hp 9000 rp4440
Operation and Maintenance Guide

Regulatory Model Number: RSVLA-0201

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1 About This Document

This document describes how to operate and maintain your hp 9000 rp4440 Server, Regulatory Model Number: RSVLA-0201.

The document printing date and part number indicate the document's current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number will change when extensive changes are made.

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What's in This Document

The hp 9000 rp4440 Operation and Maintenance Guide contains these chapters:

- **Chapter 2, "Controls, Ports, and Indicators."** Use this chapter to learn about the front panel controls, rear panel ports and connectors, and all system LED locations and functions.
- **Chapter 3, "External Connectors."** Use this chapter to learn about all external connectors, plugs, and their pinouts.
- **Chapter 4, "Installing Additional Components and Configuring."** Use this chapter to learn how to install additional hot-swap power supplies, hot-swap disk drives, memory DIMMs, processors, and PCI-X cards. Also, learn how to configure your management processor and boot your HP Server.
- **Chapter 5, "Utilities."** Use this chapter to learn how to navigate in the BCH and management processor environments.
- **Chapter 6, "Troubleshooting."** Use this chapter to learn how to perform minimal troubleshooting of your system
- **Chapter 7, "Removing and Replacing Components."** Use this chapter to learn how to remove and replace all Field Replaceable Units (FRUs) in your system.
- **Appendix A, "Parts Information."** Use this appendix to see a list of all FRUs.
- **Appendix B, "Specifications."** Use this appendix to learn the basic mechanical specifications of your HP Server.
- **Appendix C, "System I/O Board Switches and Jumpers."** Use this appendix as a reference to system I/O board indicators, connectors, and jumpers.

Typographical Conventions

This document uses the following conventions.

Title   The title of a document or a CD.

KeyCap   The name of a keyboard key. Note that **Return** and **Enter** both refer to the same key.

Emphasis   Text that is emphasized.

Bold   Text that is strongly emphasized, such as the summary text in bulleted paragraphs.

`ComputerOut`	Text displayed by the computer.
`UserInput`	Commands and other text that you type.
`Command`	A command name or qualified command phrase.

Related Documents

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2 Controls, Ports, and Indicators

Introduction

This chapter describes the controls, ports, and indicators found on the front panel, rear panel, and internal locations of the hp 9000 rp4440 Server. The HP Server comes in either rack mount or rackless configurations.

Front Panel

The front panel of the hp 9000 rp4440 Server provides the controls and indicators commonly used for operation.

Figure 2-1   Front View with Bezel
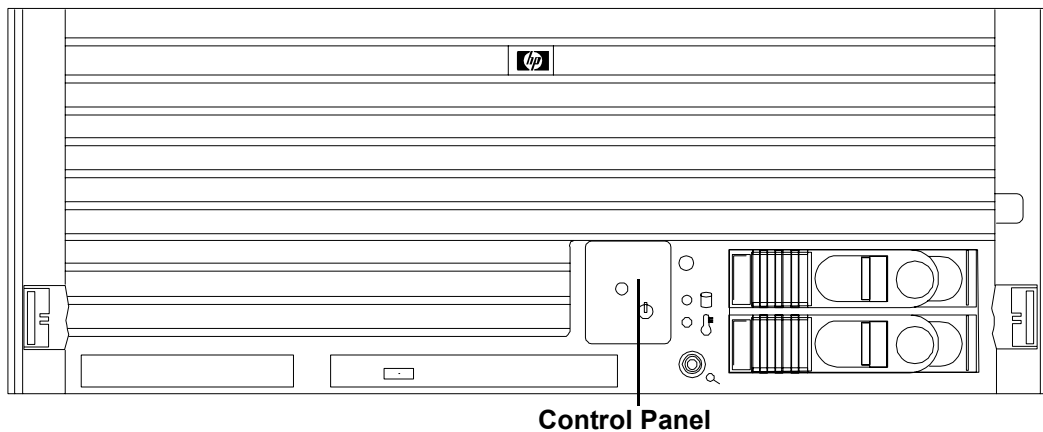
Control Panel

Figure 2-2   **Accessing the Control Panel**
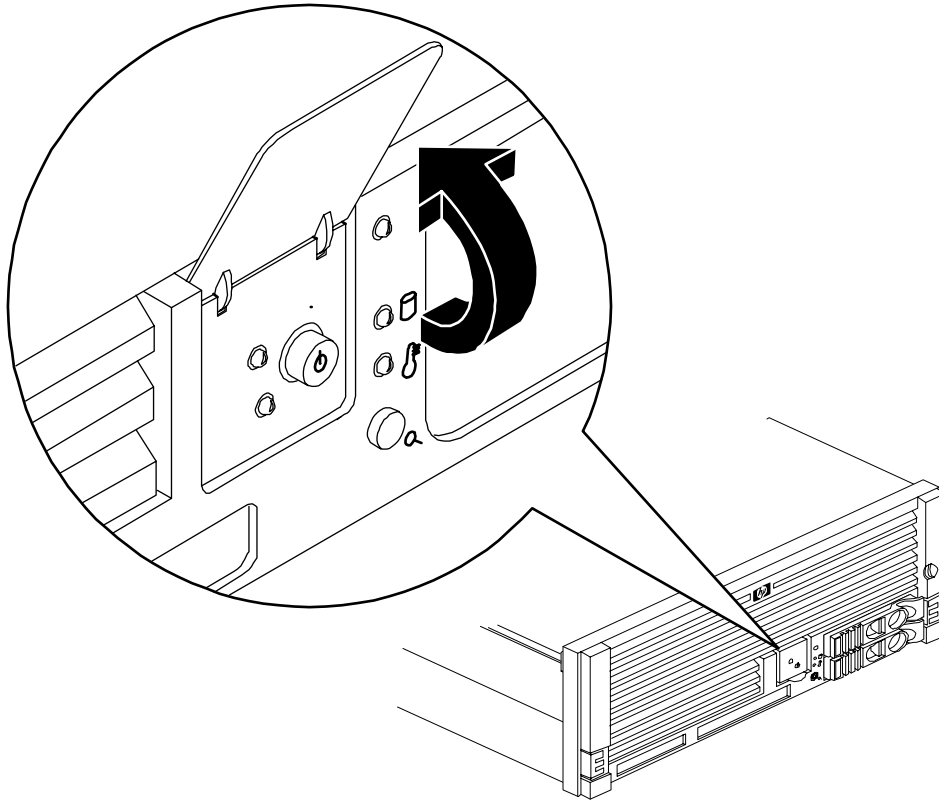
Figure 2-3   **Control Panel**
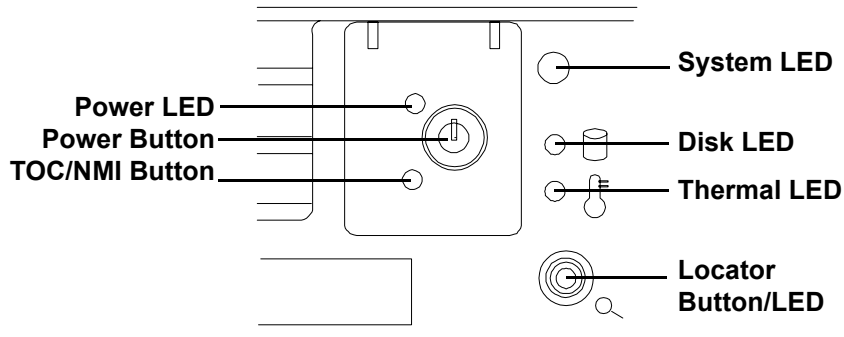
Table 2-1   **Control Panel LED Definitions**

LED/ Button	State	Flash Rate	Color	Description
System	Running	Steady	Green	Green: System normal—OS up and running
System	Booting	Flashing at 0.5Hz	Green	Flashing Green: OS booting or at BCH

Table 2-1   Control Panel LED Definitions (Continued)

LED/ Button	State	Flash Rate	Color	Description
System	Attention	Flashing at 1 Hz	Yellow	Flashing Yellow: Warning-system needs attention. Redundancy lost, component failure pending.
System	Fault	Flashing at 2 Hz	Red	Flashing Red: Hard fault. system halted
System	Off	Off	N/A	Off: System off
Power	On	Steady	Green	Green: Power normal
Power	On	Steady	Yellow	Flashing Yellow: Housekeeping voltage present
Power	Off	Off	Off	Off: Power off
Disk LED		Flashing at rate of disk activity	Green	Flashing Green: Disk activity
Thermal LED	OK	Steady	Green	Green: Thermal OK
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Flashing Yellow: Thermal warning
Locator LED/Button		Flashing at 1 Hz	Blue	Flashing Blue: System locator LED may be remotely or locally activated/deactivated

Switch/Button and Front Control Panel LED Definitions

Table 2-2   Switch/Button LED Definitions

Button/Switch	Description
Power Button	The power switch turns the HP Server AC power on or off.[a] If sleep states are available, it also transitions between power-on and sleep states. Sleep states are NOS dependent and only available if your NOS supports power management based on the ACPI (Advanced Configuration and Power Interface) standard.
NMI Button (Paper clip may be used to depress button.)	Press the nonmaskable interrupt (NMI) switch before restarting the system after a hung condition occurs. NMI provides crash dump capture capability. Obtain a system hardware status dump to use in root cause analysis and debugging.[b]

a. Turning off the power button does NOT turn off internal DC power supplies. These DC potentials are still present until you remove the AC power cords from the rear of the power supply units. Ensure that you remove the AC power cords from your HP Server before removing or replacing hardware components (unless they are hot-plug or hot-swap components).

b. The same function is available by using the Management Processor command: CM>TC

Additional Controls and Indicators

Storage devices have additional LEDs showing their status.

Hot-Plug Disk Drive Indicators

The hot-swap disk drives have two LEDs per drive, as described below.

- Drive Status LED - The drive status LED is tri-color and may display green, amber, or yellow at any given time. These colors indicate a normal, warning, or failure condition.

- Drive Activity LED - 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.

Figure 2-4   **Hot-Swap Disk Drive LED Indicators**

Status LED
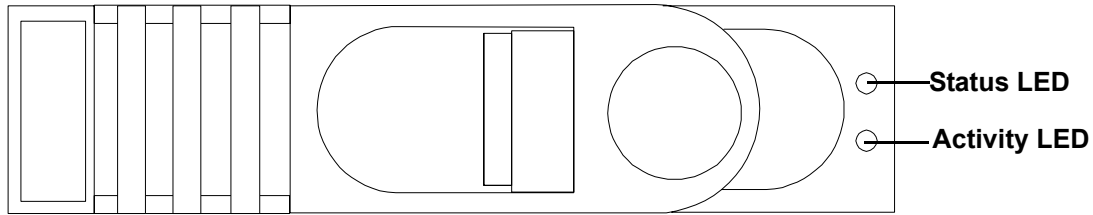
Activity LED

Table 2-3   **Hot-Swap Disk Drive LED Definitions**

LED		Description
Activity LED	Flashing green	Drive access under hard drive control.
Status LED	Solid Amber	Drive fault.
	Amber	Missing management board or jumper cable. For all HDD on SCSI bus A and/or B.
	Green	Drive/Slot normal (drive present).
	Blank	Pass through mode.

DVD–ROM/DVD-R/DVD-RW Drives

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

Figure 2-5   **DVD–ROM Drive**

Eject Button   Activity LED   Emergency Eject
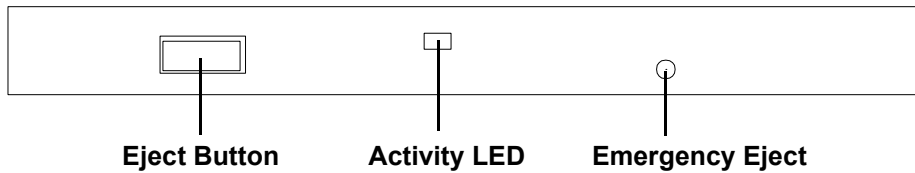
Table 2-4   **DVD Drive LED Definitions**

LED		Description
Activity LED	Flashing green	Drive access under hard drive control.

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. See "Removing the Top Cover" on page 129. You can use the QuickFind diagnostic panel as an aid in troubleshooting. For a complete description of QuickFind diagnostic LED states, see "Front Control Panel LEDs" on page 112.

Figure 2-6   QuickFind Diagnostic Panel
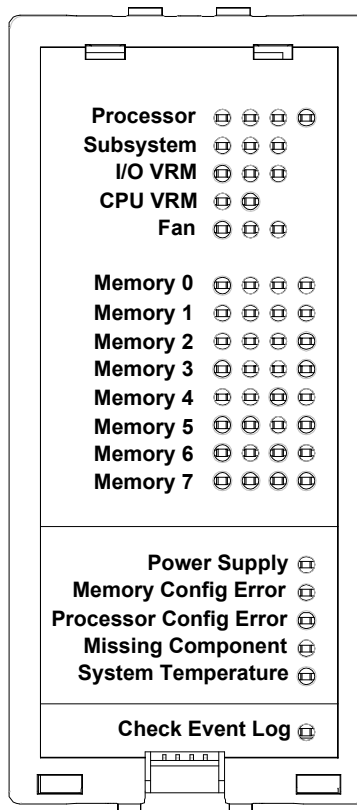
Table 2-5   QuickFind Diagnostic Panel LEDs

Item	LED 0	LED 1	LED 2	LED 3	Details
Processor	Socket 0	Socket 1	Socket 2	Socket3	If the System LED (on front panel) is in the attention or fault state and the processor LED is lit, then the processor or voltage regulator has failed—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 lit, 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—the specified board must be replaced.
I/O VRM	12 volt	5 volt	3 volt	n/a	A plug-in voltage regulator has failed—specific VRM must be replaced.
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 has failed—the module must be replaced. Fan 2 is in front of the power supplies.
Memory Bank X (0-7)	DIMM xA	DIMM xB	DIMM xC	DIMM xD	The specified DIMM has failed—the DIMM 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 supply or power supply fans has failed—replace the power supply. The faulty power supply LED (located on power supply) will be lit.
Memory Config Error	n/a	n/a	n/a		The DIMMs in a rank are mismatched. All the DIMMs in the specified rank (0-7) will be lit.
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 and thus preventing power up.
System Temp	n/a	n/a	n/a		The internal temperature of the server has exceeded the warning or critical level.

Table 2-5   QuickFind Diagnostic Panel LEDs (Continued)

Item	LED 0	LED 1	LED 2	LED 3	Details
Check Event Log	n/a	n/a	n/a		An event has occurred that requires attention.

I/O Baseboard LED Indicators

Various LEDs, sensors, reset, and attention buttons are found on the I/O baseboard.

Figure 2-7   I/O Baseboard LEDs, Buttons, and Sensors
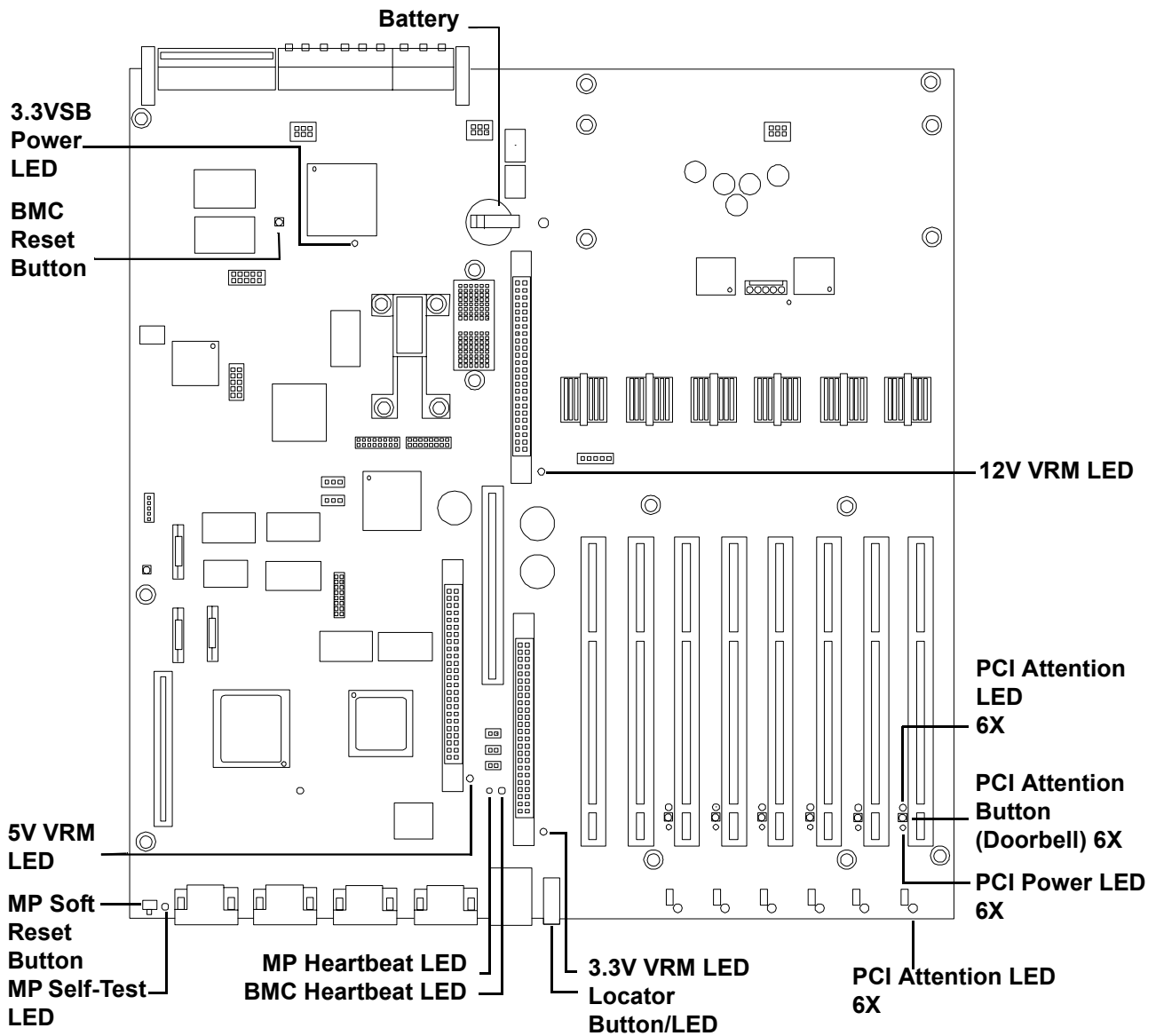
Table 2-6   I/O Baseboard LEDs, Buttons, and Sensors

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.
MP Heartbeat	Green	Blinking	The management processor is functioning correctly.
MP Self Test LED	Amber	On	The management processor is executing the internal self test.
		Off	The management processor has passed the internal self test.
BMC Heartbeat	Green	Blinking	The baseboard management controller is functioning correctly.
3.3VSB Power LED	Green	On	Standby power is available.
MP Soft Reset Button	N/A	Press	Resets the management processor values.

Rear Panel

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

- Power supplies
- Management processor LAN
- Gigabit Ethernet card LAN
- PCI slots 3-8

Figure 2-8   Rack Mount and Rackless Rear View

Gigabit Ethernet LAN LEDs

MP LAN LEDs

6 PCI Attention LEDs

Locator Button/LED
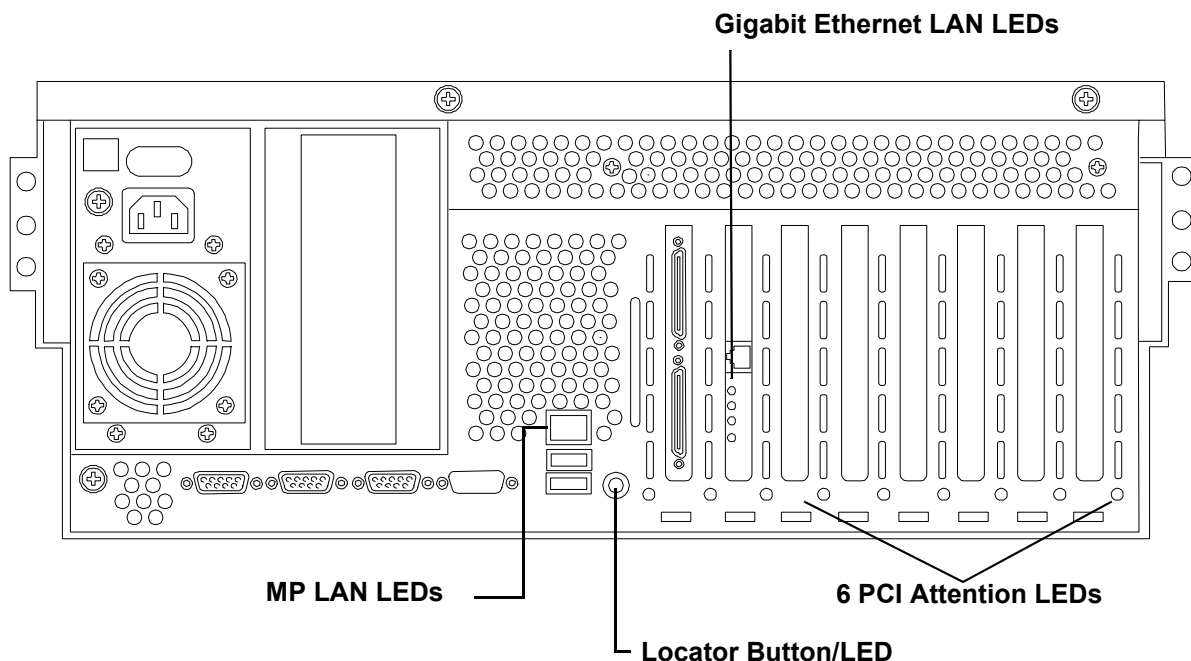
Power Supply Status LEDs

Each power supply unit has three status LEDs located on the power supply rear side. Consolidated status of all power supplies is reported by the front control panel by the power status LED.

Figure 2-9   Power Supply Status LED
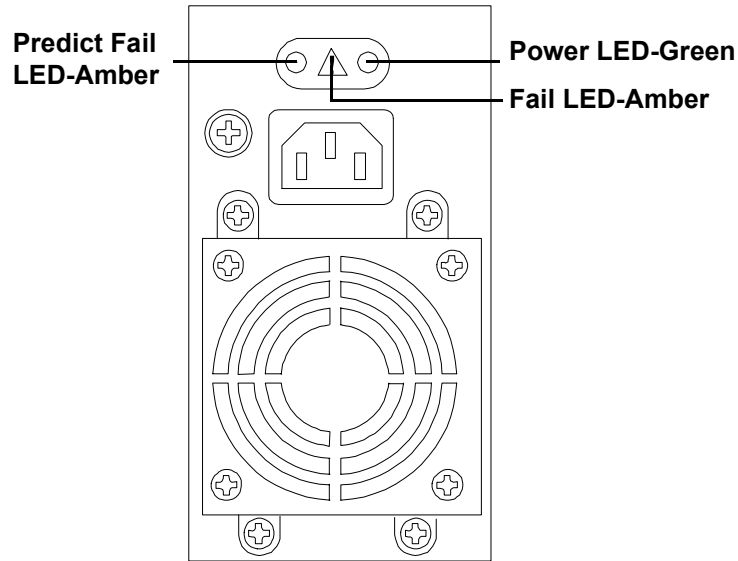
Table 2-7   Power Supply Status LED

Power LED-Green	Predict Fail LED-Amber	Fail LED-Amber	Status
Off	Off	Off	No AC power applied to all PSUs.
Off	Off	On	No AC power applied to this PSU only.
Blinking	Off	Off	AC present/standby outputs on.
On	Off	Off	PSU DC outputs on and OK.
Off	Off	On	Power supply failure.
On	Blinking	Off	Predictive failure—PSU about to fail because of poorly performing fan.
On	Off	Blinking	Current limit on 48 VDC output.

Management Processor LAN LEDs

The internal management processor (MP) LAN uses an RJ-45 type connector. This connector has two LEDs (LAN link and LAN activity) that signal status and activity.

Figure 2-10   MP LAN LEDs
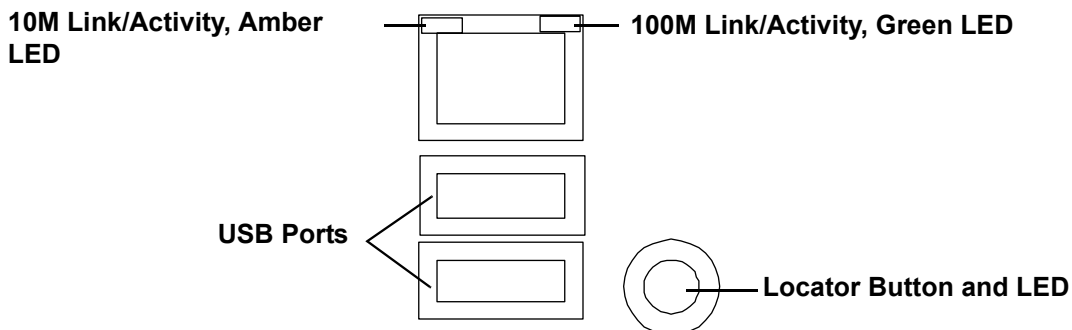
Table 2-8   MP LED Status Descriptions

LED	Condition	Status
10M amber	On	Linked at 10MBps-no activity
10M amber	Blinking	Linked at 10MBps-activity present
100M green	On	Linked at 100MBps-no activity
100M green	Blinking	Linked at 100MBps-activity present

Locator LED and Button

An LED and button is provided on the rear panel of the server. Another single blue LED and button is on the front control panel that enables/disables the locator function. See Figure 2-10, "MP LAN LEDs."

Gigabit Ethernet Card LAN LEDs

(Core I/O)

The core I/O Gigabit Ethernet card uses an RJ-45 LAN connector. This connector has 4 LEDs (3 LAN link and 1 LAN activity) that signal link speed and activity.

Figure 2-11   **Core I/O LAN Port LEDs**
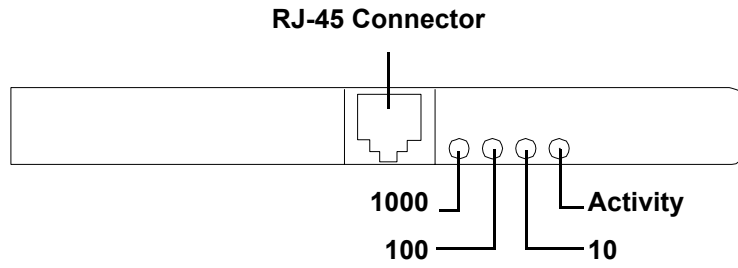
Table 2-9   **Core LED Status Descriptions**

LED	Condition	Status
Activity	Green—on	Linked—no activity
Activity	Green—off	No link
Activity	Green—blinking	Linked—activity present
1000	Green—on	Link speed—1000 MBps
100	Green—on	Link speed—100 MBps
10	Green—on	Link speed—10 MBps

3 External Connectors

Connector Pinouts

The following ports and connectors are found on the rear panel of the hp 9000 rp4440 Server. The SCSI Host Bus Adapter card in slot 1 and the Gigabit Ethernet card in slot 2 are factory installed.

Figure 3-1   **Rear View**
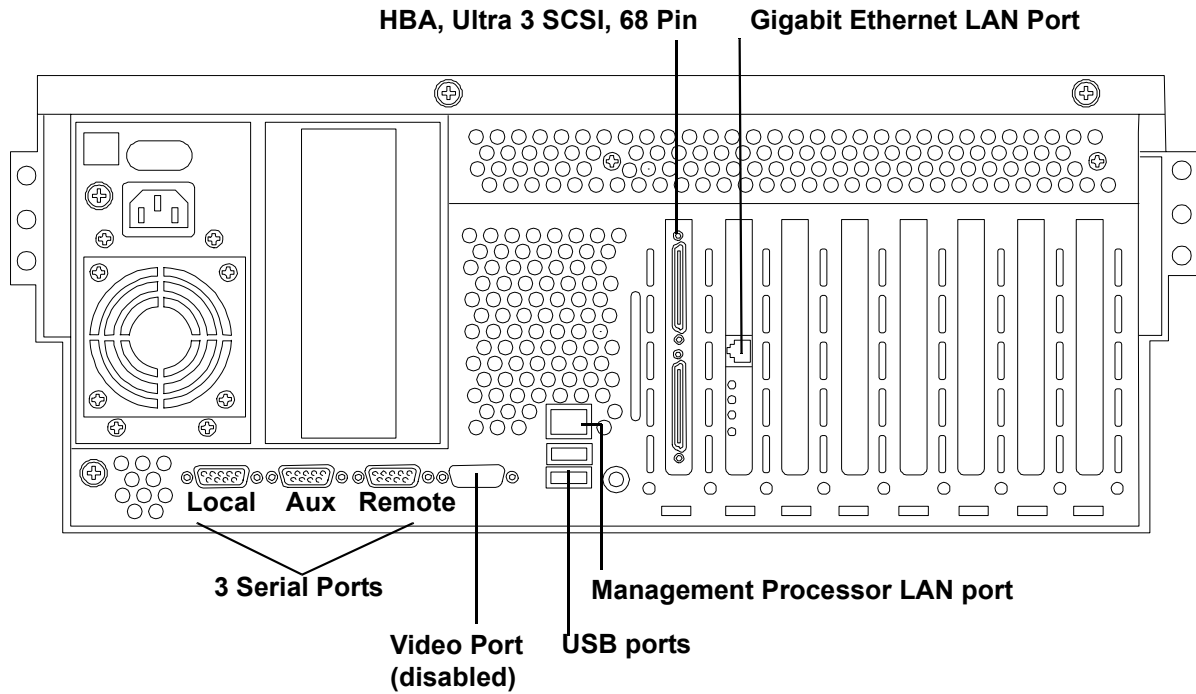
Universal Serial Bus (USB) Ports

Figure 3-2   USB Port Connector
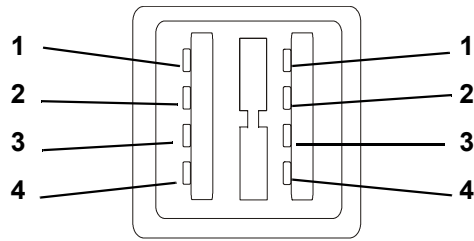
Table 3-1   USB Pinouts

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

VGA Port

Figure 3-3   Video Port Connector
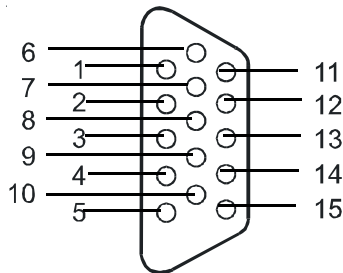
Table 3-2   Video Connector Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1	Red	9	+5VDC
2	Green	10	Sync return (ground)
3	Blue	11	Not used
4	Not used	12	Monitor ID bit 1
5	Video Self Test (ground)	13	Horizontal sync (+)
6	Red return (ground)	14	Vertical sync (-)
7	Green return (ground)	15	Video ID bit 2
8	Blue return (ground)		

Serial Ports

Figure 3-4   **Serial Port Connector**
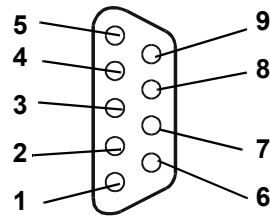
Table 3-3   **Serial Port Pinouts**

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

Management Processor LAN Port

Figure 3-5   Management Processor Port

Green —————— —————— Yellow

1 —————— —————— 8
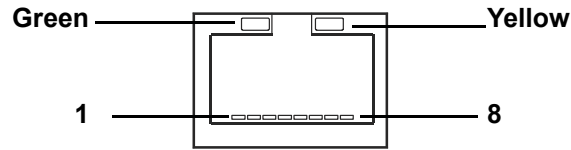
Table 3-4   Management Processor LAN Port Pinouts

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

Additional Ports on Accessory Boards

Gigabit Ethernet (LAN) Port

Figure 3-6   LAN Port
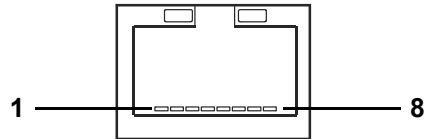
Table 3-5   LAN Port Pinouts

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 host bus adapter (HBA) located in PCI slot 1. The upper connector supports SCSI channel A and the lower connector supports SCSI channel B.

Figure 3-7   SCSI Port, Ultra 3, 68-Pin
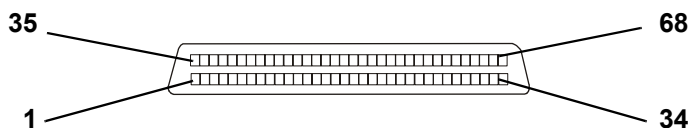
Table 3-6   SCSI Port Pinouts

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)
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

Table 3-6   SCSI Port Pinouts (Continued)

Pin Number	Signal Description	Pin Number	Signal Description
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)

4 Installing Additional Components and Configuring

Installing Power Supplies and Disk Drives

This section provides information about installing hot-swap power supplies and hot-plug disk drives. Hot-swap power supplies are located at the rear of the hp 9000 rp4440 Server and hot-plug disk drives are located behind the front bezel.

CAUTION	A hot-plug device may require interaction with the operating system before the device can be 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 will result in system failure.

NOTE	A hot-swap 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 have to be off to install a hot-swap power supply.

Figure 4-1   Front View

Hot-plug disk drive Slot 2

Hot-plug disk drive Slot 1

DVD Drive   Control
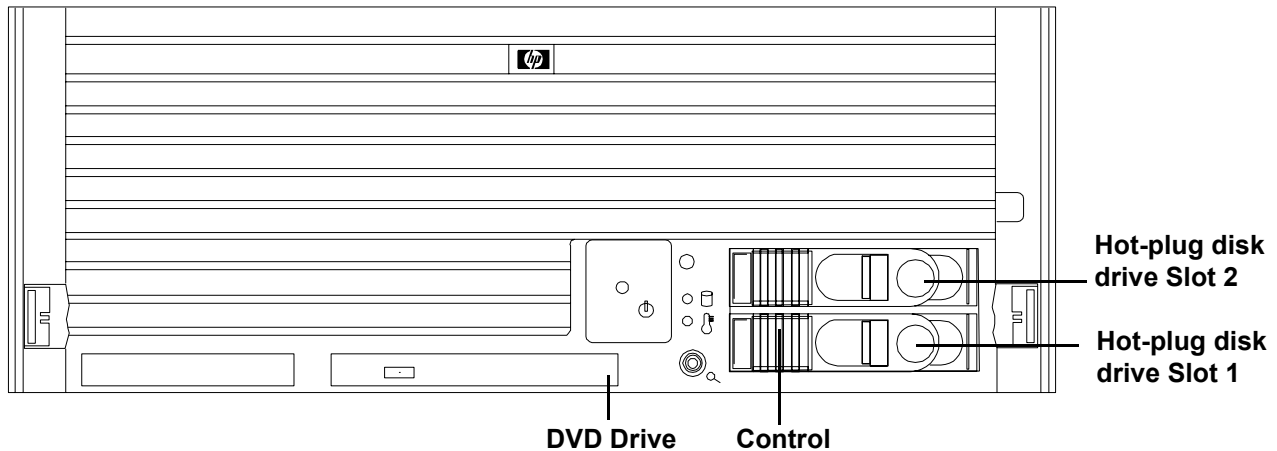
Installing Hot-Swap Power Supply Units (PSU)

Power Supply Load Order

The supported configuration of an hp 9000 rp4440 Server requires a minimum of one power supply unit to be installed. A second, optional hot-swap PSU, may be installed to provide N+1 capability.

The left side (viewing from the rear) hot-swap PSU is identified as P 0, and the second hot-swap power supply is identified as P 1. Each hot-swap PSU requires a separate power cord, installed in the appropriate power cord receptacle.

CAUTION	The empty hot-swap PSU slot P 1 must remain closed, with the supplied metal cover, when a second power supply is not used. Your server may be damaged due to overheating if the cover does not remain in place.

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

CAUTION	If the system is powered down, install the hot-swap PSU into the server before attaching the new power cord at the rear of the system. Failure to observe this caution will result in damage to the server.

To install a hot-swap power supply, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the cable management arm from the rackslide nearest the PSUs. The cable management arm does not have to be completely removed but moved just enough to allow access to the PSUs.

Step 3. Remove the metal cover from slot P 1. Grasp the metal cover and pull straight out.

Step 4. Supporting the PSU with both hands, slide it into slot P 1 until it plugs into the socket on the internal power supply board. Tighten thumbscrew hand-tight.

Step 5. Install the power cord into the PSU socket and secure it to the power cord bracket.

Step 6. Apply power to the new PSU; the LED should immediately turn on.

Step 7. If rack mounted, slide the HP Server back into the rack until it stops.

Figure 4-2   **Hot-Swap Power Supply in P 0 Slot**
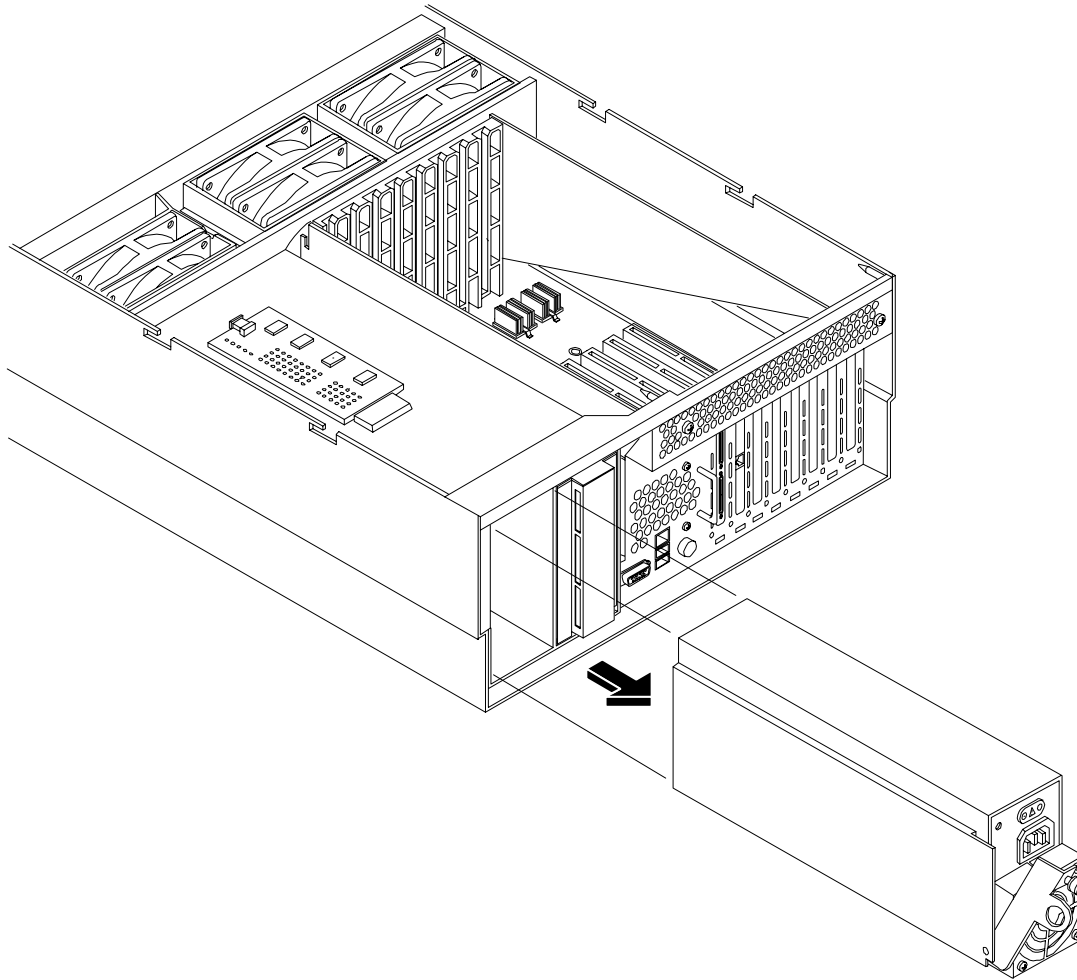
Figure 4-3   **Metal Cover in Unused P 1 Slot**
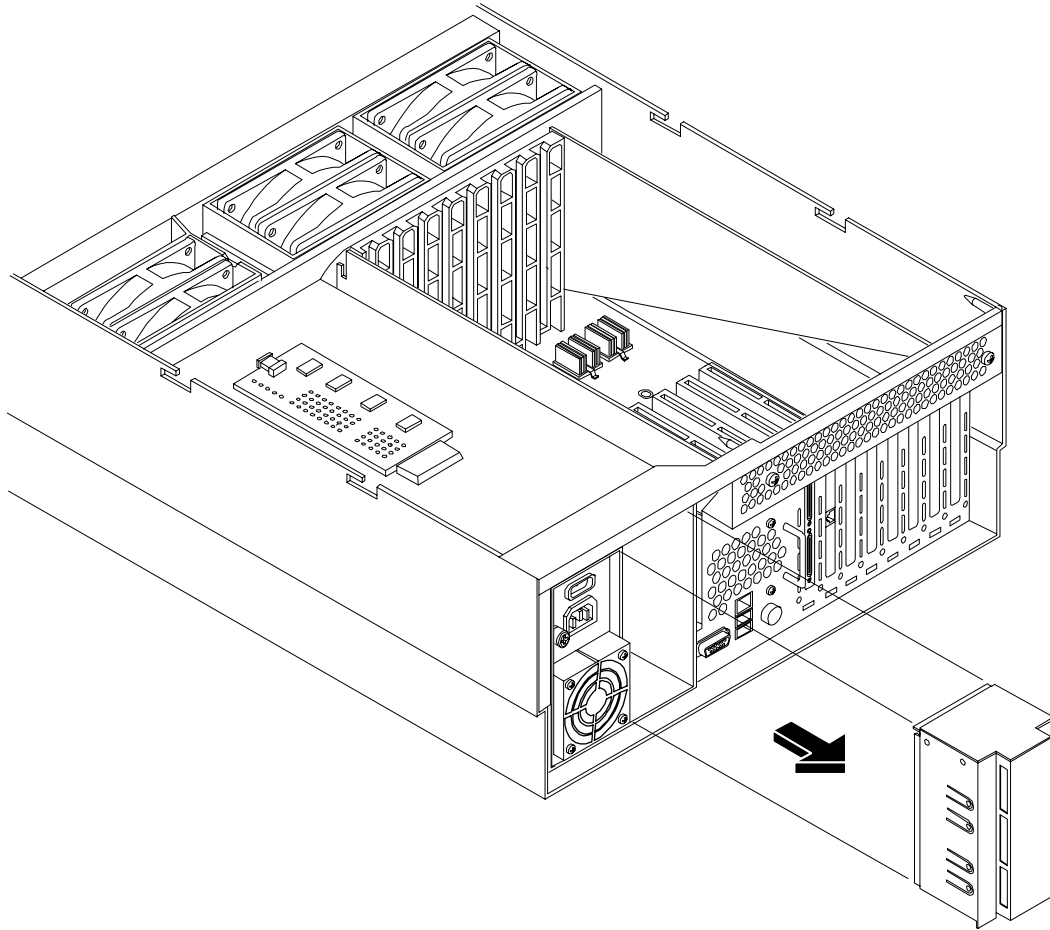
Installing Hot-Plug Disk Drives

One additional hot-plug disk drive may be added to your hp 9000 rp4440 Server in slot 2. Always use low profile disk drives (1.0" height) in your HP Server.

To install a hot-plug disk drive, perform the following steps:

Step 1. Remove the volume filler from slot 2. See *Figure 4-6, 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.

Step 2. Slide the hot-plug hard disk into slot 2 until it is seated.

Step 3. Close the drive-ejector handle by pushing it down until it clicks.

Step 4. The hot-plug disk drive is now correctly installed.

Figure 4-4   Disk Drive Installation in Slots 1 and 2

Slot 2-SCSI ID 1
Slot 1-SCSI ID 0
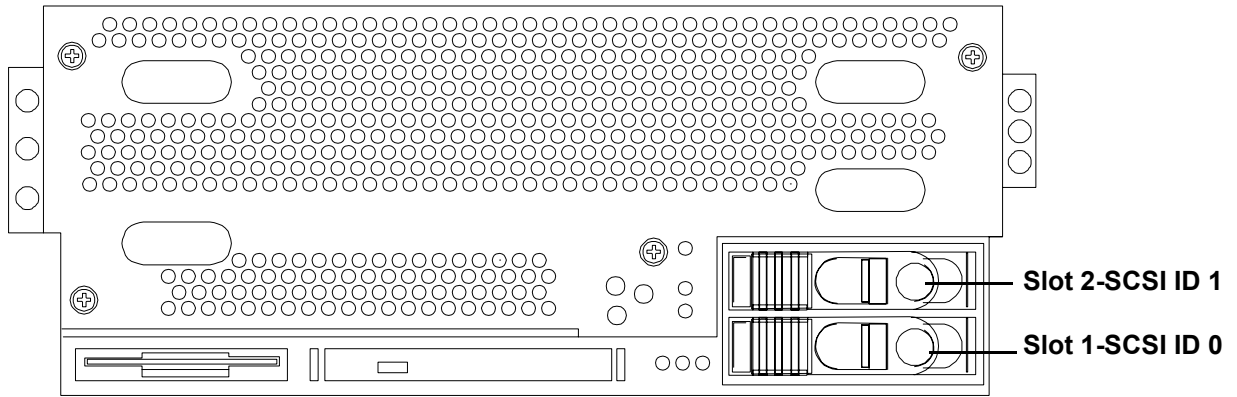
Figure 4-5   Disk Drive Installation in Slot 2
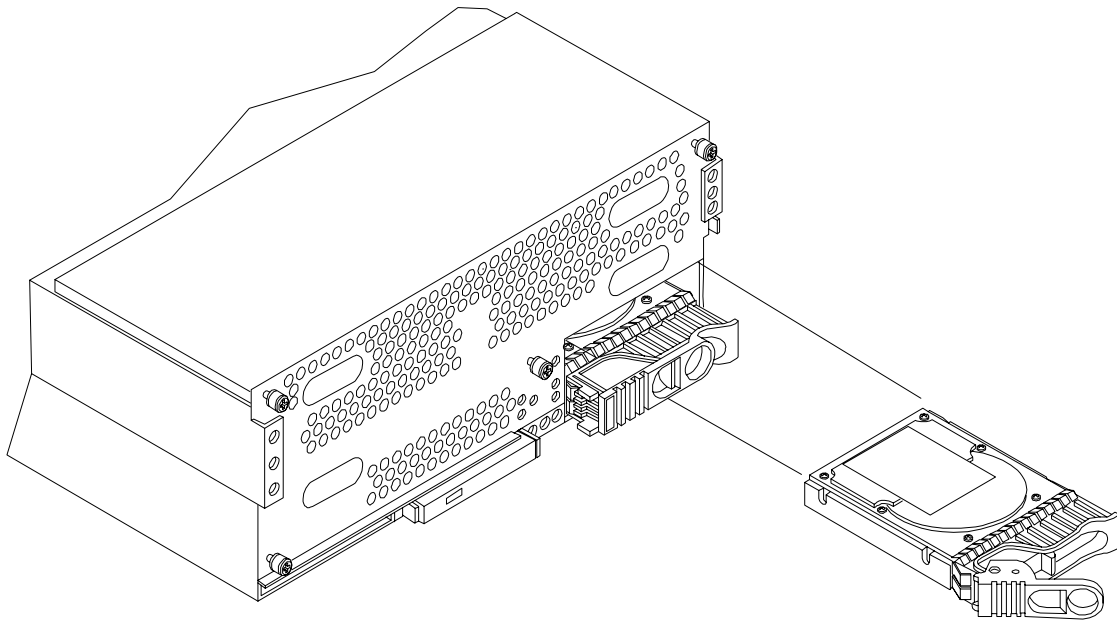
Figure 4-6   **Volume Filler Installation in Slot 2**
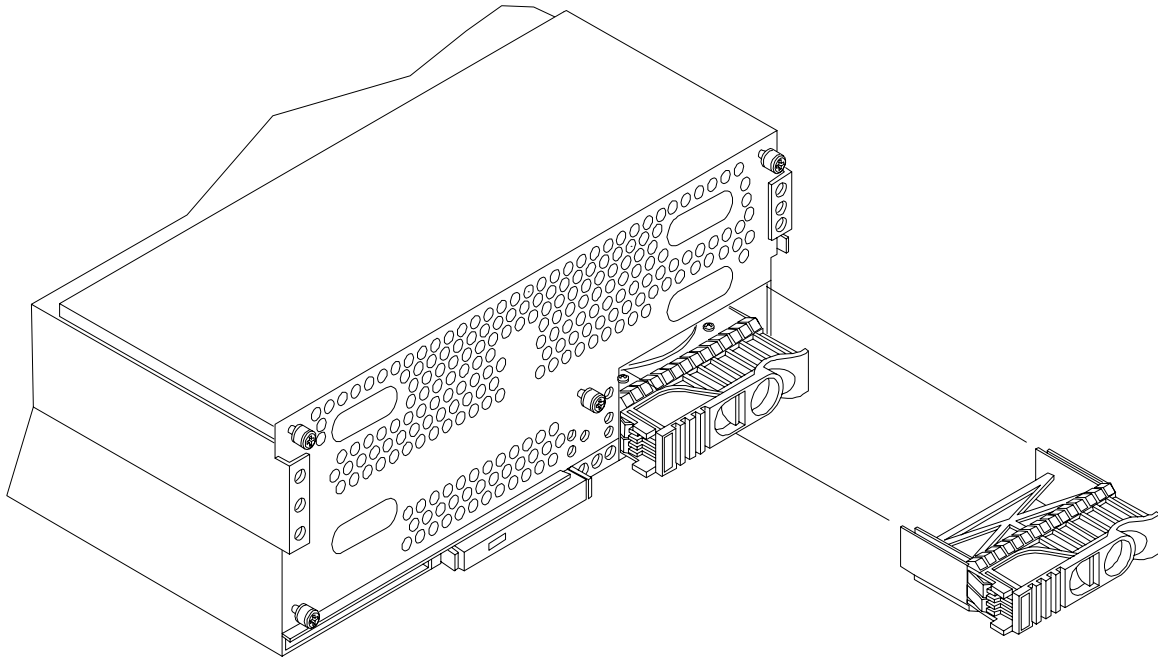
Installing Processors and Memory

This section provides information about installing processors and memory. The processors and memory extender boards are located under the front cover.

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 down and all power sources have been disconnected from the server prior to attempting the following procedures.
	Failure to observe this warning could result in personal injury or damage to equipment.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Installing Processors

CAUTION   Ensure that the cache size is identical for all processors. Failure to observe this caution will result in system failure.

Ensure that all processors are rated for use at the same speed. Failure to observe this caution will result in performance degradation.

Processor Load Order

Processors are attached to the processor extender board, which is located under the top cover in the top service bay directly under the memory extender board. The processor extender board can hold between one and four processors. CPU 0 and CPU 1 are located on the top of the processor extender board and CPU 2 and CPU 3 are located on the bottom. Processors must be installed in a specific order. The processor installation order is shown in Table 3-1.

Table 4-1   Processor Load Order

Processor	Socket
1	CPU 0
2	CPU 1
3	CPU 2
4	CPU 3

Tools Required

To install processors in your HP Server, you must use the IPF CPU Install Kit, 5069-4551.

This toolkit consists of:

- A3024-80004, Disposable ESD Kit
- A7231-04046, Label-less CPU Install tool

CAUTION	Do not modify the settings of the DIP switches located on the processor extender board. These switches are for factory use. Failure to observe this caution will result in system failure.

Figure 4-7   Removing the Processor Extender Board
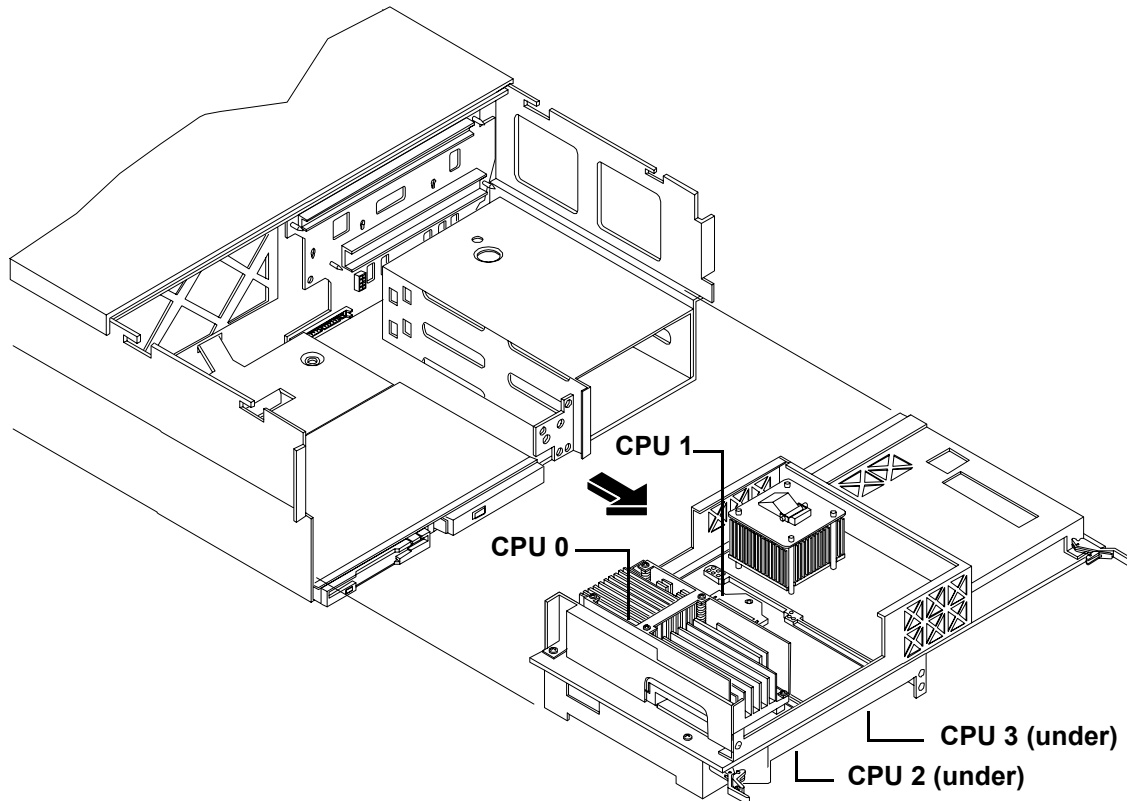
Installing a Processor on the Extender Board

To install a processor on the extender board, perform the following steps:

WARNING	Hazardous voltages are present inside the HP Server. Always remove the AC power cords from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.

Prior to installing a processor into your system, read the following instructions carefully and refer to *Figure 4-10, Installing Processor on Extender Board* for a complete understanding of this process.

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Removing the Front Cover" on page 127.

Step 4. Press the latch on each extraction lever located on each side of the processor extender board.

Step 5. Pull out on the extraction levers to unplug the processor extender board from the socket located on the midplane riser board and pull the extender board straight out.

Step 6. Using an antistatic wrist strap place the extender board on a grounding mat (Electrically Conductive Field Service Grounding Kit-HP 9300-1155).

Step 7. Ensure the cam on the processor socket lock is in the unlocked, counterclockwise position.

Step 8. Carefully lower the processor, without the sequencer clamp, 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   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 sideplay. However, because the assembly is not yet tightened, it may tilt slightly towards the center of the extender board—this is acceptable.

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 CPU assembly do not come unplugged from their sockets when you move the cable into place under the heatsink. See *Figure 4-8, Processor Cable Placed Correctly* and *Figure 4-9, Processor Cable Placed Incorrectly*.

Figure 4-8 Processor Cable Placed Correctly

Heatsink

Cable is placed correctly
and is <u>under</u> the heatsink

Protective plastic sleeve

Sheet metal frame

Figure 4-9 Processor Cable Placed Incorrectly

Heatsink

Cable is placed
incorrectly and is
pinched between the
heatsink and the
extender board frame

Protective plastic sleeve

Sheet metal frame
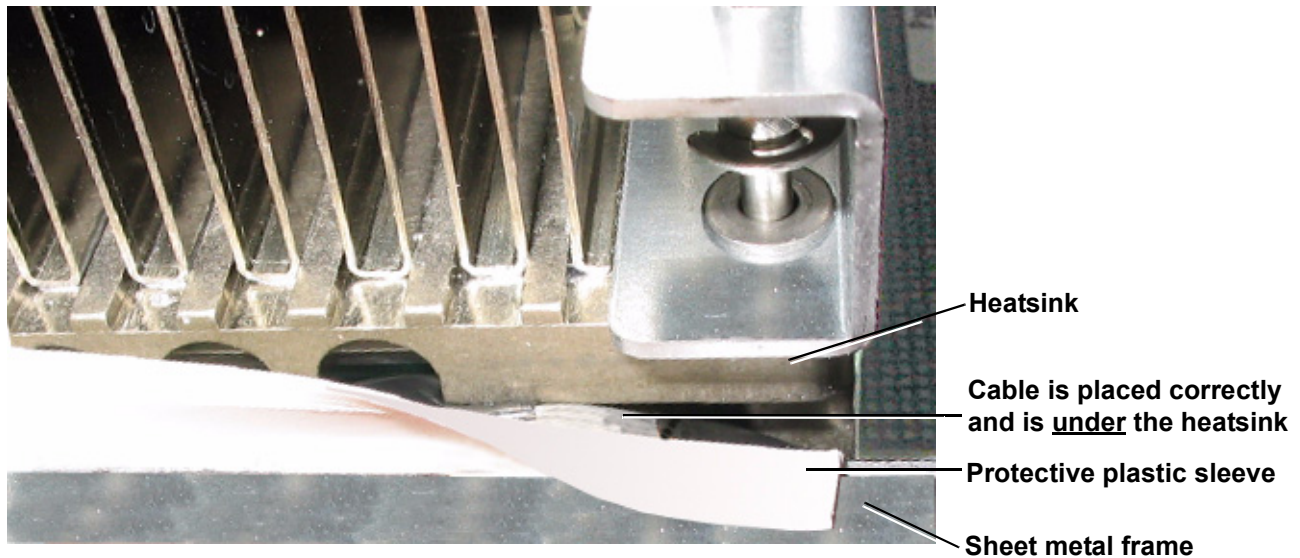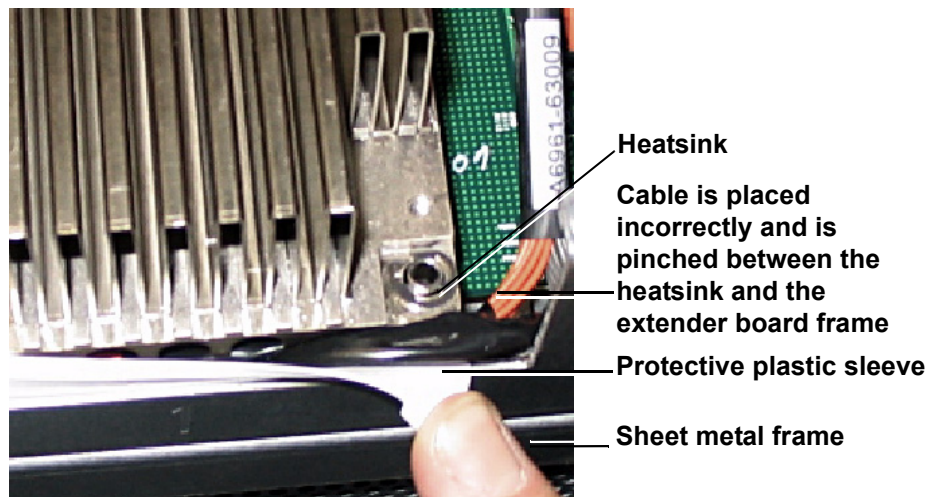
Step 9. Lock the assembly to the socket by rotating the cam on the socket 180 degrees clockwise, using a 2.5 mm driver (Allen wrench).

CAUTION	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.

Step 10. Plug in the processor cable to its socket on the extender board.

Step 11. Place the sequencer frame over the processor.

Step 12. Using your fingers, hand-tighten the 2 knurled thumbscrews on the sequencer frame just until the screw stops turning.

CAUTION	**Do not** tighten the other 4 shoulder screws until you have first hand-tightened the 2 knurled thumbscrews.

Step 13. Using the supplied Torx T15 driver, tighten the 4 remaining T15 shoulder screws until they just bottom out. Follow the tightening sequence shown in Figure 4-10, "Installing Processor on Extender Board."

CAUTION	Do not overtighten the 4 shoulder screws—they may shear off if overtightened. Stop tightening the shoulder screws when you feel them just bottom out.

Step 14. Using the supplied Torx T15 driver, finish tightening the 2 thumbscrews.

CAUTION	Do not overtighten the 2 thumbscrews—they may shear off if overtightened. Tightening the thumbscrews 1/4 turn will tighten them sufficiently.

Step 15. Replace the extender board into the chassis.

Step 16. Replace the front cover.

Step 17. Replace the front bezel.

Step 18. If rack mounted, slide the HP Server into the rack until it stops.

Figure 4-10   Installing Processor on Extender Board

**Tightening sequence for 4-shoulder screws
is 1 ,2, 3, 4**

DO NOT OVERTIGHTEN! See Step 13

3

1

2

4

**2-knurled
thumb-
screws**

**Torx-T15
Use supplied
wrench (A7231-04046)
for tightening
shoulder screws
and thumbscrews**

2.5MM Allen

**Power cable protected by
plastic sleeve**

**Align pins
on heatsink
with slots in
frame**

slots*

slots*

***Slots shown are at
CPU socket #1 for
clarity.**

**Processor shown is
being mounted on
socket #0 per CPU
load order.**
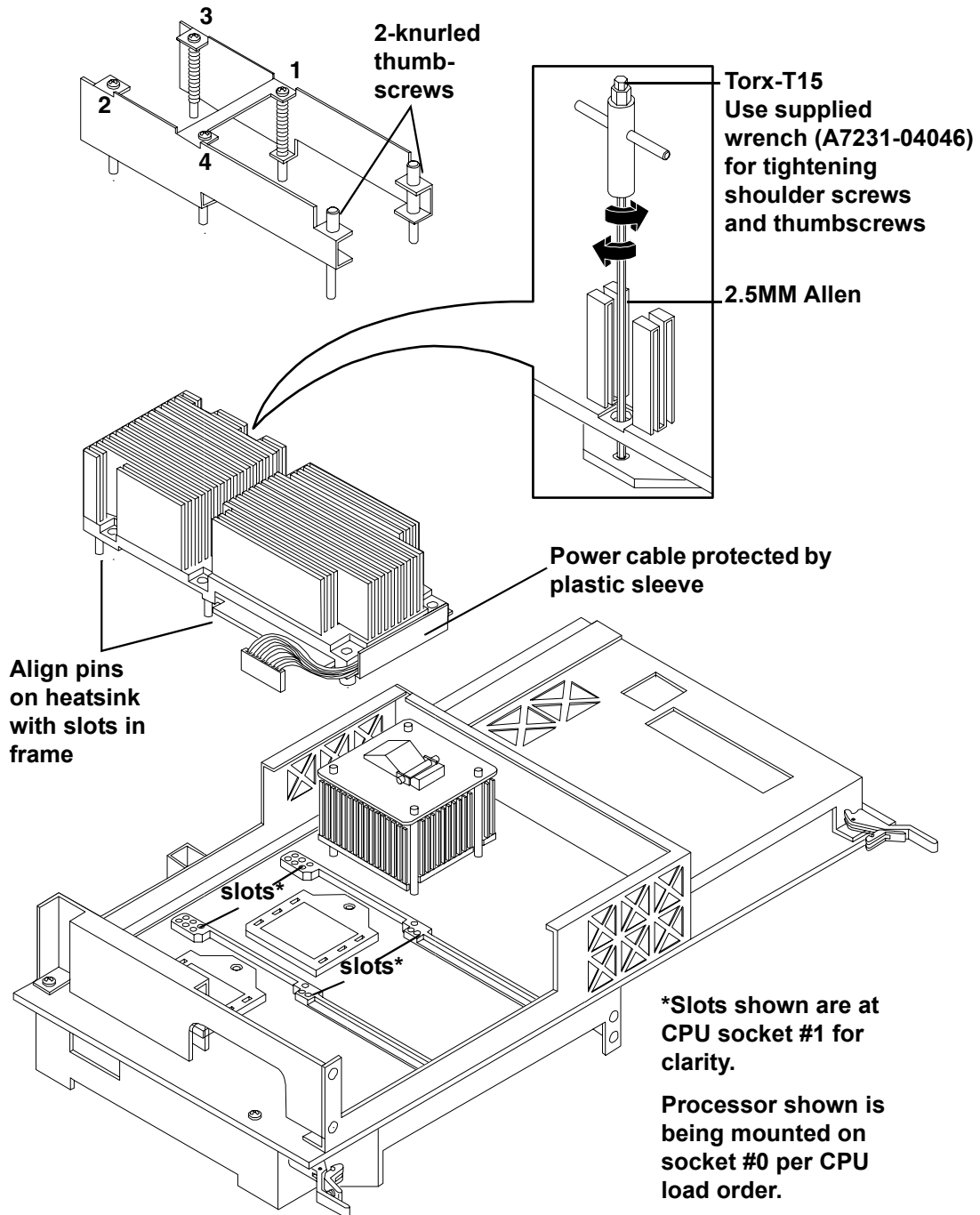
Installing Memory

Your hp 9000 rp4440 Server comes with a sixteen DIMM memory extender board that is minimally configured with 1GB of memory (four 256Mb DIMMs loaded in quad 0-(slots 0A,0B,0C,and 0D). See Figure 4-11, "16 DIMM Extender Board Minimum Configuration."

An optional thirty-two DIMM memory extender board is available to replace the sixteen DIMM memory extender board and must also be minimally configured with 1GB in quad 0. See Figure 4-12, "32 DIMM Extender Board Minimum Configuration."

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

Supported DIMM Sizes

Supported DIMM sizes are 256MB, 512MB, 1GB, 2GB. Dissimilar DIMM sizes may be used across the entire extender board but all four DIMMs in each quad must match. For cooling purposes, DIMM fillers must be used in unused slots.

DIMM Slot Fillers

Both the sixteen and thirty-two DIMM extender boards have DIMM slot filler boards placed over all unfilled DIMM slots. As you fill DIMM quads with additional memory you must remove the DIMM slot fillers covering the affected slots. All remaining DIMM fillers in unused slots must remain in place to maximize internal cooling. See Table 4-2 on page 51 and Table 4-3 on page 51.

NOTE   One DIMM filler board covers two adjacent DIMM slots. As a general rule, only remove DIMM slot fillers as you add memory and you will always retain the correct configuration.

Table 4-2   **DIMM Filler Requirements for 16 DIMM Extender Board**

16 DIMM Extender Board	
DIMMs Loaded	**Fillers Required[a]**
4 DIMMs in quad 0	6 fillers total: 2 fillers in quads 1, 2, and 3 (All quads filled)
8 DIMMs in quads 0 and 1	4 fillers total: 2 fillers in quads 2 and 3 (All quads filled)
12 DIMMs in quads 0, 1, and 2	2 fillers total: 2 fillers in quads 3 (All quads filled)
16 DIMMs in quads 0, 1, 2, and 3	No fillers required

a. One DIMM filler board covers two adjacent DIMM slots.

Table 4-3   **DIMM Filler Requirements for 32 DIMM Extender Board**

32 DIMM Extender Board	
DIMMs Loaded	**Fillers required[a]**
4 DIMMs in quad 0	12 fillers total: 2 fillers in quads 1, 3, 4, 5, 6, and 7 (quad 2 remains unfilled)
8 DIMMs in quads 0 and 1	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (quads 2 and 3 remain unfilled)
12 DIMMs in quads 0, 1, and 2	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (quad 3 remains unfilled)

Table 4-3   **DIMM Filler Requirements for 32 DIMM Extender Board (Continued)**

32 DIMM Extender Board	
16 DIMMs in quads 0, 1, 2, and 3	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (All quads filled)
20 DIMMs in quads 0, 1, 2, 3, and 4	4 fillers total: 2 fillers in quads 5, 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

a. One DIMM filler board covers two DIMM adjacent slots.

Figure 4-11   16 DIMM Extender Board Minimum Configuration

DIMM Filler

Figure 4-12   32 DIMM Extender Board Minimum Configuration

DIMM Filler

Removing a Memory Extender Board

To remove a memory extender board, perform the following steps:

WARNING   **Hazardous voltages are present inside the HP Server. Always remove the AC power cords from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.**

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel from the chassis. See "Front Bezel" on page 124.

Step 3. Remove the front cover from the chassis. See "Removing the Front Cover" on page 127.

Step 4. Press each latch on the two extraction levers located on each side of the memory extender board.

Step 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.

Installing DIMMs

To install DIMMs, perform the following steps:

Step 1. Align the DIMM with the socket located on the memory extender board.

Step 2. Gently and evenly push on each side of the DIMM until it seats in the socket. Ensure that the extraction levers are in the closed position.

Step 3. Replace the front and top covers.

Step 4. Replace the front bezel.

Step 5. If rack mounted, slide the HP Server into the rack until it stops.

Figure 4-13   Inserting DIMM into Extender Board Slot
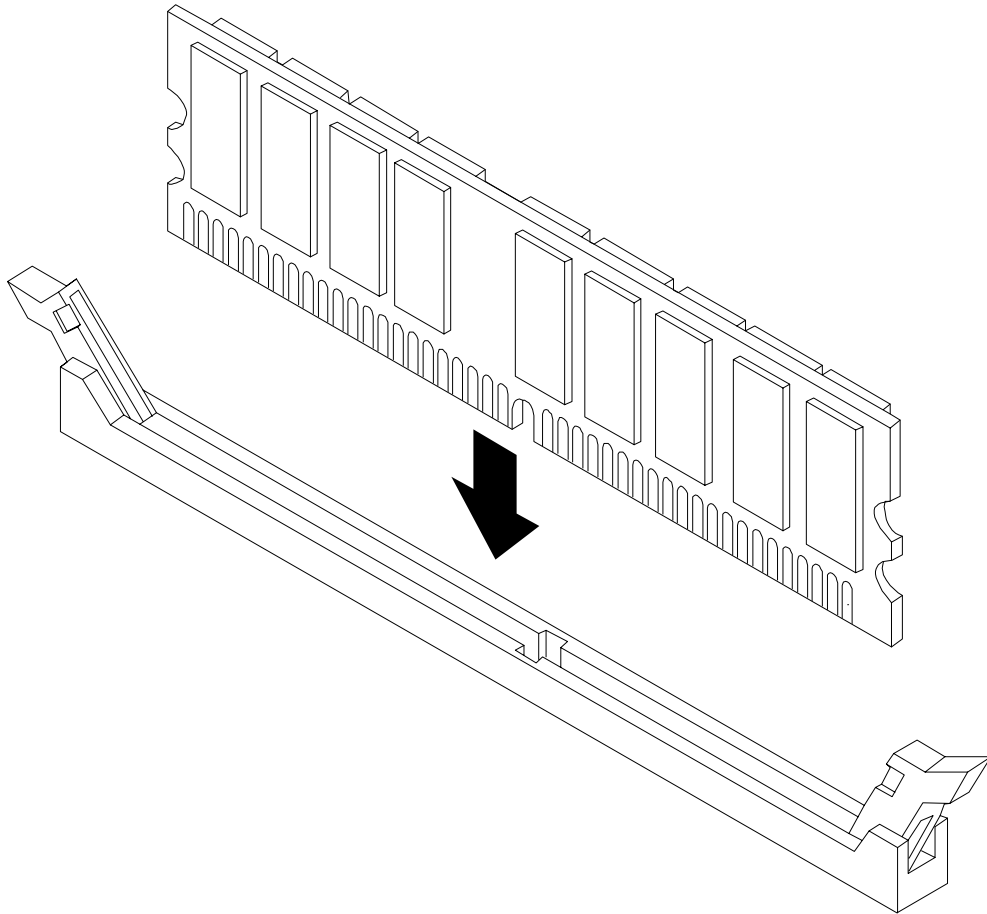
Replacing a Memory Extender Board

To replace the memory extender board, perform the following steps:

Step 1. Ensure the extraction levers are positioned in the outward, unlocked position.

Step 2. Align the memory extender board with the left and right chassis guide slots.

Step 3. Slide the memory extender board in until it begins to seat in the socket located on the midplane riser board.

Step 4. Push the extraction levers inward to the locked position in order to fully plug in the memory extender board into the midplane riser board.

Step 5. Replace the front cover onto the chassis.

Step 6. Replace the front bezel onto the chassis.

Step 7. If rack mounted, slide the HP Server into the rack until it stops.

Hot-Plug PCI/PCI-X

The hp 9000 rp4440 Server supports PCI/PCI-X hot-plug technology and offers 6 PCI/PCI-X, hot-plug capable slots.

Hot-Plug PCI/PCI-X Operations

PCI/PCI-X hot-plug 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 Operation Procedures" on page 60.

- **Online Addition (OL-A)**

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

- **Online Replacement (OL-R)**

  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 capability card. The existing driver for the old card must be compatible with the new card.

CAUTION   A special OL-R requirement for HP-UX 11i v1 is that the card to be inserted (replaced) must be exactly the same as the removed card. This is also known as like-for-like replacement.

- **PCI/PCI-X Slot Locate (Locate)**

  To easily locate the PCI/PCI-X slot at which you wish to perform a hot-plug 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 via a software or web interface, and is optional to the operating system on your HP Server.

PCI/PCI-X Hardware and Software Interfaces

The following table shows what hot-plug hardware and software interfaces are available on HP-UX 11i v1.

Table 4-4   Hot-Plug Hardware and Software Interfaces, and OS Availability

Hot-Plug PCI/PCI-X Interface	HP-UX 11i v1
Hardware interface comprised of: —Attention Button —Manual Retention Latch —Power LED —Attention LED —PCI/PCI-X card lock	Yes
Graphical User Interface	Yes
Command Line Interface (CLI)	Yes.`rad` command. Read *Interface Card OL* Support, olrad Command Line Interface, B2355-90804* at http://docs.hp.com.

Table 4-4   Hot-Plug Hardware and Software Interfaces, and OS Availability

Hot-Plug PCI/PCI-X Interface	HP-UX 11i v1
Web Interface	Yes. `pdweb` command. Read *Interface Card OL* Support, pdweb-Peripheral Device tool Web Interface, B2355-90804* at http://docs.hp.com.
System Administration Manager (SAM)	Yes.`sam` command. Performing hot-plug operations in the System Administration Manager is the preferred method. For a complete description of SAM, read *HP-UX Reference, HP-UX 11i Version 2, B2355-60103* at http://docs.hp.com.

PCI/PCI-X Slot Locations and Configurations

PCI/PCI-X slots are numbered from 1 through 8 in your HP Server. See Figure 4-14, "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-plug capable. Additional PCI/PCI-X expansion cards **may not** be placed in slots 1 or 2.

- Slot 3 and 4 is the first pair of shared slots, and slot 5 and 6 is the second pair of shared slots. The maximum capability of each of the shared slots is PCI/PCI-X 66MHz. If a PCI/PCI-X 133 MHz card is placed in a shared slot, then the maximum capability the PCI/PCI-X 133 MHz card will run at is PCI/PCI-X 66MHz. If different modes (PCI vs. PCI/PCI-X) or slower speeds (33 MHz) are used, then the slot to be used will automatically downgrade to accept the change.

  Shared slots have card compatibility restrictions. If one of the shared slots is occupied then 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 will be rejected. If the new card has a faster capability than the current bus configuration, it will only run at the bus mode and frequency of the current bus configuration (slower).

  1. If you have a 66 MHz card in slot 3, and you hot-plug insert a 33 Mhz card into slot 4, then the operation will not succeed. The new 33 MHz card will not initialize and the slot will power down because you cannot change bus speed during hot-plug operations.

NOTE	If the system is rebooted in the new configuration, then both cards will initialize to run at 33 MHz. This is because the system firmware can only change the bus capability down to the lowest common value.

  2. If you have a 33 MHz card in slot 3, and you hot-plug insert a 66 Mhz card into slot 4, it will work but the new card will run at 33 MHz. This also applies to slots 5 and 6, as they are shared (both use a common bus).

  3. If your unit is powered down, and you insert a 33 MHz card into slot 4 (that shares a 66 MHz card in slot 3), then both cards will run at 33 MHz when the unit is powered up. This also applies to slots 5 and 6, as they are shared (both use a common bus).

- Slots 7 and 8 are single slots. The maximum capability of each slot is PCI/PCI-X 133MH. Only slots 7 and 8 will 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 4-5 **PCI/PCI-X Card vs. Slot Frequency/Bus Mode Compatibility for Shared Slots[a]**

Current PCI Bus Mode and Frequency for the Current Card in a Shared Slot	Cards to be installed			
	PCI 33	**PCI 66**	**PCI-X 66**	**PCI-X 133**
PCI 33 MHz	Compatible[b]	Compatible[b] New card running at PCI 33	Compatible[b] New card running at PCI 33	Compatible[b] New card running at PCI 33
PCI 66 MHz	Incompatible -Frequency[c]	Compatible[b]	Compatible[b] New card running at PCI 66	Compatible[b] New card running at PCI 66
PCI-X 66 MHz	Incompatible -Frequency[c]	Incompatible-Bus[d]	Compatible[b]	Compatible[b] New card running at PCI-X 66
PCI-X 133 MHz[e]Running at PCI-X 66MHz)	Incompatible -Frequency[c]	Incompatible-Frequency[c]	Compatible[b] New card	Compatible[b] New card running at PCI-X 66

a. NOTE: The conditions described in this table apply only to shared slots (slots 3,4-bus 2 and 5,6-bus 3). Slots 7 and 8 are not shared slots.
b. Compatible: card is accepted and runs at frequency shown.
c. Incompatible-Frequency: card is rejected. The new card will not initialize and will power down due to frequency mismatch.
d. Incompatible-Bus: Card is rejected. The new card will not initialize and will power down due to bus mode mismatch.
e. Maximum bus mode and frequency supported on shared slots is PCI-X 66 MHz.

Figure 4-14   Slot ID Numbering

PCI-X Bus 1
PCI-X Bus 2

PCI-X Bus 3
PCI-X Bus 4
PCI-X Bus 5

1   2   3   4   5   6   7   8   Slot ID Number

Amber attention LEDs, 6x
Green power LEDs, 6x

Amber attention LEDs, 6x

Core I/O
PCI-X

Public I/O
PCI-X, Hot-Plug
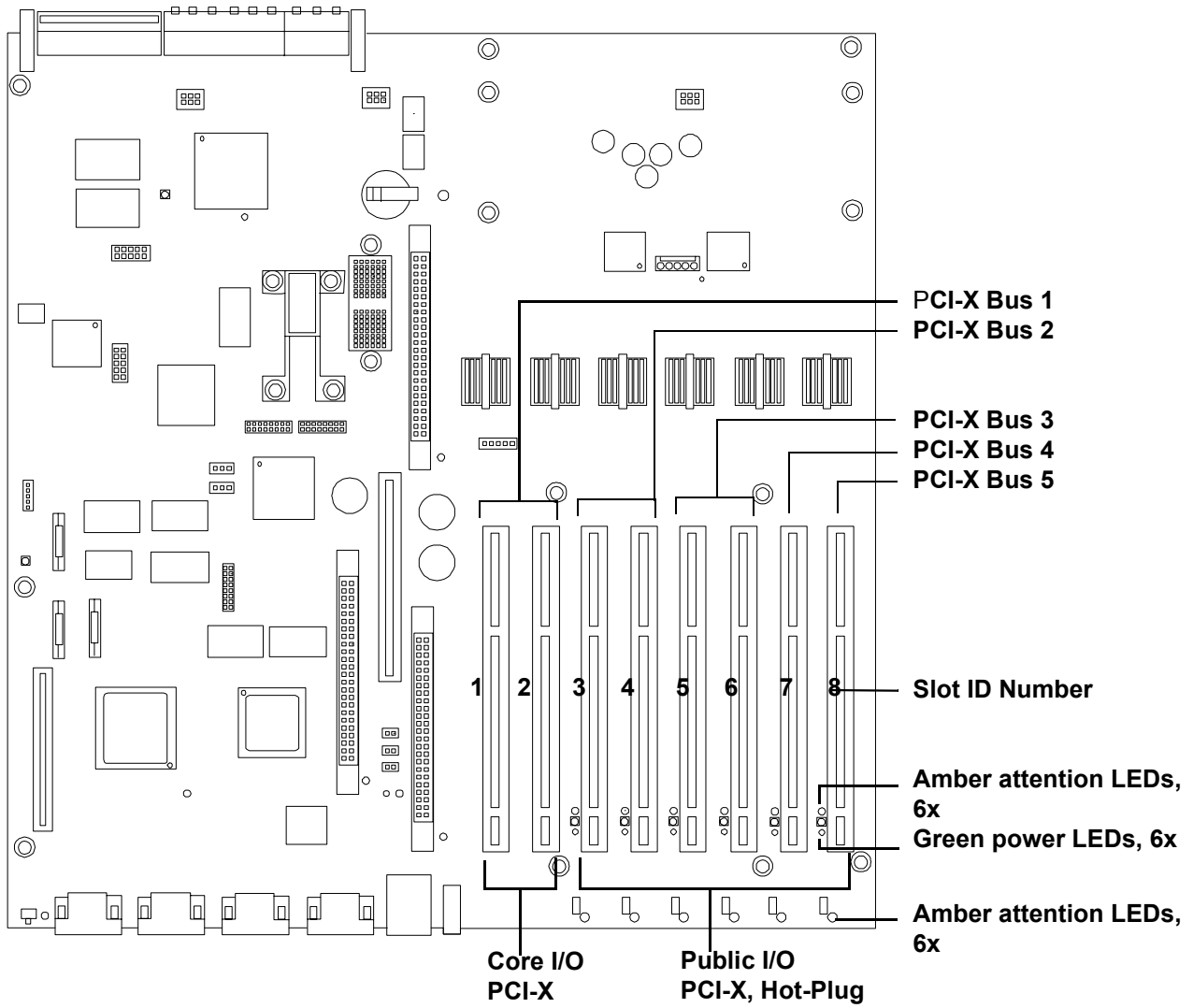
Hot-Plug Operation Procedures

The hot-plug procedures described in this section will use the hardware interface only. Software interface procedures are described in Table 4-4 on page 56.

CAUTION   Before adding or replacing a PCI/PCI-X card, determine if that card is critical to your system's operation. If you replace a card that is still operating and it is a critical resource to your system, you may cause undesired system downtime.

Online Addition-(OL-A)

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

To add a PCI/PCI-X card into an empty slot, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover from the chassis. See "Removing the Top Cover" on page 129.

Step 3. Turn the PCI/PCI-X card latch on the chassis ~45 degrees CW. See Figure 4-18 on page 65.

Step 4. Pull up on the manual retention latch (MRL) located on the OLX divider until it stops.

CAUTION   Do not pull up on the MRL of a powered-on, occupied slot or your system will crash. This OL-A procedure is for powering down a powered-on, unoccupied slot only. For a detailed procedure on how to power down an occupied slot see "Online Replacement-(OL-R)".

Step 5. Turn the PCI/PCI-X card latch on the chassis another 45 degrees CW. This fully opens the PCI/PCI-X card slot for insertion of a new card.

Step 6. If the new card is full length, open the slider gate bracket. See Figure 4-17 on page 64.

Step 7. Ensure that the MRL is already open and insert the PCI/PCI-X card to be added into the empty slot. See Figure 4-16, "Inserting PCI/PCI-X Card."

CAUTION   When inserting the PCI/PCI-X card, be careful you do not accidentally touch an attention button on the other OLX dividers—this will initiate an undesired shutdown of another PCI/PCI-X card/slot.

Also, ensure that you fully seat the card into the slot or undesired results may occur after power is re-applied to the slot.

Step 8. Turn the PCI/PCI-X card latch on the chassis ~45 degrees CCW. See Figure 4-19 on page 65.

Step 9. Push the manual retention latch down until it seats against the chassis wall.

Step 10. Turn the PCI/PCI-X card latch another 45 degrees CCW to capture the PCI/PCI-X card and manual retention latch into the closed position.

Step 11. If the new card is full length, close the slider gate bracket.

Step 12. Press the attention button and 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 5 seconds to cancel the operation by pushing the attention button again.

Step 13. Replace the top cover.

Step 14. Push the HP Server all the way back into the rack until it stops.

Figure 4-15   OLX Divider

PCI-X card latch
closed position

Manual retention
latch—closed

PCI-X card latch
open position

Manual
retention
latch—open

Power LED
light pipe

Attention
button

Attention LED
light pipe
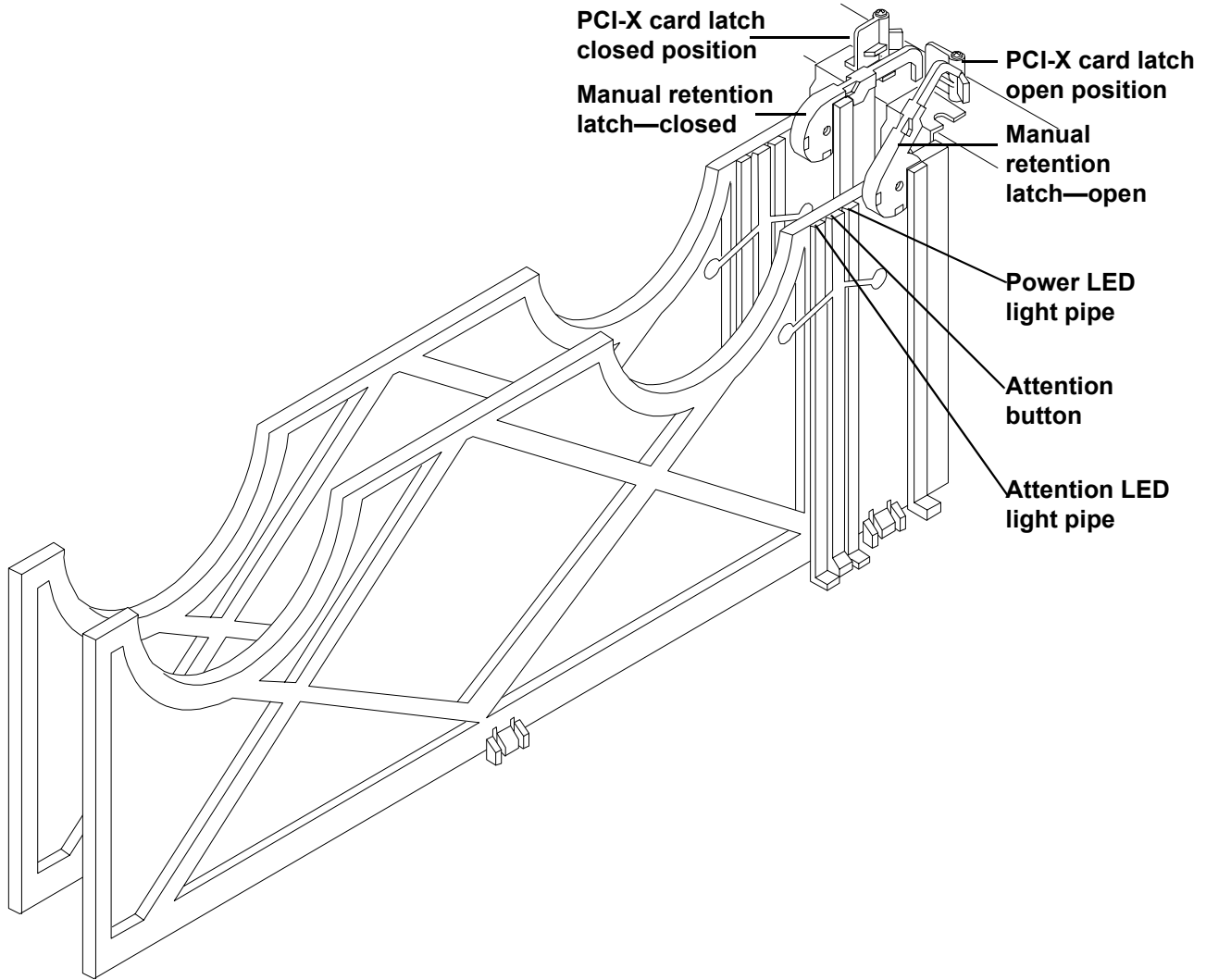
Figure 4-16   Inserting PCI/PCI-X Card
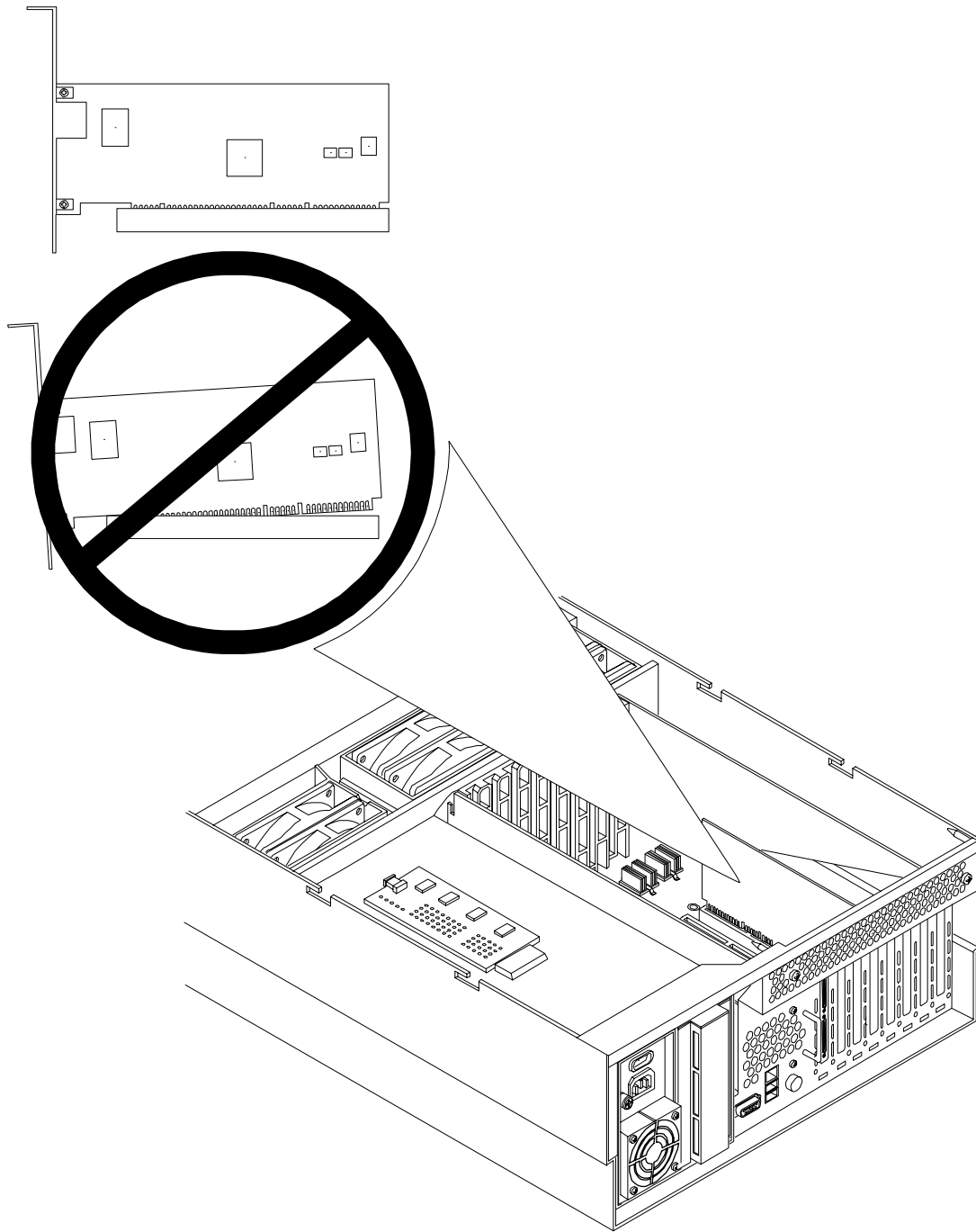
Figure 4-17   Slider Gate Bracket
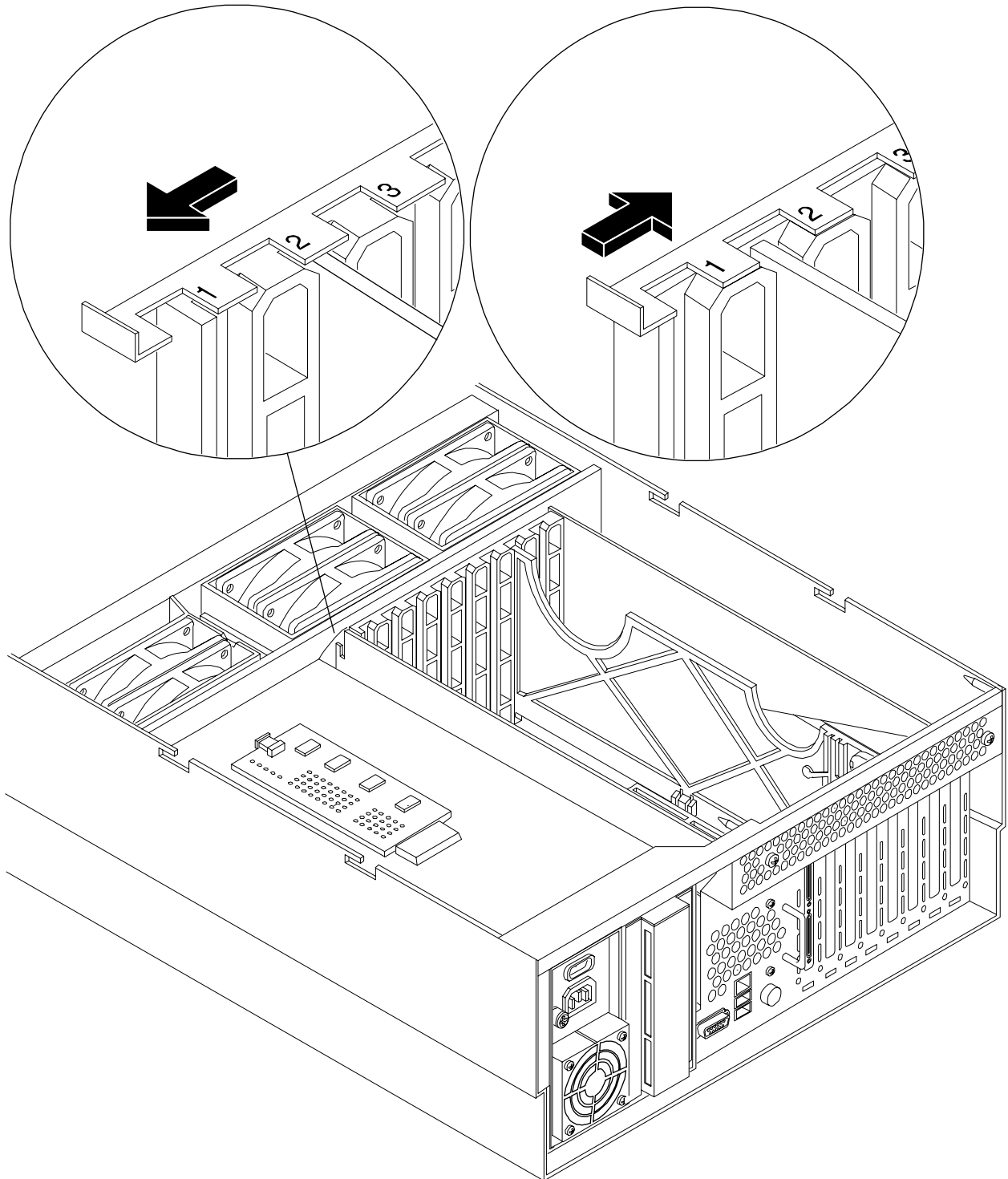
Figure 4-18   PCI-X Card Latch Opening Sequence
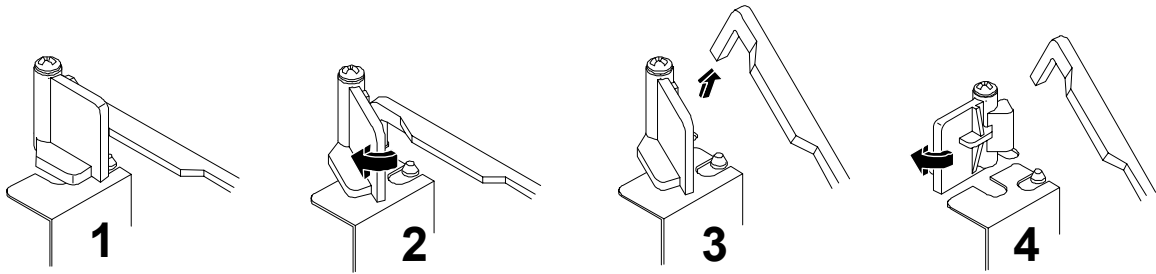
Figure 4-19   PCI-X Card Latch Closing Sequence
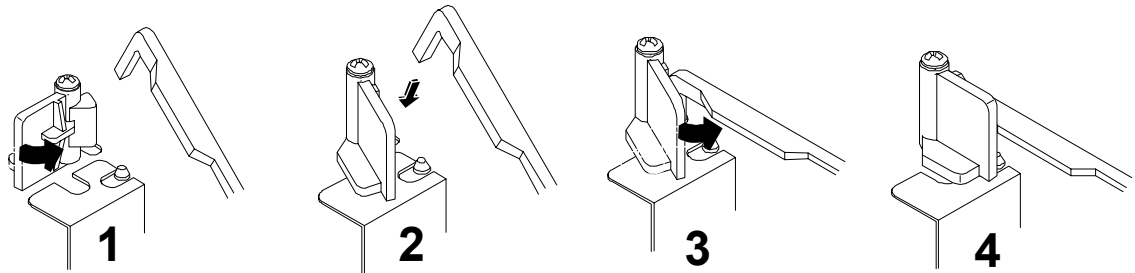
Online Replacement-(OL-R)

CAUTION	For HP-UX 11i v1 only. You can only replace an existing card with a like card.

To remove and replace a PCI/PCI-X card into a populated slot, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover from the chassis. See "Installing Processors and Memory" on page 43.

Step 3. Press the attention button located on the OLX divider 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 5 seconds to cancel the operation by pushing the attention button again.

Step 4. Turn the PCI/PCI-X card latch~45 degrees on the chassis until the manual retention latch (MRL) is free to pull up. See Figure 4-18 on page 65.

Step 5. Pull up on the manual retention latch located on the OLX divider until it stops. See Figure 4-15 on page 62

Step 6. Turn the PCI/PCI-X card latch on the chassis another 45 degrees CW. This fully opens the PCI/PCI-X card slot for removal of the card.

Step 7. If the new card is full length, open the slider gate bracket. See Figure 4-17 on page 64.

Step 8. Remove the existing PCI/PCI-X card from the slot by grasping it at the edges that are exposed by the cutouts in the OLX dividers. See Figure 4-15 on page 62.

Step 9. Insert the new PCI/PCI-X card into the powered down slot. See Figure 4-16, "Inserting PCI/PCI-X Card."

CAUTION	When inserting the PCI/PCI-X card, be careful you do not accidentally touch an attention button on the other OLX dividers—this will initiate an undesired shutdown of another PCI/PCI-X card/slot.
	Also, ensure that you fully seat the card into the slot or undesired results may occur after power is re-applied to the slot.

Step 10. Turn the PCI/PCI-X card latch ~45 degrees CCW. See Figure 4-19 on page 65.

Step 11. Push the manual retention latch down until it seats against the chassis wall.

Step 12. Turn the PCI/PCI-X card latch another 45 degrees CCW to the closed position. This locks the PCI/PCI-X card into its slot and the manual retention latch into the closed position.

Step 13. If the new card is full length, close the slider gate bracket. See Figure 4-17 on page 64.

Step 14. Press the attention button—the power LED will start to blink.

Step 15. Wait for the power LED to stop blinking—the PCI/PCI-X card is now active.

Step 16. Replace the top cover.

Step 17. Push the HP Server all the way back into the rack until it stops.

Understanding LEDs and Hardware Errors

The following table describes the hot-plug LED error conditions.

Table 4-6   Hot-Plug LED Descriptions

Power LED-Green	Condition	Description
	On	PCI/PCI-X slot is powered on.
	Blinking	Hot-plug 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 slot is powered on, it will not power off. If slot is powered off, it will not power on.
	Blinking	Slot location being indicated. **NOTE:** If you want to learn how to activate the attention LED into the blinking/indicator state, read *Interface Card OL* Support, Turning Attention LED to Blink or Off, B2355-90804* at http://docs.hp.com.
	Off	If power to slot is on, the slot is functioning normally.

Troubleshooting PCI/PCI-X Hot-Plug Operations

Sometimes a PCI/PCI-X card will not come online during a hot-plug 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 as described below. For a full understanding and description of HP-UX 11i v1 hardware errors, read *Interface Card OL* Support, Important Considerations, B2355-90804* at http://docs.hp.com.

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; 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, ensure that you wait the full duration of the 5 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-plug addition operation, the attention LED will turn steady-on and the power LED will go steady-off.

CAUTION	If your card will not power up, the power loss may be due to the existing PCI/PCI-X expansion cards using all the available power. Check the power ratings of your existing PCI/PCI-X cards. A known cause of power loss is the use of more than 3PCI/PCI-X RAID cards in your system. Therefore, do not use more than 2 RAID cards in any of the slots in your HP Server

If the PCI/PCI-X card cannot be powered off during a hot-plug removal operation, the attention button will turn steady-on and the power LED will remain steady-on.

CAUTION	If your slot does not power off during a hot-plug removal operation, do not open the manual retention latch (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 your hp 9000 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.

Safety Information

Follow the procedures listed below to ensure safe handling of components and to prevent harm to both you and the HP Server:

*   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	**Hazardous voltages are present inside the HP Server. Always remove AC power from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.**

CAUTION	Some restrictions apply to the mass storage devices that may be connected to your core I/O SCSI HBA. See "Core I/O Connections" on page 76. If you convert your system to duplex configuration, you may not install external SCSI devices to the SCSI HBA core I/O controller.

Accessing the SCSI Backplane Board

Prior to adding the accessories required to convert your hp 9000 rp4440 Server from simplex to duplex you must remove outer components to access the SCSI backplane board. To gain access to the SCSI backplane board perform the following steps:

WARNING	**Hazardous voltages are present inside the HP Server. Always remove the AC power cords from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.**

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

NOTE	If your HP Server is rackless, you need not remove the tubular stand to perform the simplex to duplex conversion. Proceed directly to the next step.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Removing the Front Cover" on page 127.

Step 4. Remove the memory extender board. See "Memory Extender Board" on page 132.

Step 5. Remove the processor extender board. See "Memory Extender Board" on page 132.

Convert to Duplex

To convert to duplex, perform the following steps:

Step 1. Remove the SCSI Jumper Cable. A SCSI jumper cable bridges the two SCSI connectors on the SCSI backplane when the server is configured for simplex operation. This jumper must be removed in order to install the duplex board and to connect the SCSI B cable. See Figure 4-20, "Removing the SCSI Jumper Cable."

Figure 4-20 Removing the SCSI Jumper Cable
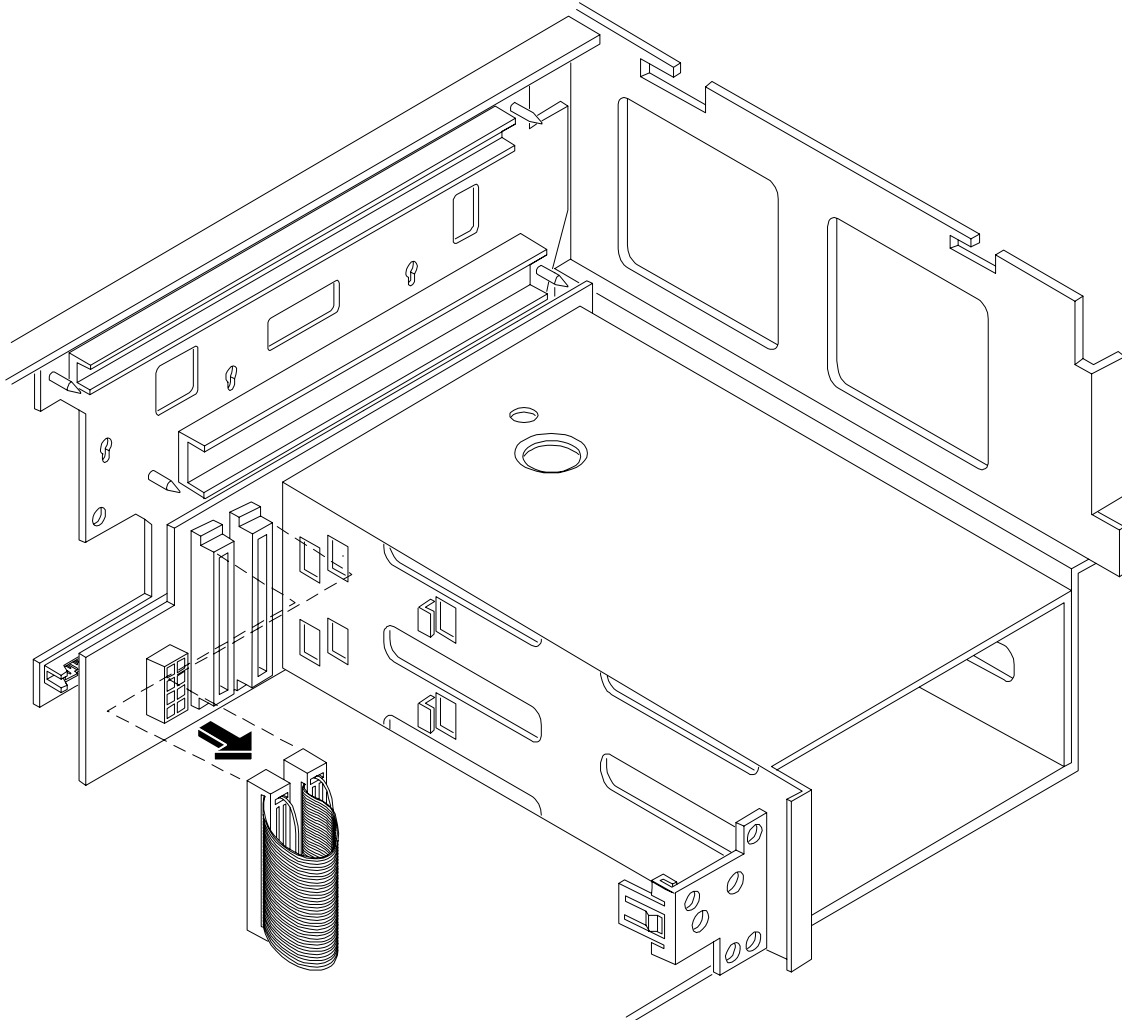
Step 2. Install the duplex board. The duplex board is installed in the SCSI connector located nearest the disk drive cage. The duplex board is shipped with a duplex board bracket attached. When the duplex board is properly installed, it is secured to the disk drive cage by the bracket and to the SCSI backplane board by the SCSI connector sockets. See Figure 4-21, "Installing the Duplex Board."

NOTE	In simplex mode, both hard disk drives, slot 0 and slot 1, are driven by SCSI channel A. When the duplex board is installed, 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 will no longer boot. Refer to the *HP-UX Installation Guide* for further information.

- Align the bracket tabs with the slots on the side of the disk drive cage.

- Press the bracket against the disk drive cage until the bracket locks into place.

- Align the connector of the duplex board with the connector on the SCSI backplane.

- Press the board connector into the backplane connector.

NOTE	When the duplex board is installed properly, the board will be secured in the duplex board bracket. The SCSI B cable will be connected to the connector at the immediate left of the duplex board.

Figure 4-21 Installing the Duplex Board
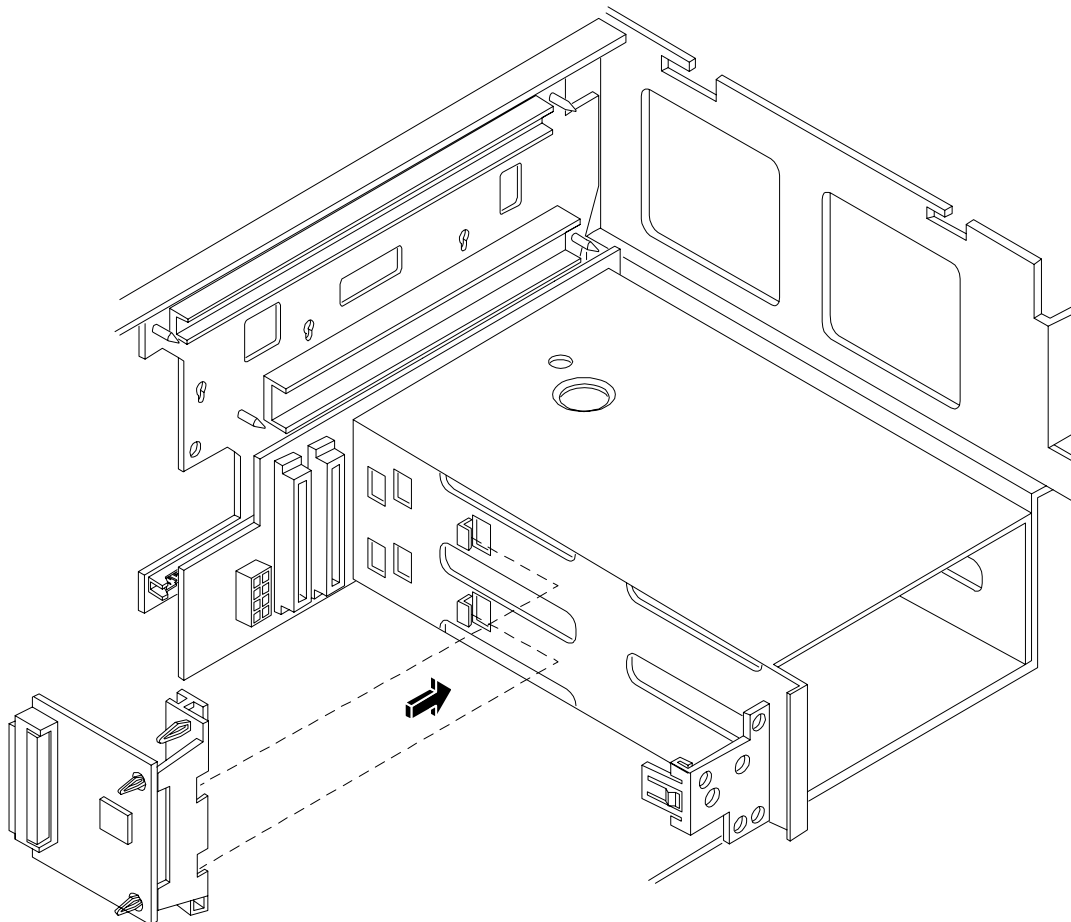
Step 3. Install the SCSI cable B to the SCSI backplane board. See Figure 4-22, "Installing SCSI Cable B to the SCSI Backplane."

- Release the SCSI B cable from its stowed position within the chassis.

- 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 4-22Installing SCSI Cable B to the SCSI Backplane
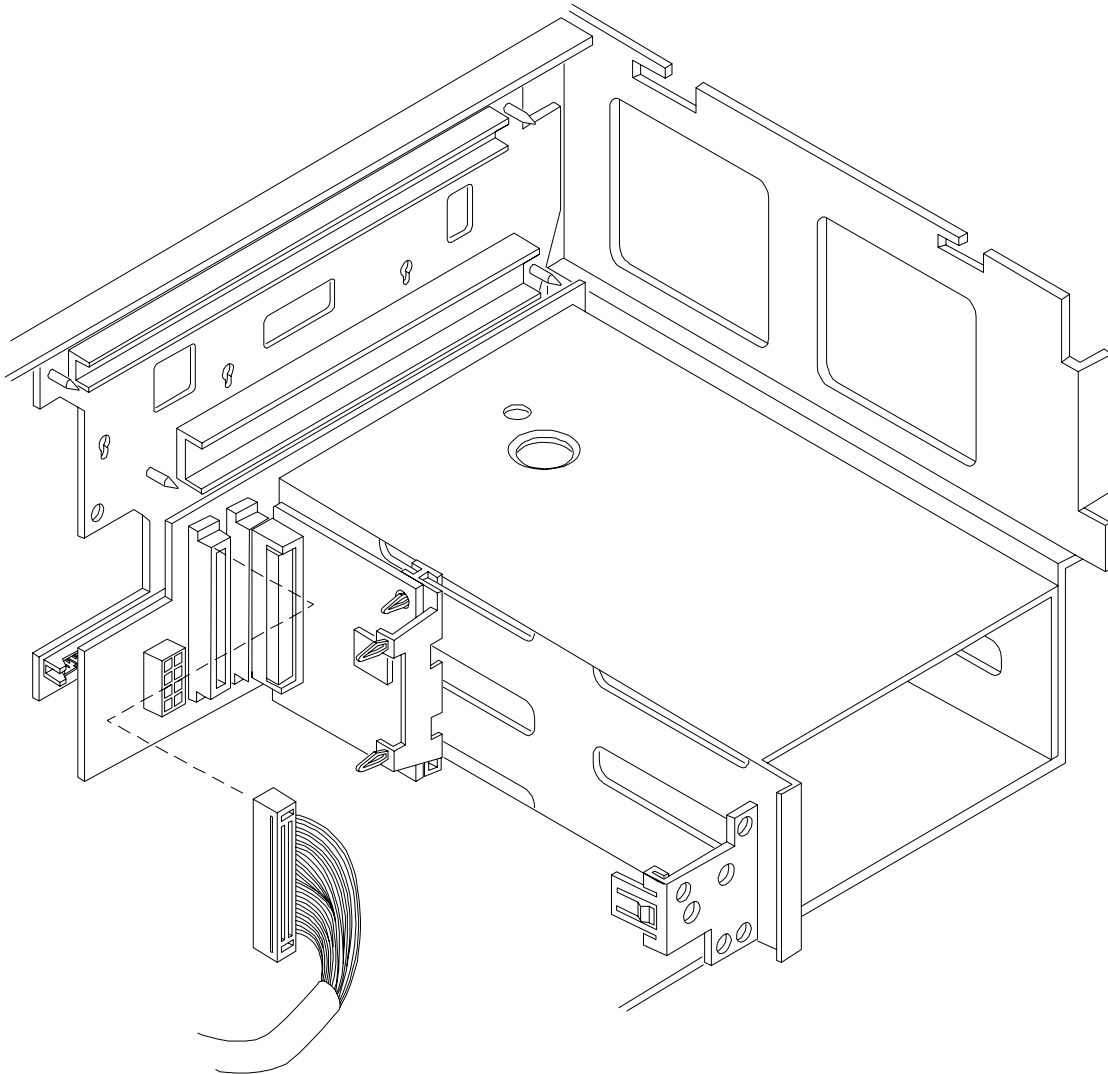
Step 4. The SCSI duplex conversion is completed by connecting the other end of SCSI cable B to the SCSI B channel connector on the SCSI adapter board. See Figure 4-23, "Installing SCSI Cable B to the SCSI Adapter Board."

    a. Release the SCSI B cable 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 4-23Installing SCSI Cable B to the SCSI Adapter Board
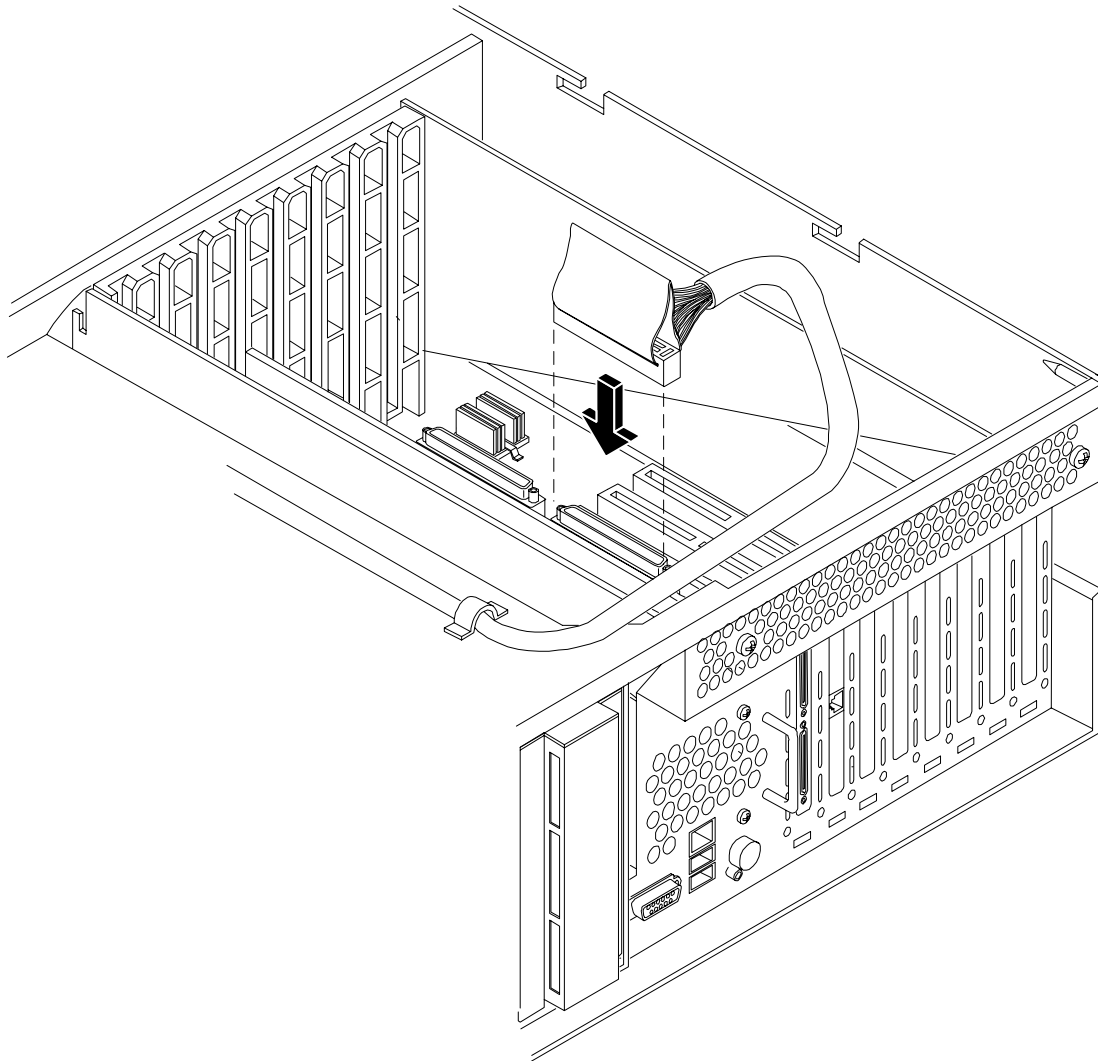
Replacing the Removed Modules

To return the server to operational configuration, perform the following steps:

Step 1. Replace the processor extender board.

Step 2. Replace the memory extender board.

Step 3. Replace the front and top covers.

Step 4. Replace the front bezel.

Step 5. If rack mounted, slide the HP Server back into the rack until it stops.

Core I/O Connections

Each hp 9000 rp4440 Server core I/O includes:

- Two USB ports

- One UDMA-100 IDE port (40 pin IDE connector)

- One common server management (CSM)

  — One 10/100 LAN-RJ45

  — Three serial ports

- SCSI host bus adapter (HBA)

  — The SCSI HBA board is required 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 may want to connect to channel B of your core I/O SCSI HBA. External connections to channel B of your 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 you convert your system to duplex configuration (see "Converting SCSI From Simplex to Duplex" on page 69), you may not 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 10/100/1000 Base-T LAN RJ45 connector.

Management Processor (MP)

The **management processor** is an independent support system for the server. It provides a way for you to connect to your HP Server and perform administration or monitoring tasks for the server hardware.

The management processor controls power, reset, transfer of control (TOC) capabilities, provides console access, displays and records system events, and can display detailed information about the various internal subsystems. The management processor also provides a virtual front panel that can be used to monitor the front panel LEDs from a remote location.

The management processor is available whenever the system is connected to a power source, even if the hp 9000 rp4440 Server main power switch is in the off position.

Access to the management processor can be restricted by user accounts. User accounts can be password-protected and provide a specific level of access to the server and management processor commands.

Multiple users can interact with the management processor. From the MP Main Menu users can select any of the following options: enter management processor command mode, enter console, view event logs, view console history, display virtual front panel, enter console session, or connect to another management processor. Multiple users can select different options from the MP Main Menu at the same time. However, management processor command mode and console mode are mirrored. The MP allows only one user at a time to have write access to the shared console.

Accessing the Management Processor

You can connect to the management processor using the following methods:

*   The local serial port using a local terminal

*   The remote console server management port (CSM) using external modem (dial-up) access, if remote modem access is configured

*   The management processor LAN port using web console or telnet, if login access through the management processor LAN is enabled

Local Terminal Access to the Management Processor

Communication with the management processor is established by connecting a terminal to the local CSM I/O serial port.

A terminal session may be established using a standalone terminal, or using terminal emulation software such as Reflection 1 running on a PC.

During installation, communicating with the management processor enables such tasks as:

*   Verifying that the components are present and installed correctly

*   Setting the LAN IP addresses

Setting Terminal Parameters

After powering on the terminal, ensure the communications settings are as follows:

*   8/none (parity)

*   9600 baud

*   None (receive)

*   None (transmit)

If the terminal is a PC using Reflection 1, check or change these communications settings by performing the following steps:

Step   1. From the Reflection 1 Main screen, pull down the Connection menu and select Connection Setup.

Step   2. Select Serial Port.

Step   3. Select Com1.

Step   4. Check the settings and change, if required.

Go to More Settings to set Xon/Xoff. Click OK to close the More Settings window.

Step   5. Click OK to close the Connection Setup window.

Step   6. Pull down the Setup menu and select Terminal (under the Emulation tab).

Step   7. Select a supported terminal type.

The preferred type is VT100.

Step   8. Click Apply.

This option is not highlighted if the terminal type you want is already selected.

Step   9. Click OK.

Network Access to the Management Processor

By connecting the management processor LAN port to an active network, another host on the same subnet can set the management processor IP address via the `ping` command. After the IP address has been set, a telnet session can be established to configure additional parameters.

To configure the management processor LAN IP address, perform the following steps:

Step   1. Determine the medium access control (MAC) address of the management processor LAN interface by viewing the label located at the rear of the server

Step   2. Connect a LAN cable on your local subnet to the core I/O LAN port found directly above the two USB ports.

Step   3. Add an address resolution protocol (ARP) table entry to another host located on your local subnet. This ARP table entry will map the MAC address of the core I/O LAN interface to the IP address chosen for that interface.

NOTE   Adding an entry to the ARP table is typically done using the `ARP` command with the appropriate option. For example, **arp -s** is used with Windows. Consult your operating system documentation for more information.

Step   4. Use the `ping` command from the host that has the new ARP table entry. The destination address is the IP address that is mapped to the MAC address of the management processor. The management processor LAN port should now be configured with the appropriate IP address.

Step   5. Use the `telnet` command to connect to the management processor from a host on the local subnet.

Interacting with the Management Processor

To interact with the management processor, perform the following steps:

NOTE	On initial system installation, the MP has two default user accounts. They are:
	1. Administrator level user; login=Admin, password=Admin (both are case sensitive).
	2. Operator level user; login=Oper, pasword=Oper (both are case sensitive).
	For security reasons, it is recommended that the UC command be used during the initial logon session (enter **CM** at the MP> prompt, and enter **UC** at the MP:CM> prompt) to modify default passwords or to delete and create user accounts.

Step 1. Log in using your management processor user account name and password.

NOTE	The management processor will start with the MP Main Menu displayed. To follow these steps, make sure you are at the Main Menu. If you are not at the Main Menu, use **CTRL+B** to return to the Main Menu.

Step 2. Use the management processor menus and commands as needed. Main menu commands are shown in "The MP Main Menu". Commands not displayed in the MP Main Menu can be accessed in command mode by first using the CM command at the MP prompt. A list of available commands is presented and can be displayed by using the management processor help function (enter **HE** followed by **LI** at the MP> prompt). You can return to the MP Main Menu by typing **CTRL+B**.

Step 3. Log out using the X command (enter **x** at the MP> prompt) after returning to the MP Main Menu.

The MP Main Menu

Main menu commands:

```
MP MAIN MENU:
        CO: Console
       VFP: Virtual Front Panel
        CM: Command Menu
        CL: Console Logs
        SL: Show Event Logs
       CSP: Connect to Service Processor
        SE: Create OS Session
        HE: Main Menu Help
         X: Exit Connection
```

Configuring Management Processor LAN Information

LAN information includes the management processor network name, the management processor IP address, the management processor subnet mask, the management processor gateway address, and the web console port number.

To set the management processor LAN IP address:

Step 1. At the MP Main Menu prompt (MP>), enter **CM** to select command mode.

Step 2. At the command mode prompt (MP:CM>), enter **LC** (for LAN configuration).

The screen displays the default values and asks if you want to modify them. It is good practice to write down the information, as it may be required for future troubleshooting. See "The LC Command Screen".

NOTE	The value in the "IP address" field is set at the factory. The customer must provide the actual management processor LAN IP address.

Step 3. The current `lc` data is displayed. When prompted to enter a parameter name, `A to modify All,` or `Q to Quit,` enter **A** to select all parameters.

Step 4. The current IP address is displayed. When prompted to enter a new value or `Q`, enter the new IP address.

Step 5. The current host name is displayed. When prompted to enter a new value or `Q`, enter the new management processor network name.

This is the host name for the management processor LAN, The name can be up to 64 characters in length, and can include dashes, underlines, periods, and spaces.

Step 6. The current subnet mask name is displayed. When prompted to enter a new value or `Q`, enter the new subnet mask name.

Step 7. The current gateway address is displayed. When prompted to enter a new value or `Q`, enter the new gateway address.

Step 8. The current web console port number is displayed. When prompted to enter a new value or `Q`, just hit **enter**. The message `-> Current Web Console Port Number has been retained` will be displayed.

Step 9. The current link state information is displayed. When prompted to enter a new value or `Q`, just press **enter**. The message `-> Current Link State has been retained` will be displayed.

Step 10. A new lc listing is displayed, including the values entered in the preceding steps. Verify that the desired values have been accepted. When prompted to enter a parameter for revision, Y to confirm, or Q to Quit, enter **Y** to confirm all parameters.

Step 11. Observe the following display:

```
> LAN Configuration has been updated

-> Reset MP (XD command option 'R') for configuration to take effect.

MP Host Name: name
```

(the name entered in step 5)

```
MP:CM>
```

Step 12. Enter **XD -reset** to reset the MP.

Step 13. After the MP resets, log into the MP again. Then enter the MP command mode (enter **CM** at the `MP:` prompt).

Step 14. At the `MP:CM>` prompt, enter **LS** to confirm the new LAN settings.

Step 15. Enter **SA** to enable/disable web console and telnet access after the MP has been reset.

The LC Command Screen

LC commands:

```
MP:CM> lc -ip 127.0.0.1 -host uninitialized -mask 255.255.255.0 -gate 127.0.0.1 -web 2003


New LAN Configuration (* modified value):

* IP Address: 127.0.0.1

* MP Host Name: uninitialized

* Subnet Mask: 255.255.255.0

* Gateway Address: 127.0.0.1

  Link State: Auto Negotiate

* Web Console Port Number: 2023


Confirm? (Y/ {N}) : y


-> LAN configuration has been updated

-> Reset the MP (XD command option 'R' ) for confirmation to take effect.


MP Host Name : uninitialized

MP:CM> xd -reset
```

Management Processor Commands

Table 4-7   Management Processor Commands and Descriptions

Command	Description
BP	Reset BMC passwords
CA	Configure serial port parameters
CE	Log a repair in the history buffer
CL	Display console history
CG	Certificate generator
CO	Return to redirected console mode
CSP	Connect to another service processor
CT	Configure trace
DATE	Display date
DC	Default configuration
DF	Display FRUID
DI	Disconnect remote or LAN console

Table 4-7   Management Processor Commands and Descriptions (Continued)

Command	Description
FW	MP firmware upgrade
HE	Display help for menu or command
ID	System information
IT	Modify MP inactivity timers
LC	LAN configuration
LOC	Locater LED control
LS	LAN status
MA	Return to main menu
MR	Modem reset
MS	Modem status
PC	Remote power control
PG	Configure paging
PR	Power restore policy configuration
PS	Power management module status
RB	Reset BMC through toggle GPIO pin
RS	Request BMC to reset system through RST signal
SA	Configure remote/modem-LAN telnet and web access options
SE	Activate a system session on locator remote port
SL	Show logs
SO	Security options and access control
SYSREV	Display all firmware revisions
SS	System status of processor modules
TC	Transfer of control-system reset through INIT signal
TE	Tell-send a message to other users
UC	User configuration
VT	Display software trace
VFP	Virtual front panel
WHO	Display connected management processor users
XD	MP diagnostics and/or reset

Booting the Server

To boot the server, perform the following step.

1. Depress the power switch located to the left of the front panel LEDs.

NOTE   If the front bezel is attached and in the closed position, you will need to open the small door on the front bezel to gain access to the power switch.

If the autoboot function is enabled, the system will boot to the installed operating system. If autoboot is not enabled, the system will enter the boot console handler (BCH). The BCH allows you to control the server's booting environment. For more information about the BCH review Chapter 5, "Utilities."

5 Utilities

Boot Console Handler (BCH)

The boot console handler (BCH) is separate code in processor dependent code (PDC).It has two purposes:

- It lets the bootstrap code know which path to boot from.

- It allows you to interact with PDC to view and/or modify a set of specific system parameters.

Booting is accomplished in the standard PA RISC manner but may 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 will end up in the interactive portion of BCH where modification and/or viewing of some system parameters is possible.

NOTE   When the `autostart` flag is off, autoboots will be interrupted if a configuration change occurs which causes reduced performance; thus requiring you to intervene prior to booting to the internal system loader (ISL).

The auto boot will halt at the BCH prompt and you may continue booting by entering `boot`.

BCH Commands

In the interactive portion of BCH there is a Main Menu and five submenus.

Table 5-1   BCH Commands

Submenu	Description
`BOot [PRI|ALT|<path>]`	Boot from a specified path
`DIsplay`	Redisplay the current menu
`HElp [<menu>|<ommand.>`	Display help for specified command or menu
`RESET`	Restart the system
`MAin`	Return to the Main Menu

Main Menu

The following commands are available in the 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

   * DeBug menu                   Displays debug commands

     MFG menu                     Displays manufacturing 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 >
```

* Not accessible to user.

** You cannot modify the Keyboard path.

Configuration Menu

The following commands are available in the configuration menu:

```
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

     FAn [HI|NORmal]             Display or change fan speed

     FastBoot [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 following commands are available from the information menu:

```
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

      FRU                         Display FRU 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


      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 here will include Description, Path. VendorID, DeviceID, Slot#, and bus#.

** Processor command displays system model string

***Warnings displayed are:

- System serial number not set

- Support Bus Controller initialization failure

- WARNING: Card in unsupported PCI slot for __system.

- WARNING: Too many cpus for a __ system. System will not boot.

- WARNING: Too much memory for a ____system.

- WARNING: A fatal error has occurred-system cannot boot. Review warning messages in the information menu

Service Menu

The following commands are available from the service menu:

```
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 >
```

The ProductNum command is for setting up the Original and/or Current Product Number. The SWID does not get updated automatically on change of the Original Product Number but it can be generated by executing the default command from the Configuration SubMenu.

The SCSI command is for displaying/setting the SCSI controller parameters like initiator ID and speed. These parameters are used by the OS device drivers to program the controller(s). Note that these values are only *suggested* by the device driver; the actual values programmed into the controller may be different.

Management Processor

The **management processor** is an independent support system for the server. It provides a way for you to connect to a server and perform administration or monitoring tasks for the server hardware.

The management processor controls power, reset, Transfer of Control (TOC) capabilities, provides console access, displays and records system events, and can display detailed information about the various internal subsystems. The management processor also provides a virtual front panel that can be used to monitor system status and see the state of front panel LEDs. All MP functions are available via the LAN, local RS-232 and remote RS-232 ports.

The management processor is available whenever the system is connected to a power source, even if the server main power switch is in the off position.

Access to the management processor can be restricted by user accounts. User accounts are password-protected and provide a specific level of access to the server and management processor commands.

Multiple users can interact with the management processor. From the MP Main Menu users can select any of the following options: enter management processor command mode, enter console, view event logs, view console history, display virtual front panel, enter console session, or connect to another management processor. Multiple users can select different options from the MP Main Menu at the same time. However, management processor command mode and console mode are mirrored, The MP allows only one user at a time to have write access to the shared console.

Accessing the Management Processor

You can connect to the management processor using the following methods:

- The **local RS-232C port** using a local terminal
- The **remote RS-232C port** using external modem (dial-up) access, if remote modem access is configured
- The **management processor LAN port** using Web Console or telnet if login access through the management processor LAN is enabled

Interacting with the Management Processor

To interact with the management processor, perform the following steps:

Step 1. Log in using your management processor user account name and password.

NOTE   If the management processor is not displaying the MP Main Menu, use **CTRL+B** to access the MP Main Menu and the management processor (MP) prompt.

Step 2. Use the management processor menus and commands as needed. A list of available commands can be displayed by using the management processor help function (in the MP Main Menu, enter **HE** followed by **LI** at the MP HELP: prompt). Log out using the X command (in the MP Main Menu, enter **X** at the MP> prompt) when done.

Management Processor Command Interface

Use the management processor menus and commands as needed. The login screen, which includes the Main Menu, is shown below. Main Menu commands (CO, VFP, CM, CL, CSP, SE, SL, HE, and X) can be entered after the MP prompt. Commands not displayed in the MP Main Menu can be accessed in command mode by first using the CM command at the MP prompt. (A list of available commands can be displayed by using the management processor help function. Display the list of commands as follows: in the MP Main Menu, enter **HE** after the MP> prompt, then enter **LI** after the MP HELP: prompt.) You can return to the MP Main Menu by typing **CTRL+B**.

MP Welcome Screen

MP Welcome screen commands:

```
MP Login: Admin
MP password: *****
Hewlett-Packard Management Processor
(C) Copyright Hewlett-Packard Company 1999-2003. All rights reserved
System Name: xxxxxxxxx


MP MAIN MENU:
CO:Console
VFP:Virtual Front Panel
CM:Command Menu
CL:Console Log
SL:Show Event Logs
CSP:Connect to Service Processor
```

MP commands are described in the following paragraphs.

Management Processor Commands

Table 5-2   **Management Processor Commands and Descriptions**

Command	Description
BP	Reset BMC passwords
CA	Configure asynch/serial ports
CG	Certificate generator
CL	View console log
CM	Select command mode
Ctrl+B	Return to MP main menu
CO	Select console mode
CSP	Connect to service processor
DATE	Date display
DC	Default configuration
DF	Display FRU information
DI	Disconnect remote or LAN console
FW	Upgrade MP firmware
HE	Display help for menu or command
ID	System information
IT	Inactivity timeout settings
LC	LAN configuration
LOC	Locator LED display and configuration
LS	LAN Status
MR	Modem reset
MS	Modem status
PC	Remote power control
PG	Paging parameter setup
PS	Power management module status
RB	Reset BMC
RS	Reset system through RST signal
SA	Set access
SE	Enter OS session
SL	Show event logs

Table 5-2   Management Processor Commands and Descriptions (Continued)

Command	Description
SO	Security options
SS	System processor status
SYSREV	Current system firmware revisions
TC	Reset via transfer of control (TOC)
TE	Tell-send a message to other users
UC	User configuration
VFP	Virtual front panel
WHO	Display connected management processor users
X	Exit management processor and disconnect
XD	Diagnostics and/or reset of management processor

Reset BMC Passwords

BP: Reset BMC Passwords

This command resets BMC passwords (both USER and ADMIN passwords).

Configure Serial Port Parameters

CA: Configure local and remote serial port parameters

Set up the local serial port parameters as follows:

• TERMINAL TYPE: Vt100 vs HPterm

• BAUD RATES: Input and output data rates are the same; 300, 1200, 2400, 4800, 9600, 38400, 115200 bit/sec.

• FLOW CONTROL: Hardware uses RTS/CTS; Software uses Xon/Xoff.

• TRANSMIT CONFIGURATION STRINGS: Disable this setting whenever the modem being used is not compatible with the supported modem (MT5634ZBA).

IMPORTANT   Do not mix HP and vt100 terminal types at the same time.

Set up the remote serial port parameters as follows:

• MODEM PROTOCOL: Bell or CCITT (CCITT is a European standard; RTS/CTS signaling is used, as well as the Ring signal. Bell is a U.S. or simple mode).

• BAUD RATES: Input and output data rates are the same; 300, 1200, 2400, 4800, 9600, 38400, 115200 bit/sec.

• FLOW CONTROL: Hardware uses RTS/CTS; Software uses Xon/Xoff.

- TRANSMIT CONFIGURATION STRINGS: Disable this setting whenever the modem being used is not compatible with the supported modem (MT5634ZBA).

- MODEM PRESENCE: When the modem may not always be connected, set this parameter to "not always connected".

  For example: A modem attached through a switch. In mode "not always connected," no dial-out functions are allowed: DIAL-BACK is disabled, and PAGING is not possible.

The MP mirrors the system console to the MP local, remote/modem, and LAN ports. One console output stream is reflected to all of the connected console users. If several different terminal types are used simultaneously by the users, some users may see strange results.

Example 5-1   HP-UX

Applications that care about the terminal type (install, SAM, vi, and so on) running on HP-UX use three methods to determine the terminal type:

1. The application takes the terminal information from the OS. This value is set in the CA command and takes effect for all MP ports.

2. The $TERM shell environment variable.

3. The application directly queries the terminal (in this case, the write enabled terminal establishes the terminal type).

Make sure that settings #1 and #2 agree with your terminal type.

Certificate Generate

CG: Generate RSA key pair or Self Signed Certificate

This command generates a new RSA key pair and self signed certificate.

Console Log

CL: Console Log—view the history of the Console output

This command displays up to 60 Kilobytes of logged console data (about 60 pages of display in text mode) sent from the system to the Console path.

Command Mode

CM: Command Mode—enter command mode

This command switches the console terminal from the MP Main Menu to mirrored command interface mode. If the current mux authority is administrator and the new login is as an operator, the command mux will be denied (remains in MP Main Menu mode). If a command is in progress, a message will be displayed warning the new user of system status.

Console

CO: COnsole—leave command mode and enter console mode

This command switches the console terminal from the MP Main Menu to mirrored/redirected console mode. All mirrored data is displayed. Type **CTRL+B** to return to the MP command interface.

For VT100 and HPTERM, verify that the MP setting in the CA command is correct and all mirrored consoles are of the same terminal type for proper operation.

Connect to Service Processor

CSP: Connect to remote management processor over the LAN

This command allows the local or remote port user to connect over the MP LAN to another MP on the network. The user that launches the command is given a private connection to the other MP over the LAN. To return to the original MP, type **CTRL+]** to disconnect the CSP session.

Date

DATE: Displays the current date, as generated in the MP real-time clock.

Default Configuration

DC: Default Configuration—reset all MP parameters to the default configuration

This command sets all MP parameters back to their default values. The user may reset all or a subset of the following parameters:

- IP configurations

- Modem configuration

- Paging configuration

- Command Interface configuration

- Disable remote access, security configuration

- Session configuration. For example: setting the security configuration to default erases all users and passwords.

There are three ways to reset passwords in the MP:

1. In the SO command, change individual users.

2. In the DC command choose "Reset Security Configuration".

3. Forgotten passwords can be reset by pressing the reset button on the back panel of your HP Server. See Figure 2-7 on page 22. After the MP reboots, the local console terminal displays a message for five seconds. Responding to this message in time will allow a local user to reset the passwords.

Notice that all user information (logins, passwords, and so on) is erased in methods 2 and 3.

Display FRUID

DF: Display FRUID information

This command displays FRUID information from the BMC for FRU devices. Information provided includes serial number; part number; model designation; name and version number; and manufacturer.

Disconnect Remote or LAN Console

DI: DIsconnect remote/modem or LAN/WEB console

This command disconnects (hang up) the remote/modem or LAN/WEB users from MP. It does not disable the ports. The remote console is no longer mirrored.

Front Panel Process

`FP`: Turn off front panel fault or attention LEDs

This command allows the user to control the state of front panel fault and attention LEDs, individually or together.

MP Firmware Update

`FW`: Activates MP firmware upgrade mode

This command is available from either the LAN or local serial port. This command activates firmware upgrade mode, which loads new firmware through the MP LAN by FTP (which must be operational). An MP Reset is generated after the upgrade is complete.

Help

`HE`: Display help for menu or command

This command displays the MP hardware and firmware version identity, and the date and time of firmware generation. If executed from the MP Main Menu, general information about the MP, and those commands displayed in the MP Main Menu, will be displayed. If executed in command mode, this command displays a list of command interface commands available to the user. It also displays detailed help information in response to a topic or command at the help prompt.

Display System ID

`ID`: Display/modify system information

This command allows the user to display and modify the following:

- SNMP contact information
- SNMP server information
- SPU hostname

Inactivity Timeout

`IT`: Inactivity Timeout settings

The session inactivity timeout is up to 1,440 minutes - default is 60 minutes. This timeout prevents sessions to the system from being inadvertently left open. A session can be started by the `SE` command. An open session can prevent users from logging onto the MP through a port and can also prevent system applications from initiating an outbound connection.

MP inactivity timeout is up to 1,440 minutes - default is 5 minutes. This timeout prevents a user from inadvertently keeping the MP locked in a MP Command Interface mode preventing other users from looking at the console output. The MP Command Interface inactivity. timeout may not be deactivated.

Flow control timeout is 0 to 60 minutes. If set to 0, no timeout is applied. This timeout prevents mirrored flow control from blocking other ports when inactive.

Configure LAN Console

`LC`: LAN configuration (IP address, and so on)

This command displays and allows modification of the LAN configuration. Configurable parameters include:

- MP IP Address

- MP Host Name

- Subnet Mask

- Gateway Address

- Web Console port number

- Link State

The MP Host Name set in this command is displayed at the MP command interface prompt. Typically the DNS name for the LAN IP is entered.

This field can be programmed to any useful name or phrase. For clarity, it is useful to enter **MP-on-SYSTEM** as the MP Host name, so both names show up in the prompt (limit 19 characters, no spaces allowed.) The web access port number is also set by this command.

LAN Status

LS: LAN Status

This command displays all parameters and the current status of the MP LAN connections. The LAN parameters are not modified by the execution of this command.

Return to Main Menu

MA: Return to MP Main Menu

This command makes the MP return to the nonmirrored MP Main Menu. This is the same as executing CTRL+B.

Modem Reset

MR: Modem Reset

This command makes the MP send an AT Z command to the modem, which resets it. Any modem connections are lost. The initialization results can be viewed via the MS command.

Modem Status

MS: Modem Status—Display modem status

The MS command displays the state of the modem lines connected to the remote/modem serial port. The display can be updated by pressing **Enter**. The current state of the status signals DCD, CTS, DSR, RI and the last state of the control signals DTR, RTS set by the firmware are displayed.

Power Control

PC: Power Control—turn system power on and off

For proper system shutdown, shutdown the OS before issuing this command or use the commands graceful shutdown option.

This command allows you to switch the system power on or off. the user can have the action take place immediately or after a specified delay.

Notice this is roughly the equivalent to turning the system power off at the front panel switch. There is no signal sent to the OS to bring the software down before power is turned off. To turn the system off properly, you must ensure that the OS is in the proper shutdown state before issuing this command. Use the proper OS commands or use the graceful shutdown option of the Remote Power Control command.

Configure Paging

PG: Paging parameter setup—configures pagers

This command allows the user to configure the pagers and set triggering events.

A string description of the triggering event will be sent with the page.

Power Status

PS: Power status—display the status of the power management module

This command displays on the console the status of the power management module.

Reset BMC

RB: Reset BMC

This command resets the BMC by toggling a GPIO pin.

Reset System

RS: Reset system through RST signal

IMPORTANT   Under normal operation, shut down the OS before issuing this command.

This command causes the system (except the MP) to be reset through the RST signal.

Execution of this command irrecoverably halts all system processing and I/O activity and restarts the computer system. The effect of this command is very similar to cycling the system power. The OS is not notified, no dump is taken on the way down, and so on.

Set Access

SA: Set access options—configures access for LAN and remote/modem ports

This command will disconnect modem, LAN, and web users if access is disabled.

Create Local Session

SE: Log into the system on local or remote port

Only valid from the local or remote/modem port, SE allows the user to leave the MP Command Interface and enter a system session. Other mirrored MP users are placed in console mode. The session user returns to the mirrored MP session on exit.

The MP regularly checks the activity of the session, closes the connection with the system, and, if the timeout period has elapsed, returns the port to mirroring. The timeout period is set with the IT command. On HP-UX, the SE command works on the local and remote ports.

In HP-UX, use the System Administration Manager (SAM) to add modem device files for the session UARTS. The modem type, CCITT or Bell must agree with the remote port settings for the remote session port and always be Bell mode for the local session port.

If the system and the MP Command Interface local or remote ports have been configured with different port speeds, the baud rate changes to the rate specified by the OS for the duration of the session.

Display Logs

`SL`: Display contents of the system status logs

This command displays the contents of the event logs that have been stored in nonvolatile memory.

- System Event Log (SEL)—High attention events and errors
- Forward progress—All events
- Current boot log—All events between "start of boot" and "boot complete"
- Previous boot log—The events from the previous boot

Reading the system event log turns off the attention LED. Accessing this log is the only way to turn off the attention LED when it is flashing and alerts have not been acknowledged at the alert display level.

Events are encoded data that provide system information to the user. Some well-known names for similar data would be Chassis Codes or Post Codes. Events are produced by intelligent hardware modules, the OS, and system firmware. Use VFP to view the live events. Use `SL` to view the event log.

Navigate within the logs as follows:

- + — View the next block (forward in time)
- - — View the previous block (backward in time)
- Enter (<CR>) — View the next block in the previously selected direction (forward or backward in time)
- D — Dump the entire log for capture or analysis
- F — First entry
- L — Last entry
- J — Jump to entry number __
- V — View mode configuration (text, keyword, hex)
- ? — Display this help menu
- Q — Quit

Table 5-3 defines alert (or severity) levels.

Table 5-3   Alert Levels

Severity	Definition
0	Minor forward progress
1	Major forward progress
2	Informational
3	Warning
5	Critical
7	Fatal

Security Options

SO: Configure security options and access control (users, passwords, and so on)

This command modifies the security parameters of the MP, which include login timeouts and allowed password faults.

If configured, when you access the MP via the modem port, the MP hangs up and dials the user back. This does not work if Modem Presence is set to not always connected with the CA command.

If the mode is Single, the State is changed to disabled after the first login.

A disabled user's login is not accepted.

Firmware Revision Status

SYSREV: Displays the revision status of firmware in the system processors

This command displays the revision status of firmware in the system processors.

System Status

SS: Displays the status of the system processors

The SS command displays the status of the system processors and which processor is the monarch.

Transfer Of Control

TC: System reset through INIT or TOC (Transfer of Control) signal

Under normal operation, shut down the OS before issuing this command.

This command causes the system to be reset through the INIT (or TOC) signal. Execution of this command irrecoverably halts all system processing and I/O activity and restarts the computer system. It is different from the RS command in that the processors are signaled to dump state on the way down.

Tell

TE: TEll—sends a message to other terminals

Up to 80 characters can be typed in. The message is broadcast to the other mirrored clients. Users in a session or CSP are not shown the message.

User Configuration

UC: User Configuration—controls user access

This command allows an administrator to add, modify, re-enable, or delete user logins. The administrator can also enable or disable security warnings and change passwords.

Virtual Front Panel

VFP: Display Virtual Front Panel

The VFP command presents a summary of the system by using direct console addressing. If the terminal is not recognized by the MP, VFP mode will be rejected. Each individual user will get this summary in order to avoid issues related to terminal type and screen display mode.

This command is executed from the Main Menu. When accessed, VFP displays the current state of the system including current LED status. The display refreshes at one second intervals.

Who

WHO: Displays a list of MP connected users

This command displays the login name and operating mode (Main Menu, command, and so on) of the connected console client users, and the port on which they are connected. For the LAN and WEB console clients the remote IP address is also displayed.

If the local console client user did not originate the MP command interface session, there is always one default user listed for the local serial port: local user i. If the local console operator types **CTRL+B**, then the login name that the local operator used is displayed instead.

Exit from MP

X: Exit from MP command interface and disconnect from the system

This command disconnects the executing user from the system. This command is available from the local port.

Diagnostics

XD: Diagnostics and/or Reset of MP

This command allows the user to perform some simple checks to confirm the MP's health and its connectivity status. The following tests are available:

- MP Parameter Checksum
- Verify I^{2}C connection (get BMC Device ID)
- LAN connectivity test using ping
- Modem self-tests

Also, the MP can be reset from this command. A MP reset can be safely performed without affecting the operation of the server.

Management Processor Help System

The MP has a robust help system. To invoke MP HELP, enter **he** after the MP> prompt. The following is displayed:

```
HE

==== MP Help: Main Menu =========================================(Administrator)===

Hardware Revision a1 Firmware Revision E.02.20 May 30 2003,15:18:47

                     MP Help System

    Use Ctrl-B to exit MP command interface and return to the main MP menu:

    Enter a command at the help prompt:

         OVerview  : Launch the help overview

         LIst      : Show the list of MP commands

         <COMMAND> : Enter the command name for help on individual command

         TOPics    : Show all MP Help topics and commands

         HElp      : Display this screen

         Q         : Quit help
```

Enter one of the commands described above: **OV, LI, <command>, TOP, HE, Q**

6 Troubleshooting

Troubleshooting Methodology

WARNING	**Before removing a cover, always disconnect the AC power cords and unplug telephone cables. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages. Disconnect the AC power cords to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry.**

CAUTION	Do not operate the HP Server for more than 10 minutes with any cover (including power supplies and disk drives) removed. Otherwise, damage to system components may result due to improper cooling airflow.
	However, you can safely remove a cover while the HP Server is running to remove and replace PCI hot-plug boards. For any other service activity requiring access to the system board or power distribution board, power down the HP Server and observe all safety precautions.

To troubleshoot your system you must be familiar with the HP-UX operating system and be able to start and stop testing processes. You should also be familiar with Support Tools Manager (STM), which runs in HP-UX, and the Offline Diagnostics Environment (ODE).

Online troubleshooting programs are available on your HP-UX operating system. Offline troubleshooting programs are available on the resource CD that is shipped with your HP Server. Both online and offline troubleshooting tools are also available for downloading at http://docs.hp.com.

Other information that can aid in troubleshooting is contained elsewhere in this document. See Chapter 2, "Controls, Ports, and Indicators," for further information about deciphering all other LEDs in your system. For information about troubleshooting hot-plug, PCI-X card problems, see "Hot-Plug PCI/PCI-X" on page 56.

Operating System Will Boot

If your operating system is running and you are experiencing problems, use the following online tools to help solve your problem: See "Troubleshooting Using Online Support Tools" on page 106.

- Support Tools Manager (STM)
- Event Monitoring Service (EMS)
- Management Processor (MP)

Operating System Will Not Boot

If your operating system will not boot, but you are able to reach the BCH (from either the main disk partition or CD), then use the following offline tools to help solve your problem: See "Troubleshooting Using Offline Support Tools" on page 110.

- Offline Diagnostic Environment (ODE)
- Management Processor (MP)

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:

- Graphical interface for X-based terminals (XSTM)

- Menu interface for ASCII terminals (MSTM)

- Command line interface for all ASCII terminals (CSTM)

You can use the graphical 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 Field Replaceable Unit (FRU).

For complete documentation on how to access and use STM go to http://docs.hp.com. Under 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. You can 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 the occurrence of any unusual activity (called an event). When an event occurs, it is reported by a variety of notification methods such as e-mail. 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 your HP-UX operating system. To bring up the event monitoring main menu, execute the following command at the shell prompt:

```
/etc/opt/resmon/lbin/monconfig
```

From the list of main menu selections, choose:

```
(E) Enable Monitoring
```

Management Processor

The management processor (MP) interface provides diagnostic and configuration capabilities. By viewing the system logs you can determine and solve problems affecting your computer. To access your MP interface and system logs, perform the following steps:

NOTE   The MP interface must be accessed from a terminal console that is attached to the MP via the MP LAN or MP remote serial connector. The MP is always available for troubleshooting, regardless of the state of your system, as long as there is AC power applied to your computer.

Step 1. If necessary, press **CTRL+B** to access the MP interface.

Step 2. Log in with proper user name and password.

Step 3. Enter `cl` to display the console logs. This log displays console history from oldest to newest.

Step 4. Enter `sl` to display the system logs. The system logs consist of:

- System event
- Forward progress
- Current boot
- Previous boot
- Live events
- Clear SEL/FPL logs

Step 5. For a complete explanation of the management processor and all commands see Chapter 5, "Utilities."

System Event Logs (SEL) Logs

To access the system event logs perform the following steps:

Step 1. Access the optional management processor command prompt.

Step 2. Run the `sl` command. The Event Log Viewer menu will display:

```
SL

Event Log Viewer:


Log Name            Entries    % Full       Latest Entry

-------------------------------------------------------------------

E - System Event          9         1 %      29 Oct 2002 19:15:05

F - Forward Progress     129        3 %

B - Current Boot          82

P - Previous Boot          0

L - Live Events

C - Clear All Logs



Enter your choice or [Q] to Quit:
```

Step 3. Select **e** to review the events. The Event Log Navigation menu will display:

```
Set up alert filter options on this buffer? (Y/[N])

(N)

      Log Name             Entries    % Full        Latest Entry

-------------------------------------------------------------------

E - System Event         410        47 %      18 Feb 2003 09:38:10



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

V       View mode configuration (text, keyword, hex)

?       Display this Help menu

Ctrl-B  Quit and return to the Main Menu
```

Step 4. Select **v**, then **t** to change the display to text mode:

```
Display Mode Configuration:

            H - Hex mode

   Current -> K - Keyword mode

            T - Text mode

Enter new value, or [Q] to Quit:

T
```

Step 5. To decode the blinking state of 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

You can use the *Support Plus CD* to troubleshoot your hp 9000 rp4440 Server by accessing the offline diagnostic environment ODE.

Offline Diagnostic Environment (ODE)

ODE is used to evaluate specific hardware components via a command line interface. To access ODE from your *Support Plus CD*, perform the following steps:

Step 1. Power on your HP Server and insert the *Support Plus CD*.

Step 2. Boot the system to the PDC prompt (BOOTADMIN, BCH, etc.) prompt. PDC prompts may differ on some computer models.

    Main Menu: Enter command or menu>

Step 3. List the bootable devices by entering search: `search`

Step 4. Select the CD device that contains the *Support Plus CD*, for example:

    p3

Step 5. Boot from that device by entering boot p3: `boot p3`

Step 6. You are asked to interact with the Initial System Loader (ISL) prompt. Enter yes: `y`

Step 7. From the ISL prompt, start the Offline Diagnostics Environment by entering ODE: `ODE`

The following commands are available at the ODE prompt:

Table 6-1   ODE Commands

Command	Description
`help`	To display a list and description of the available commands
`help` *<command>*	To display the additional information
`help` *<var>*	To display the additional information
`ls`	To list the ODE modules that will run on your computer
<module_name>	To run an ODE module interactively
`run` *<module_name>*	To run an ODE module non-interactively

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 may be included in the error message or logged into console or event logs. The following table describes the disk drive and PCI slot paths for your HP Server.

Table 6-2   Disk and DVD Paths

Slot	Path
Slot 1	0/1/0
Slot 2	0/1/1
DVD	0/0/3

Table 6-3   I/O Paths

I/O Slot	Path
Slot 1	0/1/2
Slot 2	0/1/0
Slot 3	0/2/2
Slot 4	0/2/0
Slot 5	0/3/2
Slot 6	0/3/0
Slot 7	0/4/0
Slot 8	0/5/0

Troubleshooting Using LED Indicators

Your hp 9000 rp4440 Server has 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. For descriptions of all LEDs on your hp 9000 rp4440 Server see

Front Control Panel LEDs

The front control panel LEDs show you the system status at a glance. If warning or attention lights are flashing, then you should to query the QuickFind diagnostic panel or management processor for further information.

Figure 6-1   Front Control Panel LEDs

Table 6-4   Front Control Panel LED Definitions

LED/ Button	State	Flash Rate	Color	Description
System	Running	Steady	Green	Green: System normal-OS up and running
System	Booting	Flashing at 0.5Hz	Green	Flashing green: OS booting or at BCH
System	Attention	Flashing at 1 Hz	Yellow	Flashing yellow: Warning-system needs attention. Redundancy lost, component failure pending.
System	Fault	Flashing at 2 Hz	Red	Flashing red: Hard fault, system Halted
System	Off	Off	N/A	Off: System off
Power	On	Steady	Green	Green: Power normal
Power	On	Steady	Yellow	Flashing yellow: Housekeeping voltage present
Power	Off	Off	Off	Off: Power off
Disk LED		Flashing at rate of disk activity	Green	Flashing green: Disk activity
Thermal LED	OK	Steady	Green	Green: Thermal OK
Thermal LED	Warning	Flashing at 1 Hz	Yellow	Flashing Yellow-Thermal warning

Table 6-4   Front Control Panel LED Definitions (Continued)

LED/ Button	State	Flash Rate	Color	Description
Locator LED/Button		Flashing at 1 Hz	Blue	Flashing Blue: System locator LED may 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.

Table 6-5   QuickFind Diagnostic Panel LED Definitions

Item	LED 0	LED1	LED2	LED3	Details
Processor	Socket 0	Socket 1	Socket 2	Socket3 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-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-the specified board must be replaced.
I/O VRM	12 volt	5 volt	3 volt	n/a	A plug-in voltage regulator has failed-specific VRM must be replaced.
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-the module must be replaced. Fan 2 is in front of the power supplies.
Memory Bank X (0-7)	DIMM xA	DIMM xB	DIMM xC	DIMM xD	The specified DIMM has failed-the DIMM 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 supply or power supply fans have failed-replace the power supply. The faulty power supply LED (located on Power supply) will be lit.
Memory Config Error	n/a	n/a	n/a		The DIMMs in a rank are mismatched. All the DIMMs in the specified rank (0-7) will be lit.
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 and thus preventing "power up."

Table 6-5   QuickFind Diagnostic Panel LED Definitions (Continued)

| Item	LED 0	LED1	LED2	LED3	Details
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 6-2   QuickFind Diagnostic Label
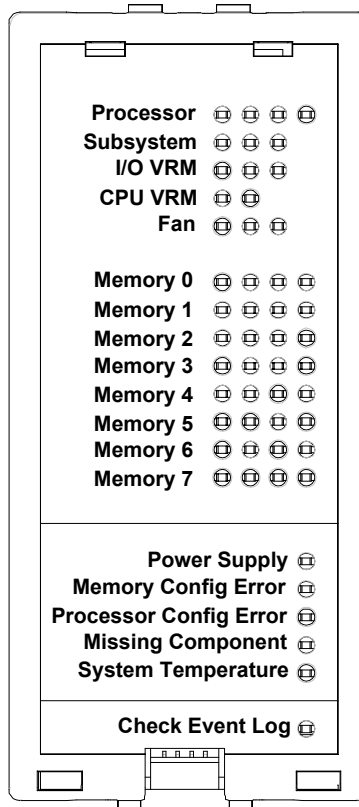
I/O Baseboard LED Indicators

Various LEDs, sensors, and reset or attention buttons are found on the I/O baseboard.

Figure 6-3   I/O Baseboard LEDs, Buttons, and Sensors
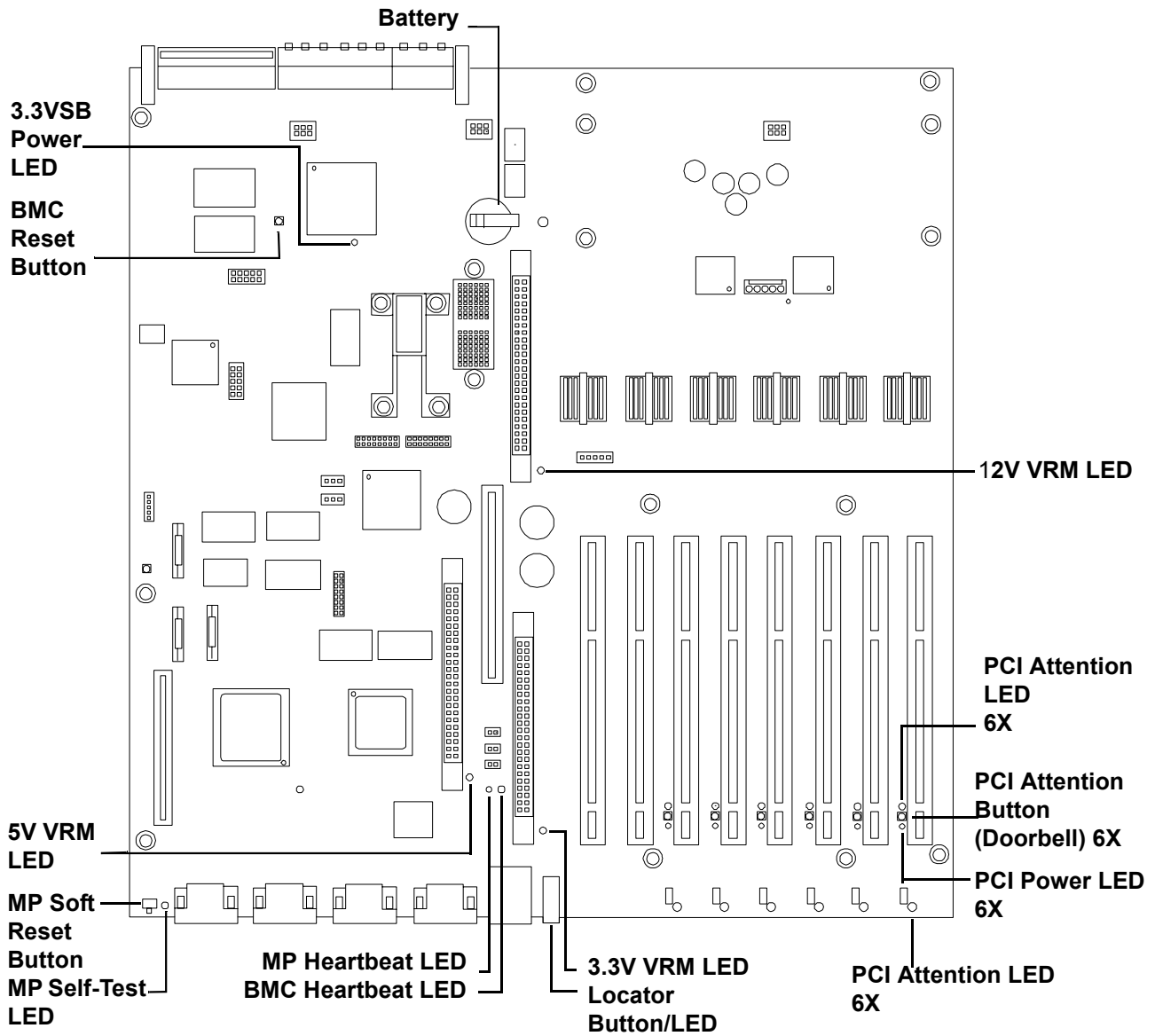
Table 6-6   I/O Baseboard LEDs, Buttons, and Sensors

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.
MP Heartbeat	Green	Blinking	The Management Processor is functioning correctly
MP Self Test LED	Amber	On	The Management Processor is executing the internal self test.
		Off	The Management Processor has passed the internal self test.
BMC Heartbeat	Green	Blinking	The Baseboard Management Controller is functioning correctly.
3.3VSB Power LED	Green	On	Standby power is available.
MP Soft Reset Button	N/A	Press	Resets the Management Processors values.

Memory Extender Boards

The 32 DIMM memory extender board has two power status LEDs-1.25V and 1.5V. See Figure 6-4 on page 118.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 2 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 field replaceable units (FRUs).

Figure 6-4   **32 DIMM Memory Extender Board LEDs**
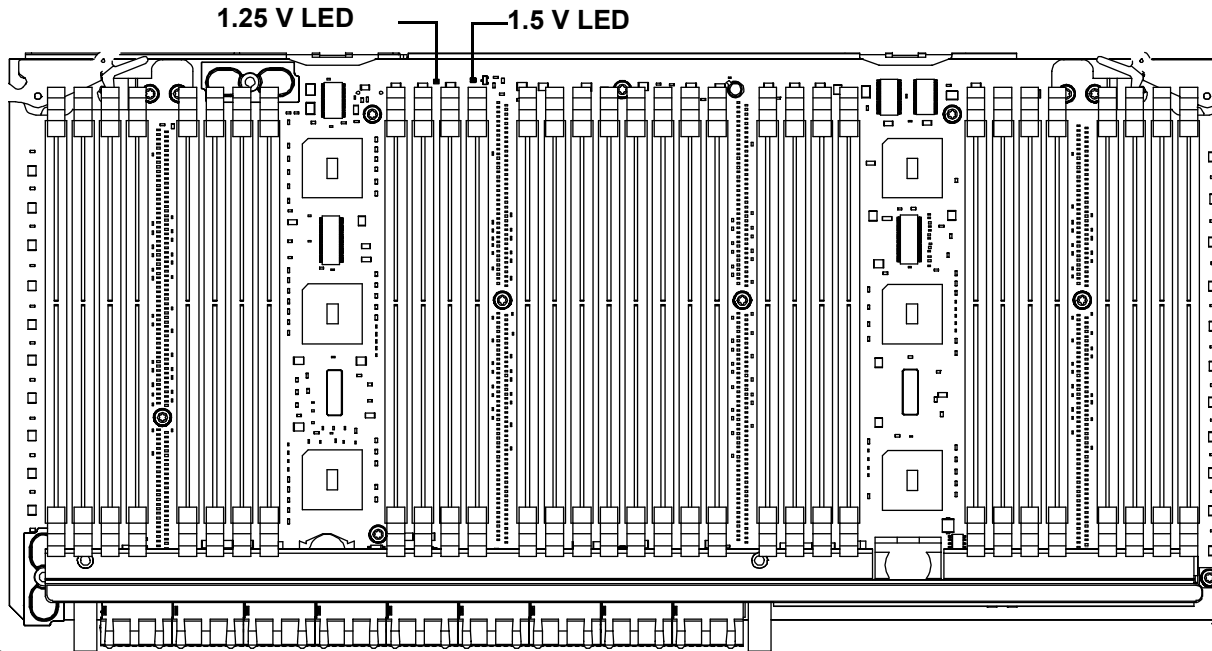
Table 6-7   **32 DIMM Memory Extender Board**

LED	Color	Status	Condition
1.25 V Power	Green	On	Power OK
1.5 V Power	Green	On	Power OK

Figure 6-5   16 DIMM Memory Extender Board LEDs

VRM LEDs
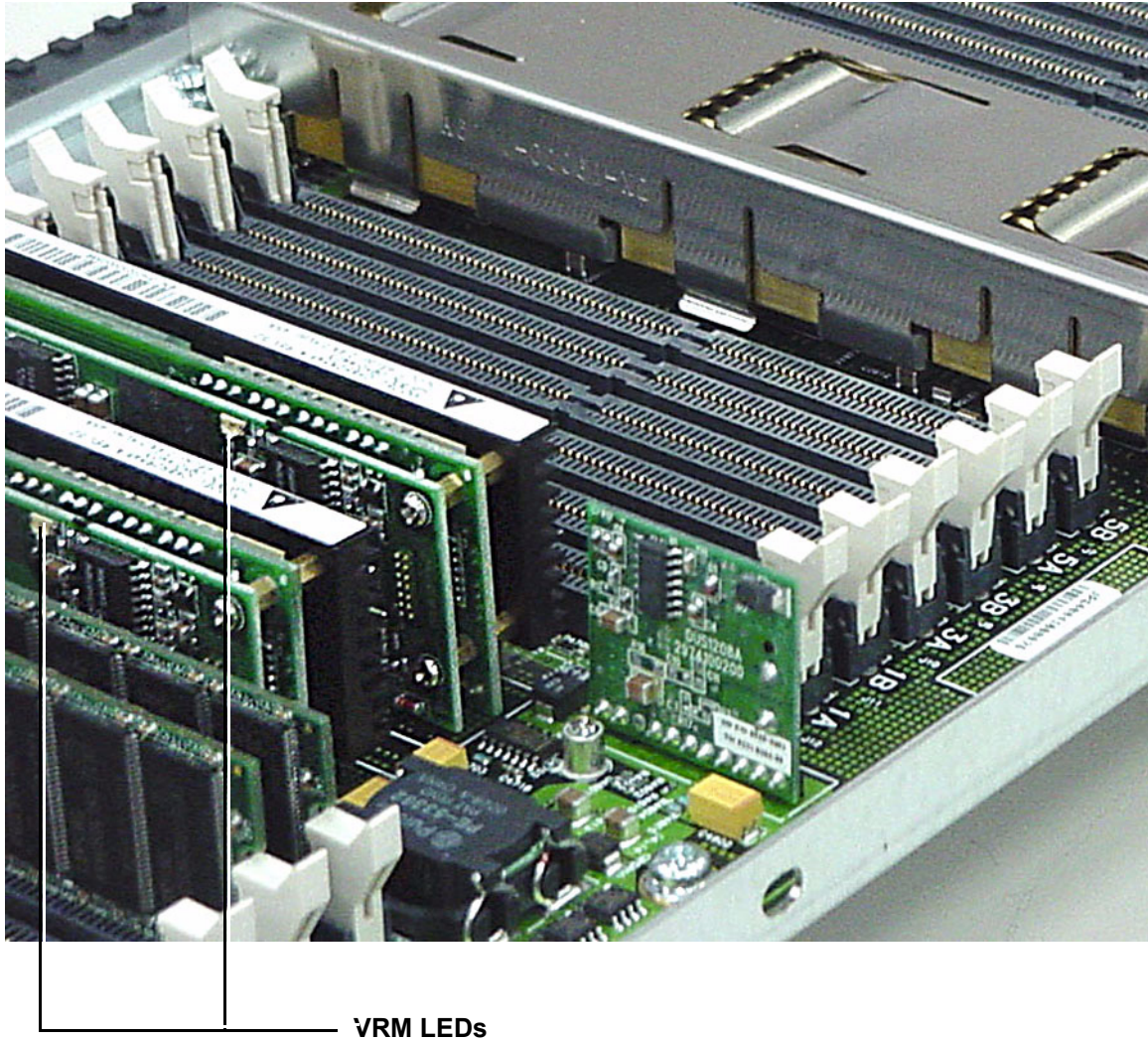
Table 6-8   16 DIMM Memory Extender Board

LED	Color	Status	Condition	Action
VRM Status	Green	On	VRM is bad	Replace memory extender board

7 Removing and Replacing Components

Safety Information

Follow the procedures listed below to ensure safe handling of components and to prevent harm to both you and the HP Server:

- 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	**Hazardous voltages are present inside the HP Server. Always remove AC power from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.**

Service Tools Required

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

- Electrically Conductive Field Service Kit (P/N 9300-1155)
- 1/4 inch Flat Blade Screwdriver
- ACX-15 Torx Screwdriver

Accessing a Rack Mounted Server

The hp 9000 rp4440 Server is designed to be rack mounted. The following procedure explains how to gain access to your HP 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 at http://www.hp.com/racksolutions.

WARNING	**Ensure that all anti-tip features (front and rear anti-tip feet installed; adequate ballast properly placed; and so on) are employed prior to extending the server.**

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 out the front and work on it.

To extend the server from the rack, perform the following steps:

Step 1. Remove the T-25 screws that fasten the server to the rack. See Figure 7-1, "Accessing 25MM Torx Screws."

Step 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.

Figure 7-1   Accessing 25MM Torx Screws

25MM Torx
screw 2X
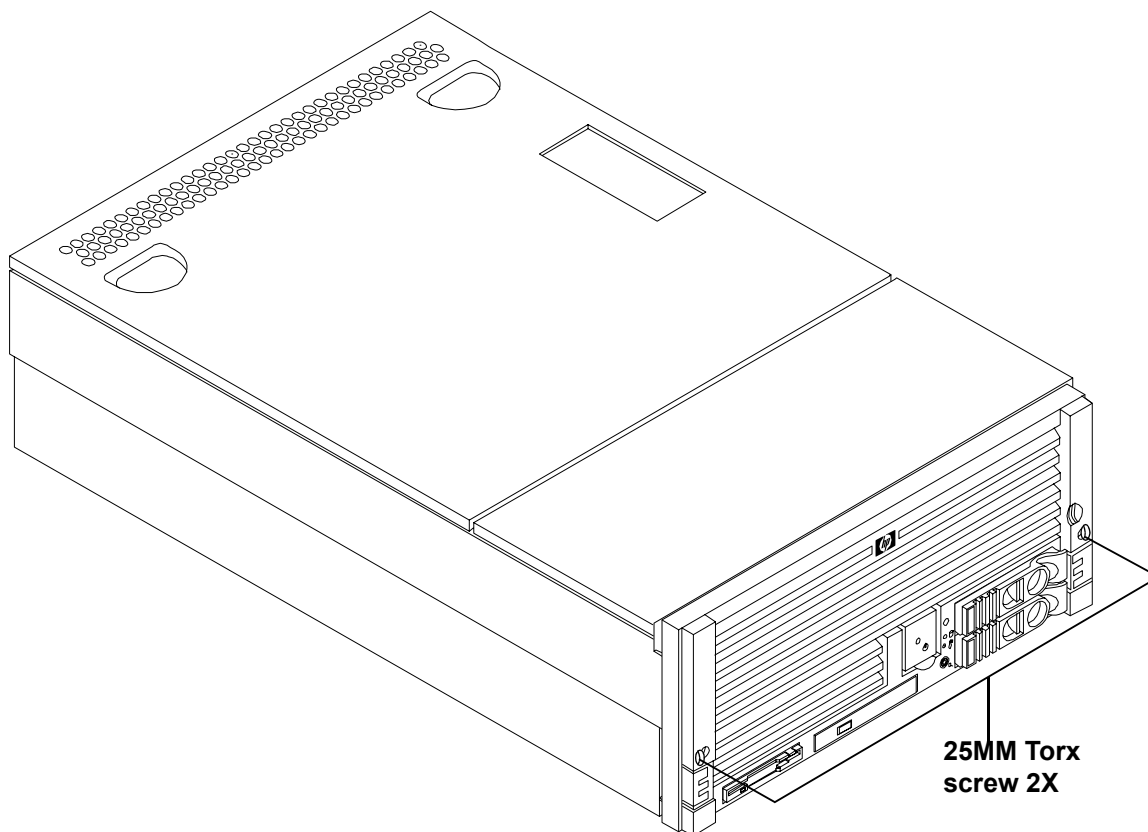
Insert the Server into the Rack

To insert the server into the rack, perform the following steps:

Step 1. Press the rail clips on either side of the server inward and push the server into the rack until it stops.

Step 2. Replace the T-25 screws that fasten the server to the rack.

Accessing a Rackless Server

The hp 9000 rp4440 Server is also designed to be rackless. You do not need to remove the tubular stand from the HP Server to gain access to internal components. The front bezel, front cover, and top cover may be removed with the tubular stand attached to the HP Server.

WARNING	Ensure that the HP 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 7-2   Rackless hp 9000 rp4440 Server
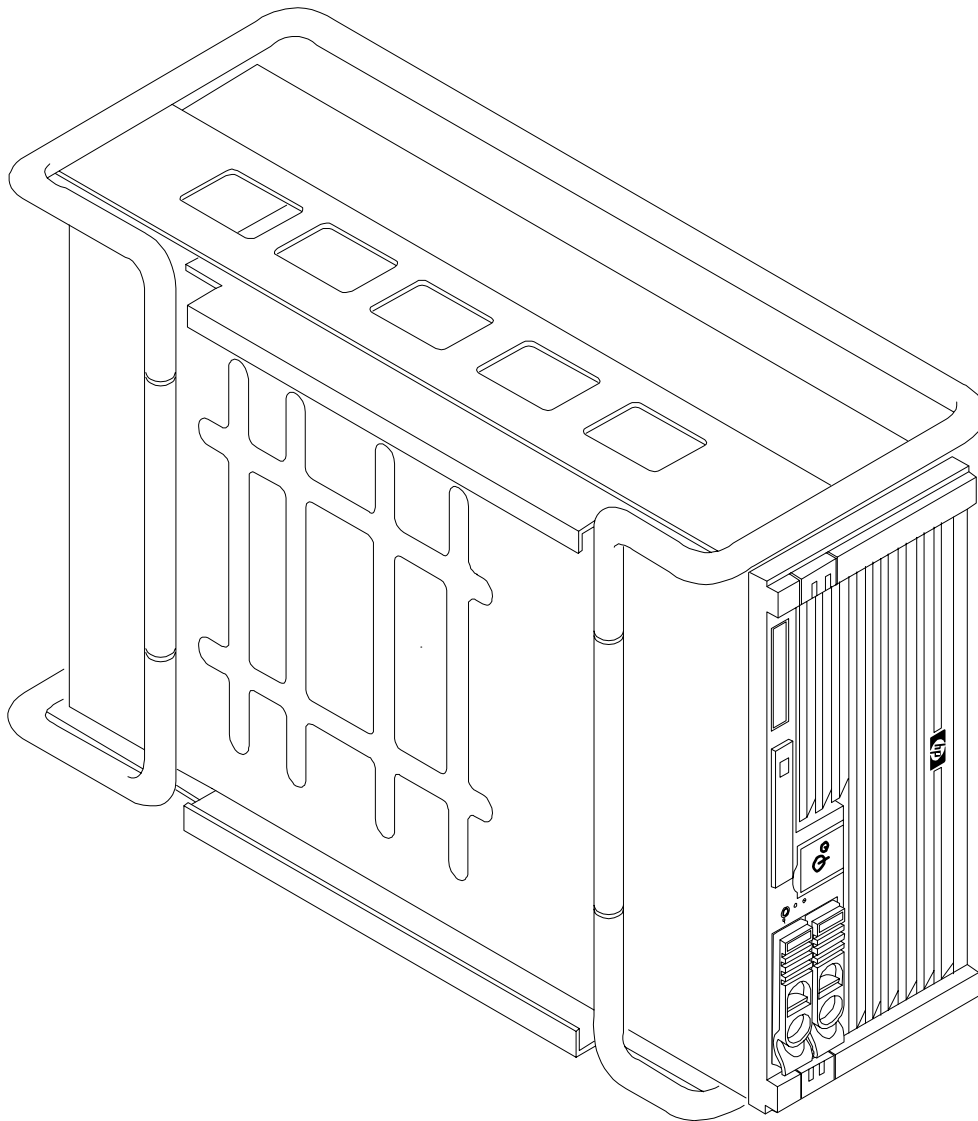
Front Bezel

The server does not have to be turned off to remove the front bezel.

Opening the control panel door provides access to the following components:

- Power switch
- System LEDs

Figure 7-3   Removing and Replacing the Front Bezel
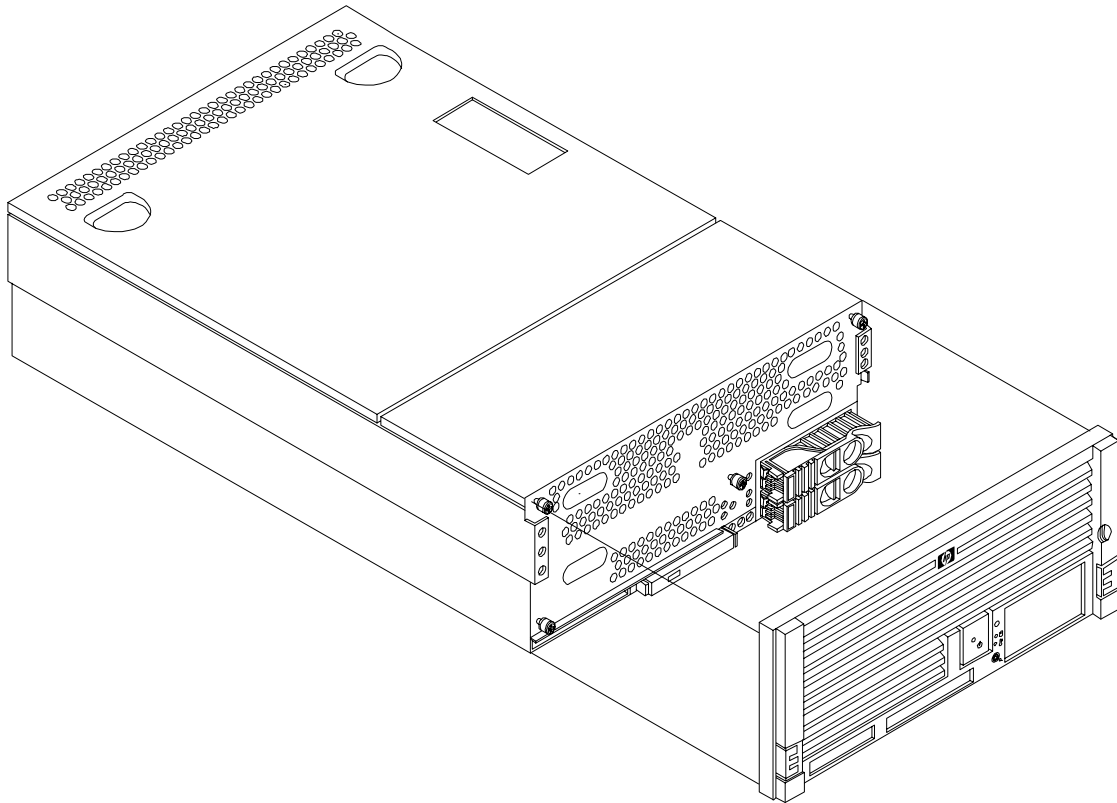
Removing the Front Bezel

To remove the front bezel, perform the following steps:

Step 1. Grasp the front bezel at the outer edges and pull straight out.

Replacing the Front Bezel

To Replace the front bezel, perform the following steps:

Step 1. Push the front bezel straight into the chassis until it snaps into place.

Front and Top Covers

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.

Figure 7-4   Removing and Replacing the Front Cover

Thumbscrews

Removing the Front Cover

To remove the front cover, perform the following steps:

WARNING   **Hazardous voltages are present inside the HP Server. Always remove the AC power cords from the server and associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.**

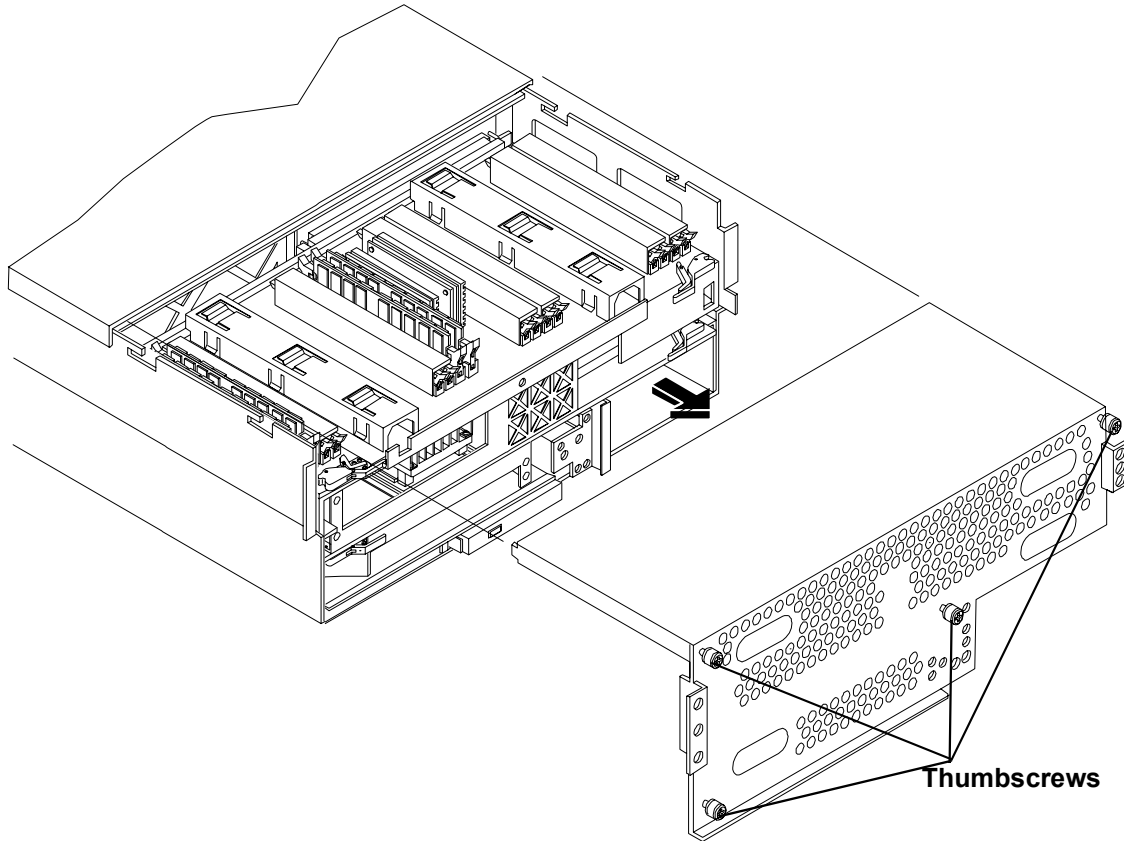**Step 1.** If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Using a Torx T15 driver, loosen the four captive thumbscrews that hold the front cover in place.

Step 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, perform the following steps:

Step 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.

Step 2. Tighten the four thumbscrews securely.

Step 3. Replace the front bezel.

Step 4. If rack mounted, slide the HP Server into the rack until it stops.

Figure 7-5   **Removing and Replacing the Top Cover**

Removing the Top Cover
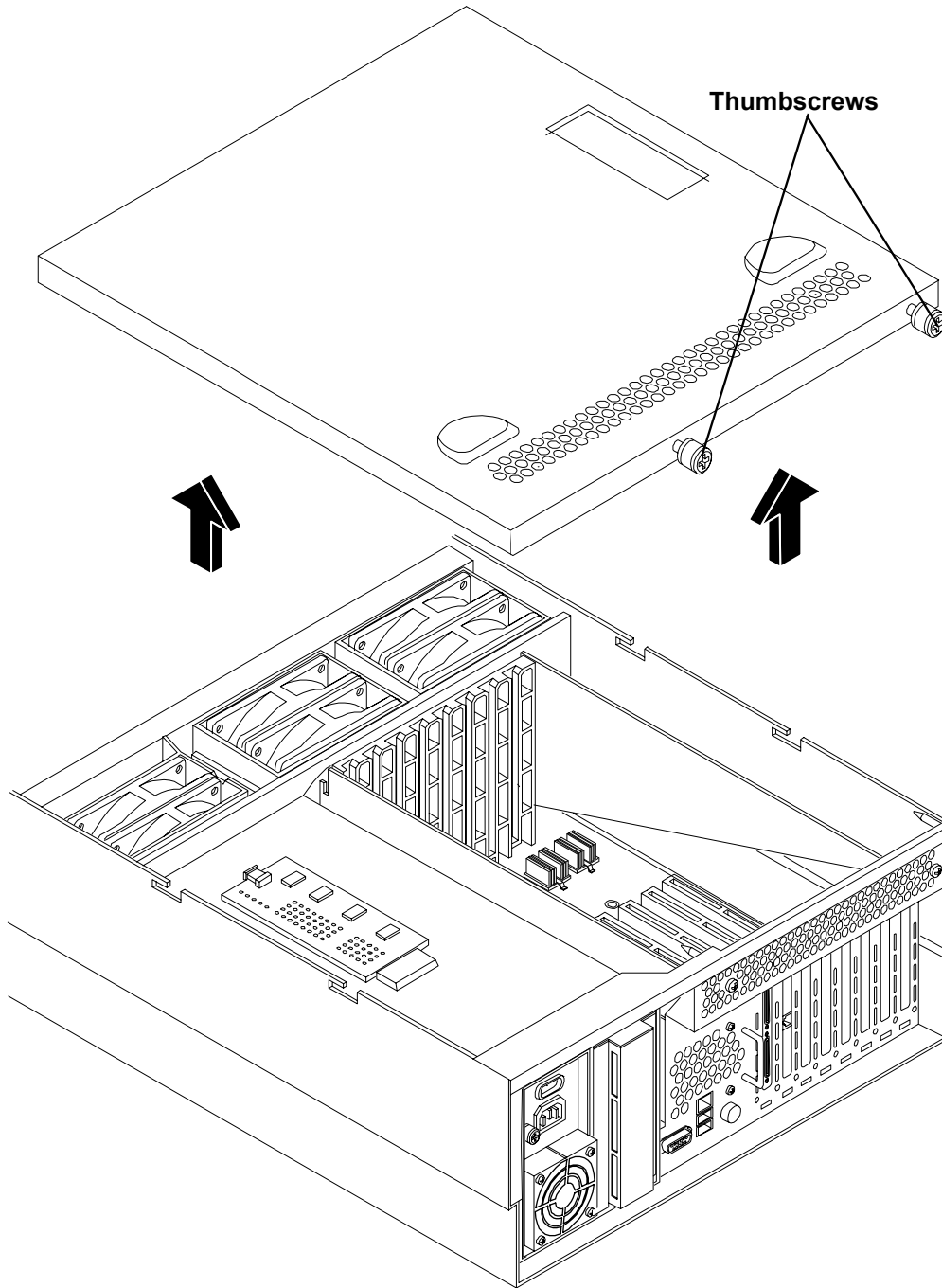
To remove the top cover, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Loosen the two captive thumbscrews that hold the top cover in place.

Step 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 it straight up.

Replacing the Top Cover

To replace the top cover, perform the following steps:

Step 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.

Step 2. Using a Torx T15 driver, tighten the two thumbscrews securely.

Step 3. If rack mounted, slide the HP Server into the rack until it stops.

System Battery

The system battery may be replaced by removing the top cover and accessing the I/O baseboard.

To remove and replace the system battery, perform the following steps:

CAUTION	Before changing your battery, save all boot configuration settings. These values will need to be reset after changing your battery.

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover from the chassis. See "Front and Top Covers" on page 126.

Step 3. Remove the I/O baseboard assembly from the chassis. See "I/O Baseboard Assembly" on page 154.

Step 4. Locate the system battery on the I/O baseboard. Remove the battery by lifting the retaining clip and pull the battery from its socket.

Step 5. Install the new battery and replace the retaining clip.

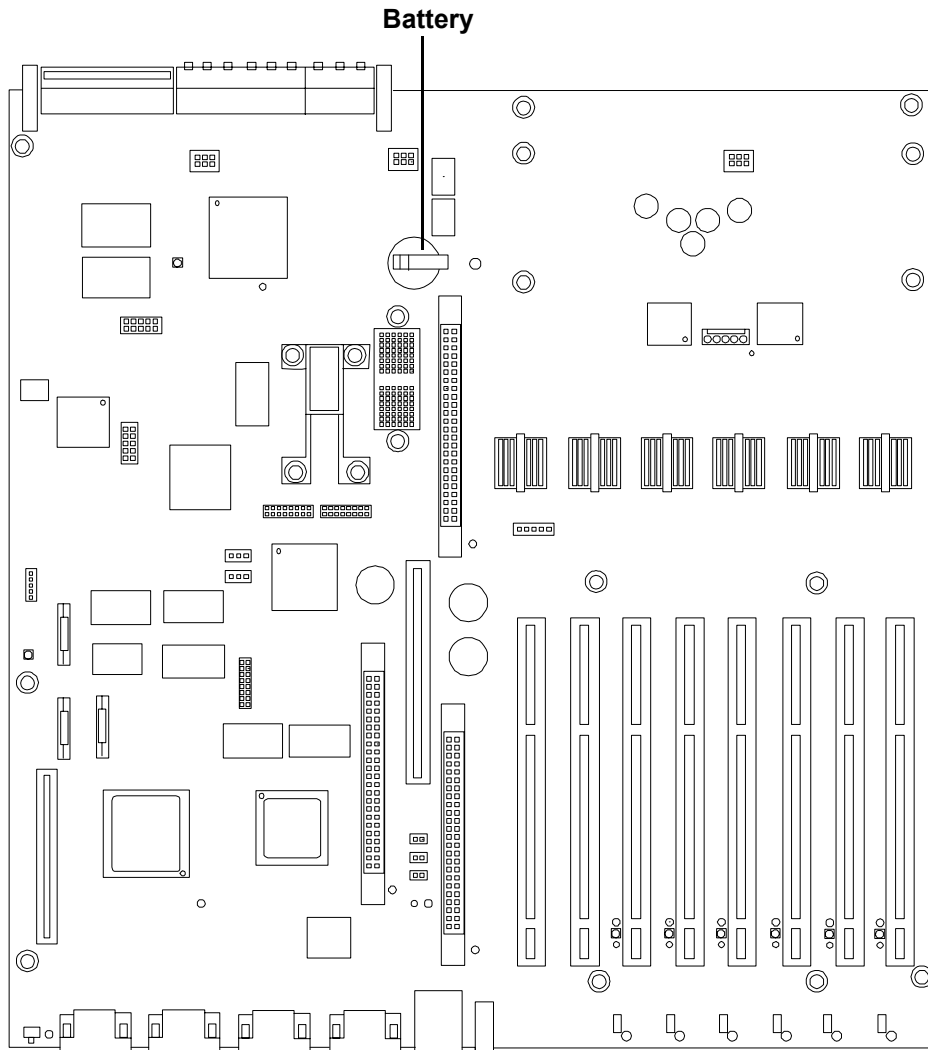|	
NOTE	The positive terminal of the battery is designated by the "+" sign. The battery is installed with the "+" sign facing up.

Step 6. Replace the top cover.

Step 7. Replace the I/O baseboard assembly.

Step 8. If rack mounted, slide the HP Server all the way in until it stops.

Figure 7-6   Battery Location on I/O Baseboard

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 high capacity memory extender board can hold up to 32 DIMMs.

WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Removing a Memory Extender Board

To remove a memory extender board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

NOTE	If desired, the memory extender board may be removed without removing the HP Server from the rack.

Step 2. Remove the front bezel from the chassis. See "Front Bezel" on page 124.

Step 3. Remove the front cover from the chassis. See "Front and Top Covers" on page 126.

Step 4. Press each latch on the two extraction levers located on each side of the memory extender board.

Step 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 7-7   Memory Extender Board Latches
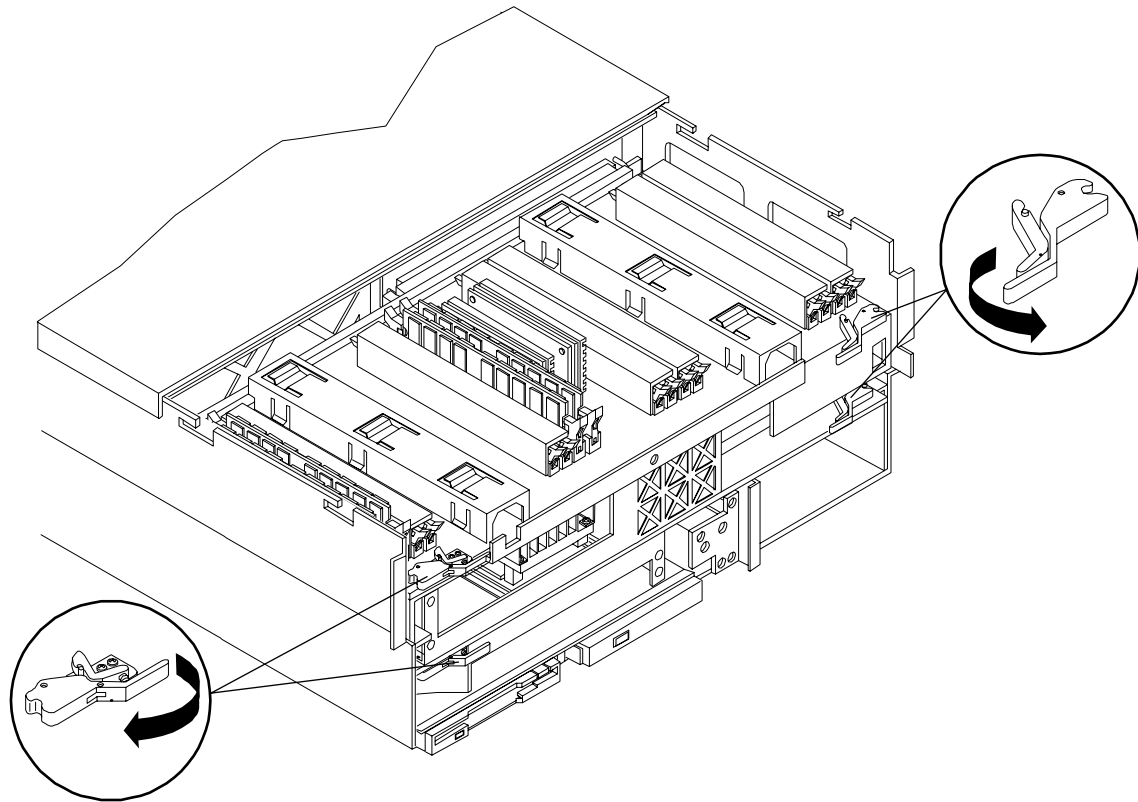
Figure 7-8   Memory Extender Board
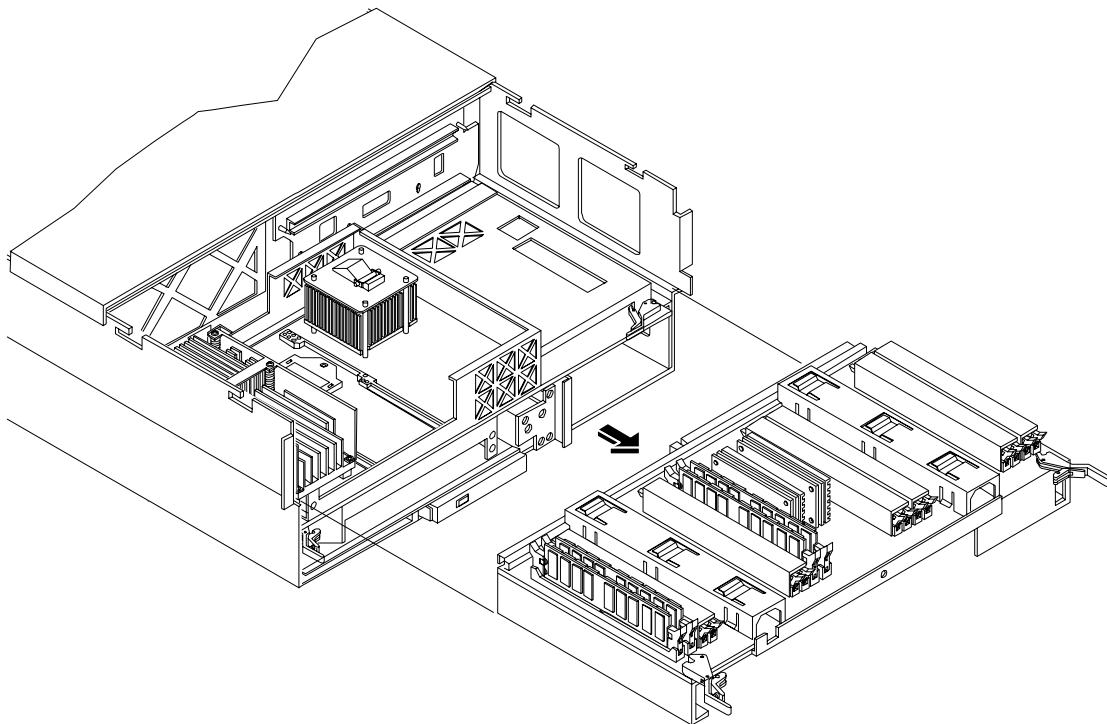
Replacing a Memory Extender Board

To replace the memory extender board, perform the following steps:

Step 1. Ensure the extraction levers are positioned in the outward, unlocked position.

Step 2. Align the memory extender board with the front and rear chassis guide slots.

Step 3. Slide the memory extender board in until it begins to seat in the socket located on the midplane board.

Step 4. Push the extraction levers inward to the locked position in order to plug in the memory extender board into the midplane riser board.

Step 5. Replace the front cover.

Step 6. Replace the front bezel.

Step 7. If rack mounted, slide the HP Server into the rack until it stops.

System Memory DIMMs

System memory DIMMs are located on the memory extender board.

WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Removing System Memory DIMMs

To remove system memory, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

NOTE	If desired, the processor extender board may be removed without removing the HP Server from the rack.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Remove the memory extender board. See "Memory Extender Board" on page 132.

Step 5. Identify the DIMM to be removed and push the appropriate extraction levers found on either side of the DIMM slot outward to the open position. The DIMM will eject from the slot.

Step 6. Remove the DIMM from the socket.

Installing Memory DIMMs

Your hp 9000 rp4440 Server comes with a sixteen DIMM memory extender board that is minimally configured with 1GB of memory [four 256Mb DIMMs loaded in quad 0 (slots 0A,0B,0C,and 0D)]. See Figure 7-9, "16 DIMM Extender Board Slot IDs."

An optional thirty-two DIMM memory extender board is available to replace the sixteen DIMM memory extender board and must also be minimally configured with 1GB in quad 0. See Figure 7-10, "32 DIMM Extender Board Slot IDs."

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

Supported DIMM Sizes

Supported DIMM sizes are 256MB, 512MB, 1GB, 2GB. Dissimilar DIMM sizes may be used across the entire extender board but all four DIMMs in each quad must match. For cooling purposes, DIMM fillers must be used in some unused slots.

DIMM Slot Fillers

Both the sixteen and thirty-two DIMM extender boards have DIMM slot filler boards placed over all unfilled DIMM slots. As you fill DIMM quads with additional memory you must remove the DIMM slot fillers covering the affected slots. All remaining DIMM fillers in unused slots must remain in place to maximize internal cooling. See Table 7-1, "DIMM Filler Requirements for 16 DIMM Extender Board."

NOTE   One DIMM filler board covers two adjacent DIMM slots. As a general rule, only remove DIMM slot fillers as you add memory and the correct configuration will always remain.

Table 7-1   DIMM Filler Requirements for 16 DIMM Extender Board

16 DIMM Extender Board	
DIMMs Loaded	**Fillers Required[a]**
4 DIMMs in quad 0	6 fillers total: 2 fillers in quads 1, 2, and 3 (all quads filled)
8 DIMMs in quads 0 and 1	4 fillers total: 2 fillers in quads 2 and 3 (all quads filled)
12 DIMMs in quads 0, 1, and 2	2 fillers total: 2 fillers in quads 3 (all quads filled)
16 DIMMs in quads 0, 1, 2, and 3	No fillers required

a. One DIMM filler board covers two adjacent DIMM slots.

Table 7-2   **DIMM Filler Requirements for 32 DIMM Extender Board**

32 DIMM Extender Board	
DIMMs Loaded	**Fillers required[a]**
4 DIMMs in quad 0	12 fillers total: 2 fillers in quads 1, 3, 4, 5, 6, and 7 (quad 2 remains unfilled)
8 DIMMs in quads 0 and 1	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (quads 2 and 3 remain unfilled)
12 DIMMs in quads 0, 1, and 2	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (quad 3 remains unfilled)
16 DIMMs in quads 0, 1, 2, and 3	8 fillers total: 2 fillers in quads 4, 5, 6, and 7 (all quads filled)
20 DIMMs in quads 0, 1, 2, 3, and 4	4 fillers total: 2 fillers in quads 5, 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

a. One DIMM filler board covers two DIMM adjacent slots.

Figure 7-9   16 DIMM Extender Board Slot IDs
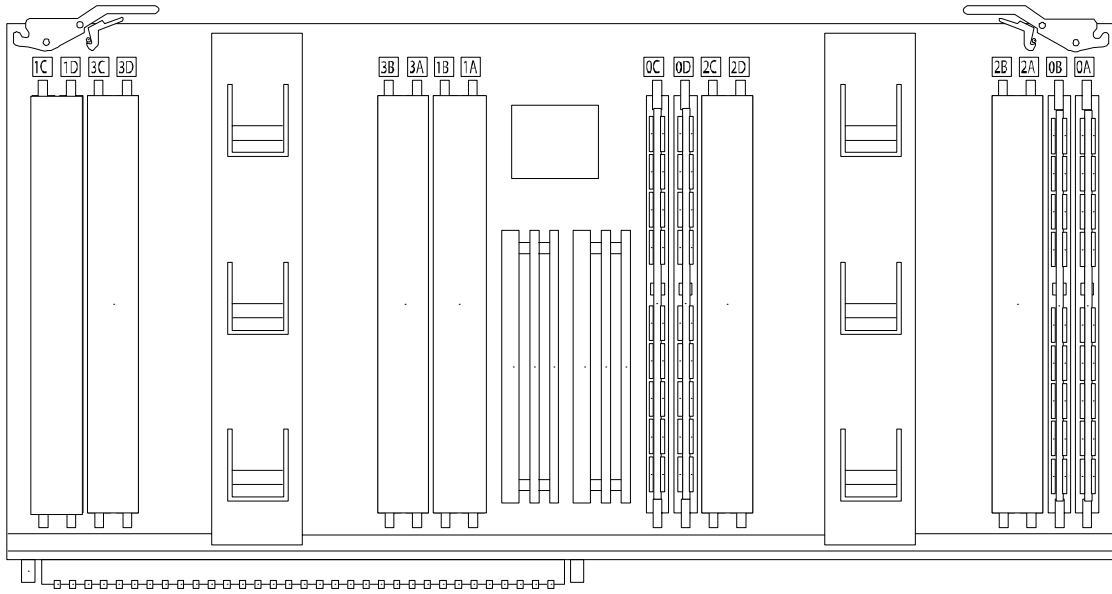
Figure 7-10   32 DIMM Extender Board Slot IDs
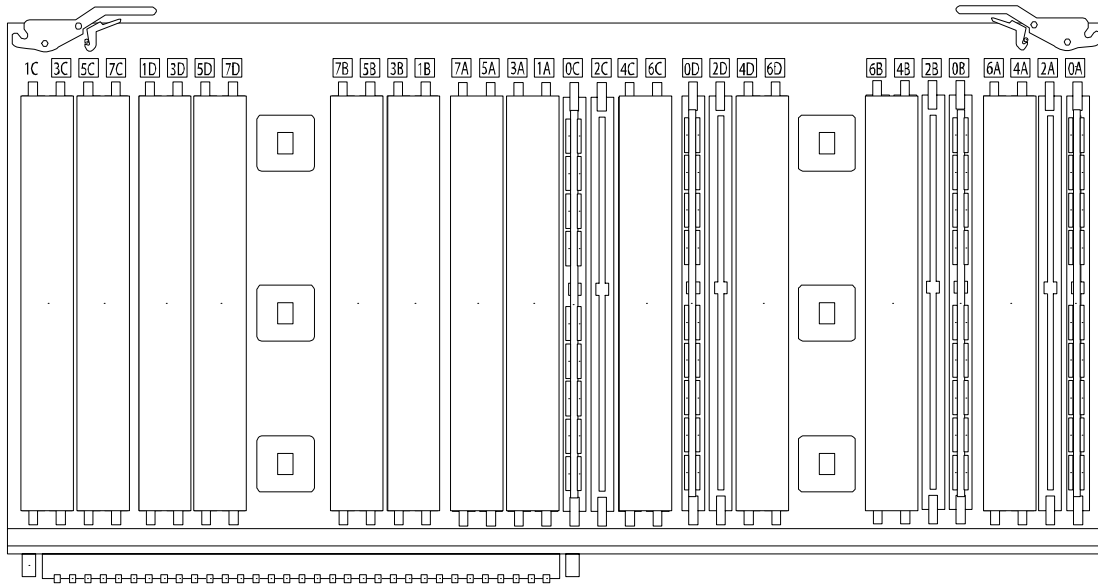
Installing DIMMs

To install DIMMs, perform the following steps:

Step 1. Align the DIMM with the socket located on the memory extender board. (Align key in slot with the notch in the DIMM.)

Step 2. Gently and evenly push on each side of the DIMM until it seats in the socket. Ensure that the extraction levers are in the closed position.

Step 3. Replace the memory extender board.

Step 4. Replace the top cover.

Step 5. Replace the front bezel.

Step 6. If rack mounted, slide the HP Server into the rack until it stops.

Figure 7-11   Inserting DIMM into Extender Board Slot
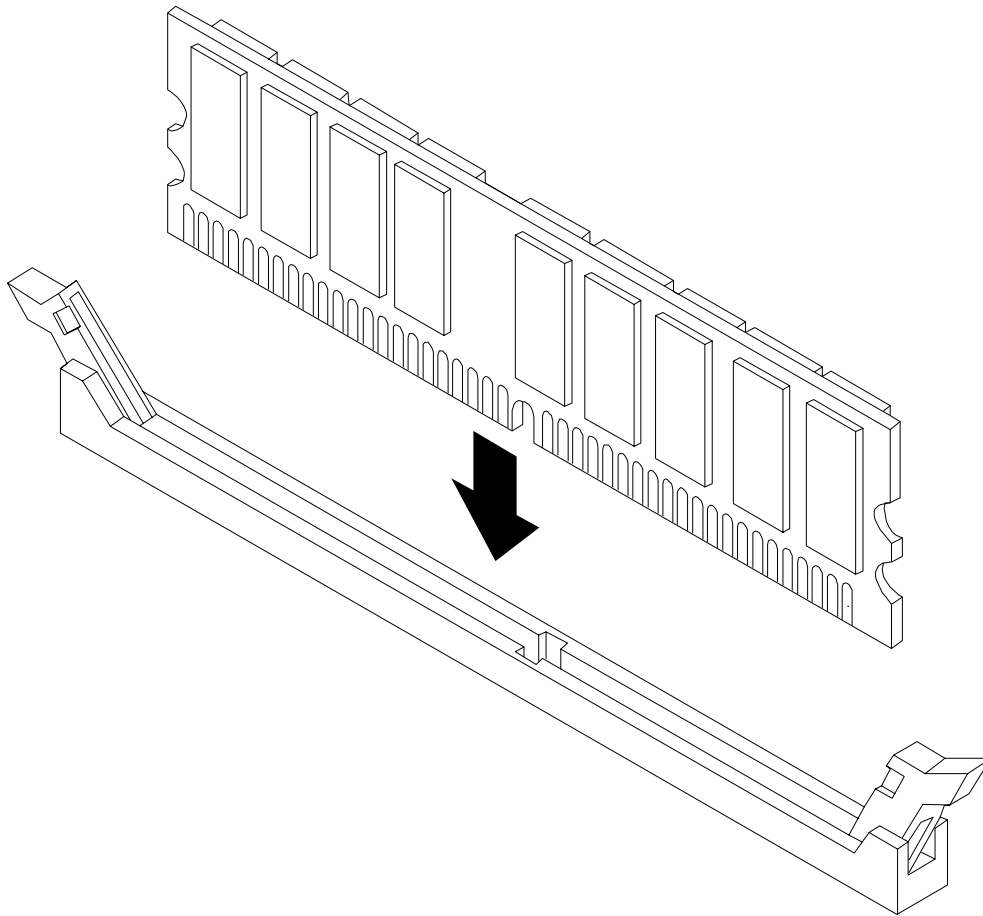
Processor Extender Board

The processor extender board is located directly under the memory extender board. The processor extender board can hold between one and four processors.

WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Removing the Processor Extender Board

To remove the processor extender board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

NOTE	If desired, the processor extender board may be removed without removing the HP Server from the rack.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Press the latch on the extraction levers located on each side of the processor extender board.

Step 5. Pull out on the extraction levers to unplug the processor extender board from the socket located on the midplane riser board.

Figure 7-12   Processor Extender Board
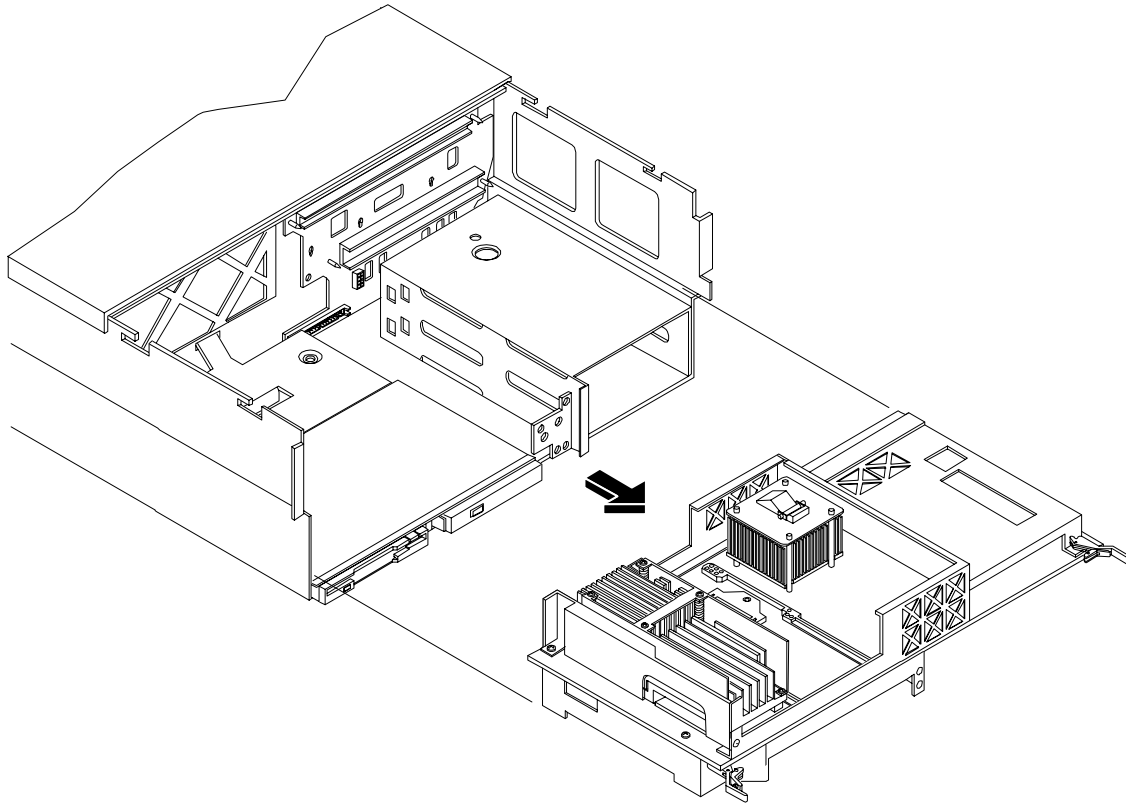
Figure 7-13   Settings for PA RISC/IPF Dipswitch

Replacing the Processor Extender Board

To replace the processor extender board, perform the following steps:

CAUTION   Your processor extender board may be used in either Itanium (IPF) or PA RISC processor based systems. Ensure that the PA RISC/IPF dipswitch is set to PA RISC for proper functioning of your system. See Figure 7-13 on page 142 for the correct dipswitch settings.

Step 1. Ensure the extraction levers are positioned in the outward, unlocked position.

Step 2. Align the processor extender board with the front and rear card guides.

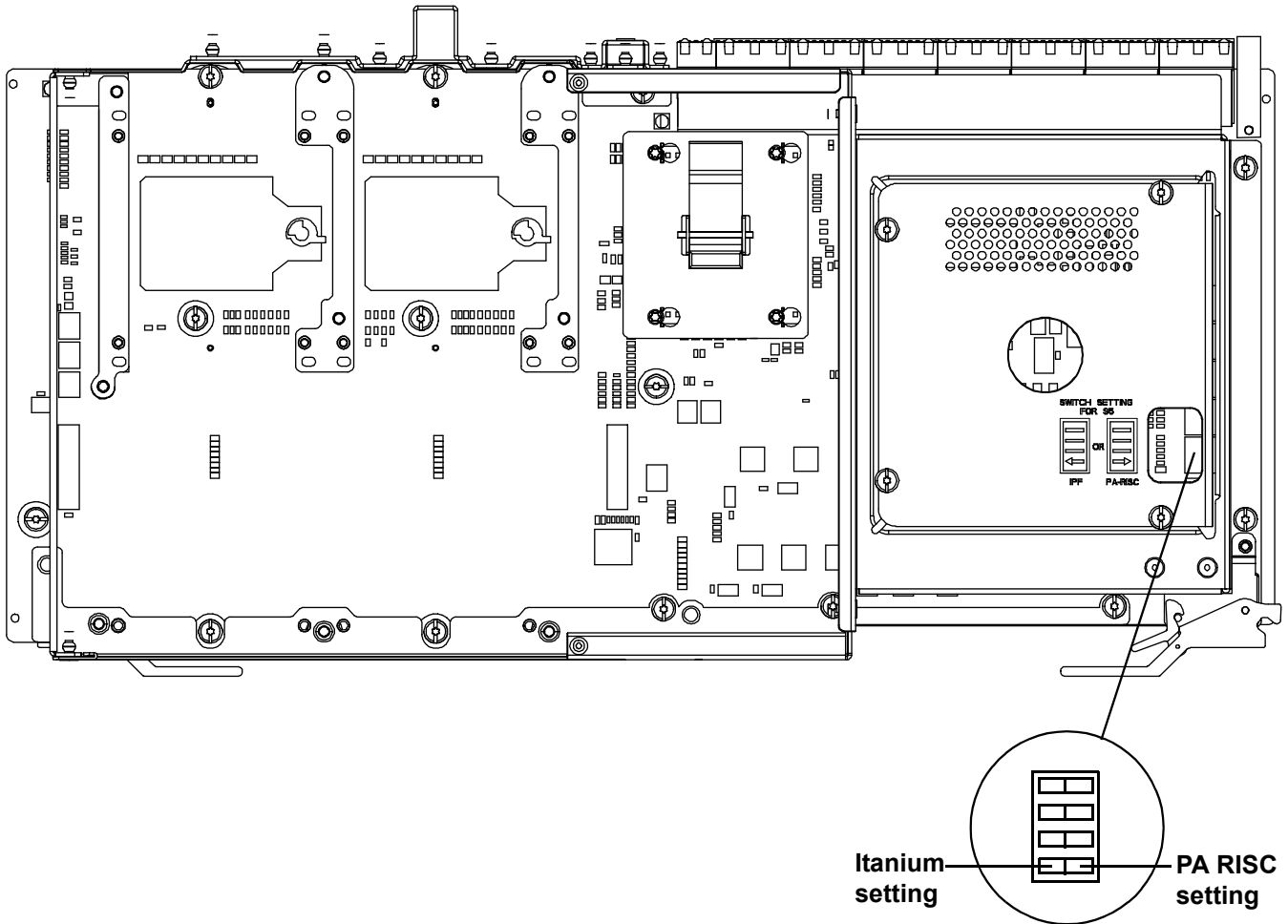**Step 3.** Slide the processor extender board down until it begins to seat in the socket located on the midplane riser board.

Step 4. Push the extraction levers inward to the locked position in order to fully seat the processor extender board into the socket on the midplane riser board.

Step 5. Replace the front cover.

Step 6. Replace the front bezel.

Step 7. If rack mounted, slide the HP Server into the rack until it stops.

Processors

Processors are located on the top and bottom surfaces of the processor extender board.

WARNING	Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

Installing Processors

CAUTION	Ensure that the cache size is identical for all processors. Failure to observe this caution will result in system failure.
	Ensure that all processors are rated for use at the same speed. Failure to observe this caution will result in performance degradation.

Processor Load Order

Processors are housed on the processor extender board located under the top cover in the top service bay. The processor extender board can hold between one and four processors. CPU 0 and CPU 1 are located on the top of the processor extender board and CPU 2 and CPU 3 are located on the bottom. Processors must be installed in a specific order.

Table 7-3   Processor Load Order

Processor	Socket
1	CPU 0
2	CPU 1
3	CPU 2
4	CPU 3

CAUTION	Do not modify the settings of the DIP switches located on the processor extender board. These switches are for factory use. Failure to observe this caution will result in system failure.

Tools Required

To install processors in your HP Server, you must use the IPF CPU Install Kit, 5069-4551.

This toolkit consists of:

- 1ea, A3024-80004, Disposable ESD Kit
- 1ea, A7231-04046, Label-less CPU Install tool

CAUTION Do not modify the settings of the DIP switches located on the processor extender board. These switches are for factory use. Failure to observe this caution will result in system failure.

Figure 7-14   Removing the Processor Extender Board
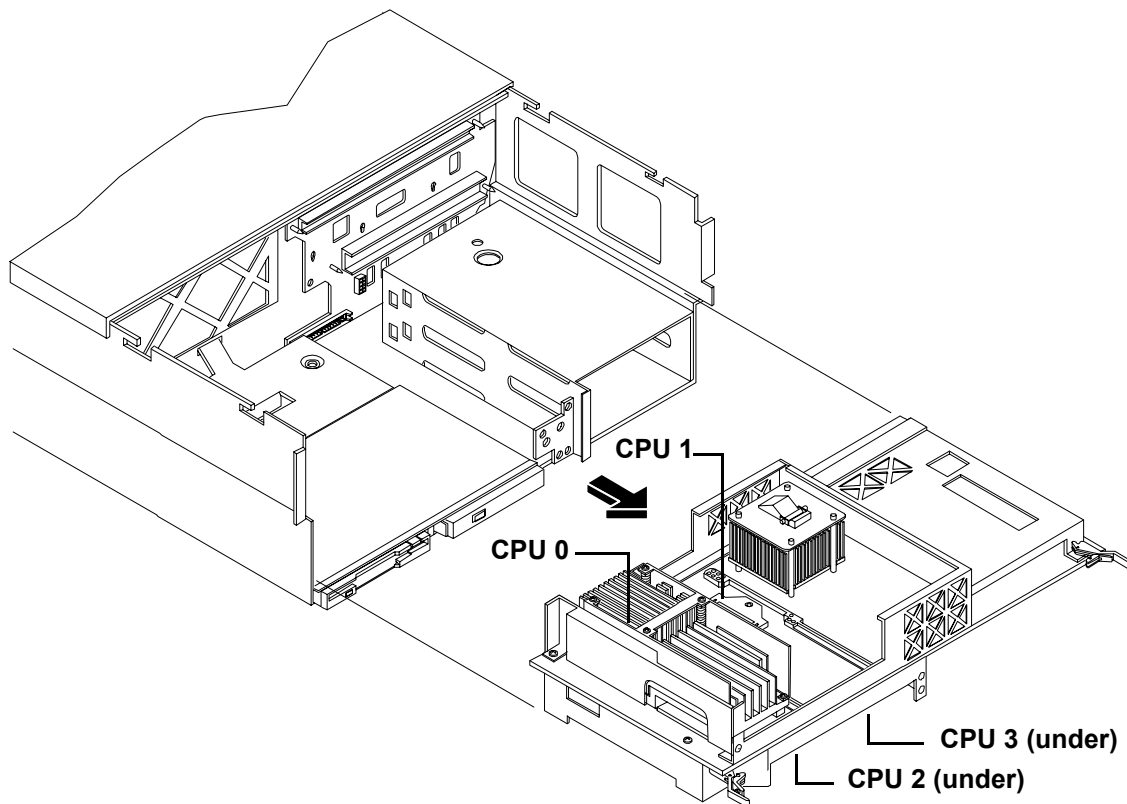
Removing a Processor

To remove a processor on the processor extender board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Remove the processor extender board. See "Processor Extender Board" on page 140.

Step 5. Unplug the processor cable from its socket on the extender board.

Step 6. Using a Torx T15 driver, loosen the 4, T15 shoulder screws and the 2 knurled thumbscrews that attach the sequencer frame on the heatsink, until the sequencer frame is free.

Step 7. Remove the sequencer frame from the heatsink.

Step 8. Unlock the assembly to the socket by rotating the cam on the socket 180 degrees clockwise, using a 2.5 MM driver (Allen wrench).

Step 9. Ensure the cam on the processor socket lock is in the unlocked, counterclockwise position.

Step 10. Carefully remove the processor, from the processor socket.

Replacing a Processor

To install a processor on the extender board, perform the following steps:

Prior to installing a processor into your system, read the following instructions carefully and refer to Figure 7-17, "Installing Processor on Extender Board," for a complete understanding of this process.

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Remove the processor extender board and place on anti-static mat. See "Processor Extender Board" on page 140.

Step 5. Ensure the cam on the processor socket lock is in the unlocked, counterclockwise position.

Step 6. Carefully lower the processor, without the sequencer clamp, 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	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 sideplay. However, because the assembly is not yet tightened, it may tilt slightly towards the center of the extender board—this is acceptable.

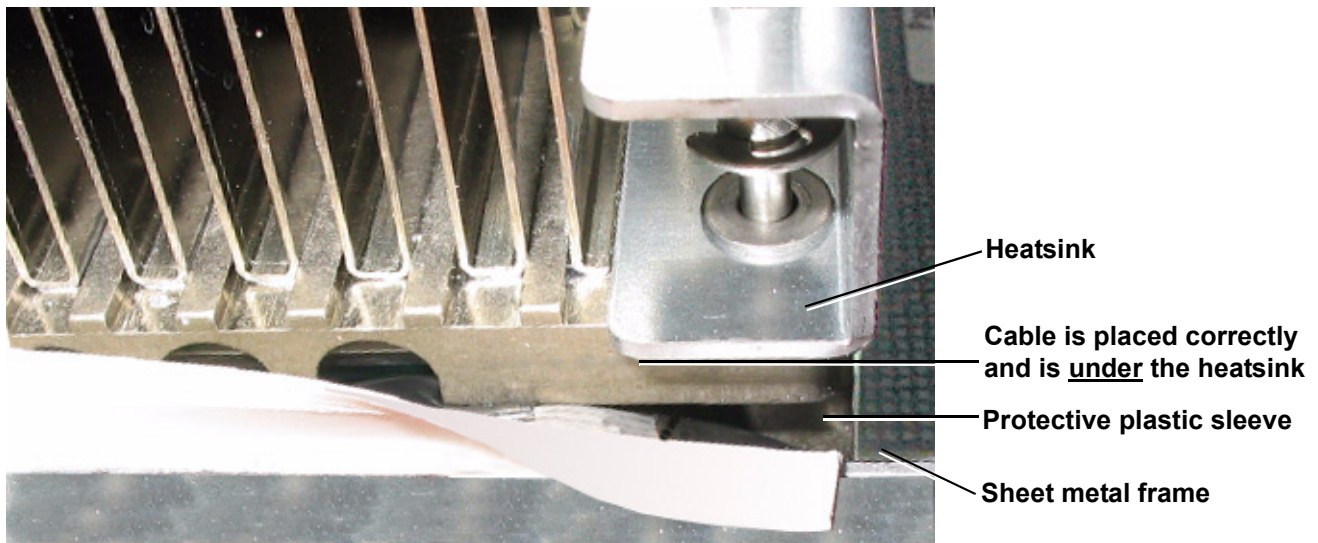| **CAUTION**	Before locking the processor assembly into its socket, ensure that the power cable is not pinched between the heatsink and sheet metal frame of the extender board. Also, ensure that the two power cable ends attached to the CPU assembly do not come unplugged from their sockets when you move the cable into place under the heatsink. See Figure 7-15 on page 147and Figure 7-16 on page 147.

Figure 7-15 Processor Cable Placed Correctly

Heatsink

Cable is placed correctly and is <u>under</u> the heatsink

Protective plastic sleeve

Sheet metal frame

Figure 7-16 Processor Cable Placed Incorrectly

Heatsink

Cable is placed incorrectly and is pinched between the heatsink and the extender board frame

Protective plastic sleeve

Sheet metal frame
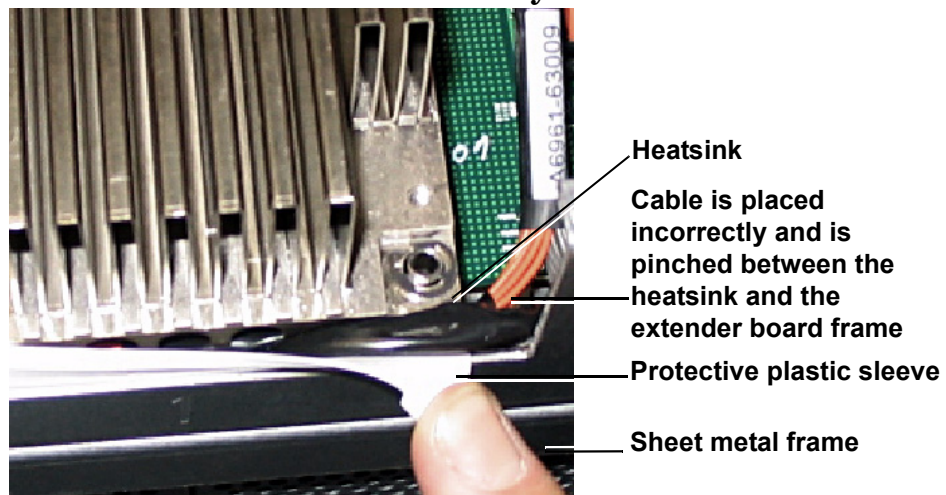
Step 7. Lock the assembly to the socket by rotating the cam on the socket 180 degrees clockwise, using a 2.5 mm driver (Allen wrench).

CAUTION	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.

Step 8. Plug in the processor cable to its socket on the extender board.

Step 9. Place the sequencer frame over the processor.

Step 10. Using your fingers, hand-tighten the 2 knurled thumbscrews on the sequencer frame just until the screw stops turning.

CAUTION	**Do not** tighten the other 4 shoulder screws until you have first hand-tightened the 2 knurled thumbscrews.

Step 11. Using the supplied Torx T15 driver, tighten the 4 remaining T15 shoulder screws until they just bottom out. Follow the tightening sequence shown in Figure 7-17, "Installing Processor on Extender Board."

CAUTION	Do not overtighten the 4 shoulder screws—they may shear off if overtightened. Stop tightening the shoulder screws when you feel them just bottom out.

Step 12. Using the supplied Torx T15 driver, finish tightening the 2 thumbscrews.

CAUTION	Do not overtighten the 2 thumbscrews—they may shear off if overtightened. Tightening the thumbscrews 1/4 turn will tighten them sufficiently.

Figure 7-17   Installing Processor on 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 supplied wrench (A7231-04046) for tightening shoulder screws and thumbscrews

2.5MM Allen

Power cable protected by plastic sleeve

Align pins on heatsink with slots in frame

slots*

slots*

*slots shown are at CPU socket #1 for clarity.

Processor shown is being mounted on socket #0 per CPU load order.
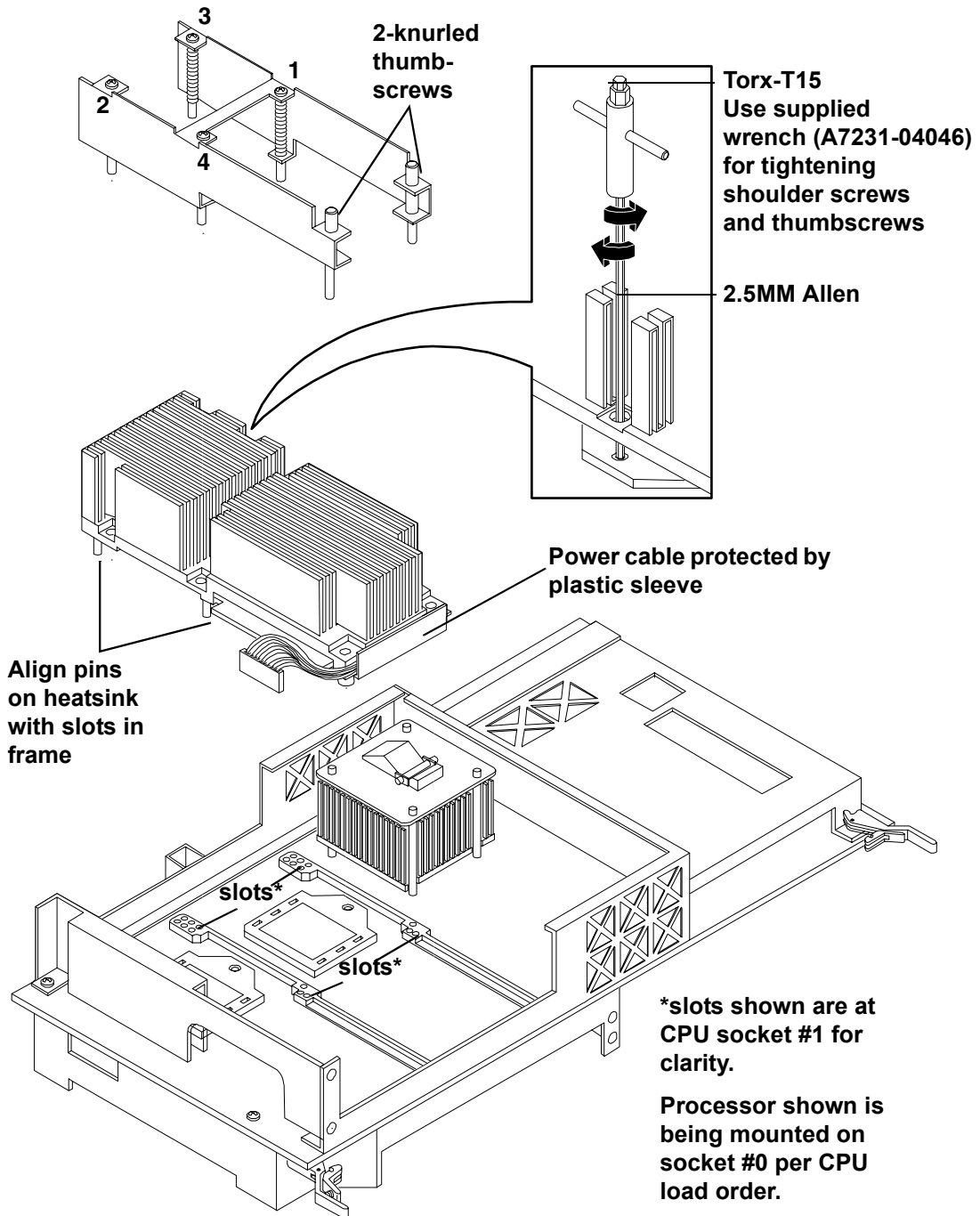
Hot-Swap Chassis Fan Unit

There are three hot-swap chassis fan units in the HP 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).

CAUTION   Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.
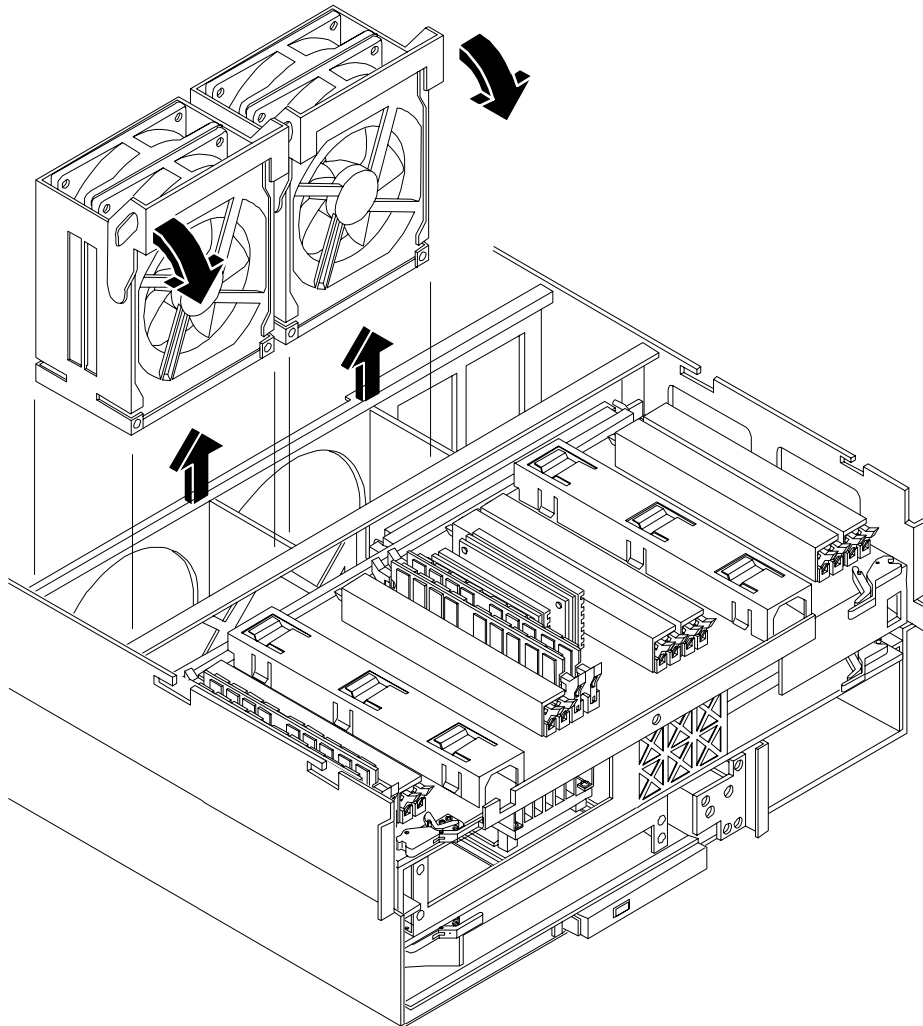
NOTE   A hot-swap device does not require interaction with the operating system before the device is removed from or installed into the server.

The AC power to the server does not have to be off to remove or replace a hot-swap chassis fan unit.

Removing a Hot-Swap Chassis Fan Unit

Figure 7-18   Hot-Swap I/O Chassis Fans Removal and Replacement

To remove a hot-swap chassis fan unit, perform the following steps:

Step   1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step   2. Remove the front bezel. See "Front Bezel" on page 124.

Step   3. Remove the top cover. See "Front and Top Covers" on page 126.

Step   4. Grasp the fan unit locking handle, tilt it up, and pull out the fan from the chassis.

NOTE   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" will occur.

Figure 7-19   **Hot-Swap Power Supply Chassis Fan Removal and Replacement**
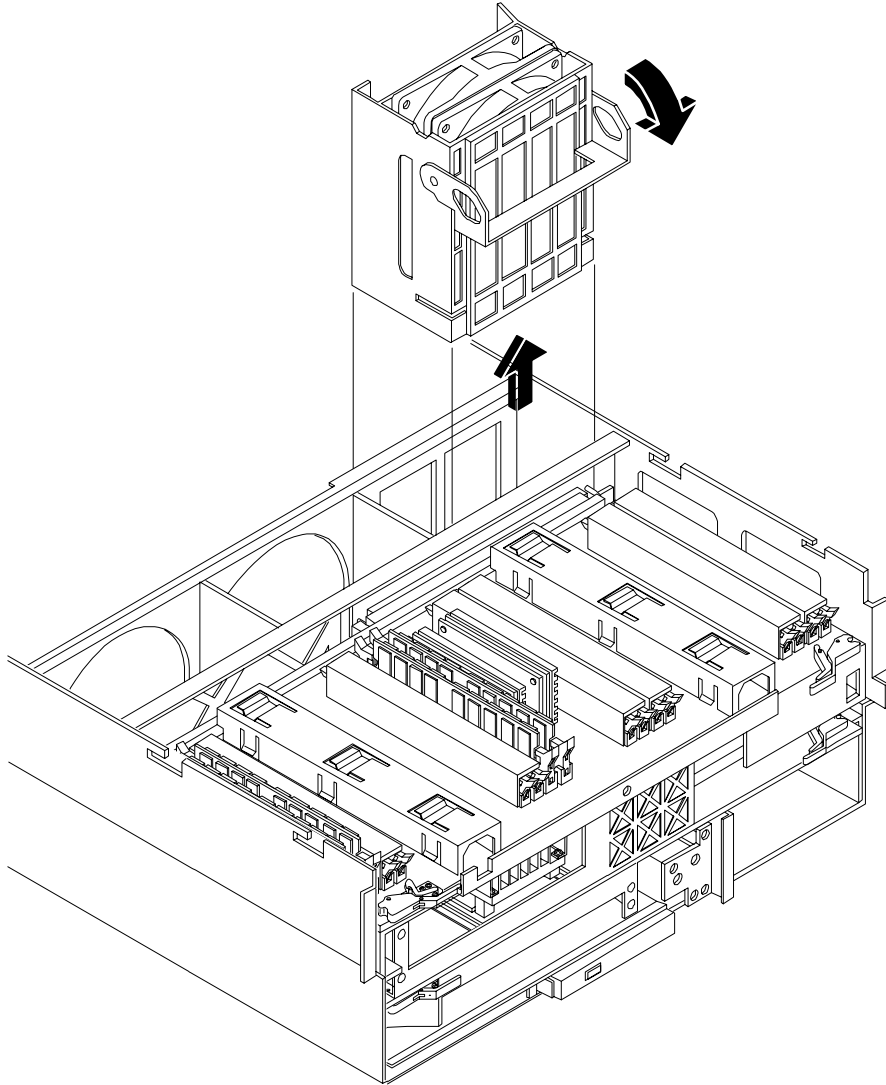
Replacing a Hot-Swap Chassis Fan Unit

To replace a hot-swap chassis fan unit, perform the following steps:

Step 1. Orient the fan units by aligning the appropriate icon on the fan unit handle to the identical icon on the chassis wall. Fan units 0 and 1 have "triangle" icons and fan unit 2 has a "square" icon.

Step 2. Push the fan unit firmly into the housing and close the handle until flush to the top of the chassis—the fan unit will plug 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.

Step 3. Check the QuickFind diagnostic board LED indicating the replaced fan unit.

- When the fan is functioning normally, the LED is off.

- When the fan fails, the LED is lit.

Step 4. Replace the top cover.

Step 5. Replace the front bezel.

Step 6. If rack mounted, slide the HP Server into the rack until it stops.

I/O Baseboard Assembly

The I/O baseboard assembly is located in the rear service bay.

WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Removing the I/O Baseboard Assembly

To remove the I/O baseboard assembly, perform the following steps:

CAUTION	Before removing your I/O baseboard assembly, save all boot configuration settings. These values will need to be reset after replacing your I/O baseboard assembly.

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover. See "Front and Top Covers" on page 126.

Step 3. Remove the three chassis fan units. See "Hot-Swap Chassis Fan Unit" on page 150.

Step 4. Unplug all external cabling attached to ports at the rear of the I/O baseboard.

Step 5. 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 re-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.

Step 6. Lift up on the locking lever attached to the side of the Power Supply cage to unplug the I/O baseboard from the socket on the midplane riser board. See Figure 7-20, "I/O Board Locking Lever."

Step 7. Slide the I/O baseboard assembly all the way to the rear until removed from chassis.

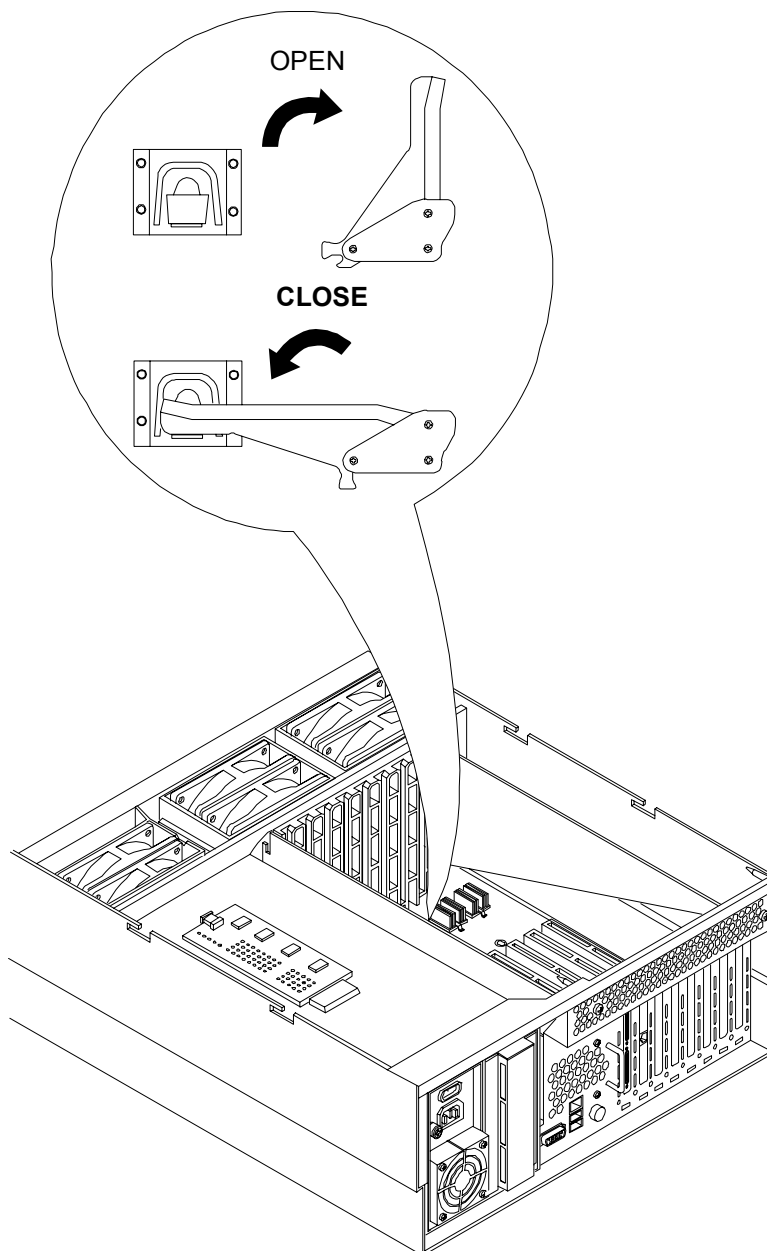| NOTE	The I/O baseboard assembly is large, so be careful when lifting it out of the server chassis.

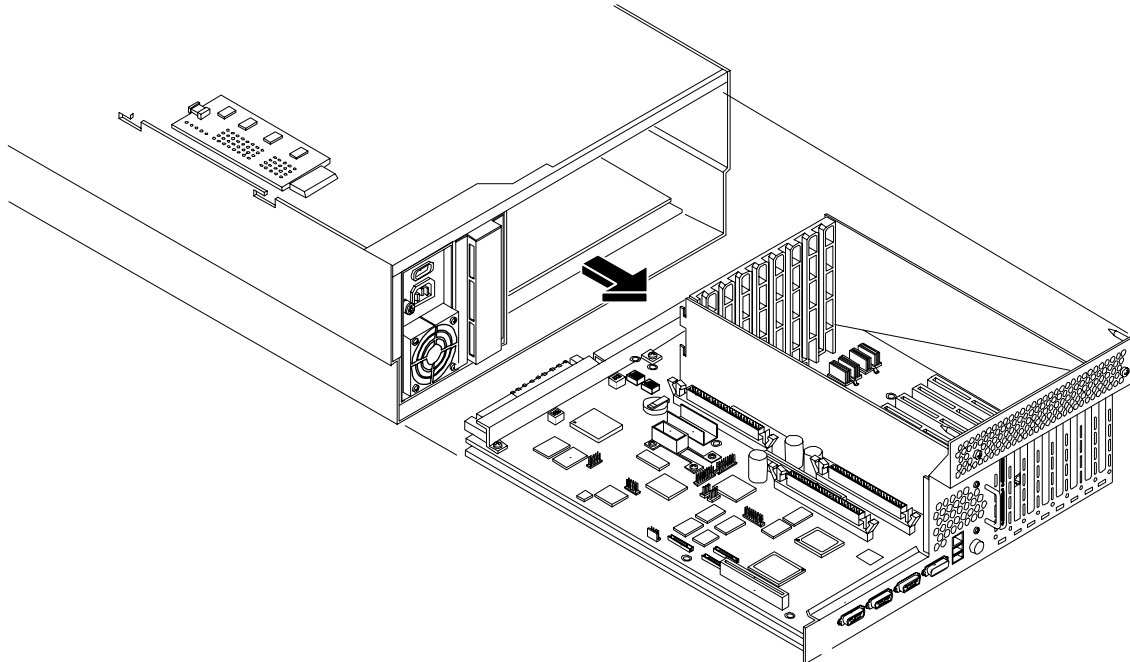| NOTE	If you are going to replace the I/O board with a new board, remove the cover from the VGA port at the rear of the I/O board and save it to put on VGA port of the new board. This VGA graphics port is not supported on your hp 9000 rp4440 Server.

Figure 7-20   I/O Board Locking Lever

Figure 7-21   **I/O Baseboard**

Replacing the I/O baseboard Assembly

NOTE	The I/O baseboard is large, so use care when sliding it into the server chassis.

To replace the I/O baseboard assembly, perform the following steps:

Step 1. 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 board locking lever is in the "up" position or the I/O board will hang up before engaging the midplane riser board socket.
	Also, ensure that all fan modules are removed from the chassis prior to sliding in the I/O baseboard or both the fans and the I/O baseboard may be damaged.

CAUTION	Before installing your replacement I/O board, check dipswitch S5102 on located on top of the I/O board. Dipswitch position bit 1 must be in the OFF position to disable the on-board Radeon graphics chip. If you do not disable the Radeon graphics chip it will appear as "unknown-unclaimed" when performing the ioscan command. See Figure 7-22 on page 159.
	Remember to replace the VGA port cover on the new board that you saved when removing the old I/O board. This VGA graphics port is not supported on your hp 9000 rp4440 Server.

Step 2. 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. See Figure 7-20 on page 156.

Step 3. Replace the three chassis fan units.

Step 4. Plug in all external cabling the rear ports of the I/O baseboard.

CAUTION	When re-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.

Step 5. Plug in the internal SCSI cable(s) to the HBA board in PCI slot 1.

Step 6. Replace the top cover.

Step 7. Replace the front bezel.

Step 8. If rack mounted, slide the HP Server into the rack until it stops.

Figure 7-22 **S5102 Dipswitch**
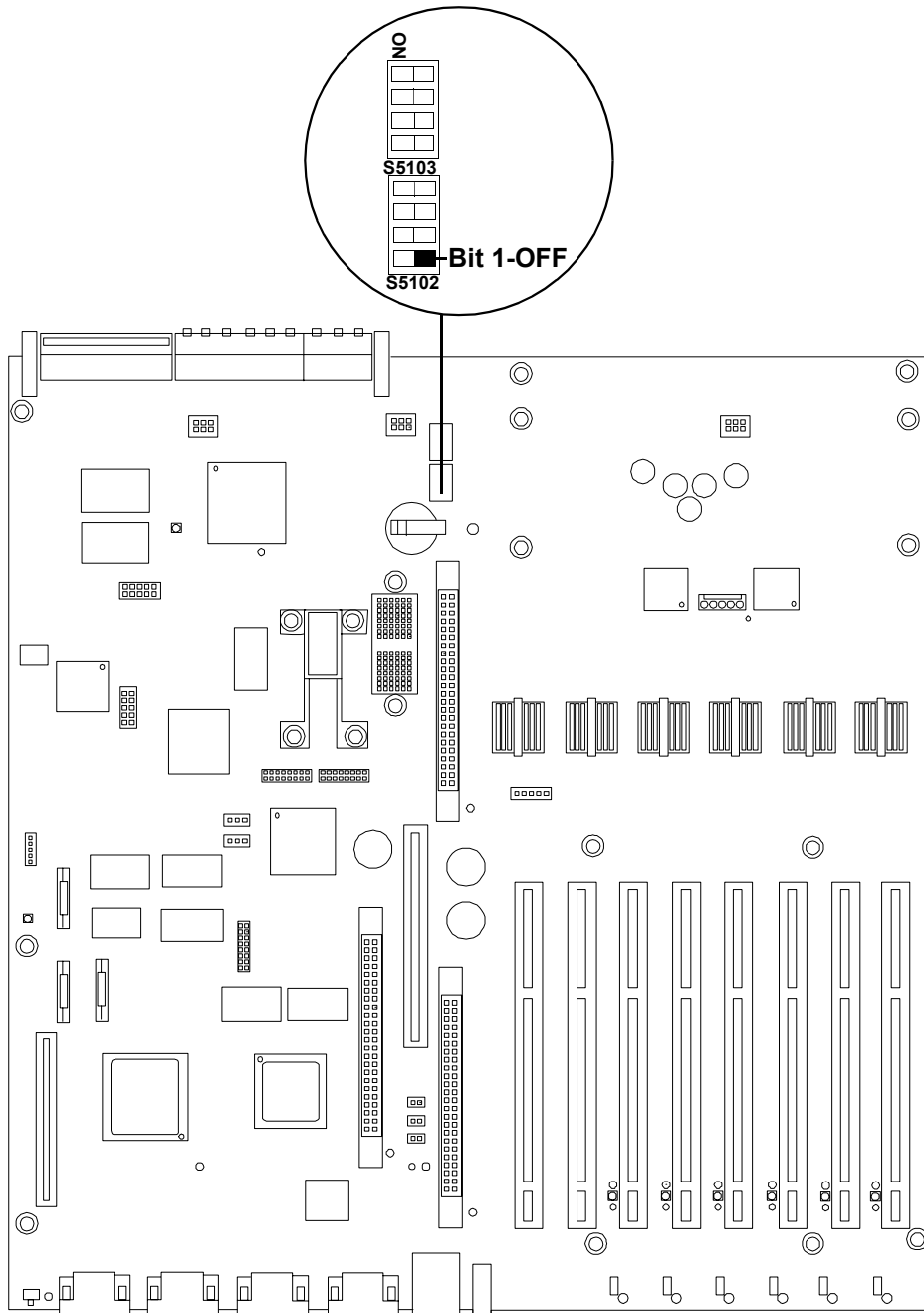
Removing and Replacing PCI/PCI-X Cards

The server may contain up to 8 PCI/PCI-X cards. PCI/PCI-X cards are located on the I/O baseboard, under the top cover. If you are not using the hot-plug procedure described in the Installing and Configuring chapter to remove or replace PCI/PCI-X cards, follow the steps in this procedure to change PCI-PCI-X cards.

WARNING	**Ensure that the system is powered-down and all power sources have been disconnected from the server prior to removing or replacing a PCI/PCI-X card.**
	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 could result in personal injury or damage to equipment.
	This is not a hot-plug operation. Power must be turned off to the entire system prior to removing and replacing PCI/PCI-X cards in your HP Server.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

|	
NOTE	PCI/PCI-X slots are numbered from 1 through 8, reading left-to-right when looking at the rear of your HP Server. PCI slots 1 and 2 are dedicated for use by the core I/O cards. The core I/O functions are shared between two cards; an SCSI HBA card which must be located in slot 1, and a Gigabit Ethernet LAN which must be located in slot 2. (See Figure 7-23.)

NOTE	If you are installing the Graphics Kit A6150B, use slots 3-8. However, DO NOT install the included USB card. Your HP Server currently supports USB and the ports are already located on the rear of your HP 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 will interfere with the manual retention latch (MRL) on the OLX divider in the next higher slot. Because of this interference you are restricted to only two RAID cards in your system-slot 1 and slot 8.

Figure 7-23   PCI Cards Locations
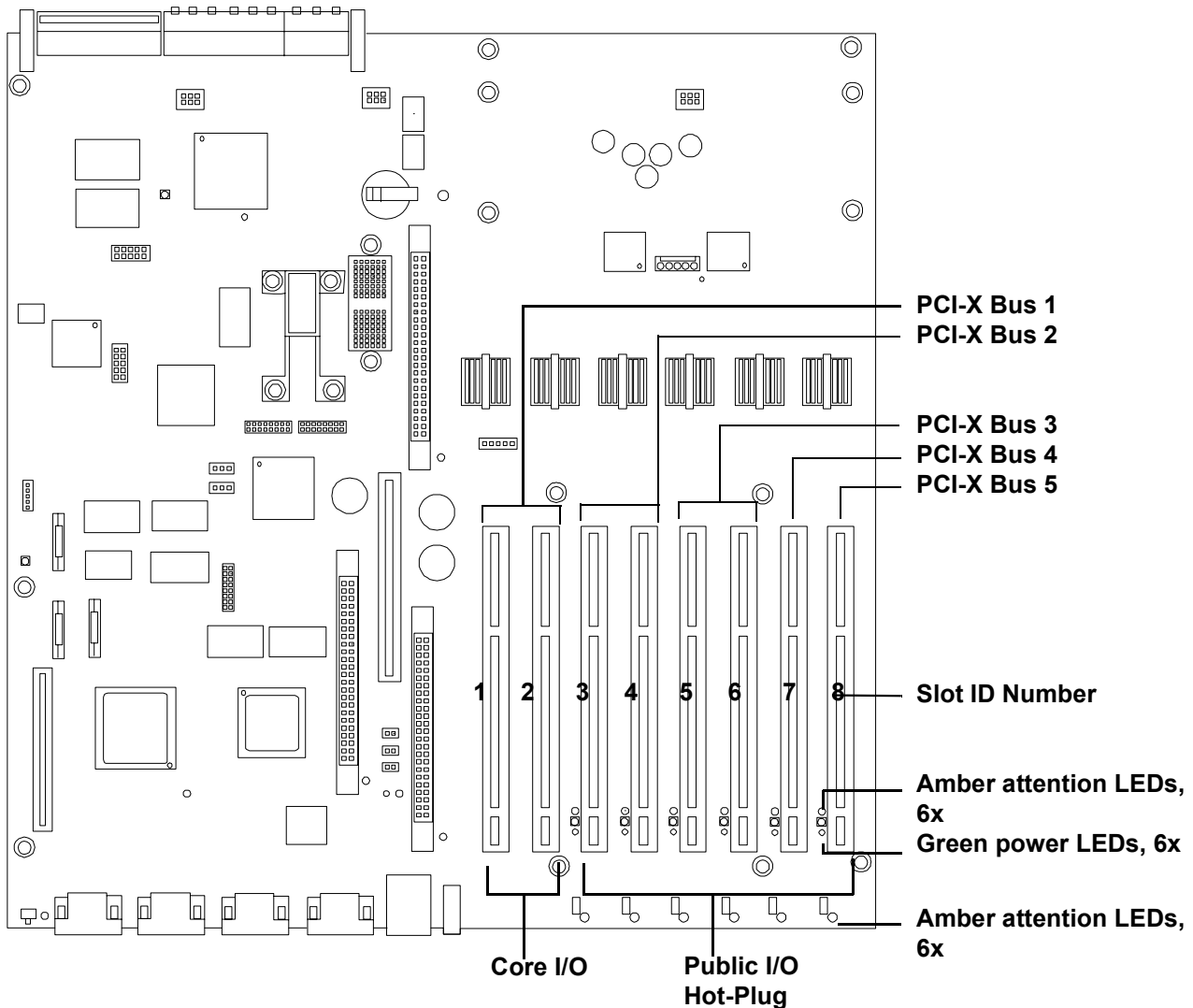
Removing a PCI/PCI-X Card

To remove a PCI card from the server, perform the following steps:

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 could cause boot failure.
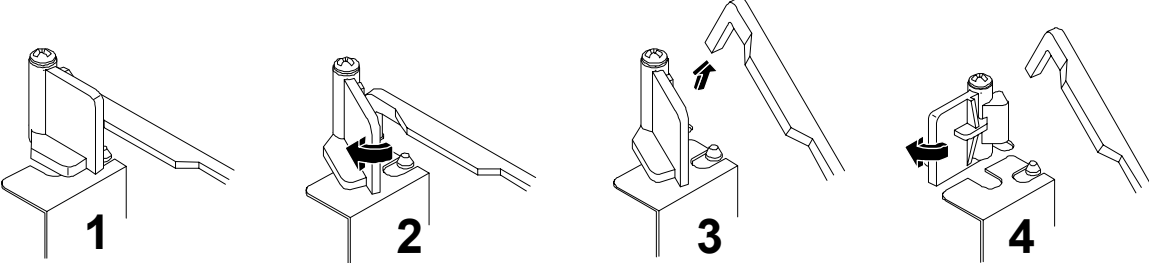

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.
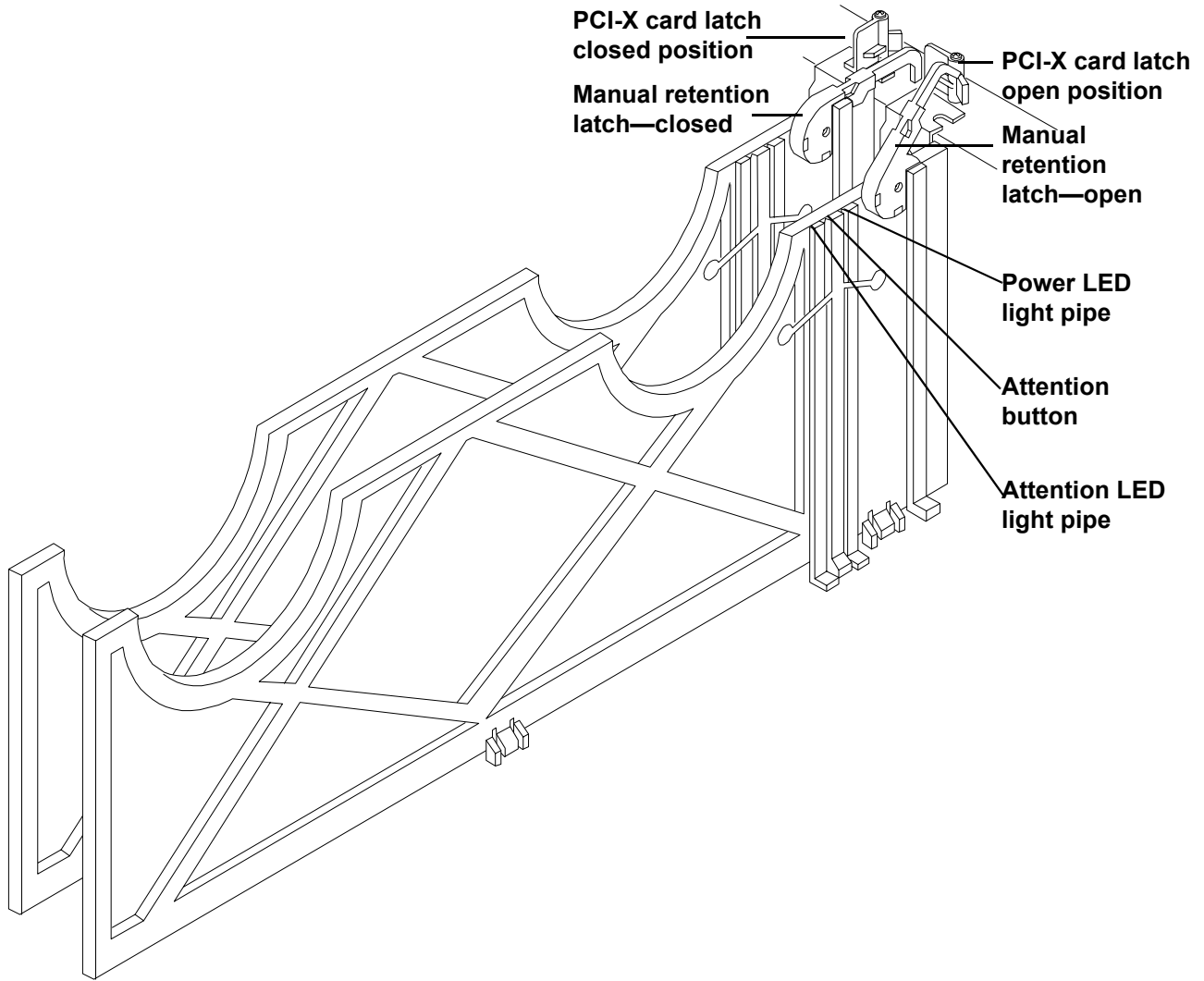
Step 2. Remove the top cover. See "Front and Top Covers" on page 126.

Step 3. Disconnect all external and internal cables attached to the PCI card in the side service bay.

Step 4. Turn the PCI/PCI-X card latch on the chassis to ~ 45 degrees CW to free up the manual retention latch (MRL).

Step 5. Pull up on the MRL until it stops.

Step 6. Turn the PCI/PCI-X card latch another 45 degrees CW to completely expose the PCI-PCI-X card bulkhead. See Figure 7-25 on page 164

Step 7. If the PCI/PCI-X card is full size, open the slider gate bracket to allow PCI/PCI-X card removal. See Figure 7-26 on page 166.

Step 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.

Figure 7-24   PCI-X Card Latch Opening Sequence

Figure 7-25   **OLX Divider**

PCI-X card latch
closed position

PCI-X card latch
open position

Manual retention
latch—closed

Manual
retention
latch—open

Power LED
light pipe

Attention
button

Attention LED
light pipe

Replacing a PCI Card

To replace a PCI card, perform the following steps:

Step 1. Insert the card into the appropriate slot. See Figure 7-26 on page 166

Step 2. Turn the PCI/PCI-X card latch on the chassis to ~ 45 degrees CCW to allow closing of the manual retention latch (MRL.

Step 3. Push down on the MRL until stops against the chassis wall.

Step 4. Turn the PCI/PCI-X card latch on the chassis another 45 degrees CCW to lock the PCI/PCI-X card into position.

Step 5. If the PCI/PCI-X card is full size, close the slider gate bracket to secure the card. See Figure 7-26 on page 166.

Step 6. Reconnect all internal and external cables to the PCI/PCI-X card.

Step 7. Replace the top cover.

Step 8. Slide the HP Server all the way back into the rack until it stops.

Step 9. Turn on power by plugging in AC power cords to power supply unit(s).
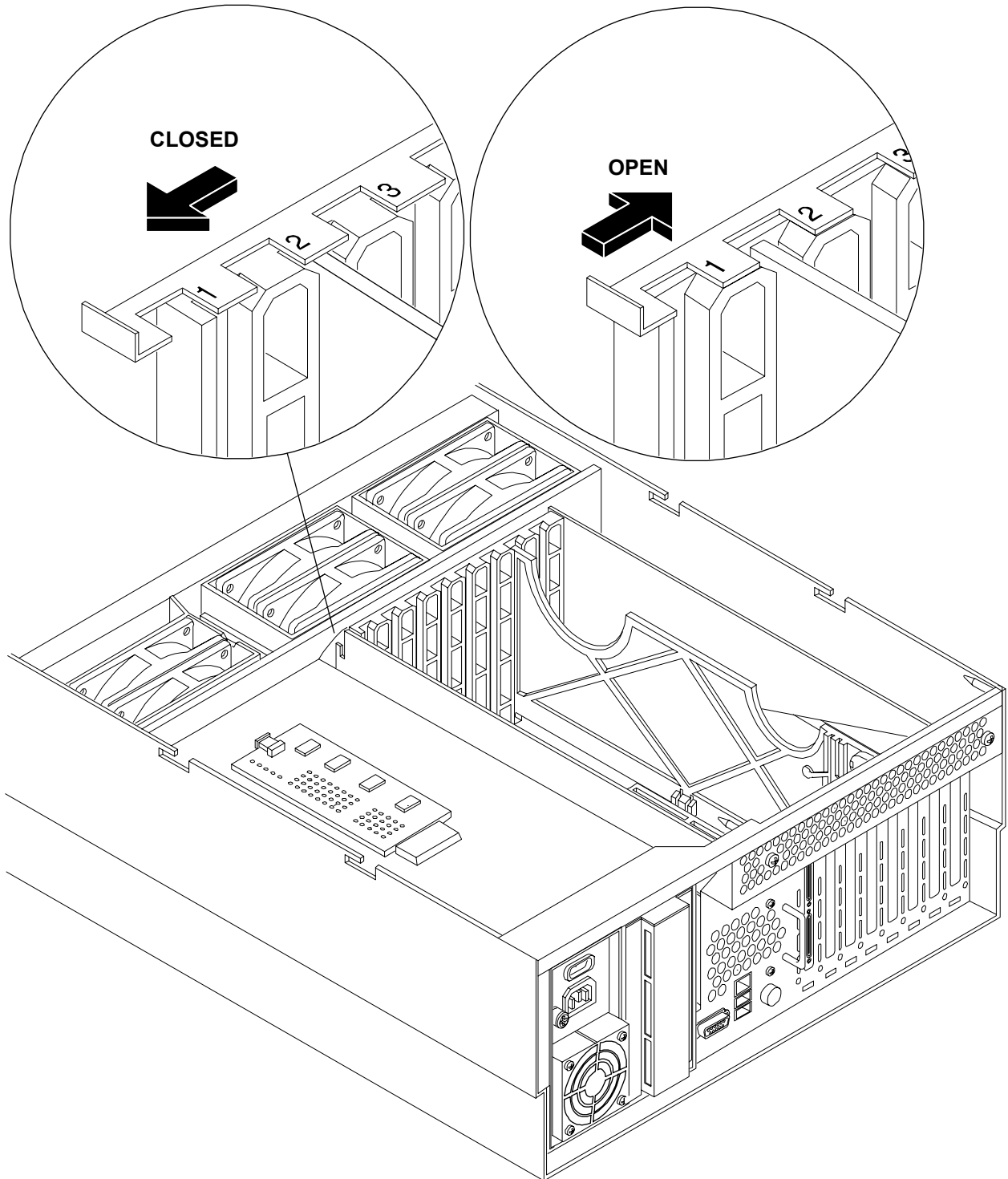
Figure 7-26   PCI/PCI-X Card Installation
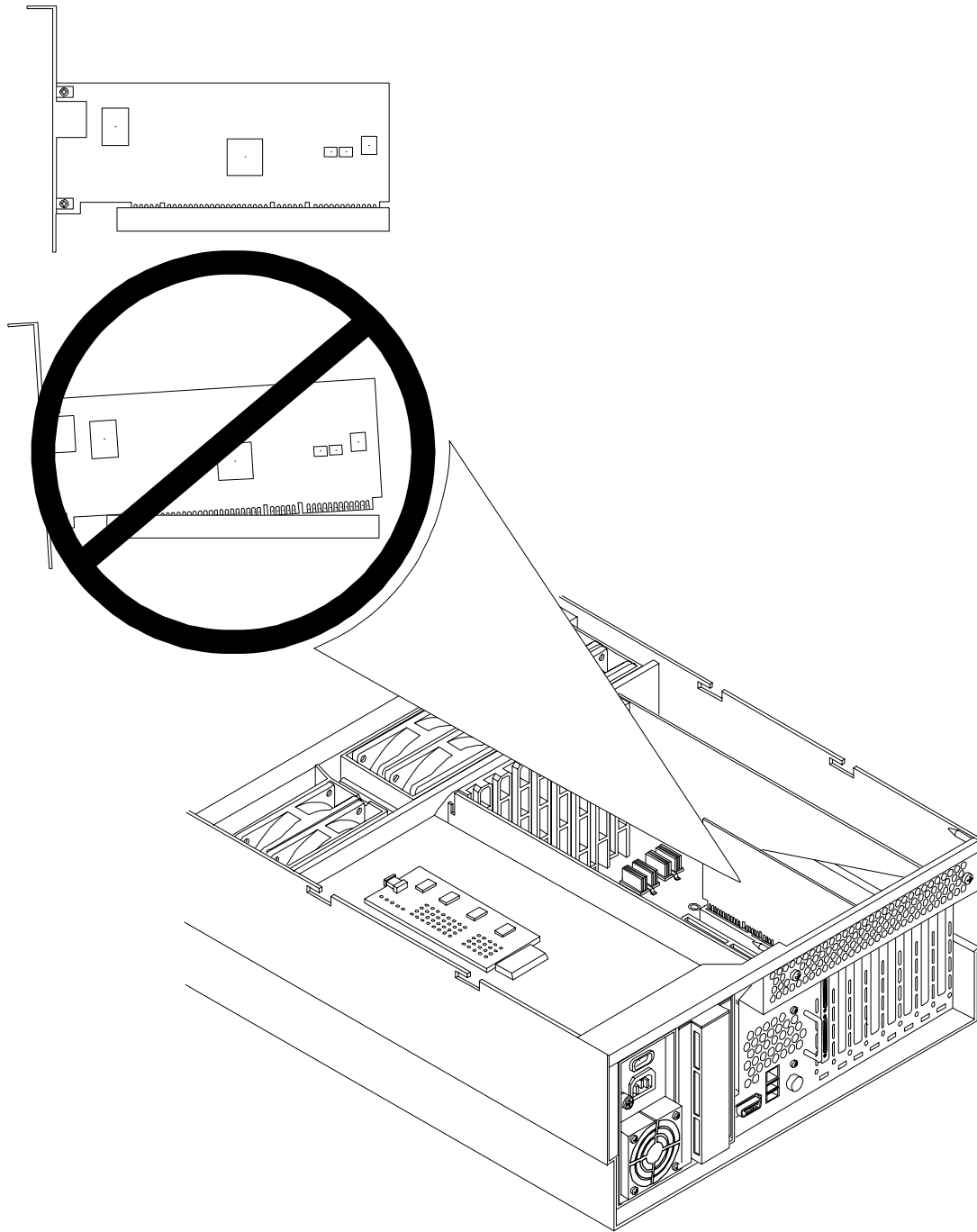
Figure 7-27   PCI-X Card Latch Closing Sequence
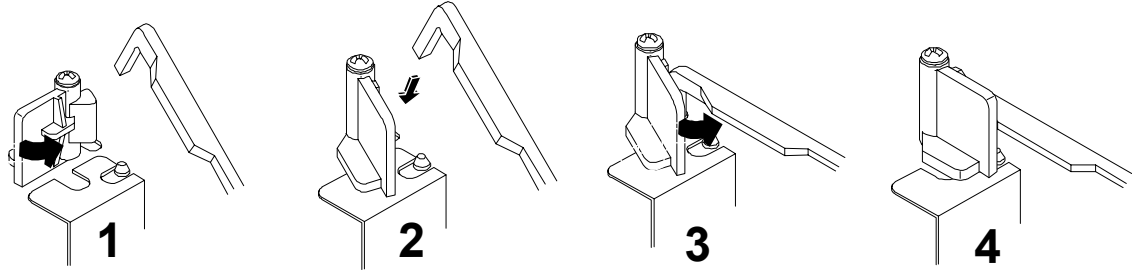
Figure 7-28   **Slider Gate Bracket**

OLX Dividers

OLX dividers are located on the I/O baseboard, between the PCI cards. Six OLX dividers provide short circuit protection to the hot-plug 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 board, to the top of the divider. The light pipes allow the LED status to be easily viewed when the top cover is removed.

WARNING   **Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Figure 7-29   **OLX Divider Removal and Replacement**
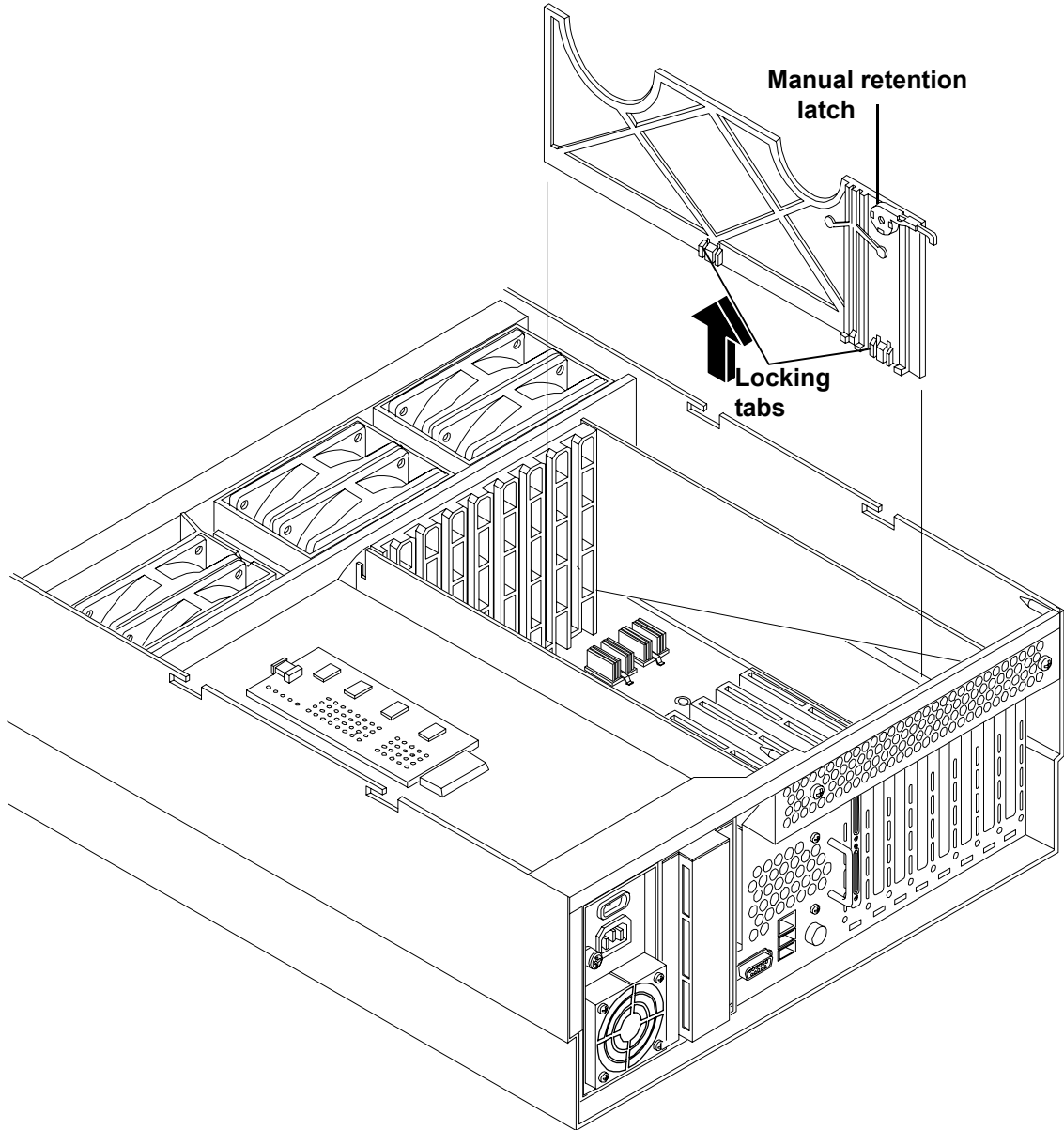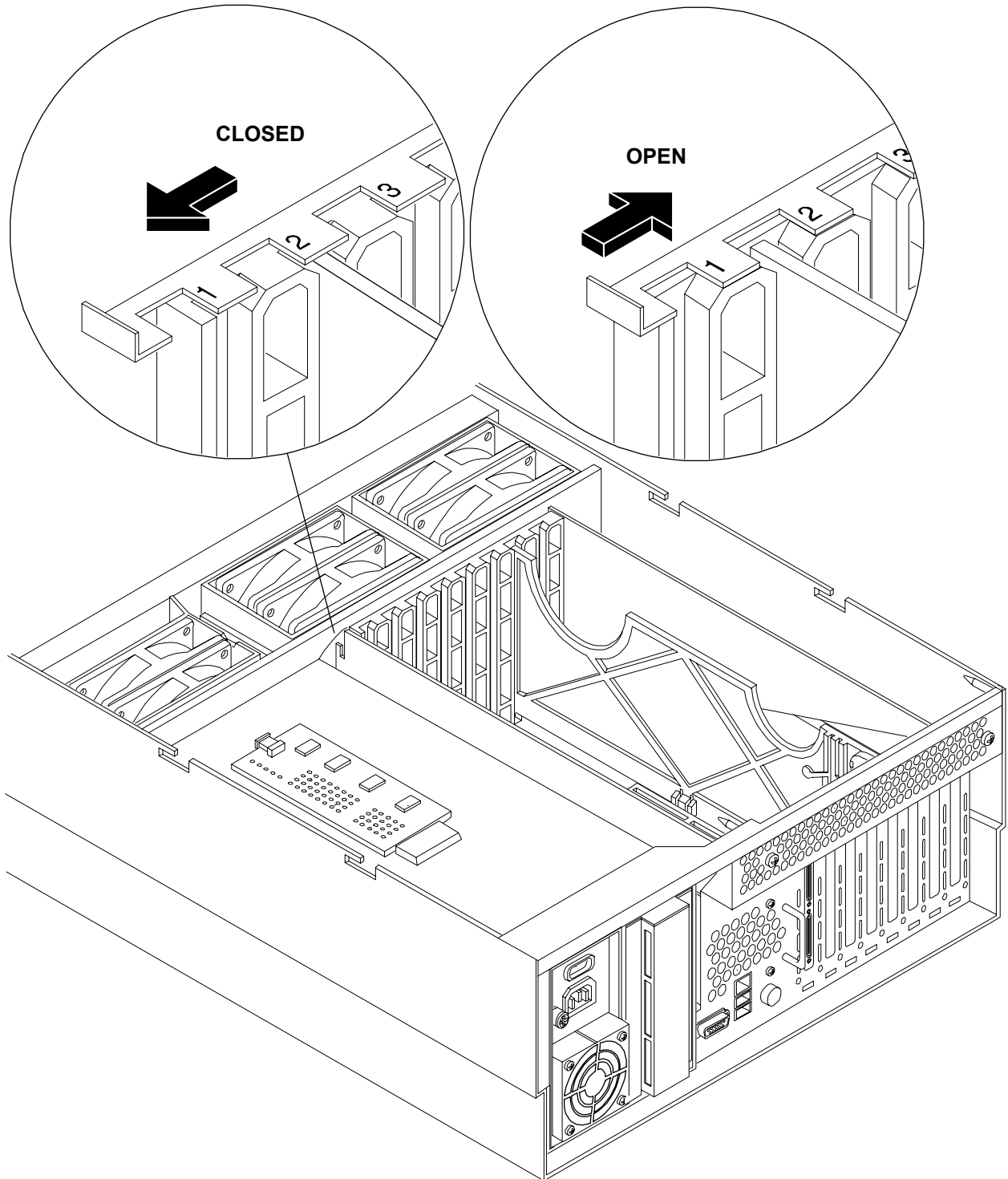
Figure 7-30   OLX Slider Gate Bracket

Removing an OLX Divider

To remove an OLX divider, perform the following steps:

NOTE An alternative method of removing OLX dividers individually is to remove all OLX dividers at once by removing the rack they are mounted in from the I/O baseboard, 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 4 Torx T15 fasteners.

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the top cover. See "Front and Top Covers" on page 126.

Step 4. Pull up on the manual retention latch to unlock it from the chassis wall. See Figure 7-29, "OLX Divider Removal and Replacement."

Step 5. Slide open the latch on the slider gate bracket to unlock the rear edge of the PCI divider. See Figure 7-30, "OLX Slider Gate Bracket."

Step 6. At this point, if you are removing the entire OLX divider rack, remove the 4 T15 fasteners attaching the rack to the I/O baseboard.

Step 7. 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 may damage them. If you damage the tabs, the OLX divider will not seat properly when you reinsert it,

---

Replacing an OLX Divider

To replace an OLX divider, perform the following steps:

Step 1. Insert the OLX divider into the available slots on the I/O baseboard and push down firmly to seat it into the slots.

Step 2. At this point, if you are replacing the entire OLX divider rack on to the I/O baseboard, replace the 4 Torx T15 fasteners.

Step 3. Slide the latch on the slider gate bracket closed, to lock the rear edge of the PCI divider.

Step 4. Push down on the manual retention latch until it locks into the chassis wall.

Step 5. Replace the top cover.

Step 6. Replace the front bezel.

Step 7. If rack mounted, slide the HP Server into the rack until it stops.

Voltage Regulator Modules (VRM)

The server contains 3 VRMs that are located on I/O baseboard. Each is labeled with one of the following voltages:

- 3.3 Volts

- 5.0 Volts

- 12.0 Volts

CAUTION	VRMs must be inserted into the slot with the corresponding voltage. Ensure VRMs are located in the proper slot by checking the voltage label on the I/O baseboard. See Figure 7-31, "VRM Board Remove and Replace."

|	
WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to removing or replacing a VRM.**
	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 could result in personal injury or damage to equipment.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Figure 7-31   VRM Board Remove and Replace
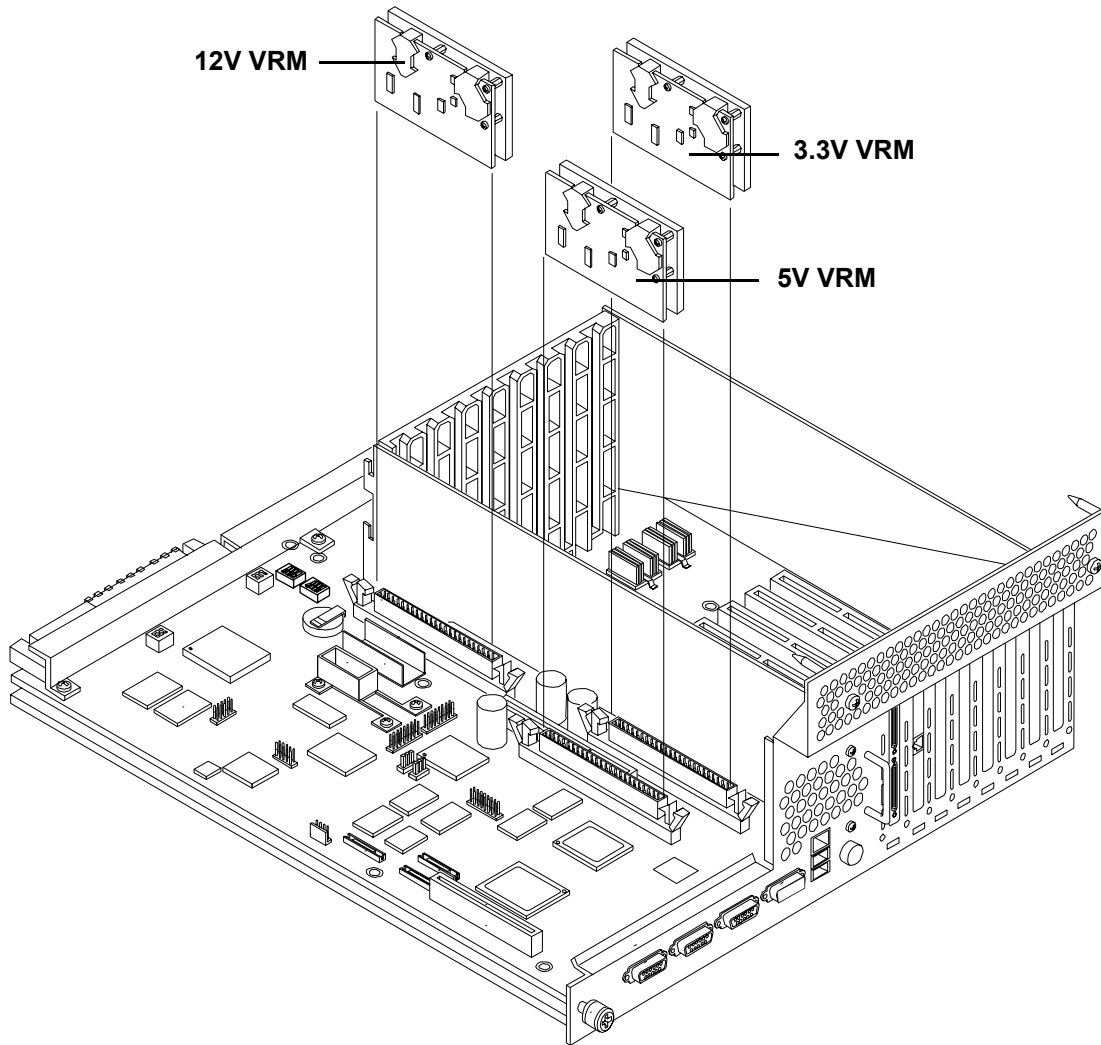
Removing a Voltage Regulator Module (VRM)

To remove a VRM from the server, perform the following steps:

Step   1.   Remove the I/O baseboard from the chassis. See "I/O Baseboard Assembly" on page 154.

Step   2.   Push out the locking tabs at the end of the VRM slot to release it, then pull the VRM straight out of the I/O baseboard.

Replacing a Voltage Regulator Module (VRM)

To replace a VRM, perform the following steps:

Step 1. Push the VRM straight into the slot until it stops, then push in the two locking tabs on either side of the slot to lock the VRM into position.

CAUTION	Ensure that the VRM and slot voltages match up and also check that the heatsink on the VRM faces the PCI card rack after installation. If the VRM is inserted backwards the system will halt during the boot process.

Step 2. Replace the I/O baseboard in the chassis.

Hot-Plug Disk Drives

The two hot-plug disk drives are located in the front of the hp 9000 rp4440 Server.

CAUTION	A hot-plug device may 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/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 will result 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 because they have the same product number.

Removing a Hot-Plug Disk Drive

To remove a hot-plug disk drive, perform the following steps:

NOTE	For cooling purposes, always leave the volume filler in slot 2 if you do not use a second disk drive.

Step 1. Grasp the tab at the bottom of the latch on the selected disk drive.

Step 2. Push the button inside the latch and pull the latch out and up; the disk will unlock.

Step 3. Pull gently until the hot-plug disk drive slides out of the chassis.

Replacing a Hot-Plug Disk Drive

One additional hot-plug disk drive may be added to your HP Server in slot 2. Always use low profile disk drives (1.0" height) in your hp 9000 rp4440 Server. See Figure 7-32, "Disk Drive Installation in Slots 1 and 2."

To install a hot-plug disk drive, perform the following steps:

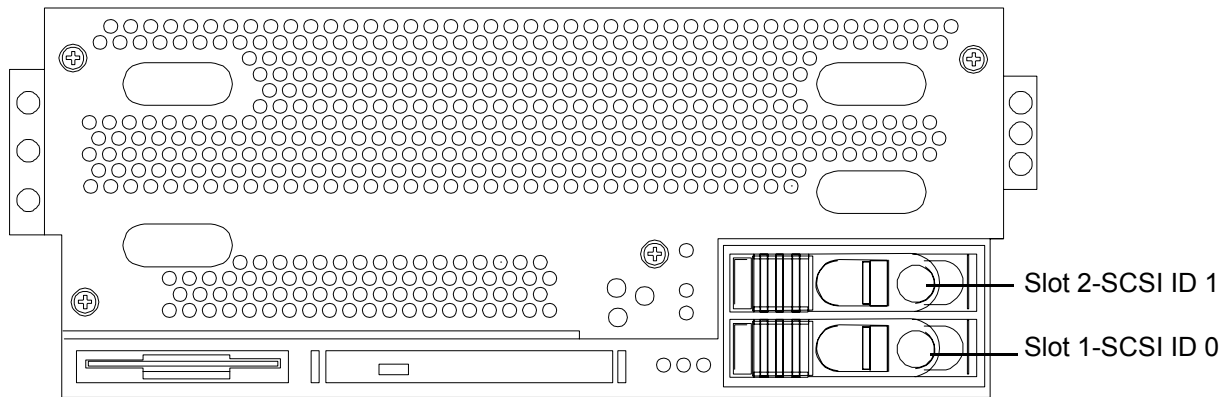**Step 1.** Slide the hot-plug hard disk into slot 1 until it is seated.

Step 2. Close the drive-ejector handle by pushing it down until it clicks.

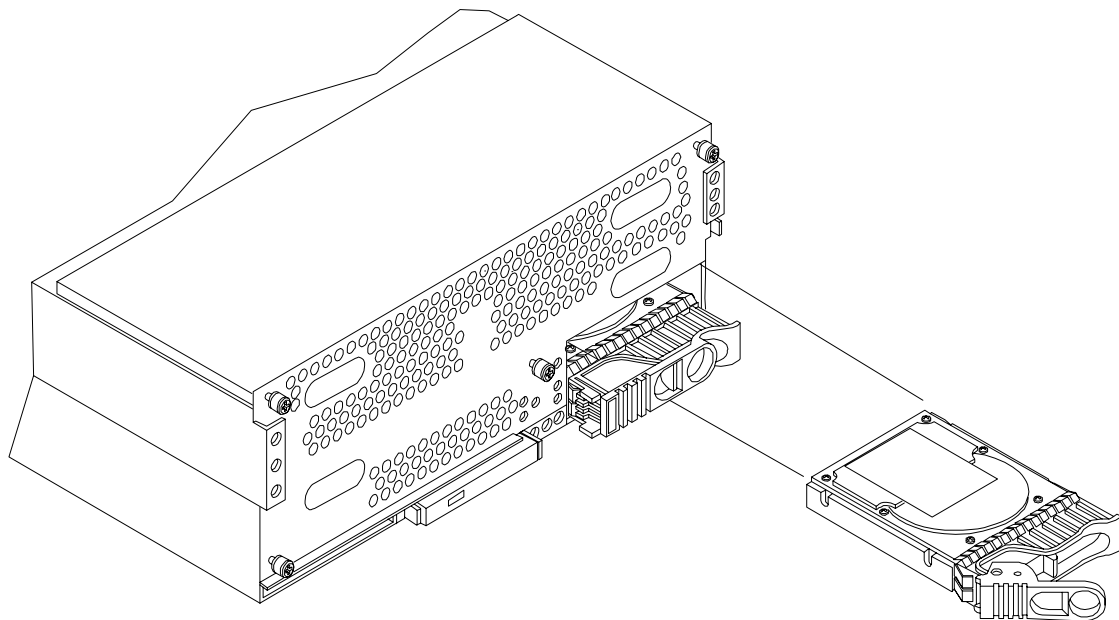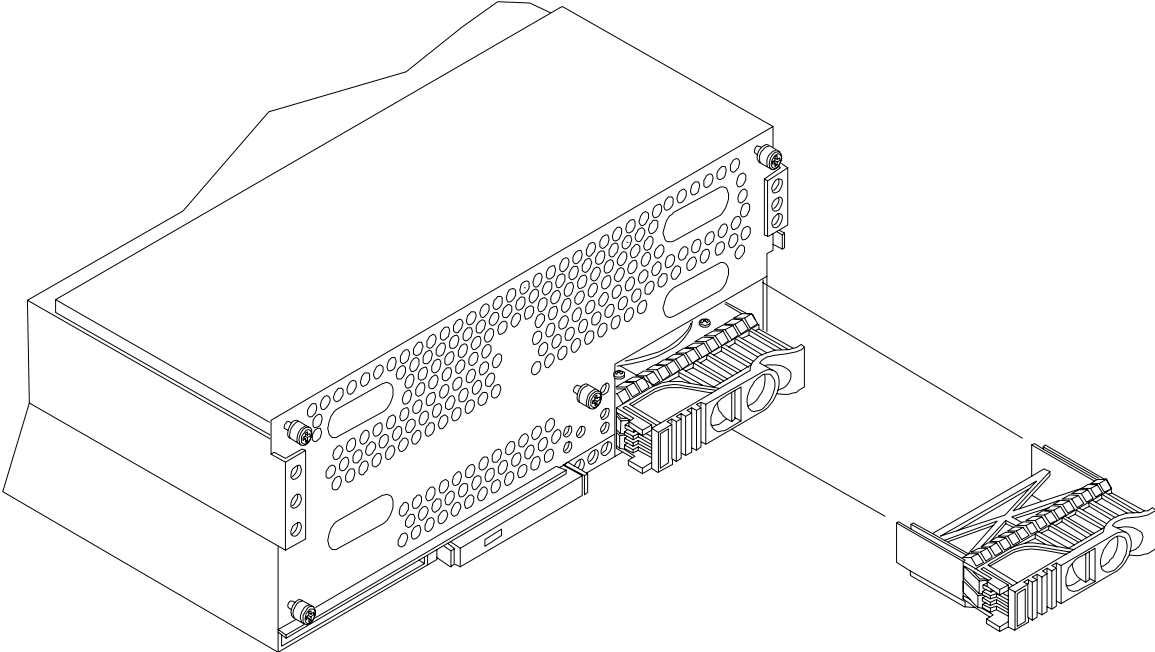**Step 3.** The hot-plug disk drive is now correctly installed.

Figure 7-32   Disk Drive Installation in Slots 1 and 2

Slot 2-SCSI ID 1
Slot 1-SCSI ID 0

Figure 7-33   Disk Drive Installation in Slot 2

Figure 7-34 **Volume Filler Installation in Slot 2**

SCSI Backplane Board

The SCSI backplane board 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 down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-35   SCSI Backplane Removal and Replacement
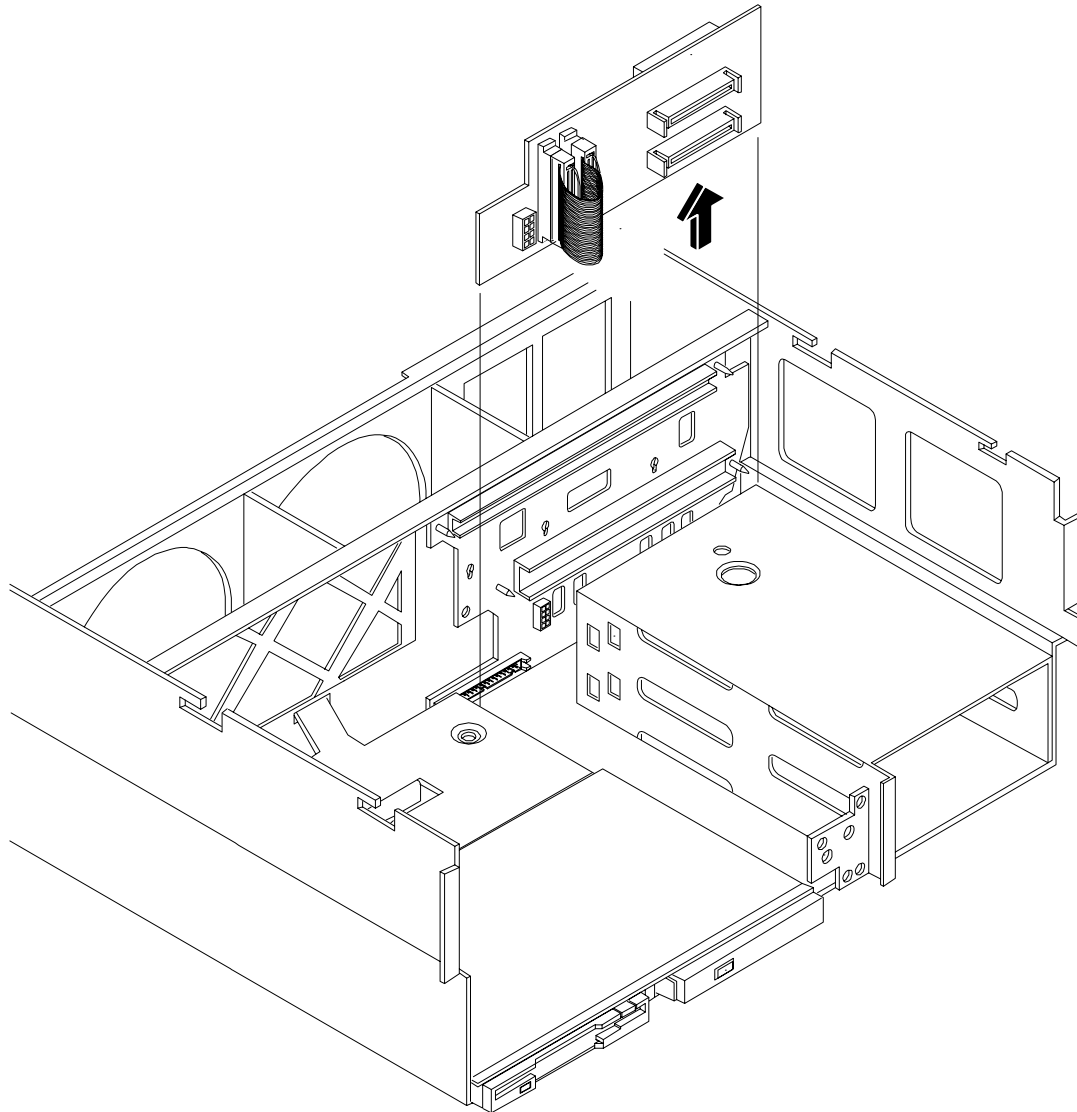
Removing the SCSI Backplane

To remove the SCSI backplane, perform the following steps:

Step   1.   If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step   2.   Remove the front bezel. See "Front Bezel" on page 124.

Step   3.   Remove the front cover. See "Front and Top Covers" on page 126.

Step   4.   Remove the memory extender board. See "Memory Extender Board" on page 132.

Step   5.   Remove the processor extender board. See "Processor Extender Board" on page 140.

Step   6.   Remove the two hot-plug disk drives. See "Hot-Plug Disk Drives" on page 176.

Step 7. Unplug the internal SCSI cable(s) from the SCSI backplane board.

Step 8. Unplug the SCSI backplane-to-midplane riser cable from the SCSI backplane.

Step 9. Using your finger, turn the swivel latch on top of the hot-plug hard disk drive cage to unlatch the SCSI backplane board from the hard disk cage.

Step 10. Grasp the top edge of the SCSI backplane board and pull up until it releases from the keyway slots on the back of the hot-plug disk drive cage.

Step 11. Push the SCSI backplane board away from the disk drive cage and lift it up and out of the chassis.

Replacing the SCSI Backplane

To replace the SCSI backplane, perform the following steps:

Step 1. Replace the SCSI backplane to the rear of the disk drive cage.

Step 2. Replace the two hot-plug disk drives into the disk drive cage.

Step 3. Re-plug the SCSI backplane-to-midplane cable back into the SCSI backplane.

Step 4. Re-plug the internal SCSI cable into the SCSI back plane.

Step 5. Replace the processor extender board.

Step 6. Replace the memory extender board.

Step 7. Replace the front cover.

Step 8. Replace the front bezel.

Step 9. If rack mounted, slide the HP Server back into the rack until it stops.

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 down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Removing the Midplane Riser Board

To remove the midplane riser board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front and top covers. See "Front and Top Covers" on page 126.

Step 4. Remove the memory extender board. See "Memory Extender Board" on page 132.

Step 5. Remove the processor extender board. See "Processor Extender Board" on page 140.

Step 6. Remove the 3 chassis hot-swap fan units. See "Hot-Swap Chassis Fan Unit" on page 150.

Step 7. Remove the I/O baseboard assembly. See "I/O Baseboard Assembly" on page 154.

Step 8. Remove the SCSI backplane board. See "SCSI Backplane Board" on page 179.

Step 9. Unplug the power distribution board power cable and signal cable from the midplane riser board.

Step 10. Unplug the DVD relay board and front panel display board cable from the midplane riser board.

Step 11. Unplug the QuickFind diagnostic board cable from the midplane riser board.

NOTE	At this point, all cables and connectors should be unplugged from the midplane riser board.

Step 12.   Using a Torx #15 driver, remove the five Torx screws attaching the midplane riser board to the chassis.

Step 13.   Grasp the top edge of the midplane riser board and lift straight up to release it from the keyway slots on the chassis. Then pull straight out and up to remove the midplane riser board from the chassis.

Figure 7-36   Midplane Riser Board
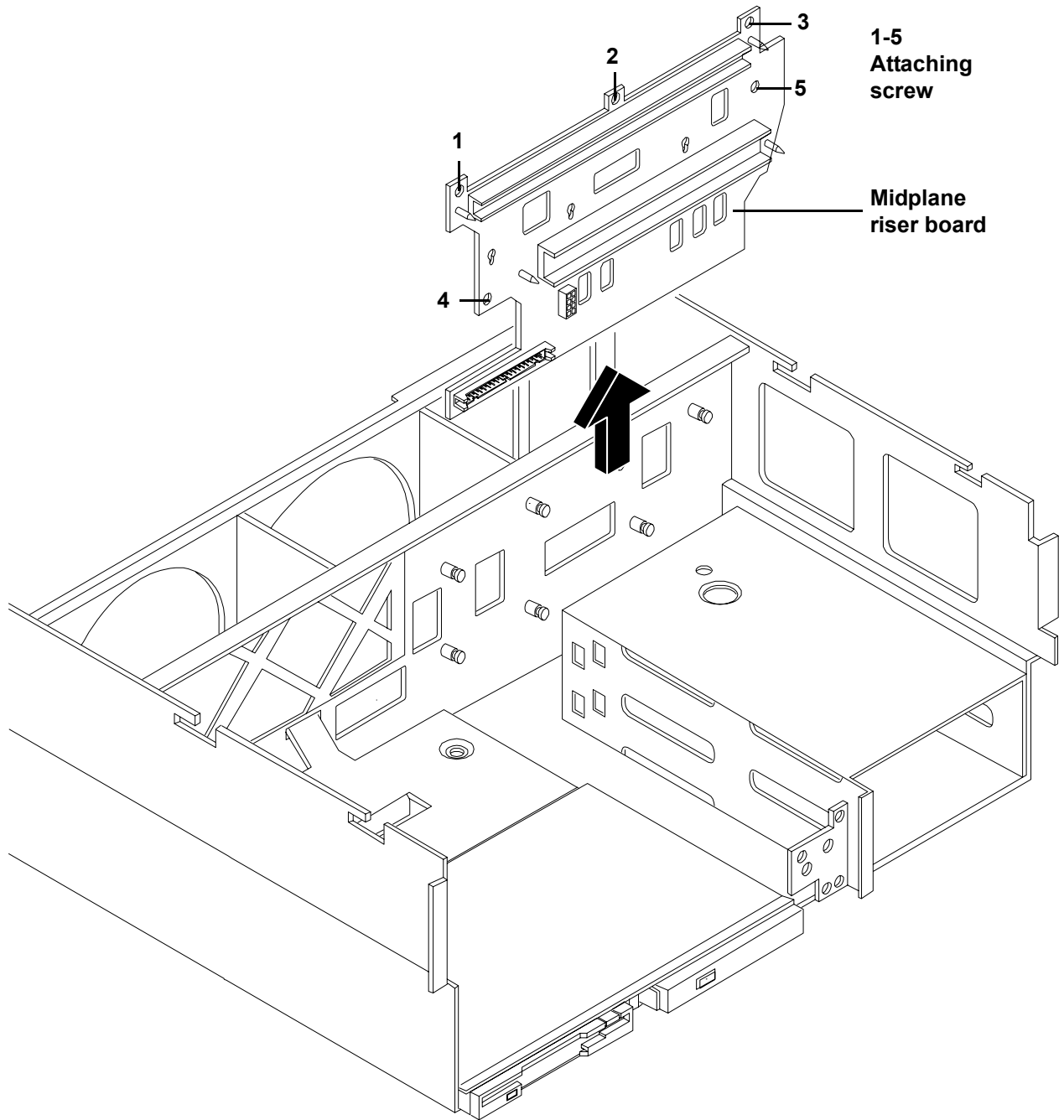
Replacing the Midplane Riser Board

To replace the midplane riser board, perform the following steps:

Step 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.

Step 2. Using a Torx #15 driver, replace and tighten the 5 Torx screws attaching the midplane riser board to the chassis.

Step 3. Plug in the QuickFind diagnostic board cable to the midplane riser board.

Step 4. Plug in the DVD relay board and front panel display board cable to the midplane riser board.

Step 5. Plug in the power distribution board power cable and signal cable to the midplane riser board.

Step 6. Replace the SCSI backplane board.

Step 7. Replace the I/O baseboard assembly.

Step 8. Replace the three chassis hot-swap fan units.

Step 9. Replace the processor extender board.

Step 10. Replace the memory extender board.

Step 11. Replace the front and top covers.

Step 12. Replace the front bezel.

Step 13. If rack mounted, slide the HP Server back into the rack until it stops.

Hot-Swap Power Supplies

The hp 9000 rp4440 Server has two hot-swap power supply units (PSU). These PSUs are located at the rear of the HP Server. The supported configuration of the HP Server requires a minimum of one PSU be installed.

CAUTION	Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

NOTE	A hot-swap 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 have to be off to remove or replace a hot-swap power supply.

Power Supply Load Order

The supported configuration of your hp 9000 rp4440 Server requires a minimum of one PSU. A second, optional hot-swap PSU, may be installed to provide N+1 capability. Each hot-swap requires a separate power cord.

The left side (viewing from the rear) hot-swap PSU is identified as P 0, the second hot-swap power supply is identified as P 1. Each hot-swap PSU requires a separate power cord be installed in the appropriate power cord receptacle and attached to a power cord support bracket.

CAUTION	The empty hot-swap PSU slot P 1 must remain closed with the supplied metal cover when a second PSU is not used. Your server may be damaged due to overheating if the cover does not remain in place.

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

CAUTION	If the system is powered down, install the hot-swap PSU into the server before attaching the new power cord at the rear of the system. Failure to observe this caution will result in damage to the server.

Removing a Hot-Swap Power Supply

To remove a hot-swap PSU, perform the following steps:

**CAUTION**   Be careful when removing the hot-swap power supply. It is heavier than it appears.

Step 1. If rack mounted, slide the HP Server back out of the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the cable management arm from the rackslide nearest the PSUs. The cable management arm does not have to be completely removed but moved just enough to allow access to the PSUs.

Step 3. Remove the power cord plug from the power receptacle.

Step 4. Loosen the captive thumbscrew located at the top left of the PSU.

Step 5. Grasp the handle and pull the PSU out of the server.

Replacing a Hot-Swap Power Supply

Step 1. Supporting the PSU with both hands, slide it into the empty slot until it plugs into the socket on the internal power distribution board. Tighten the thumbscrew hand-tight.

Step 2. Install the power cord into the PSU socket.

Step 3. Apply power to the new PSU and the LED should immediately turn on.

Step 4. If rack mounted, slide the HP Server back into the rack until it stops.

Figure 7-37   Hot-Swap Power Supply Removal and Replacement
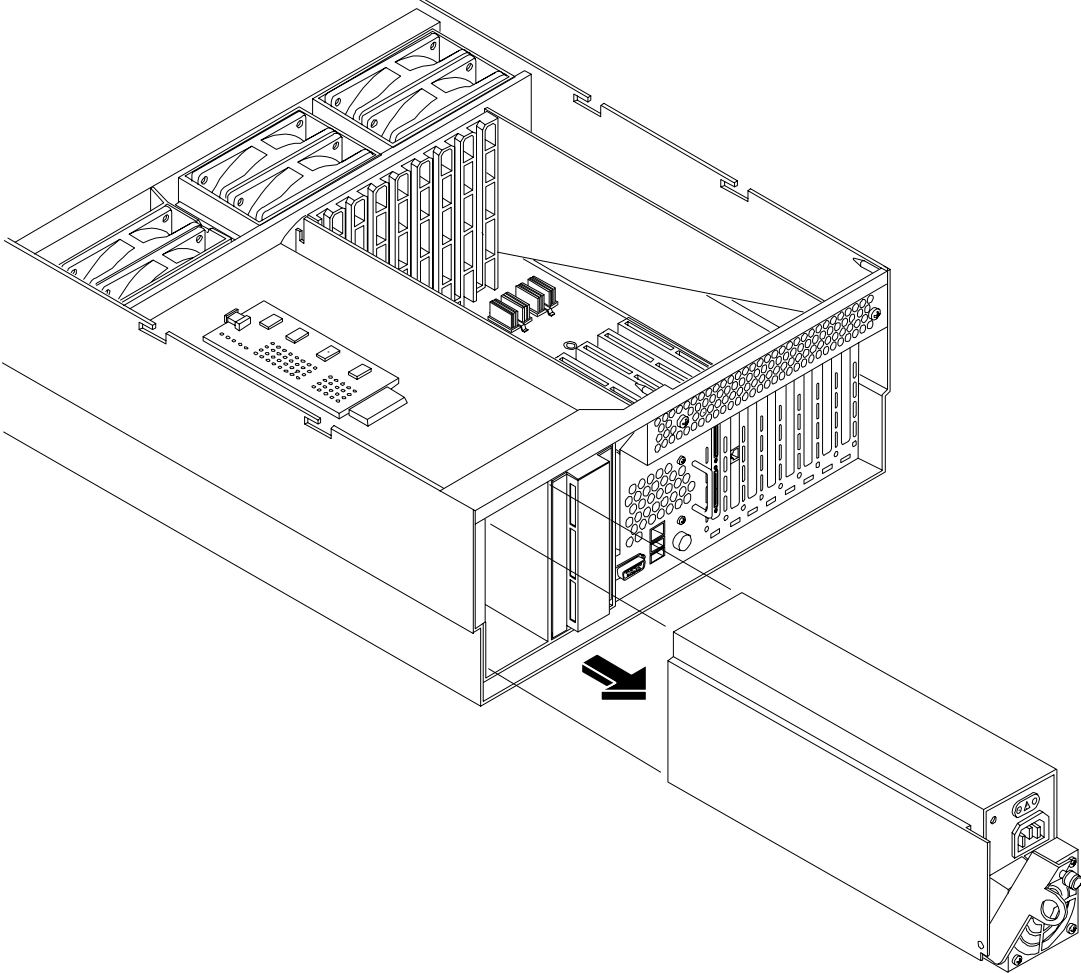
Power Distribution Board

The power distribution board is attached to the rear power supply cage, underneath the hot-swap power supply fan unit.

|	
WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-38   Power Distribution Board Removal and Replacement
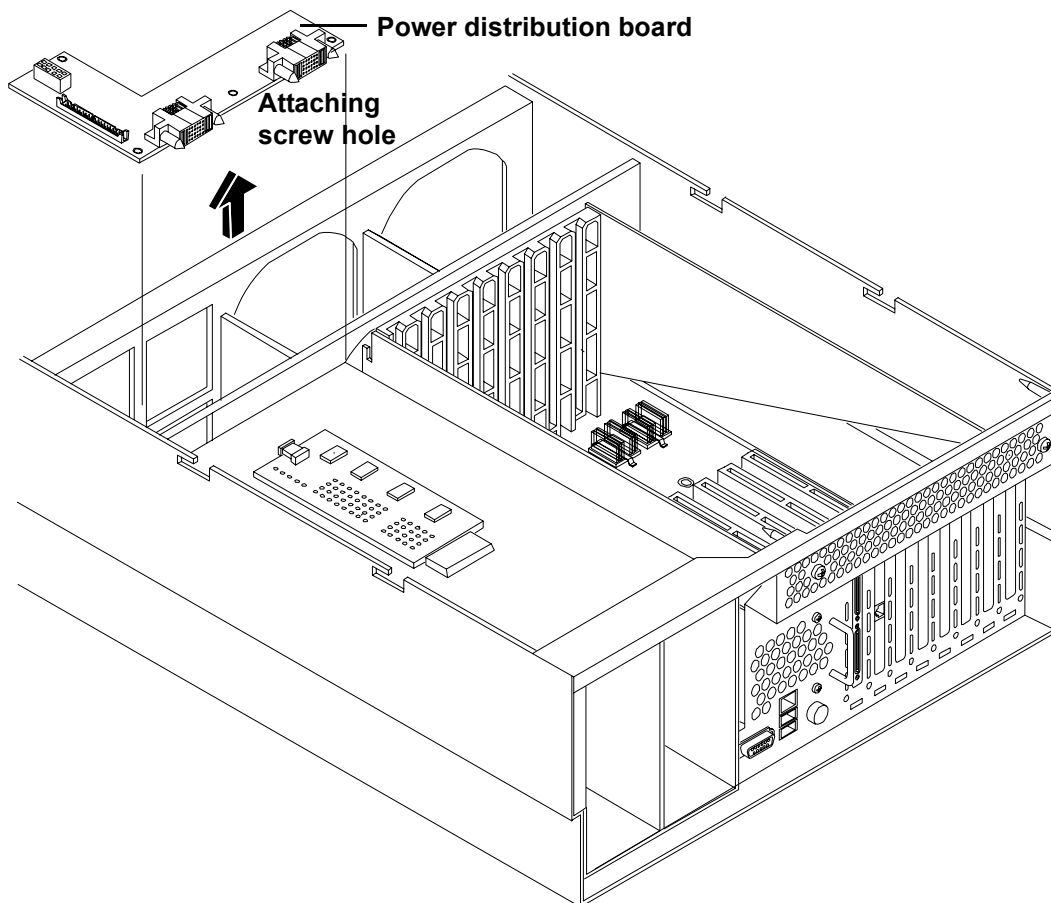
Removing the Power Distribution Board

To remove the power distribution board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover. See "Front and Top Covers" on page 126.

Step 3. Remove the power supply fan unit from the chassis. See "Hot-Swap Chassis Fan Unit" on page 150.

Step 4. Remove the hot-swap power supply(s) from the chassis. See "Hot-Swap Power Supplies" on page 186.

Step 5. Unplug the power cable and the signal cable from the midplane riser board.

Step 6. Using a Torx #15 driver, loosen the one Torx screw attaching the power distribution board to the chassis.

Step 7. Push the power distribution board towards the center of the chassis to release it from the keyway slots. Pull it off the keyway slots and up and out of the chassis.

Replacing the Power Distribution Board

To replace the power distribution board, perform the following steps:

Step 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.

Step 2. Reattach the power distribution board to the chassis bulkhead by replacing the one Torx #15 screw. Tighten hand-tight.

Step 3. Replug the power and signal cables back into the midplane riser board.

Step 4. Replace the hot-swap power supply(s) into the chassis.

Step 5. Replace the power supply fan unit into the chassis.

Step 6. Replace the top cover.

Step 7. If rack mounted, slide the HP Server back into the rack until it stops.

DVD Drive

The DVD drive is located on the front of the HP Server.

| WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-39   DVD Drive Removal and Replacement
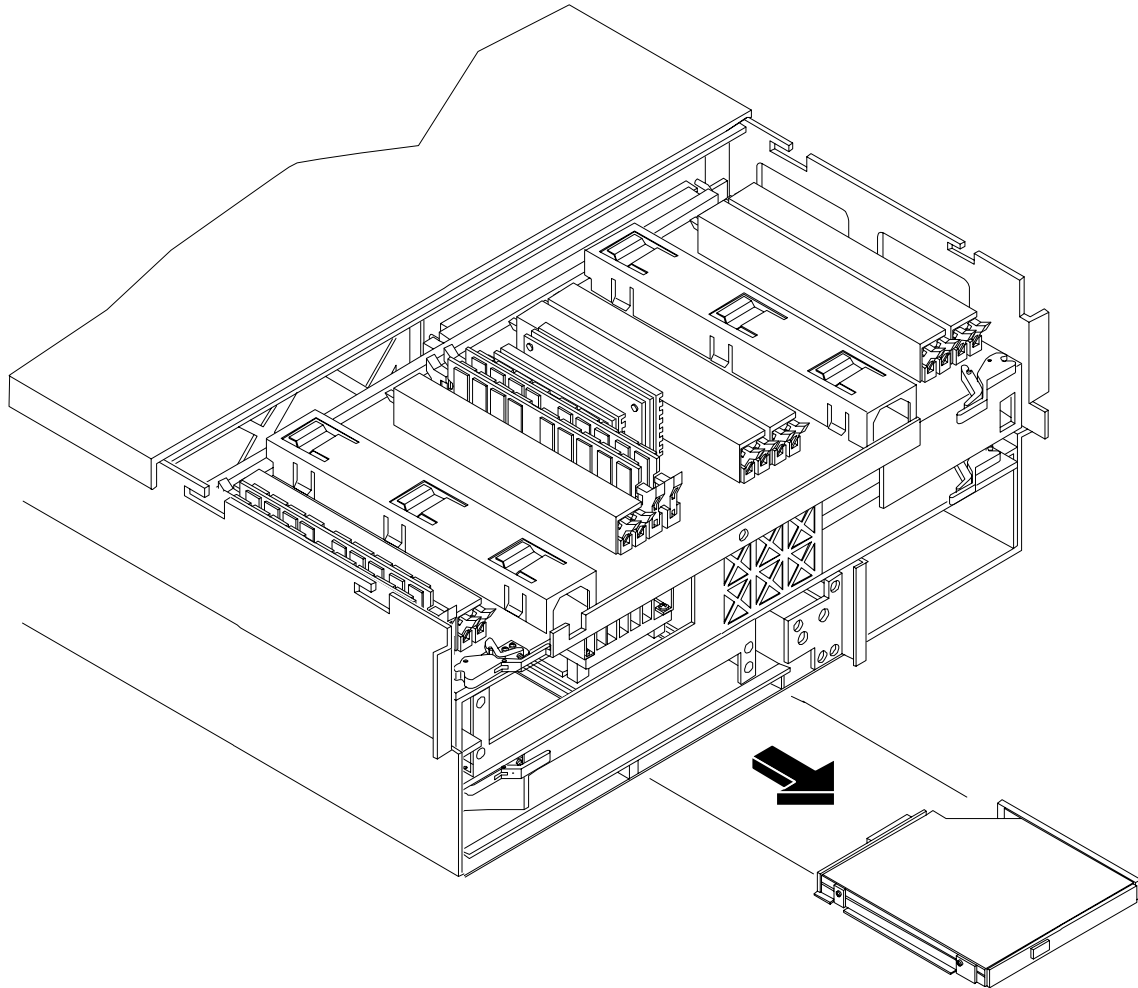
Removing a DVD Drive

To remove a DVD drive, perform the following steps:

Step 1. Grasp the front of the DVD drive and squeeze in on the locking tab to release the drive.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Pull the drive straight out to remove it from the chassis.

Replacing a DVD Drive

To replace a DVD drive, perform the following steps:

Step 1. Grasp the front of the DVD drive and squeeze in on the locking tab to release the drive.

Step 2. Push the drive straight into the drive bay until the locking tab clicks into place.

Step 3. Replace the front bezel.

DVD I/O Board

The DVD I/O board is located under a metal cover that is directly under DVD location at the front left of the chassis.

|	
WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-40   DVD I/O Board Removal and Replacement

Cover
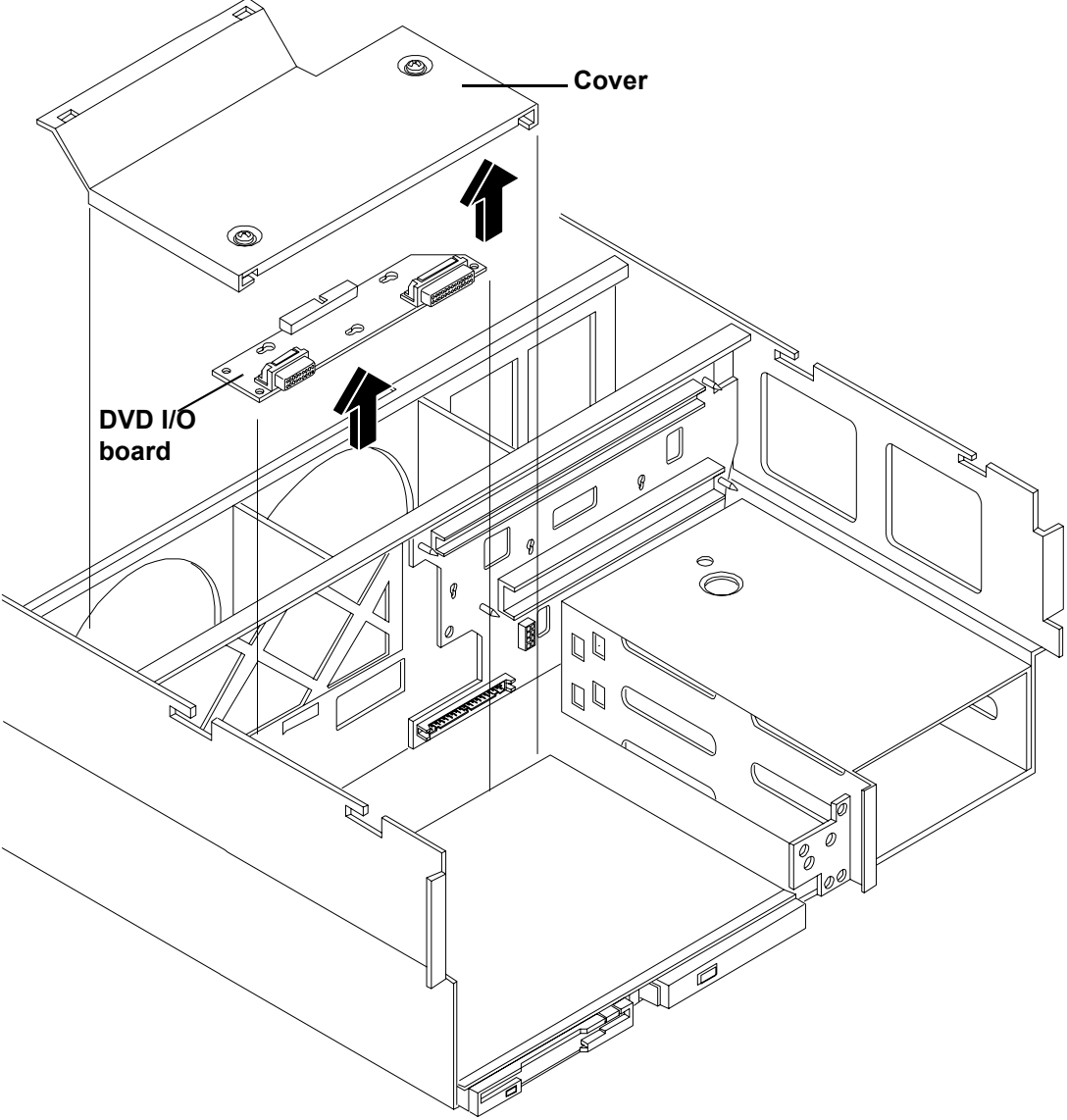
DVD I/O
board

Removing a DVD I/O Board

To remove a DVD I/O board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Remove the memory extender board. See "Memory Extender Board" on page 132.

Step 5. Remove the processor extender board. See "Processor Extender Board" on page 140.

Step 6. Using a Torx #15 driver, remove the two Torx screws holding the DVD I/O board cover plate to the chassis and remove the cover plate.

Step 7. Unfasten the release clip attaching the DVD I/O board to the chassis. and remove the I/O board from the chassis.

Step 8. Lift out the DVD I/O board and remove the midplane riser board connector cable and remove the DVD I/O board from the chassis.

Replacing a DVD I/O Board

To replace a DVD I/O board, perform the following steps:

Step 1. Replace the DVD I/O board into the chassis and plug in the midplane riser board connector cable.

Step 2. Replace DVD I/O board to the chassis by refastening the release clip.

Step 3. Replace the cover plate using the two Torx #15 screws and a Torx #15 driver.

Step 4. Replace the processor extender board.

Step 5. Replace the memory extender board.

Step 6. Replace the front and top covers.

Step 7. Replace the front bezel.

Step 8. If rack mounted, slide the HP Server into the rack until it stops.

Display Board

The display board is located behind the control panel and under the front cover. The display board contains the server's on/off switch and three LEDs that indicate server status.

| WARNING	**Ensure that the system is powered down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-41   Display Board Removal and Replacement
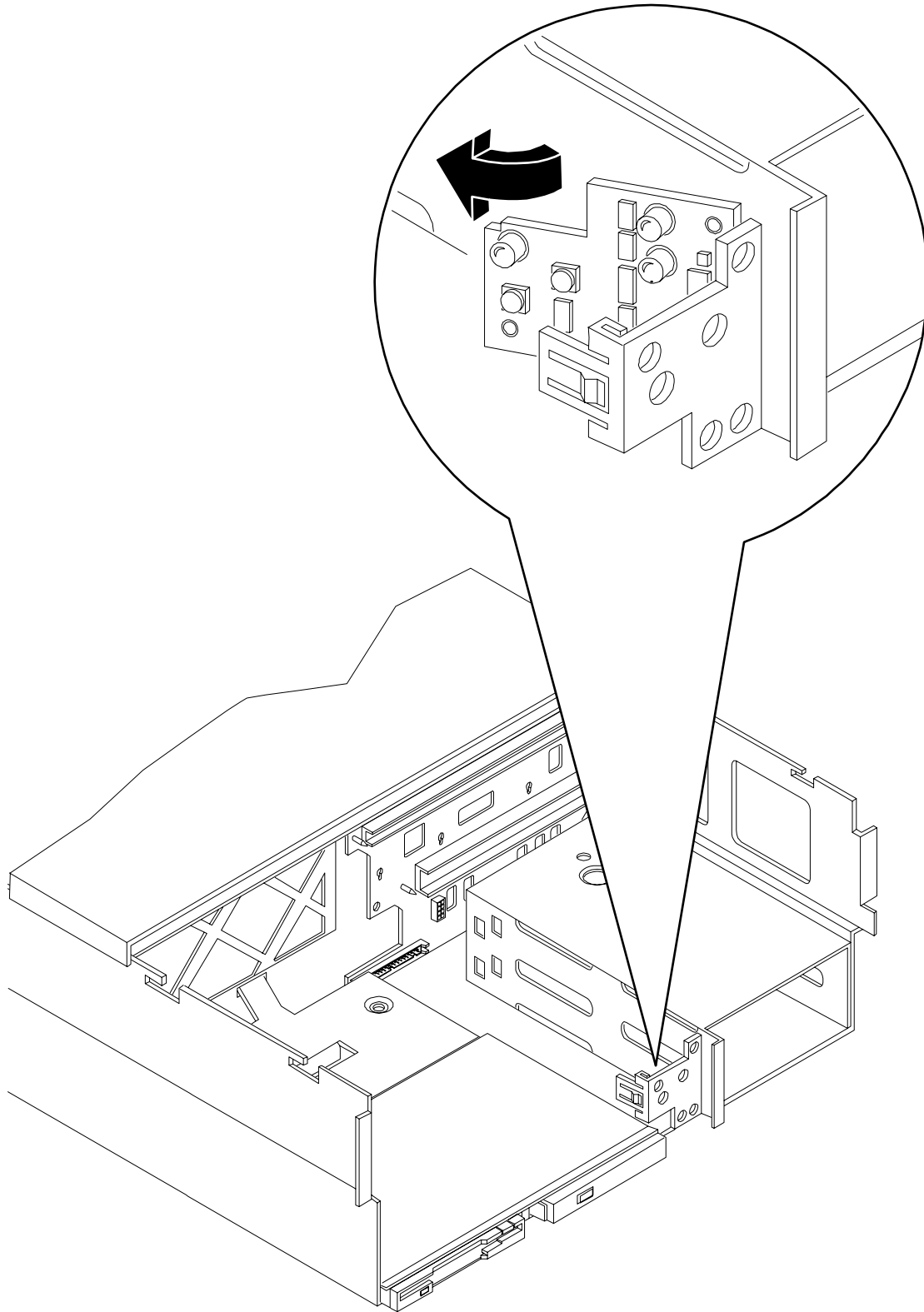
Removing the Display Board

To remove the display board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the front bezel. See "Front Bezel" on page 124.

Step 3. Remove the front cover. See "Front and Top Covers" on page 126.

Step 4. Using your finger, slightly pull out the retaining tab on the chassis that holds the display board in position.

Step 5. Gently unplug the midplane riser board connector cable from the display board and remove the board from the chassis.

Replacing the Display Board

To replace the display board, perform the following steps:

Step 1. Gently plug in the midplane riser board cable into the display board.

Step 2. Hold the display board in position near the chassis and rotate it into the retaining clip until it clicks into place.

Step 3. Replace the front cover.

Step 4. Replace the front bezel.

Step 5. If rack mounted, slide the HP Server into the rack until it stops.

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 down and all power sources have been disconnected from the server prior to 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 could result in personal injury or damage to equipment.

CAUTION	Failure to properly complete the steps in this procedure will result 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 could result in damage to the server.

Figure 7-42   QuickFind Diagnostic Board Removal and Replacement

Cover

QuickFind
diagnostic board
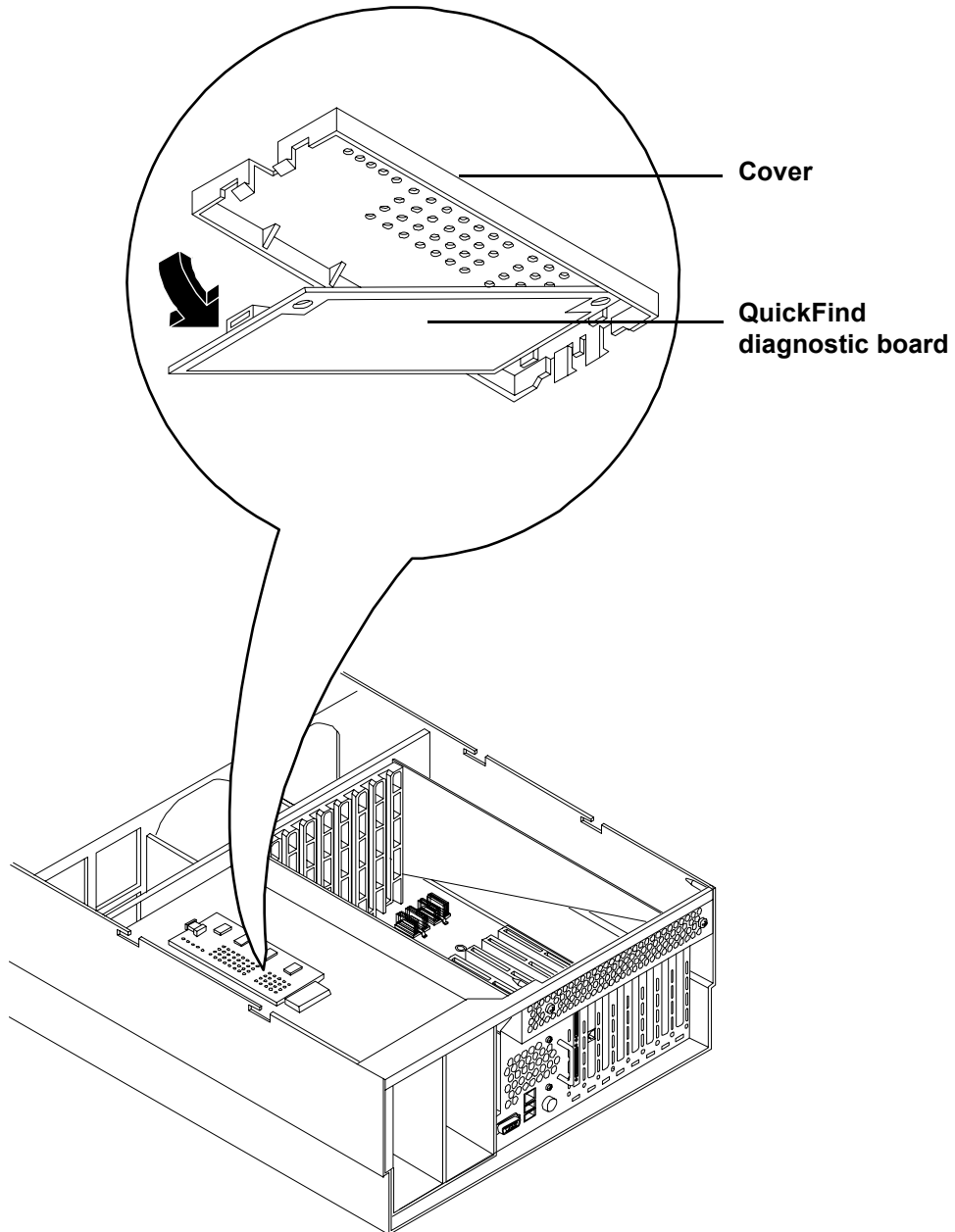
Removing the QuickFind Diagnostic Board

To remove the QuickFind diagnostic board, perform the following steps:

Step 1. If rack mounted, slide the HP Server out from the rack until it stops. See "Accessing a Rack Mounted Server" on page 121.

Step 2. Remove the top cover. See "Front and Top Covers" on page 126.

Step 3. Gently squeeze the cover surrounding the QuickFind diagnostic board and remove the cover/board assembly from the top of the power supply cage.

Step 4. Turn this assembly upside down and remove the QuickFind diagnostic board from the cover.

Step 5. Unplug the cable from the connector on QuickFind diagnostic board and remove the board from the chassis.

Replacing the QuickFind Diagnostic Board

To replace the QuickFind diagnostic board, perform the following steps:

Step 1. Gently plug the cable into the QuickFind diagnostic board connector.

Step 2. Replace the QuickFind diagnostic board into the cover by snapping it into place.

Step 3. Turn the assembly over and snap into place on top of the power supply cage.

Step 4. Replace the top cover.

Step 5. If rack mounted, slide the HP Server into the rack until it stops.

A Parts Information

Field Replaceable Parts (FRU) List

The items in this list and the corresponding item numbers are the Field replaceable Units (FRUs) for the hp 9000 rp4440 Server.

NOTE	The item numbers listed below are used with the part illustrations in order to identify the nomenclature of the part. Part numbers are found by using the part nomenclature from this list to select the correct part from the HP Partsurfer. If a system board needs to be replaced, remove processors, DIMMs, and adapter boards and transfer these to the new board. Ensure all jumper and switch settings on the old board are transferred to the new board.

Table A-1   Field Replaceable Parts (FRU) List

Item No.	Description	Part Number Replacement	Part Number Exchange
	Cable		
A6961-63006	Cable, Internal SCSI	A6961-63006	None
A6961-63005	Cable, QuickFind Diagnostic to Midplane	A6961-63005	None
A6961-63004	Cable, Power Distribution to Midplane Ribbon	A6961-63004	None
A6961-63003	Cable, Power Distribution to Midplane 10 pin	A6961-63003	None
A6961-63011	Cable, SCSI Controller Jumper (Simplex only)	A6961-63011	None
A6961-63008	Cable, SCSI Backplane to Midplane	A6961-63008	None
A6961-63002	Cable, Display to IDE to Midplane	A6961-63002	None
	PCA Boards		
A6961-60007	PCA, Processor Extender	A6961-67007	A6961-69007
A6961-60001	PCA, I/O baseboard (includes VRMs)	A6961-67001	A6961-69001
A6961-60004	PCA, 16 slot Memory Board	A6961-67004	A6961-69004
A7124-04001	PCA, 32 slot Memory Board	A7124-67001	A7124-69001
A6961-60005	PCA, Midplane Riser Board	A6961-67005	None
A6961-04057	PCA, SCSI Backplane/Management Assy, includes: Management board (A6961-60003) and SCSI Backplane board (A6961-60002)	A6961-67057	None
A6961-60006	PCA, SCSI Duplex Board	A6961-67006	None
A6961-60008	PCA, Front Panel Display	A6961-67008	None

Table A-1   Field Replaceable Parts (FRU) List (Continued)

Item No.	Description	Part Number Replacement	Part Number Exchange
A6961-60009	PCA, QuickFind Diagnostic Board (includes plastic cover and label)	A6961-67009	None
A6961-60015	PCA, Power Distribution Board	A6961-67015	None
A6961-60013	PCA, I/O Board to DVD connectivity (IDE/USB)	A6961-67013	None
1818-8797	256MB DIMM	A6967-67001	None
1818-8795	512MB DIMM	A6968-67001	None
1818-8833	1GB DIMM	A6969-67001	A6969-69001
1818-8799	2GB DIMM	A6835-67001	A6835-69001
	Internal disks/removable media		
A9896-64001	36GB 15K RPM SCSI Disk (A986A)	5065-5286EO	A6848--69001
A7163-04001	73GB 15K RPM SCSI Disk (A987A)	0950-4381EO	A9761-69001
A9898-64001	146GB 10K RPM SCSI Disk (A9898A)	0950-4385EO	A7080-69001
A7163-04001	DVD-R/CD-R Drive	A7163-67001	None
A7007-04001	DVD-R/CD-RW Drive	A7007-67001	None
	Fans		
A6961-04001	I/O Fan	A6961-04055	None
A6961-04028	Power Supply Fan	A6961-04028	None
	Processor Module		
A7125-04001	800 MHz PA-RISC CPU	A7125-67002	A7125-69002
A7126-04001	900 MHz PA-RISC CPU	A7126-67002	A7126-69002
	Miscellaneous		
0950-4428	Power Supply	A6961-67016	None
0950-4419	DC-DC Converter (VRM 3.3V)	A6961-67017	None
0950-4418	DC-DC Converter (VRM 5.0V)	A6961-67018	None
0950-4417	DC-DC Converter (VRM 12.0V)	A6961-67019	None
A6961-04047	PCI Card Divider (doorbell and latch included)	A6961-67020	None
A6961-40021	PCI Retention Clip	A6961-67021	None
1420-0386	System battery	1420-0386	None

Table A-1   Field Replaceable Parts (FRU) List (Continued)

Item No.	Description	Part Number Replacement	Part Number Exchange
	Rack solutions		
5069-3305	Rack Mount Hardware, Right (included with Left Bracket in kit)	A6977-67001	None
5069-3306	Rack Mount Hardware, Left (included with Right Bracket in kit)	A6977-67002	None
A7124-04004	Bezel-Rack Mount	A7124-67003	None
	Parts shared with other products		
A6825-60101	LAN Core I/O	A6825-67101	None
A6829-60101	U160 Core I/O	A6829-67001	None

B Specifications

This appendix provides the power requirements, operating conditions (environmental requirements), physical requirements, and hardware specifications of your hp 9000 rp4440 Server. The following tables provide the specifications required for normal operation of your HP Server.

NOTE The specifications and requirements for the power supply and environment can vary if you install a mass storage device in the server that has more stringent environmental limits than required for the HP Server. Ensure that the operating environment for any mass storage devices you intend to install are compatible with the server environmental requirements.

Hardware Specifications

Table B-1   Hardware Specifications

Micro-processors	PA-RISC (up to 4 processors modules): 800 MHz, 900 MHz, and 1GHz supported
Memory	Supports up to 32 Double Data Rate (DDR) registered ECC Memory, in PC2100 DIMMs. Supported DDR DIMM sizes: 128MB, 256MB, 513MB, 1GB, and 2GB. Requires DIMMs to be added in quads of equal capacity.
Video	Pinnacle FXe PCI card
SCSI	Integrated Ultra-3 SCSI dual channel controller; 80 MB/s transfer rate with two 68-pin connectors.
Integrated HP RAID Controller	Optional.
LAN	PCI Gigabit, Fast Ethernet Controller; with Wake-on-LAN enabled/disabled via BIOS setup.
PCI Slots	Four 64-bit PCI-X slots, 66MHz slots Two 64-bit PCI-X slots, 133 MHz slots.
Core I/O	Three serial ports, 2 USB ports, Integrated RJ-45 LAN .
DVD-ROM	DVD-R/CD-ROM drive; IDE interface; 48x speed.
Mass Storage	Maximum Internal Storage: Two 73MB, 15K drive.
External Storage	2 external SCSI ports
Power Supply	1+1 configuration, redundant power supply (optional).

Dimensions and Weights

This section provides dimensions and weights of hp Integrity rp4440 Server components.

Component Dimensions

Table B-2   Server Component Dimensions

Dimension	Value
Height	6.87" (17.46 cm)
Width	17.32" (44 cm)
Depth	27.1" (68.8 cm)
Weight	Unloaded 75 lbs (34 kg) Fully loaded <95 lbs (43 kg)

C System I/O Board Switches and Jumpers

The following descriptions are for reference only.

Table C-1   System I/O Board Indicators, Connectors, and Jumpers

LED Indicators		Connectors		Jumpers	
Ref Des	**Function**	**Ref Des**	**Function**	**Ref Des**	**Function**
DS0907	Slot 8 Attn	P2314	DHPC JTAFG	P5704	AC Range-Off
DS0805	Slot 8 Attn	P4506	BMC DUART	P5705	Console Mux-Off
DS0806	Slot 8 Power	P5301	12V VRM Module	P5708	Mfg/Schmoo-Off
DS1922	Slot 7 Attn	P5603	3.3V VRM Module	P8412	Manual PowerOn-Off
DS1810	Slot 7 Attn	J6607	5V VRM Module	S5102 Pos 1	VGA Enable On-rx4640 Off-rp4440
DS1808	Slot 7 Power	J6305	PDH Monitor Connector	S5102 Pos 2	N/A
DS1921	Slot 6 Attn	P5401	RiLoe Connector	S5102 Pos 3	N/A
DS1811	Slot 6 Attn	J5604	Scan Connector	S5102 Pos 4	N/A
DS1813	Slot 6 Power	P6406	BMC JTAG	S5103 Pos 1	
DS2917	Slot 5 Attn	P6407	BMC Test Header	S5103 Pos 2	
DS2807	Slot 5 Attn	J7605	MP JTAG	S5103 Pos 3	
DS2809	Slot 5 Power	P7502	12C Bus 2 Header	S5103 Pos 4	Hondo Enable Off-rx4640 On-rp4440
DS2918	Slot 4 Attn	P7503	12C Bus 1 Header		

Table C-1   System I/O Board Indicators, Connectors, and Jumpers (Continued)

LED Indicators		Connectors			Jumpers	
Ref Des	**Function**	**Ref Des**	**Function**		**Ref Des**	**Function**
DS2808	Slot 4 Attn	P8204	ACPI Events			
DS2806	Slot 4 Power	P8304	LPC Bus Header			
DS3916	Slot 3 Attn	J9503	MP Data Bus Debug Header			
DS3808	Slot 3 Attn	J98611	MP Data Bus Debug Header			
DS3809	Slot 3 Power	J9602	MP Data Bus Debug Header			
DS5501	12V Power	P9505	IPMB Bus between BMC and MP			
DS5808	3.3V Power	J9803	Core I/O Debug Connector			
DS6113	3.3VSB Power	J2001	Left Fan or Fan)			
DS5809	5V Power	J6002	Middle Fan or Fan 1			
DS5815	BMC Heartbeat	J7001	Right Fan or Fan 2			
DS5816	MP Heartbeat	J6004	Hi-Speed Backplane for Ropes			
DS8816	MP ROM Error	J7003	Hi-Speed Backplane for Ropes			
DS9906	MP Selftest	J7002	Hi-Speed Backplane for Ropes			
		J9006	Low-Speed Backplane Signals			
		J5910	Dual USB and MP LAN			
		J6921	DB-15 Analog Video			
		JD7901	DB-9 Remote/Console RS-232			
		J8906	DB-9 Auxillary RS-232			
		J9905	DB-9 Local RS-232			
		J6502	Frequency Input for Margin			

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