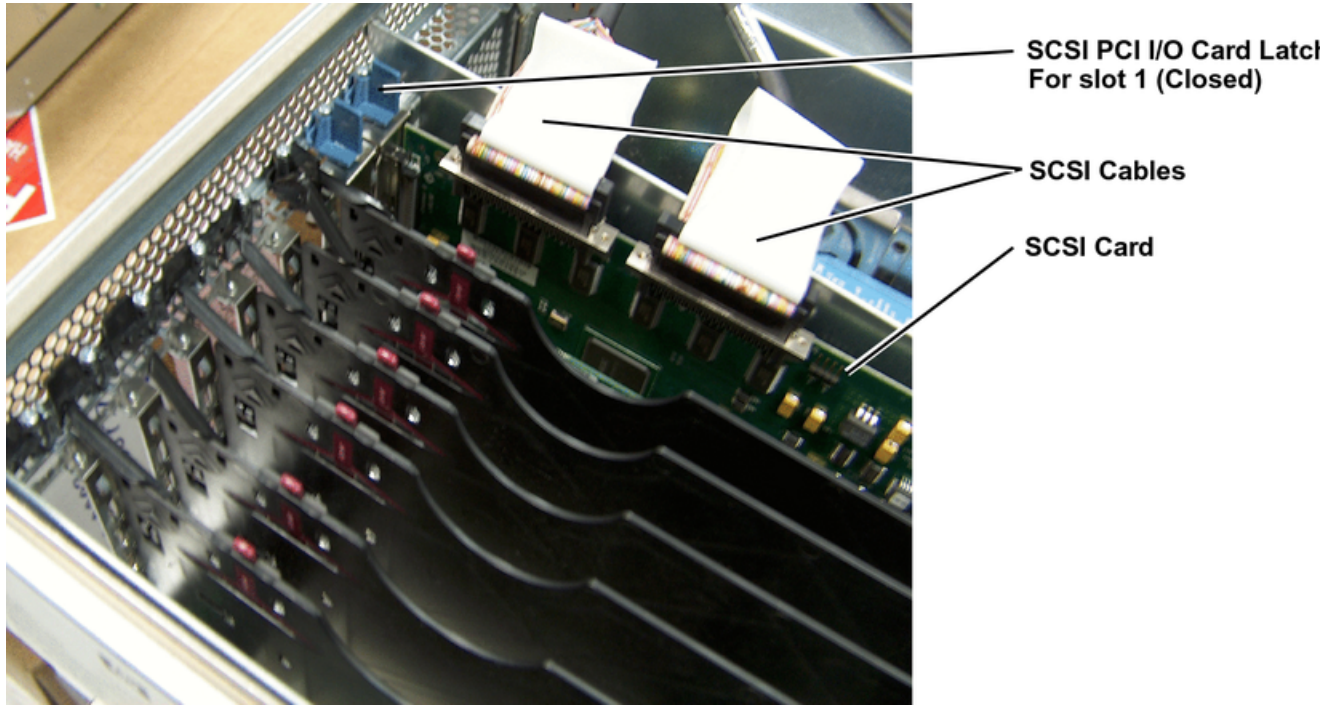
To install the LAN core I/O card, follow these steps:

1. Insert the replacement LAN core I/O card into slot 2.

⚠️ **CAUTION:** Always handle I/O cards by their edges. Failure to comply with this precaution can result in damage to the card.

Ensure that you fully seat the card into the slot or the card can be damaged when power is reapplied to the slot.

Figure 6-44 Installing the LAN I/O Card
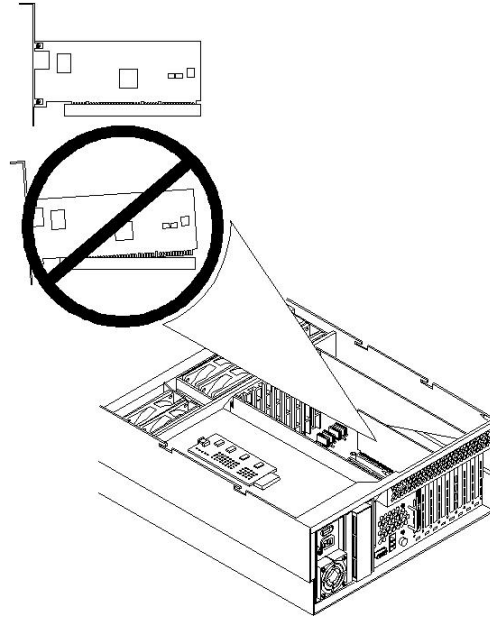
2. Close the blue PCI card latch for slot 2 by twisting it counterclockwise.
3. Reconnect the LAN cables to the LAN core I/O card. Be sure to attach cables to their original connectors.
4. Replace the top cover. See "Replacing the Top Cover" (page 154).
5. Push the server back into the rack until it stops.

Removing the SCSI Core I/O Card

To remove the SCSI core I/O card in slot 1, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 153).
3. Disconnect any internal and external SCSI cables connected to the SCSI core I/O card.

4. Open the blue PCI card latch for slot 1 by twisting it clockwise.

Figure 6-45 SCSI I/O Card Latch Location

SCSI PCI I/O Card Latch
For slot 1 (Closed)

SCSI Cables

SCSI Card

5. Remove the internal and external SCSI cables from the SCSI core I/O card.
6. Remove THE SCSI core I/O card.

Installing the SCSI Core I/O Card

To install the SCSI core I/O card, follow these steps:

1. Insert the replacement SCSI core I/O card into slot 1.

△ **CAUTION:** Always handle I/O cards by their edges. Failure to comply with this precaution can result in damage to the card.

Ensure that you fully seat the card into the slot or the card can be damaged when power is reapplied to the slot.

Figure 6-46 Installing the SCSI I/O Card
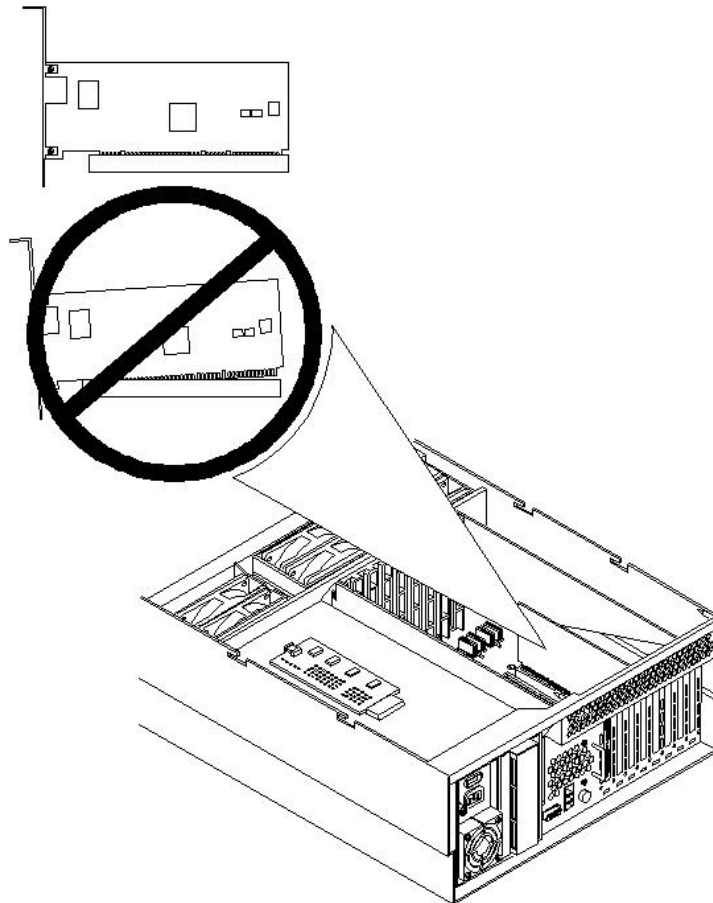
2. Close the blue PCI card latch for slot 1 by twisting it counterclockwise.
3. Reconnect the internal and external SCSI cables to the SCSI core I/O card.
4. Replace the top cover. (See "Replacing the Top Cover" (page 154).)
5. Push the server back into the rack until it stops.

Hot-Pluggable Disk Drives

The two hot-pluggable disk drives are located in the front of the HP 9000 rp4410 and rp4440 servers. The hot-pluggable disk drives are replaced using the procedures in this section when power is on or off.

⚠ **CAUTION:**   A hot-pluggable device can require interaction with the operating system before the device can be safely removed from or installed into the server. Verify that the operating system supports removing and replacing disk drives while the operating system is running. If the operating system does not support this feature, shut down the operating system before attempting this procedure. Failure to observe this caution results in system failure.

📝 **NOTE:**   The replacement disk drive must be the same product ID as the disk drive that is being replaced.

HP often uses different manufacturers for disks that have the same product number. The replacement disk drive will have the same capacity and block size as the defective disk if they have the same product number.

Removing a Hot-Pluggable Disk Drive

📝 **NOTE:**   For cooling purposes, always leave the volume filler in slot 2 if you do not use a second disk drive.

To remove a hot-pluggable disk drive, follow these steps:

1. Grasp the tab of the latch on the selected disk drive.
2. Push the tab toward the latch and pull the latch out; the disk unlocks.
3. Pull gently until the disk drive slides out of the chassis.

Replacing a Hot-Pluggable Disk Drive

One additional hot-pluggable disk drive can be added to the server in slot 2. Always use low profile disk drives in the HP 9000 rp4410 and p4440 servers.

Figure 6-47 shows the disk drive slots.

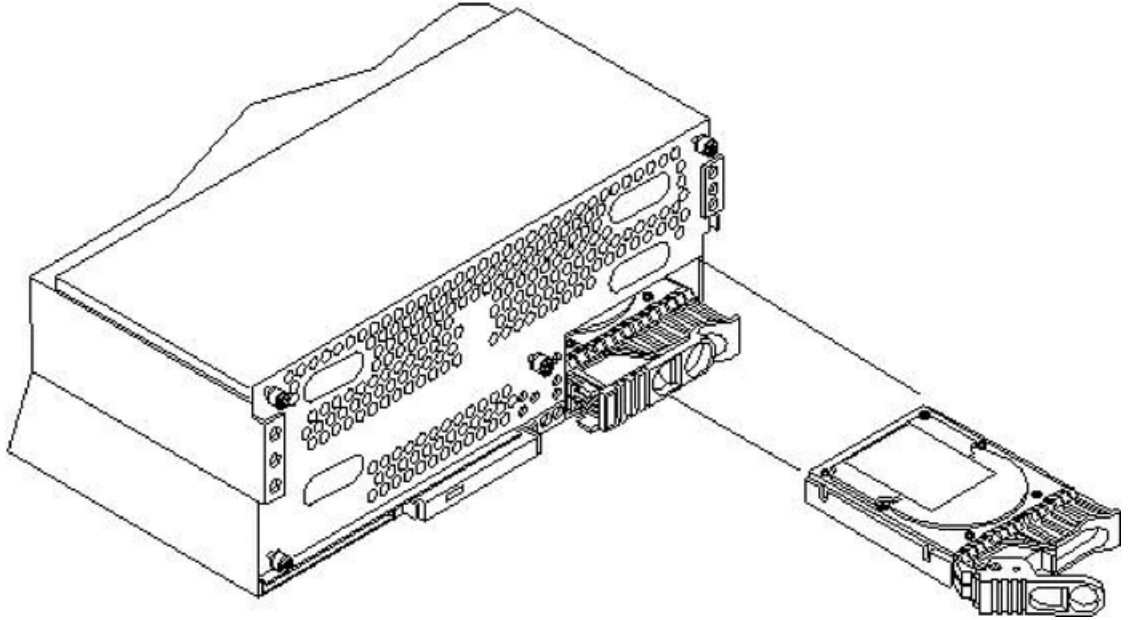**Figure 6-47 Installing a Disk Drive in Slots 1 and 2**
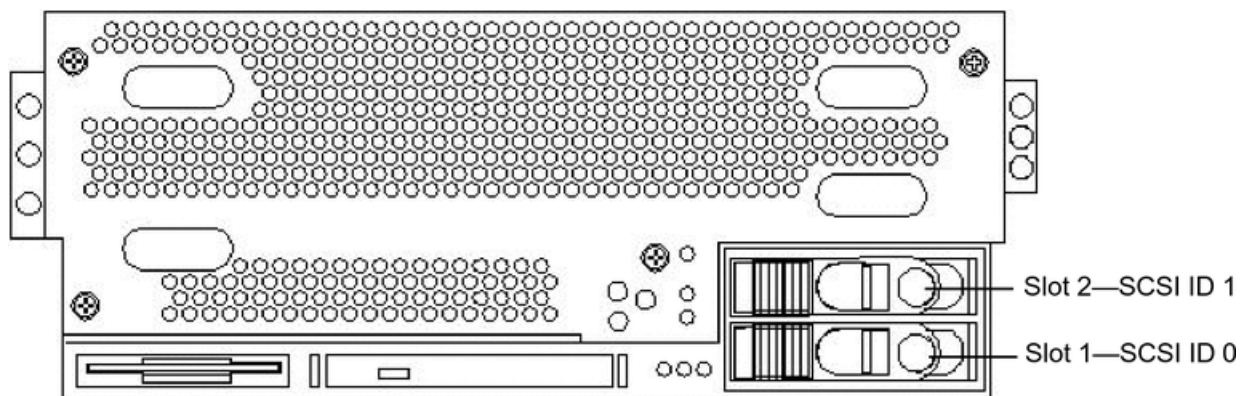
To install a hot-pluggable disk drive, follow these steps:

1. Slide the hot-pluggable disk drive into slot 2 until it is seated.

Figure 6-48 Installing a Disk Drive in Slot 2

2. Close the drive-ejector handle by pushing it down until it clicks.

If you will not be installing a hot-pluggable disk drive in slot 2, you must install a volume filler.

Figure 6-49 Installing a Volume Filler in Slot 2
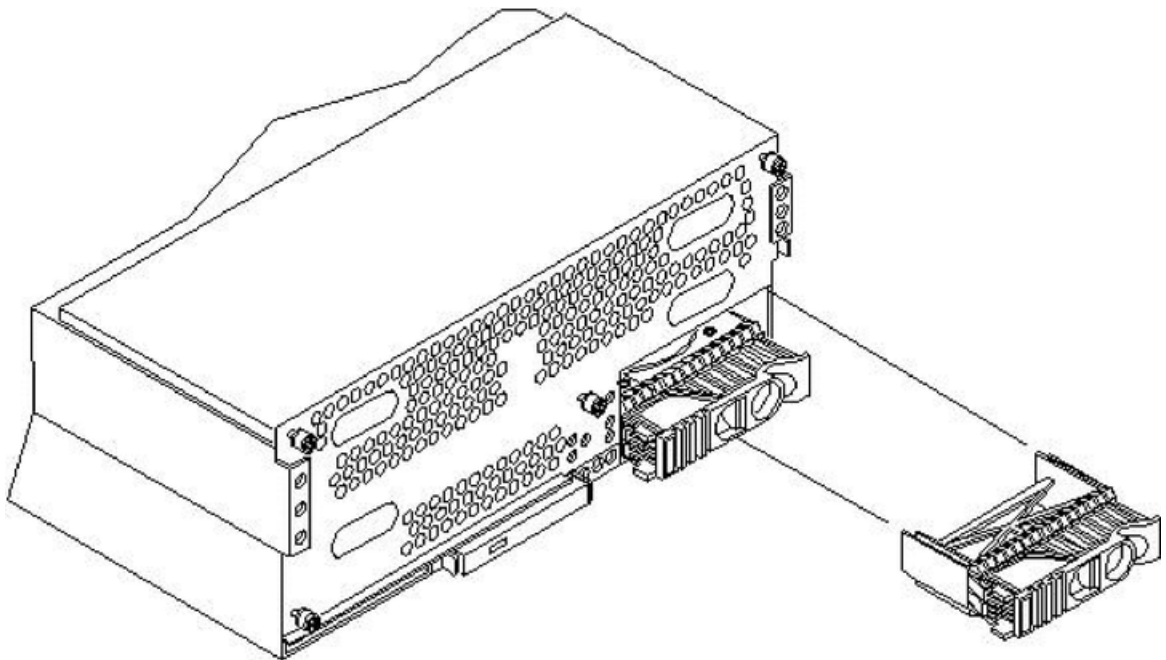
SCSI Backplane

The SCSI backplane is attached to the rear of the disk media housing at the front right side of the chassis.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the SCSI backplane.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the SCSI Backplane

To remove the SCSI backplane, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Accessing a Rack-Mounted Server" (page 149).)
2. Remove the front bezel. (See "Removing the Front Bezel" (page 152).)
3. Remove the front cover. (See "Removing the Front Cover" (page 152).)
4. Remove the memory extender board. (See "Removing the Memory Extender Board" (page 155).)
5. Remove the processor extender board. (See "Removing the Processor Extender Board" (page 161).)
6. Remove the two hot-pluggable disk drives. (See "Hot-Pluggable Disk Drives" (page 212).)
7. Unplug the internal SCSI cables from the SCSI backplane.
8. Unplug the SCSI backplane-to-midplane riser cable from the SCSI backplane.
9. Remove the hot-pluggable disk drives. (See "Removing a Hot-Pluggable Disk Drive" (page 212).)
10. To unlatch the SCSI backplane from the cage, turn the swivel latch on top of the hot-pluggable hard disk drive cage.
11. Grasp the top edge of the SCSI backplane and pull up until it releases from the keyway slots on the back of the hot-pluggable disk drive cage.

12. Push the SCSI backplane away from the disk drive cage and lift it up and out of the chassis.

Figure 6-50 SCSI Backplane Removal and Replacement
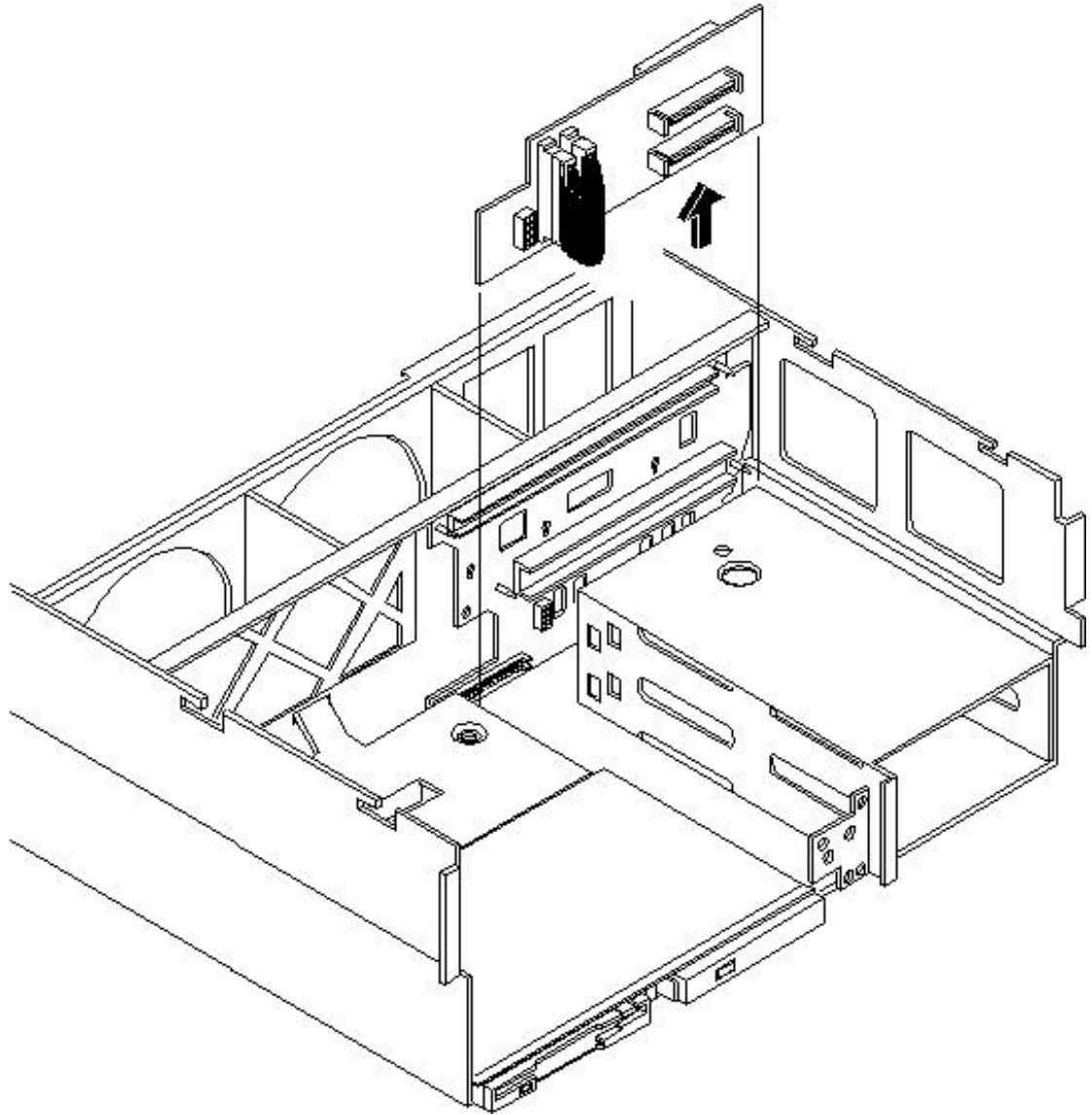
Replacing the SCSI Backplane

To replace the SCSI backplane, follow these steps:

1. Replace the SCSI backplane to the rear of the disk drive cage.
2. Turn the swivel latch on top of the hot-pluggable hard disk drive cage to latch the SCSI backplane to the cage.
3. Replace the two hot-pluggable disk drives into the disk drive cage. See "Hot-Pluggable Disk Drives" (page 212).
4. Plug the SCSI backplane-to-midplane cable back into the SCSI backplane.
5. Plug the internal SCSI cables into the SCSI back plane.
6. Replace the processor extender board. See "Replacing the Processor Extender Board" (page 162).
7. Replace the memory extender board. See "Replacing the Memory Extender Board" (page 156).
8. Replace the front cover. See "Replacing the Front Cover" (page 153).
9. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

Midplane Riser Board

The midplane riser board is attached to the main bulkhead in the center of the chassis.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the midplane riser backplane.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Midplane Riser Board

To remove the midplane riser board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front and top covers. See "Front and Top Covers" (page 152).
4. Remove the memory extender board. See "Removing the Memory Extender Board" (page 155).
5. Remove the processor extender board. See "Removing the Processor Extender Board" (page 161).
6. Remove the three chassis fan units. See "Hot-Swappable Chassis Fan Unit" (page 172).
7. Remove the I/O baseboard assembly. See "Removing the I/O Baseboard Assembly" (page 175).
8. Remove the SCSI duplex board from the SCSI backplane. See "Removing the SCSI Duplex Board" (page 195).
9. Remove the SCSI backplane. See "Removing the SCSI Backplane" (page 214).
10. Unplug the power distribution board power cable and signal cable from the midplane riser board.
11. Remove the air baffle.
12. To disconnect the cable from the midplane riser board, release the latches on the DVD I/O board cover and front panel display board cable.
13. Unplug the QuickFind diagnostic board cable from the midplane riser board.

📝 **NOTE:**   At this point, all cables and connectors must be unplugged from the midplane riser board.

14. Using a Torx 15 driver, remove the five T-15 screws attaching the midplane riser board to the chassis.
15. Grasp the top edge of the midplane riser board and lift straight up to release it from the keyway slots on the chassis.

16. To remove the midplane riser board from the chassis, pull it straight up from the chassis.

Figure 6-51 Midplane Riser Board
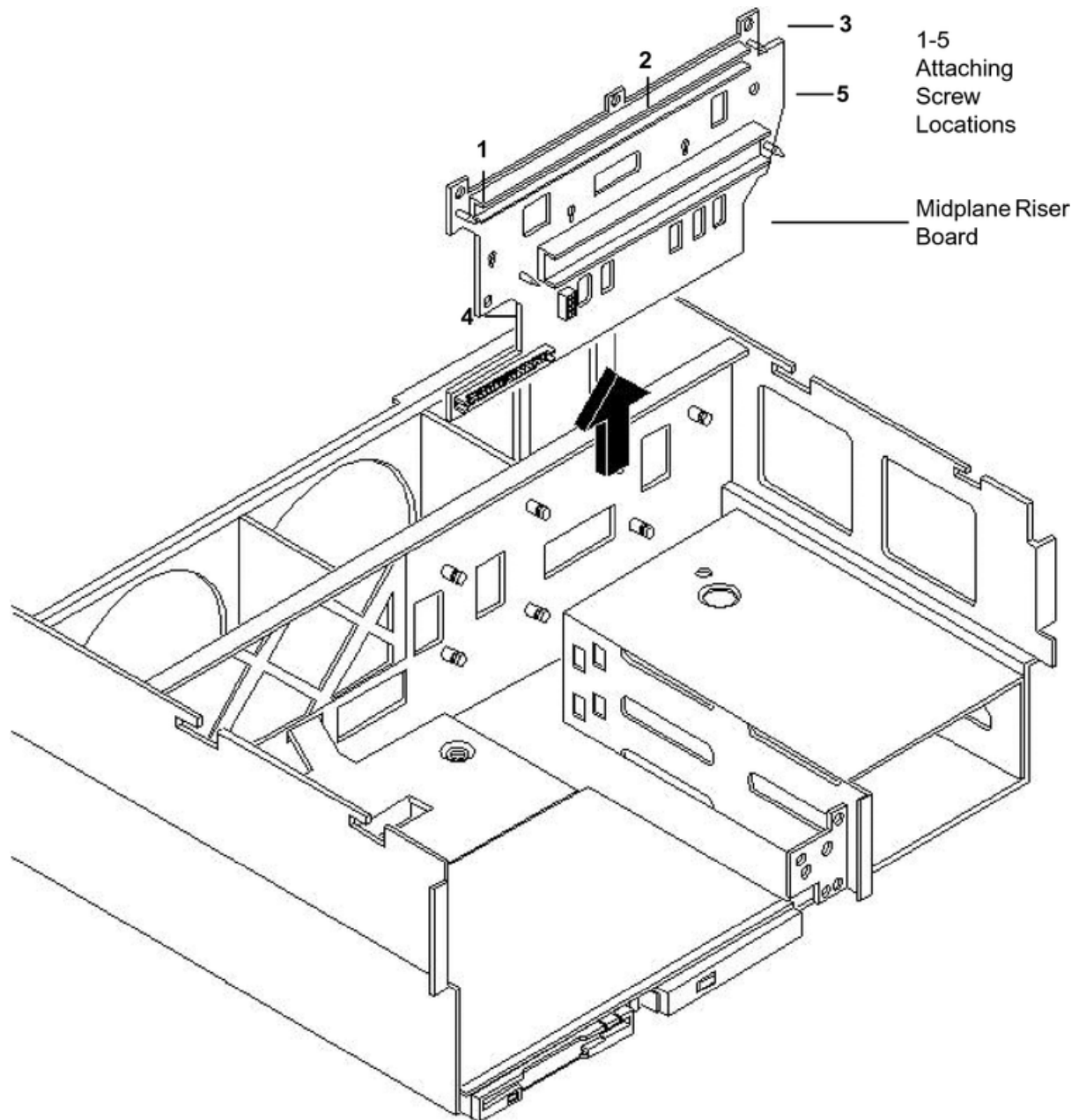
Replacing the Midplane Riser Board

To replace the midplane riser board, follow these steps:

1. Replace the midplane riser board onto the keyway slots on the chassis wall. Then push straight down until it seats onto the locking studs.
2. Using a Torx 15 driver, replace and tighten the five T-15 screws attaching the midplane riser board to the chassis.
3. Plug the DVD relay board and front panel display board cable into the midplane riser board.
4. Replace the air baffle.
5. Plug the power distribution board power cable and signal cable into the midplane riser board.
6. Plug the QuickFind diagnostic board cable into the midplane riser board.

7. Replace the SCSI backplane. See "Replacing the SCSI Backplane" (page 215).
8. Replace the duplex board on the SCSI backplane.
9. Replace the I/O baseboard assembly. See "Replacing the I/O Baseboard Assembly" (page 177).
10. Replace the three chassis fan units. See "Hot-Swappable Chassis Fan Unit" (page 172).
11. Replace the processor extender board. See "Replacing the Processor Extender Board" (page 162).
12. Replace the memory extender board. See "Replacing the Memory Extender Board" (page 156).
13. Replace the front and top covers. See "Front and Top Covers" (page 152).
14. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

Hot-Swappable Power Supplies

The HP 9000 rp4410 and rp4440 servers include one or two hot-swappable power supplies. These power supplies are located at the rear of the server. The supported configuration of the server requires a minimum of one power supply be installed. A hot-swappable power supply can be replaced using the procedures in this section when power is on or off.

⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

📝 **NOTE:** A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The ac power to the server does not need to be powered off to remove or replace a hot-swappable power supply.

Power Supply Load Order

The supported configuration of the HP 9000 rp4410 or rp4440 server requires a minimum of one power supply. A second, optional hot-swappable power supply, can be installed to provide N+1 capability.

The left side (viewing from the rear) hot-swappable power supply is identified as P0, the second hot-swappable power supply is identified as P1. Each hot-swappable power supply requires a separate power cord be installed in the appropriate power cord receptacle and attached to a power cord support bracket.

⚠ **WARNING!** Be careful when installing a hot-swappable power supply. It is heavier than it appears.

⚠ **CAUTION:** The empty hot-swappable power supply slot P1 must remain closed with the supplied metal cover in place when a second power supply is not used. The server can be damaged due to overheating if the cover does not remain in place.

CAUTION: If the system is powered off, install the hot-swappable power supply into the server before attaching the new power cord at the rear of the system. Failure to observe this caution results in damage to the server.

Removing a Hot-Swappable Power Supply

⚠ **WARNING!** Be careful when removing the hot-swappable power supply. It is heavier than it appears.

To remove a hot-swappable power supply, follow these steps:

1. If rack-mounted, slide the server out of the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the cable management arm from the rack slide nearest the power supplies. The cable management arm does not need to be completely removed but moved just enough to enable access to the power supplies.
3. Remove the power cord plug from the power receptacle.
4. Loosen the captive thumbscrew located at the top left of the power supply.
5. Grasp the handle and pull the power supply out of the server.

Figure 6-52 Hot-Swappable Power Supply Removal and Replacement
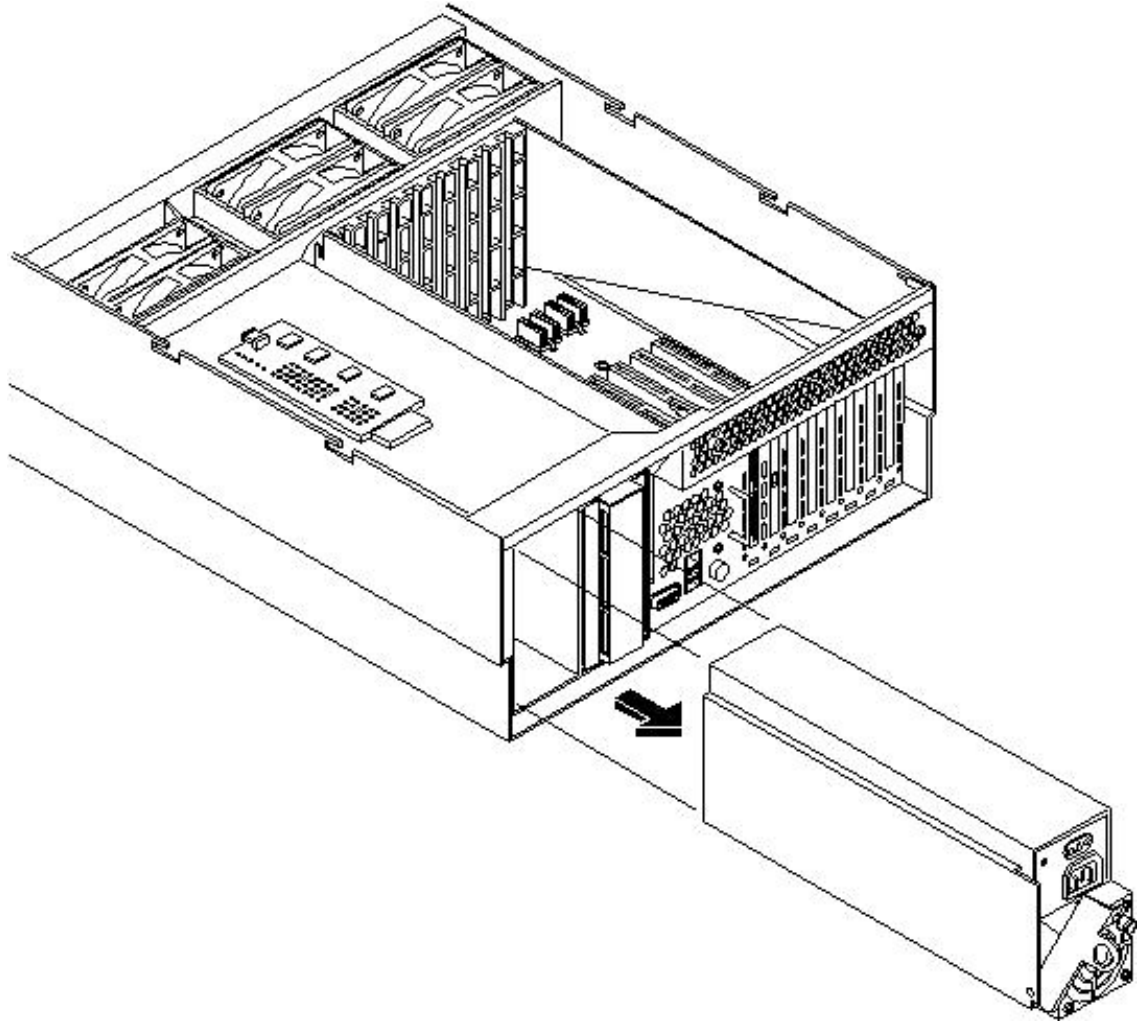
Replacing a Hot-Swappable Power Supply

1. Supporting the power supply with both hands, slide it into the empty slot until it plugs into the socket on the internal power distribution board. Hand-tighten the thumbscrew.
2. Install the power cord into the power supply socket.
3. Apply power to the new power supply. The LED immediately turns on.

Power Distribution Board

The power distribution board is attached to the rear power supply cage, underneath the hot-swappable power supply fan unit.

⚠️ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the power distribution board.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠️ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Power Distribution Board

To remove the power distribution board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the top cover. See "Removing the Top Cover" (page 153).
3. Remove the power supply fan unit from the chassis. See "Removing a Hot-Swappable Chassis Fan Unit" (page 172).
4. Remove the hot-swappable power supplies from the chassis. See "Removing a Hot-Swappable Power Supply" (page 218).
5. Unplug the power cable and the signal cable from the midplane riser board.
6. Unplug the QuickFind diagnostic board cable.
7. Using a Torx 15 driver, loosen the one T-15 screw attaching the power distribution board to the chassis. (Figure 6-53)
8. To release the power distribution board from the keyway slots, push it toward the center of the chassis.

9. Pull the power distribution board off the keyway slots and up and out of the chassis.

Figure 6-53 Power Distribution Board Removal and Replacement
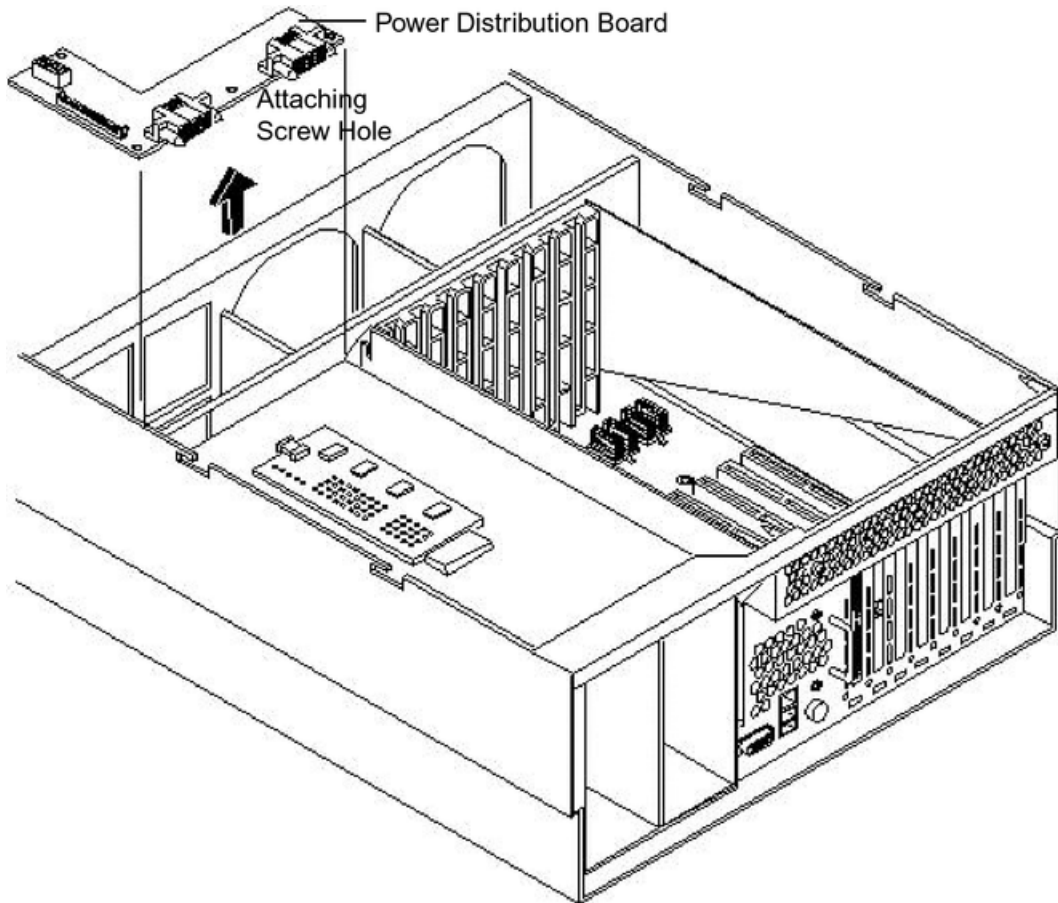
Replacing the Power Distribution Board

To replace the power distribution board, follow these steps:

1. Replace the power distribution board over the keyway slots and push it towards the side of the chassis to lock it onto the studs.
2. Reattach the power distribution board to the chassis bulkhead by replacing the one T-15 screw and hand tightening it.
3. Replug the power and signal cables into the midplane riser board.
4. Replace the hot-swappable power supplies into the chassis. See "Replacing a Hot-Swappable Power Supply" (page 219).
5. Replace the power supply fan unit into the chassis. See "Replacing a Hot-Swappable Chassis Fan Unit" (page 174).
6. Replace the top cover. (See "Replacing the Top Cover" (page 154).)

DVD Drive

The DVD drive is located on the front of the server.

⚠ **WARNING!**　Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a DVD drive.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:**　Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing a DVD Drive

To remove a DVD drive, follow these steps:

1. Remove the front bezel. See "Removing the Front Bezel" (page 152).
2. To release the drive, grasp the front of the DVD drive and squeeze the locking tab.

3. To remove the DVD drive from the chassis, pull it straight out of the server.

Figure 6-54 DVD Drive Removal and Replacement
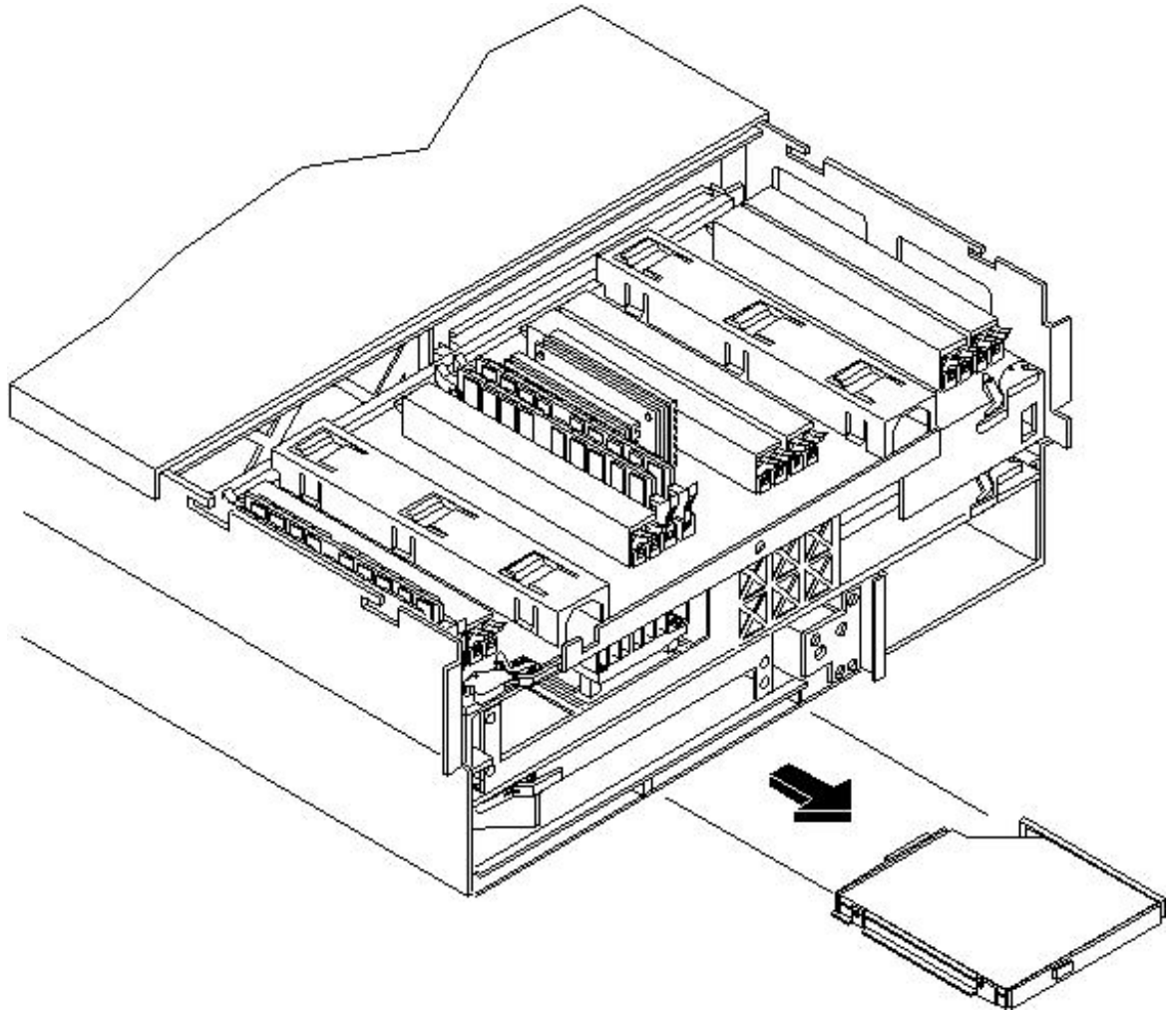
Replacing a DVD Drive

To replace a DVD drive, follow these steps:
1. Grasp the front of the DVD drive and squeeze the locking tab.
2. Push the drive straight into the drive bay until the locking tab clicks into place.
3. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

DVD I/O Board

The DVD I/O board is located under a metal cover that is directly above the DVD drive at the front left of the chassis.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing a DVD I/O board.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing a DVD I/O Board

To remove a DVD I/O board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Removing the Front Cover" (page 152).
4. Remove the memory extender board. See "Removing the Memory Extender Board" (page 155).
5. Remove the processor extender board. See "Removing the Processor Extender Board" (page 161).
6. Using a Torx 15 driver, remove the two T-15 screws holding the DVD I/O board cover plate to the chassis and remove the cover plate.
7. Unfasten the release clip attaching the DVD I/O board to the chassis.

8. Lift out the DVD I/O board and remove the midplane riser board connector cable. Remove the DVD I/O board from the chassis.

Figure 6-55 DVD I/O Board Removal and Replacement
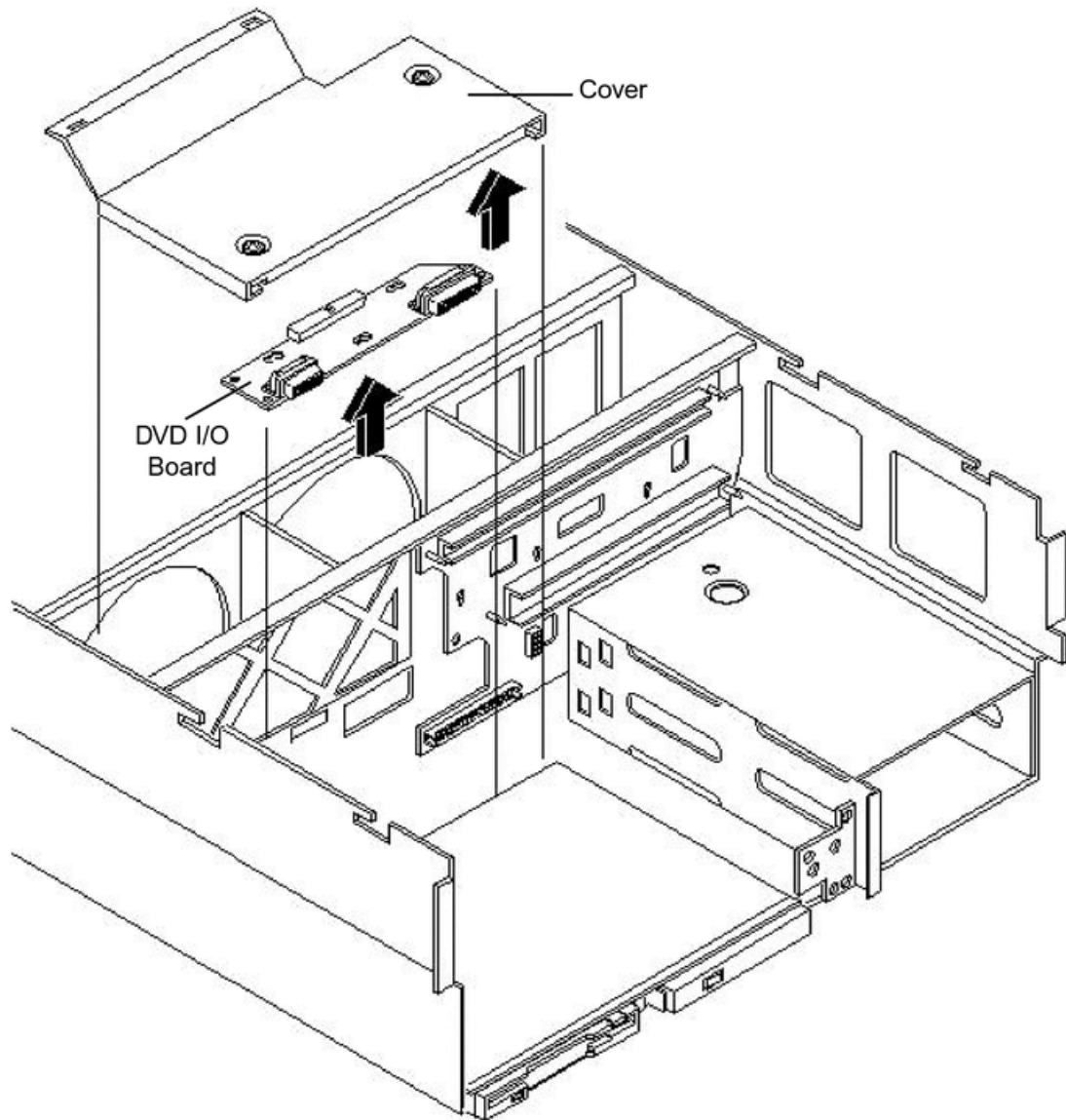
Replacing a DVD I/O Board

To replace a DVD I/O board, follow these steps:

1. Replace the DVD I/O board into the chassis and plug in the midplane riser board connector cable.
2. Refasten the release clip.
3. Replace the cover plate using the two T-15 screws and a Torx 15 driver.
4. Replace the processor extender board. See "Replacing the Processor Extender Board" (page 162).
5. Replace the memory extender board. See "Replacing the Memory Extender Board" (page 156).
6. Replace the front cover. See "Replacing the Front Cover" (page 153).
7. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

Display Board

The display board is located behind the control panel under the front cover. The display board contains the server power button and three LEDs that indicate server status.

> ⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the display board.
>
> Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.
>
> Failure to observe this warning can result in personal injury or damage to equipment.

> ⚠ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.
>
> Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Display Board

To remove the display board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. See "Accessing a Rack-Mounted Server" (page 149).
2. Remove the front bezel. See "Removing the Front Bezel" (page 152).
3. Remove the front cover. See "Removing the Front Cover" (page 152).
4. Remove the memory extender board. See "Removing the Memory Extender Board" (page 155).
5. Remove the processor extender board. See "Removing the Processor Extender Board" (page 161).
6. Slightly pull out the retaining tab on the chassis that holds the display board in position.

7. Gently unplug the midplane riser board connector cable from the display board and remove the board from the chassis as shown in Figure 6-56.

Figure 6-56 Display Board Removal and Replacement
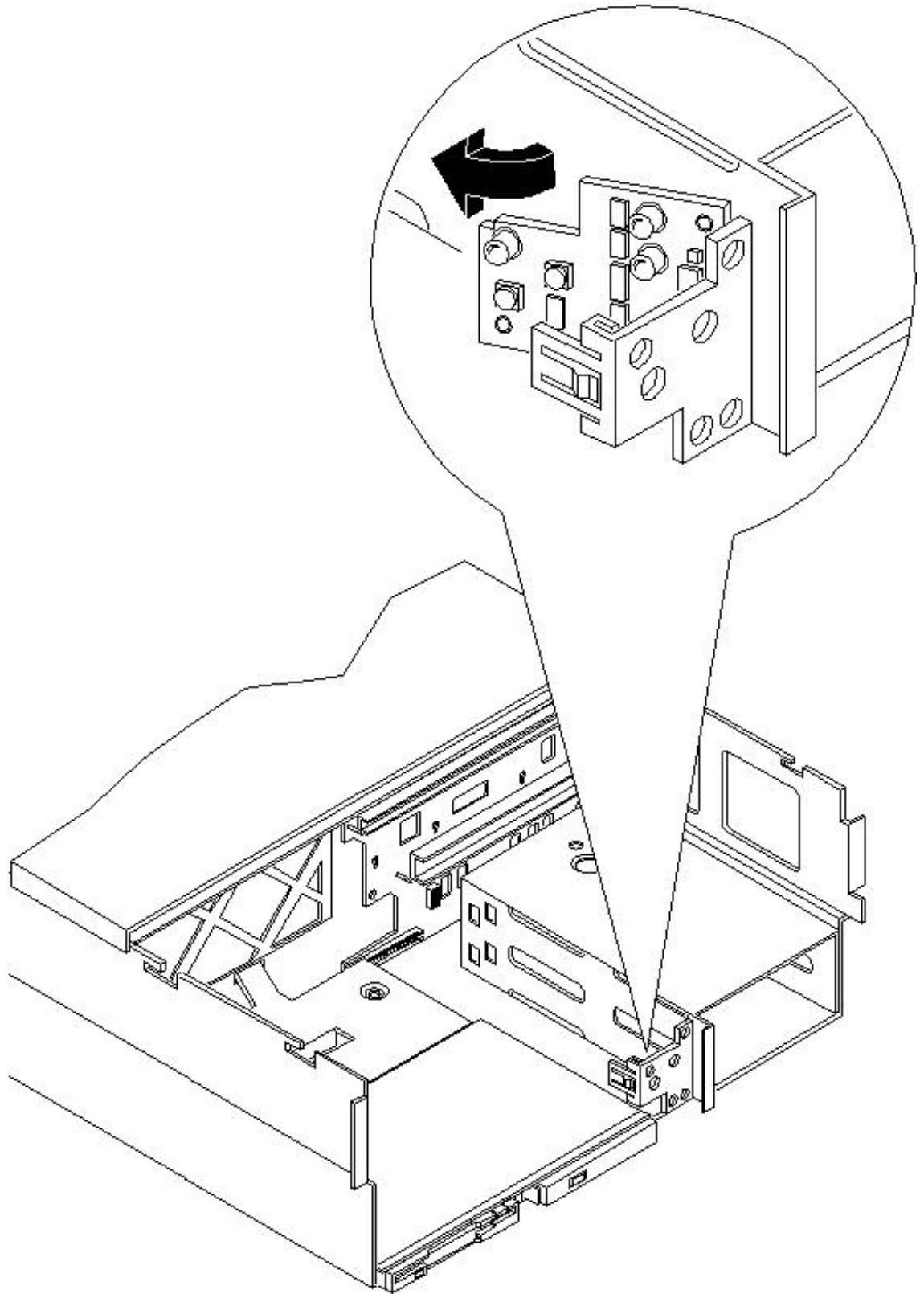
Replacing the Display Board

To replace the display board, follow these steps:

1. Gently plug the midplane riser board cable into the display board.
2. Hold the display board in position near the chassis and rotate it into the retaining clip until it clicks into place.
3. Replace the front cover. See "Replacing the Front Cover" (page 153).
4. Replace the front bezel. See "Replacing the Front Bezel" (page 152).

QuickFind Diagnostic Board

The QuickFind diagnostic board is located on top of the power supply cage, underneath the top cover.

⚠ **WARNING!**   Ensure that the system is powered off and all power sources have been disconnected from the server before removing or replacing the QuickFind diagnostic board.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:**   Failure to properly complete the steps in this procedure results in erratic system behavior or system failure. For assistance with this procedure, contact your local HP Authorized Service Provider.

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the QuickFind Diagnostic Board

To remove the QuickFind diagnostic board, follow these steps:

1. If rack-mounted, slide the server out from the rack until it stops. (See "Accessing a Rack-Mounted Server" (page 149).)
2. Remove the top cover. See "Removing the Top Cover" (page 153).
3. Gently squeeze the cover surrounding the QuickFind diagnostic board and remove the cover and board assembly from the top of the power supply cage as shown in Figure 6-57.

Figure 6-57 QuickFind Diagnostic Board Removal and Replacement

Cover

QuickFind Diagnostic Board
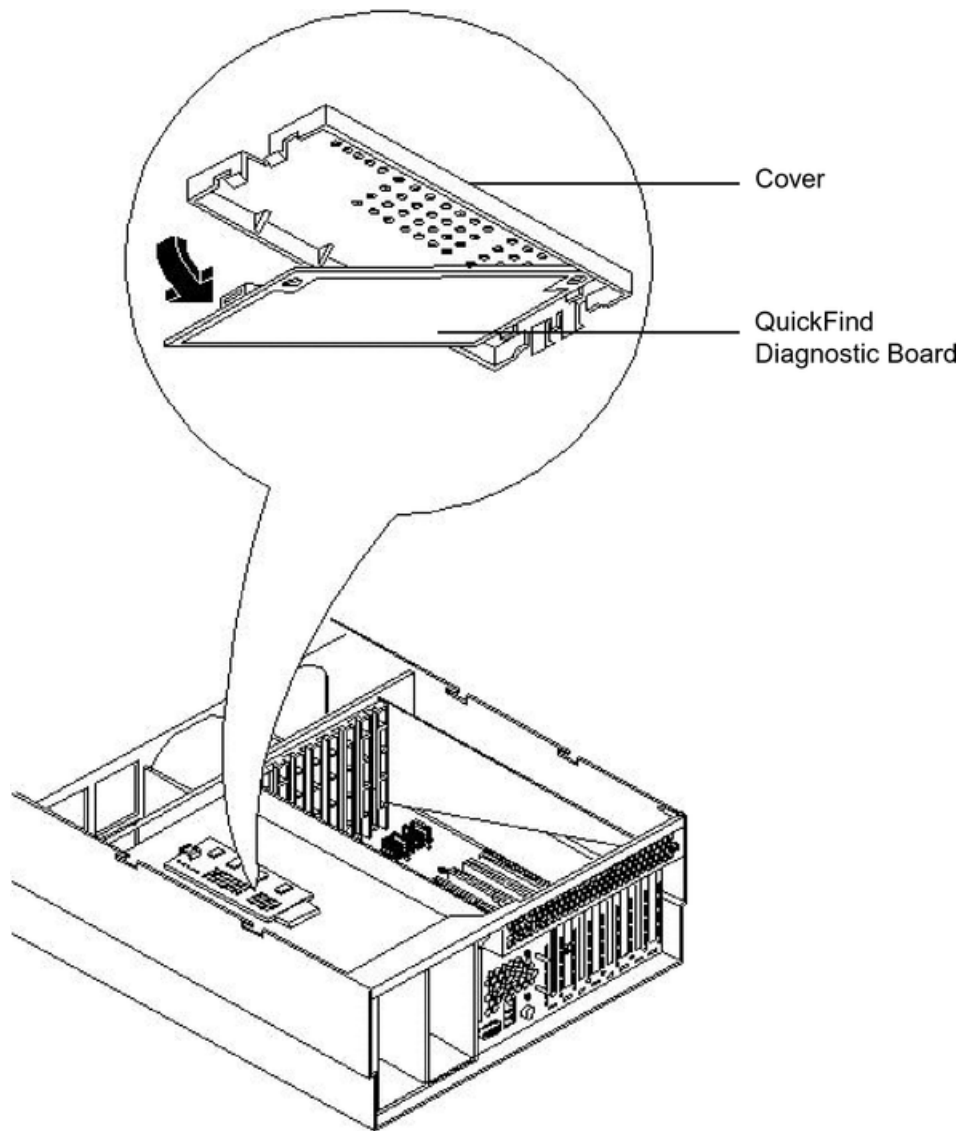
4. Turn this assembly upside down and remove the QuickFind diagnostic board from the cover.
5. Unplug the cable from the connector on the QuickFind diagnostic board and remove the board from the chassis.

Replacing the QuickFind Diagnostic Board

To replace the QuickFind diagnostic board, follow these steps:

1. Gently plug the cable into the QuickFind diagnostic board connector.
2. Replace the QuickFind diagnostic board into the cover by snapping it into place.
3. Turn the assembly over and snap into place on top of the power supply cage.
4. Replace the top cover. See "Replacing the Top Cover" (page 154).

A Replacement Parts

This appendix provides a replacement parts list that contains the following customer self-repair part information for the server:

- Manufacturing Part Number
- Description
- Replacement Part Number, if applicable
- Exchange Part Number, if applicable

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are three categories of CSR parts:

Yes: Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

Optional: Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

No: Some HP parts are not designed for customer self repair. To satisfy the customer warranty, HP requires that an authorized service provider replace the part.

Based on availability and where geography permits, CSR parts are shipped for next business day delivery. Same-day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone.

HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a CSR, HP pays for all the shipping and part return costs and determines the courier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, see the HP website at
http://www.hp.com/go/selfrepair.

Table A-1 provides CSR information.

Table A-1 Customer Self Repair Information

Code	Level	Description	Comments
AY	Yes	Level A with instructions available in the service guide	Requires you to replace these parts under warranty. No technical skills required.
BY	Optional	Level B with instructions available in the service guide	Low to moderate technical skills required.
CY	Optional	Level C with instructions available in the service guide	High technical skills required.
N	No	Not a customer replaceable part	Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part.

Replacement Parts List

📝 **NOTE:** If you need to replace a system board, first remove the processors, DIMMs, and adapter boards, and then transfer them to the new board.

You must transfer all jumper and switch settings from the old board to the new board.

Use this parts list whenever ordering parts for the HP 9000 rp4410 and rp4440 servers.

Table A-2 Replacement Parts List

Manufacturing Part Number	Description	Part Number Replacement	Part Number Exchange	Customer Self Repair
Cables				
A6961-63006	Internal SCSI, Cable	A6961-63006	N/A	N
A6961-63005	QuickFind Diagnostic to Midplane, Cable	A6961-63005	N/A	N
A6961-63004	Power Distribution to Midplane Ribbon, Cable	A6961-63004	N/A	N
A6961-63003	Power Distribution to Midplane 10 pin, Cable	A6961-63003	N/A	N
A6961-63011	SCSI Controller Jumper (Simplex only), Cable	A6961-63011	N/A	N
A6961-63008	SCSI Backplane to Midplane, Cable	A6961-63008	N/A	N
A6961-63002	Display to IDE to Midplane, Cable	A6961-63002	N/A	N
A7231-63024	Single-channel Internal SCSI Cable	A7231-63024	N/A	N
A7231-63025	Dual-channel Internal SCSI Cables(2)	A7231-63025	N/A	N
PCA Boards				
A6961-60007	Processor Extender PCA	A6961-67007	A6961-69007	N
A6961-60201	I/O Baseboard (includes VRMs) PCA	A6961-67401	A6961-69401	N
A6961-60204	16 slot Memory Board PCA	A6961-67204	A6961-69204	N
A7124-04006	32 slot Memory Board PCA	A9739-67007	A9739-69007	N
A6961-60005	Midplane Riser Board PCA	A6961-67005	N/A	N
A6961-04075	SCSI Backplane/Management Assembly, includes: Management Board (A6961-60103) and SCSI Backplane Board (A6961-60002) PCA	A6961-67024	N/A	N
A6961-60106	SCSI Duplex Board (HP-UX) PCA	A6961-67106	N/A	N
A6961-60008	Front Panel Display PCA	A6961-67008	N/A	N
A6961-60009	QuickFind (visual) Diagnostic Board (includes plastic cover and label) PCA	A6961-67009	N/A	N
A6961-60015	Power Distribution Board PCA	A6961-67015	N/A	N
A6961-60113	I/O Board to DVD Connectivity (IDE/USB) PCA	A6961-67113	N/A	N
A6967AX	256 MB DIMM	A6967AX	N/A	AY
A6968AX	512 MB DIMM	A6968AX	N/A	AY
A6969AX	1 GB DIMM	A6969AX	A6969-69001	AY

Table A-2 Replacement Parts List *(continued)*

Manufacturing Part Number	Description	Part Number Replacement	Part Number Exchange	Customer Self Repair
A6970AX	2 GB DIMM	A6970AX	A6835-69001	AY
AB475AX	4 GB DIMM	AB475AX	AB475-69001	AY
Internal Disks and Removable Media				
A9896-64001	36 GB 15K RPM SCSI Disk (A9776A)	5065-5286EO	A9896-69001	AY
A9897-64001	73 GB 15K RPM SCSI Disk (A9777A)	0950-4381EO	A9897-69001	AY
A9898-64001	146 GB 10K RPM SCSI Disk (A9778A)	0950-4385E0	A9898-69001	AY
A7384-64202	300 GB 10K RPM Hot Plug Ultra320 SCSI LP Drive	0950-4532E0	A7384-69001	AY
A7163-04001	DVD-R/CD-R Drive	A7163-67001	N/A	AY
A7007-04001	DVD-R/CD-RW Drive	A7007-67001	N/A	AY
AB349-62001	DVD-R/CD-RW Drive	AB349-67001	N/A	AY
Fans				
A6961-04055	I/O Fan	A6961-04055	N/A	AY
A6961-04028	Power Supply Fan	A6961-04028	N/A	AY
Processor Modules and Assemblies				
A7125-04004	800 MHz CPU Assembly with 32 MB L2 Cache	A7125AX	A7125-69002	BY
AB526-62001	800 MHz PA8900 CPU Assembly with 64 MB L2 Cache requires PDC greater than 44.21	AD059A	AD059-69001	BY
A7135-04004	1 GHz CPU Assembly with 32 MB L2 Cache	A7135AX	A7135-69002	BY
AB527-62001	1 GHz PA8900 CPU Assembly with 64 MB L2 Cache requires PDC greater than 44.21	AD060A	AD060-69001	BY
Miscellaneous				
0950-4428	Power Supply	A6961-67016	N/A	AY
A6961-04047	PCI Card Divider (doorbell and latch included)	A6961-67020	N/A	AY
A6961-40021	PCI Retention Clip	A6961-67021	N/A	N
A6961-40001	Kit, I/O Baseboard Lever	A6961-04089		BY
1420-0386	System Battery (BR2330)	N/A	N/A	BY
A6961-40034	Filler, Memory Air Blocker	A6961-40034	N/A	AY
Rack Solutions				
5069-3305	Rack Mount Hardware, right (included with left bracket in kit)	A6977-67001	N/A	N
5069-3306	Rack Mount Hardware, left (included with right bracket in kit)	A6977-67002	N/A	N
A7124-04004	Bezel, Rack Mount (rp4440)	A7124-04004	N/A	CY
A9955-4001	Bezel, Rack Mount (rp4410)	A9955-04001	N/A	CY

Table A-2 Replacement Parts List *(continued)*

Manufacturing Part Number	Description	Part Number Replacement	Part Number Exchange	Customer Self Repair
A6979-04001	Rackless pedestal kit	A6979-04001	N/A	N/A
Parts Shared with Other Products				
A6825-60101	Single Port GigE LAN Card (PA8800 only)	A6825-67101	N/A	BY
AB352-60001	Dual-port GigE LAN Card (PA8900 only)	AB352-67001	N/A	BY
A6829-60101	U160 Core I/O (PA8800 only)	A6829-67001	N/A	BY
A6961-60011	U320 Dual-port SCSI (PA8900 only)	A6961-67011	N/A	BY
309520-001N	SPS-BD, Controller, Smart Array, 2/4CSPS (A9890A)	N/A	309520-001	BY
309521-001N	Board, Memory, 128M, 72BT, DDR, W/BTY	309521-001	N/A	BY

B Utilities

This appendix describes the utilities that are part of the server. These include the Boot Console Handler (BCH) and the iLO MP.

Boot Console Handler

The BCH user interface provides the interface between you and the firmware through the menus and simple commands.

The BCH is separate code in processor-dependent code (PDC). The BCH code has two purposes:

- Enables the bootstrap code to know which path to boot from.
- Enables you to interact with PDC to view and modify a set of specific system parameters.

Booting is standard for PA RISC, but can be transparent depending on the state of the autoflags (`boot`, `search`, and `start`). If the autoflags are clear and you override autobooting, a boot sequence ends in the interactive portion of BCH where modification and viewing of some system parameters is possible.

> **NOTE:** When the `autostart` flag is off, autoboots are interrupted if a configuration change occurs, which causes reduced performance. Therefore, you must intervene before booting to the internal system loader (ISL).
>
> The auto boot halts at the BCH prompt. Continue booting by entering `boot`.

BCH Commands

The PDC user interface provides the following types of commands:

User Commands — Relate to common system management or administration tasks such as configuration or boot.

Service Commands — Available to qualified service personnel. The service commands are generally used to access information about faults that occur while the system is running.

Table B-1 shows the **BCH Main Menu**, submenus and commands. Examples are provided in "BCH Main Menu Commands and Submenus" (page 236).

Table B-1 BCH Main Menu, Submenus, and Commands

Submenu	Description
BOot [PRI|ALT|<path>]	Boots from the specified path.
PAth [PRI|ALT] [<path>]	Displays or modify a path.
SEArch [DIsplay|IPL] [<path>]	Search for boot devices.
COnfiguration menu	Displays or sets boot values.
INformation menu	Displays hardware information.
SERvice menu	Displays service commands.
DIsplay	Redisplays the current menu.
HElp [<menu>|<command>	Displays help for menu or command.
RESET	Restarts the system.

The boot device paths specify the primary boot device (PRI boot path), the high-availability alternate device (HAA boot path), and the alternate device (ALT boot path).

Table B-2 lists the boot paths.

Table B-2 Boot Paths

Boot Source	Boot Path
Bottom Disk – Slot 1 (SCSI ID = 0)	0/1/1/0.0.0 (Simplex Mode) 0/1/1/1.0.0 (Duplex Mode)
Top Disk – Slot 2 (SCSI ID = 1)	0/1/1/0.1.0 (Duplex Mode)
DVD	0/0/3/0.0

BCH Main Menu Commands and Submenus

The following sections provide information and examples of the submenus and commands in the BCH firmware user interface.

The BCH **Main Menu** is the first menu displayed when you enter the firmware user interface. The other menus available are listed in this menu. To view the commands available from this menu, enter `DI` (display).

Access other menus by entering the name of the menu at the command prompt. From a given menu, you can run a command from any other menu by entering the menu name that is associated with the command, followed by the command. For example, to run the `TI` (time) command (in the `COnfiguration` menu) from the `Main Menu`, enter `co ti`. To see all available commands listed under their respective menus, enter **HE** (help) **MA** (main).

Example screen output of the BCH `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 menu                 Displays or sets boot values
    INformation menu                   Displays hardware information
    SERvice menu                       Displays service commands

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

Main Menu: Enter command or menu >
```

* You cannot modify the keyboard path.

Boot Command

To initiate the boot sequence from any menu in the interface, use the `BO` (boot) command. You can enter either a default or specified path to the boot device. This path must be the definition of a device, for example, FWSCSI.6.0 or PRI. The default is PRI.

Path Command

The `PA` (path) command displays or sets the current paths. Invoked with only one argument, `PA` displays the current path of the entity passed as argument. For example, `path alt` displays the current alternative boot path, and `path pri fwscsi.6.0` sets up the primary boot path as the device attached to SCSI controller with ID 6 and LUN 0. You can also set and display the paths of console (graphics/serial) and keyboard. For example:

```
Main Menu: Enter command or menu > pa

    Primary boot path:           intscsia.1
                                 0/1/1/0.1
                                 0/01/01/0.1        (hex)
```

```
        Alternate boot path:        intscsib.2
                                    0/1/1/0.2
                                    0/01/01/01.2      (hex)


        Console path:               0/7/1/1.0
                                    0/07/01/01.1      (hex)


        Keyboard path:              0/0/4/0.0
                                    0/0/04/0.0        (hex)

Main Menu: Enter command or manu >
```

Search Command

The SEA (search) command automatically checks all possible boot and install devices connected to the system and displays these bootable paths. In several firmware versions, it links these paths to a shortcut (such as P0). It can also search the LAN, if the system can boot it. Some firmware revisions enable you to restrain the search path, for example SEA LAN or SEA disk. The SEA command is available in the Main and COnfiguration menus.

```
Main Menu: Enter command or menu > sea

Searching for potential boot device(s)

This may take several minutes.

To discontinue search, press any key (termination may not be immediate).


                                                                    IODC
Path#  Device Path (dec)  Device Path (mnem)  Device Type          Rev

-----  -----------------  ------------------  -----------          ----

P0     0/0/2/0.0          ide.0               Random access media   1

P1     0/1/1/0.1          intscsia.1          Random access media   1

P2     0/1/1/0.0          intscsia.0          Random access media   1

P3     0/1/1/1.2          intscsib.2          Random access media   1
```

Configuration Menu

The COnfiguration Menu commands enable you to view and modify the configuration and state of the system.

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

---- Configuration Menu -------------------------------------------------

    Command                          Description
    -------                          -----------
    AUto [BOot|SEArch|STart] [ON|OFF] Display or set specified flag
    BootID [<proc>] [<bootid>]       Display or set Boot Identifier
    BootINfo                         Display boot-related information
    BootTimer [0 - 200]              Seconds allowed for boot attempt
    CPUconfig [<proc>] [ON|OFF]      Config/Deconfig processor
    DEfault                          Set the system to predefined values
    FastBoot [ON|OFF]                Display or set boot tests execution
    ResTart [ON|OFF]                 Display or set boot tests execution
    PAth [PRI|ALT] [<path>]          Display or modify a path
    SEArch [DIsplay|IPL] [<path>]    Search for boot devices
    TIme [c:y:m:d:h:m:[s]]           Read or set the real time clock in GMT

    BOot [PRI|ALT|<path>]            Boot from specified path
```

```
        DIsplay                         Redisplay the current menu
        HElp [<command>]                Display help for specified command
        RESET                           Restart the system
        MAin                            Return to Main Menu
----
Configuration Menu: Enter command >
```

The configuration default command sets the following values:

```
    Primary boot path:      0/0/1/0.0
    Alternate boot path:    0/0/2/0
    Console path:           0/0/1/0.0
    Keyboard path:          0/0/4/0.0
    Autoboot:               ON
    Autosearch:             ON
    Autostart:              OFF
    BootTimer               0
```

Information Menu

The INformation menu commands enable you to view information about the configuration and state of the system.

```
Main Menu: Enter command or menu > in

---- Information Menu -----------------------------------------------------

        Command                         Description
        -------                         -----------
        ALL                             Display all system information
        BootINfo                        Display boot-related information
        CAche                           Display cache information
        ChipRevisions                   Display revisions of major VLSI
        COprocessor                     Display coprocessor information
        FwrVersion                      Display firmware version
    *   IO                              Display I/O interface information
        LanAddress                      Display Core LAN station address
        MEmory                          Display memory information
   **   PRocessor                       Display processor information
  ***   WArnings                        Display selftest warning messages
  ***   IORevisions                     Display selftest warning messages

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

* The PCI device information displayed includes description, path, vendor ID, device ID, slot number, and bus number.

** The PRocessor command displays the system model string.

***Warnings displayed are as follows:

WARNING: Too many CPUS for a rp4410 system. System will not boot.

WARNING: A fatal error has occurred-system cannot boot. Review warning messages in the information menu.

Service Menu

The **SERvice** menu commands are used by service personnel to view information about the system for the purpose of system service operations.

```
Main Menu: Enter command or menu > ser

---- Service Menu ---------------------------------------------------------

        Command                         Description
        -------                         -----------
        CLEARPIM                        Clear (zero) the contents of PIM
```

```
    SCSI [option] [<path>] [<val>]    Display or set SCSI controller values
    MemRead <address> [<len>]         Read memory and I/O locations
    PDT [CLEAR]                       Display or clear the PDT
    PIM [<proc>] [HPMC|LPMC|TOC]      Display PIM information
    ProductNum <O|C> [<number>]       Display or set Product Number
    ScRoll [ON|OFF]                   Display or change scrolling ability
    SELftests [ON|OFF]                Enable/disable self test execution

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

Display Command

The DI (display) command redisplays the current menu.

SCSI Command

The SCSI command displays and sets the SCSI controller parameters, such as initiator ID and speed. The OS device drivers use these parameters to program the controller.

📝 **NOTE:** These values are only suggested by the device driver; the actual values programmed into the controller can be different.

ProductNum Command

The ProductNum command configures the original or current product number. The software ID (SWID) does not get updated automatically when the original product number changes, but you can manually update the SWID by resetting the system with the reset command.

iLO MP

The Integrated Lights-Out Management Processor (iLO MP) for HP PA-RISC and Integrity is an autonomous management subsystem embedded directly on the server. It is the foundation of server High Availability (HA), embedded server, and fault management. It also provides system administrators secure remote management capabilities regardless of server status or location. The iLO MP is available whenever the system is connected to a power source, even if the server main power button is in the off position.
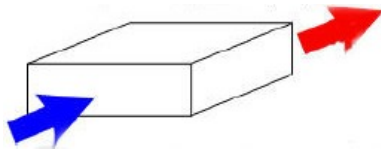
For complete information on the iLO MP, see the *HP Integrity and HP 9000 iLO MP Operations Guide*.

C Physical and Environmental Specifications

Table C-1 provides temperature and airflow information for minimum, typical, and maximum configurations for the HP 9000 rp4410 and rp4440 servers. It also lists the server and rack weights and dimensions.

Table C-1 Physical and Environmental Specifications

	Condition					Weight			Overall Server (W x D x H)	
	Typical Heat Release	Airflow, Nominal		Airflow, at Maximum Ambient degrees C[1]						
	180-264 VAC					Server Alone	Rack	Pede-stal	Rack	Pede-stal
Min. Config.	410 Watts		297 m3/hr	250 CFM	425 m3/hr	88 lbs (40 kg)	100 lbs (45.4 kg)	115 lbs (53 kg)	W: 19 in (48.2 cm) D: 27.2 in (69.0 cm) H: 6.8 in (17.3 cm)	W: 10.3 in (26.1 cm) D: 27.4 in (69.5 cm) H: 20.9 in (53.0 cm)
Max. Config.	1368 Watts	175 CFM								
Typical Config.	1065 Watts									
ASHRAE Class 1	Airflow cooling scheme (front to rear)			Min./ Config.	One CPU, one power supply, 1 GB DIMM, zero DVD, one HDD, zero PCI cards, one core I/O.					
				Max. Config.	Four CPUs, two power supplies, 128 GB DIMM, one DVD, two HDD, six PCI cards, two core I/O.					
				Typical Config.	Two CPUs, two power supplies, 16 GM DIMM, one DVD, two HDD, two PCI cards, one core I/O.					

1   Derate maximum dry bulb temperature 1 degree per 300 meters above 900 meters.

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