

# Maintenance Guide

**HP 9000 rp3410 and HP 9000 rp3440**



**Manufacturing Part Number: A7137-96002**

**Third Edition**

**April 2005**

U.S.A.

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# Preface

This preface contains the following sections:

- Intended Audience
- What's New?
- Notational Conventions
- Reader Comments and Feedback
- Related Information
- Printing History

## Intended Audience

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

## What's New?

- The layout of this document was changed to improve usability.
- Updated the field replaceable parts (FRU) list

## Notational Conventions

The following notational conventions are used in this publication.

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

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

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

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- Commands and options are represented using this font.
- **Text that you type exactly as shown** is represented using **this font**.
- *Text to be replaced with text that you supply* is represented using *this font*.

Example:

“Enter the `ls -l filename` command” means you must replace *filename* with your own text.

- **Keyboard keys and graphical interface items (such as buttons, tabs, and menu items)** are represented using **this font**.

Examples:

The **Control** key, the **OK** button, the **General** tab, the **Options** menu.

- **Menu** → **Submenu** represents a menu selection you can perform.

Example:

“Select the **Partition** → **Create Partition** action” means you must select the **Create Partition** menu item from the **Partition** menu.

- Example screen output is represented using this font.

## Reader Comments and Feedback

HP welcomes your feedback on this publication. Please address your comments to [edit@presskit.rsn.hp.com](mailto:edit@presskit.rsn.hp.com) and note that you will not receive an immediate reply. All comments are appreciated.

## Related Information

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

### Web Site for HP Technical Documentation:

<http://docs.hp.com>

The main Web site for HP technical documentation is <http://docs.hp.com>, which has complete information available for free.

### Server Hardware Information:

<http://docs.hp.com/hpux/hw/>

The <http://docs.hp.com/hpux/hw/> Web site is the systems hardware portion of the docs.hp.com and provides HP nPartition server hardware management details, including site preparation, installation, and more.

### Windows Operating System Information

You can find information about administration of the Microsoft® Windows® operating system at the following Web sites, among others:

- [http://docs.hp.com/windows\\_nt/](http://docs.hp.com/windows_nt/)
- <http://www.microsoft.com/technet/>

### Diagnostics and Event Monitoring: Hardware Support Tools

Complete information about HP's hardware support tools, including online and offline diagnostics and event monitoring tools, is at the <http://docs.hp.com/hpux/diag/> Web site. This site has manuals, tutorials, FAQs, and other reference material.

### Web Site for HP Technical Support:

<http://us-support2.external.hp.com>

HP's IT resource center Web site at <http://us-support2.external.hp.com/> provides comprehensive support information for IT professionals on a wide variety of topics, including software, hardware, and networking.

### Books about HP-UX Published by Prentice Hall

The <http://www.hp.com/hpbooks/> Web site lists the HP books that Prentice Hall currently publishes, such as HP-UX books including:

- *HP-UX 11i System Administration Handbook*  
[http://www.hp.com/hpbooks/prentice/ptr\\_0130600814.html](http://www.hp.com/hpbooks/prentice/ptr_0130600814.html)
- *HP-UX Virtual Partitions*  
[http://www.hp.com/hpbooks/prentice/ptr\\_0130352128.html](http://www.hp.com/hpbooks/prentice/ptr_0130352128.html)

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

## Printing History

The Printing History below identifies the edition dates of this manual. Updates are made to this publication on an unscheduled, *as needed*, basis. The updates will consist of a complete replacement manual and pertinent on-line or CD-ROM documentation.

Second Edition	.....	June 2004
Third Edition	.....	April 2005



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# 1 Troubleshooting

This chapter provides troubleshooting instructions for maintaining your HP 9000 rp3410 or HP 9000 rp3440 server.

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## Troubleshooting Methodology

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**WARNING**    **Ensure that the system is powered down and all power sources have been disconnected from the server prior to working with the server.**

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

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

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**CAUTION**    **Do not operate the HP server for more than 5 minutes with any cover (including disk drives) removed. If you are hot-swapping a fan, reinstall the cover within 5 minutes to prevent overheating. Damage to system components may result due to improper cooling airflow.**

---

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

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

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

## Using the Front Panel Power Button

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

**Table 1-1 Power Button Functions**

System State	Switch Pressed Time	Result
Power connected to power supplies—system power off	1 second or less	System power on.
	More than 1 second	No effect.
System at ISL	Less than 1 second	No effect.
	More than 1 second but less than 5 seconds	Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp3410 and HP 9000 rp3440 servers.
	More than 5 seconds	Hard shutdown.
System at BCH	Less than 1 second	Hard shutdown.
	More than 1 second but less than 5 seconds	Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp3410 and HP 9000 rp3440 servers.
	More than 5 seconds	Hard shutdown.
Power on—OS shut down	Less than 1 second	No effect.
	More than 1 second but less than 5 seconds	Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp3410 and HP 9000 rp3440 servers.
	More than 5 seconds	Hard shutdown.
OS running	Less than 1 second	No effect.
	More than 1 second but less than 5 seconds	Not used. This selection initiates E-buzzer functions that are not supported in the HP 9000 rp3410 and HP 9000 rp3440 servers.
	More than 5 seconds	Hard shutdown.

## 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:

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

### 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 the Topics menu go to Diagnostics and look for Support Tools Manager.

### Event Monitoring Service

Event Monitoring Service (EMS) is the framework for monitoring hardware and reporting events. 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/sbin/monconfig
```

From the list of Main Menu selections, choose:

```
(E) Enable Monitoring
```

## Management Processor (MP)

**Integrated Lights-Out (iLO)** offers remote server management through an independent management processor (MP). It provides a way for you to connect to a server and perform administration or monitoring tasks for the server hardware. iLO is available whenever the system is connected to a power source, even if the server main power switch is in the off position.

iLO controls power, reset, and Transfer of Control (TOC) capabilities; provides console access; displays and records system events; and can display detailed information about the various internal subsystems. iLO also provides a virtual front panel that you can use to monitor system status and see the state of front panel LEDs. All iLO functions are available through the server LAN and the local RS-232 and remote RS-232 ports. Access to local and remote ports, telnet, and secure shell (SSH) is through the iLO text interface, while Web access is through a graphical user interface (GUI).

iLO was introduced into most Integrity Entry Class servers in late 2004. Prior to that, embedded remote server management was referred to as MP functionality. All legacy MP functionality has been carried forward and combined with new features, all under the heading of "iLO". Therefore, "iLO" and "MP" mean the same thing for Entry Class servers.

Once you update the firmware to version E.03.13, the following features in the Integrated Lights-Out MP are activated:

- Always-on capability: iLO is active as long as the power cord is plugged in
- Multiple access methods: Local, remote, telnet, and SSH use the iLO text interface. Web access uses a GUI.
  - Local Serial Port: Use a terminal or laptop computer for direct connection.
  - Remote/Modem Serial Port: Use a dedicated modem RS-232 port and external modem.
  - LAN: Use telnet, Web, or SSH to access iLO LAN.
- Remote power cycle; power on or power off; reset
- Mirrored console: The system console output stream is reflected to all connected console users, and any user can provide input.
- Independent, non mirrored sessions (from local and modem ports)
  - Direct session with OS using the MP command SE
  - Connection to another iLO using the MP command CSP
- Display of information about various internal subsystems
  - Field replaceable unit (FRU) information
  - System power state, temperature information, and fan status
  - Status of processors
- Logging, display, and keyword search of:
  - System console history
  - System events
- User access control
- DHCP and DNS support
- IPMI over LAN



- Licensing
- iLO Advanced Pack features, such as SSH access, group actions capability, and LDAP

---

**NOTE** A complete description of the MP is provided in the *HP Integrity and HP 9000 Integrated Lights-Out Management Processor Operations Guide*.

---

### Configuring the MP LAN Port IP Address

By connecting the MP LAN port to an active network, you have two options for configuring an IP address. The first option is to use a DHCP server, which automatically assigns an IP address, and the other is to use the ping command from another host on the same subnet to set a static IP address for the MP. After the IP address has been set, you can establish a telnet session to configure additional parameters.

If you are using a DHCP server, and it provides the Domain Name, and if the primary DNS server accepts dynamic DNS (DDNS) updates or has been configured through the DHCP server, then you can use a default host name to connect to the MP through telnet. The default host name is 14 characters long, consisting of the letters “mp” followed by the 12 characters of the Media Access Protocol (MAC). See “Configure an IP Address” on page 18 to determine the MAC address. If no DNS access is available, the telnet session can use the assigned IP address.

If you are using DHCP, proceed to “Accessing the Management Processor” on page 18. For more information on configuring DHCP, see “Configuring the Management Processor LAN Information” on page 19. For a non-DHCP implementation, perform the following steps to configure a static IP address.

**Configuring a Static IP Address (Non-DHCP)** To configure a static IP address for the MP LAN port, follow these steps:

1. Set up local terminal access.
2. Configure the IP address.

**Set Up Local Terminal Access** 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 choose **Connection Setup**.

**Step 2.** Choose **Serial Port**.

**Step 3.** Choose **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 choose **Terminal** (under the Emulation tab).

**Step 7.** Choose 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**.

**Configure an IP Address** To configure the MP LAN static IP address, perform the following steps:

**Step 1.** Determine the Media Access Control (MAC) address of the MP 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.

**Step 3.** Add an Address Resolution Protocol (ARP) table entry to another host located on your local subnet. This ARP table entry maps 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 MP. The MP LAN port should now be configured with the appropriate IP address.

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

### 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 Customer Service Modem (CSM) port using external modem (dial-up) access, if remote modem access is configured
- The MP LAN port using the Web interface, telnet, or SSH, if login access through the MP LAN is enabled

**Local Terminal Access to the Management Processor** You establish communication with the MP by connecting a terminal to the local CSM I/O serial port.

You can establish a terminal session using a standalone terminal or using terminal emulation software, such as HyperTerm, Putty, or Reflection 1 running on a PC.

During installation, communicating with the MP enables such tasks as:

- Verifying that the components are present and installed correctly
- Configuring the LAN port

**Interacting with the Management Processor** To interact with the MP command line interface, perform the following steps:

---

**NOTE** On initial system installation, the MP has two default user accounts:

- All Rights (Administrator) level user; login = Admin, password = Admin (both are case sensitive).

---

- Console Rights (Operator) level user; login = Oper, password = Oper (both are case sensitive).

For security reasons, HP recommends that you use the UC command during the initial logon session to modify default passwords (enter **CM** at the MP> prompt, and enter **UC** at the MP:CM> prompt).

---

**IMPORTANT** Deleting default users such as Admin prevents you from using the HP Systems Insight Manager group actions feature.

---

**Step 1.** Log in using your MP user account name and password.

---

**NOTE** If you are logged in, the MP Main Menu displays. To follow this procedure, make sure you are at the MP Main Menu. Use **Ctrl-B** to return to the MP Main Menu.

---

**Step 2.** Use the MP menus and commands as needed. Main Menu commands are shown in “MP Main Menu”. You can access commands not displayed in the MP Main Menu in command mode by first using the CM command at the MP prompt. You can display a list of available commands using the MP help function. Invoke the help function from either the MP Main Menu or the Command Menu prompts by entering **HE** followed by **LI**. You can return to the MP Main Menu by pressing **Ctrl-B**.

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

**MP Main Menu** Following are the MP 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
```

---

**NOTE** The previous example shows the Main Menu screen accessed through the local serial or remote modem ports. The list of commands displayed might be different and depends on your method of access to the MP.

---

### Configuring the Management Processor LAN Information

LAN information includes the management processor network name, IP address information, and configuring DHCP and DNS service information.

To configure the management processor LAN IP address:

**Step 1.** At the MP Main Menu prompt (MP>), enter **CM** to choose 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, because you might need it for future troubleshooting. See “The LC Command Screen” on page 21.

---

**NOTE** The default value in the “IP address” field is set at the factory. You must configure the actual MP LAN IP address.

---

**Step 3.** The screen displays the current LC data. When prompted to enter a parameter name, **A** to modify All, or **Q** to Quit, enter **A** to choose all parameters.

**Step 4.** The screen displays the current DHCP status. If DHCP is used to acquire IP address information, enter **E** to enable, **D** to disable, or **Q** unless you are using the local serial port.

To disable DHCP from the local serial port:

- a. Use the **LC** command to disable DHCP.
- b. Commit the DHCP change.
- c. Use the **LC** command again to set network parameters.

---

**CAUTION** Modifying the DHCP, IP address, gateway IP address, or subnet mask parameters will drop all present LAN and Web connections.

---

---

**NOTE** Changing DHCP status to Enabled or Disabled resets IP address, gateway IP address, and subnet mask parameters to factory default values.

---

---

**NOTE** If the IP address, gateway IP address, and subnet mask are obtained through DHCP, you cannot change them without first disabling DHCP.

---

**Step 5.** The screen displays the current IP address. When prompted to enter a new value or **Q**, enter the new IP address.

**Step 6.** The screen displays the current host name. When prompted to enter a new value or **Q**, enter the new MP network name.

This is the host name for the MP LAN displayed at the command prompt. It is also used to identify the MP LAN interface in a DNS database. The name can be up to 64 characters in length, and must start with a letter, end with a letter or number, and contain only letters, numbers, or dashes.

---

**NOTE** The host name is not case sensitive.

---

**Step 7.** The screen displays the current subnet mask name. When prompted to enter a new value or **Q**, enter the new subnet mask name.

**Step 8.** The screen displays the current gateway address. When prompted to enter a new value or **Q**, enter the new gateway address.

**Step 9.** The screen displays the current link state information. When prompted to enter a new value or **Q**, press **enter**. The message -> Current Link State has been retained displays.

**Step 10.** The screen displays the current Web console port number. When prompted to enter a new value or **Q**, press **enter**. The message -> Current Web Console Port Number has been retained displays.

**Step 11.** The screen displays the current SSH console port number. When prompted to enter a new value or **Q**, press **enter**. The message -> Current SSH Console Port Number has been retained displays.

---

**NOTE**            SSH settings will not display if you do not have Integrated Lights-Out Advanced Pack licensing.

---

**Step 12.** The screen displays a new LC listing, 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.

```
> LAN Configuration has been updated
-> Reset MP (XD command option 'R') for configuration to take effect.
MP Host Name: mpserver
```

**Step 13.** Enter **XD -reset** to reset the MP.

**Step 14.** After the MP resets, log in to the MP again. Then enter the MP command mode (enter **CM** at the MP: prompt).

**Step 15.** At the MP:CM> prompt, enter **LS** to confirm the new LAN settings.

**Step 16.** Enter **SA** to enable or disable Web console and telnet access after the MP has been reset.

**The LC Command Screen** The following screen shows LC command output:

```
MP:CM> LC -nc
Current LAN Configuration:
    MAC Address           : 0x0060b0f54c51
    DHCP Status           : Enabled
    IP Address             : 127.1.1.1
    MP Host Name           : maestro
    Subnet Mask            : 255.255.248.0
    Gateway Address        : 127.1.1.1
    Link State             : Auto Negotiate
    Web Console Port Number : 2023
    SSH Access Port Number  : 22
    IPMI/LAN Port Number   : 626
LAN status: UP and RUNNING
-> Command successful.
MP:CM>
```

---

**NOTE**            The SSH console port number does not display if you do not have Integrated Lights-Out Advanced Pack licensing.

---

## MP Command Reference

There are two menus from which commands are executed: the MP Main Menu and the Command Menu. You access the Command Menu by first using the `CM` command at the `MP>` prompt.

The following tables provide a reference for commands available through the command line interface.

**MP Main Menu Commands** Commands are listed in Table 1-2.

**Table 1-2 MP Main Menu Commands and Descriptions**

Command	Description
CL	View console log
CM	Enter command mode
CO	Select console mode
CSP	Connect to another service processor
HE	Display help for menu or command
SE	Enter OS session
SL	Show event logs
VFP	Display virtual front panel
X	Exit

**Command Menu Commands** Commands are listed in Table 1-3.

**Table 1-3 Command Menu Commands and Descriptions**

Command	Description
BP	Reset BMC passwords
CA	Configure async or serial ports
DATE	Display the current date
DC	Default configuration
DF	Display field replaceable unit (FRU) information
DI	Disconnect remote or LAN console
DNS	Set DNS configuration
FW	Upgrade MP firmware
HE	Display help for menu or command
ID	Display or modify system information
IT	Modify MP inactivity timers
LC	LAN configuration
LDAP	LDAP configuration

**Table 1-3 Command Menu Commands and Descriptions (Continued)**

Command	Description
LM	License management
LOC	Display and configure locator LED
LS	LAN status
MR	Modem reset
MS	Modem status
PC	Remote power control
PG	Paging parameter setup
PR	Power restore
PS	Power management module status
RB	Reset BMC
RS	Reset system through RST signal
SA	Set access options
SO	Configure security options
SS	Display system processor status
SYSREV	Display all firmware revisions
TC	Reset via transfer of control (TOC)
TE	Tell (send a message to other users)
UC	User configuration
VDP	Display virtual diagnostic panel LEDs
WHO	Display connected management processor users
XD	Diagnostics or reset of management processor

### Accessing MP Interface and System Logs

To access your MP interface and system logs, perform the following steps:

- 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 **c1** to display the console logs. This log displays console history from oldest to newest.
- Step 4.** Enter **s1** to display the system logs. The system logs consist of:
  - System event log
  - Forward progress log

- Current boot log
- Previous boot log
- Live events log

### System Event Logs (SEL)

**Step 1.** Access the management processor command prompt.

**Step 2.** Enter the **sl** command. The Event Log Viewer menu displays:

```
SL

Event Log Viewer Menu:

  Log Name                Entries    % Full    Latest Timestamped Entry
-----
  E - System Event        39         3 %      01 Nov 2004 17:15:03
  F - Forward Progress    1307       32 %
  B - Current Boot        299        99 %
  P - Previous Boot       0
  C - Clear All Logs
  L - Live Events

Enter menu item or [Ctrl-B] to Quit:
```

**Step 3.** Enter **e** to review the events. The Event Log Navigation menu displays:

```
  Log Name                Entries    % Full    Latest Timestamped Entry
-----
  E - System Event        39         3 %      01 Nov 2004 17:15:03

Event Log Navigation Help:

+      View next block      (forward in time, e.g. from 3 to 4)
-      View previous block (backward in time, e.g. from 3 to 2)
<CR>  Continue to the next or previous block
D      Dump the entire log for capture and analysis
F      First entry
L      Last entry
J      Jump to entry number
H      View mode configuration - hex
K      View mode configuration - keyword
T      View mode configuration - text
A      Alert Level Filter options
U      Alert Level Unfiltered
?      Display this Help menu
Q      Quit and return to the Event Log Viewer Menu
Ctrl-B Exit command and return to the MP Main Menu
```

**Step 4.** Enter **t** to select text mode.

**Step 5.** Enter **d** to dump the log to the screen. (If desired, save this file for reference.)

**Step 6.** To decode the blinking state of the system LED, review the entire SEL and look at events with alert level 3 and above.

For example:



Log Entry 24: 14 Feb 2003 15:27:02

Alert Level 3: Warning

Keyword: Type-02 1b0800 1771520

Hot Swap Cage: SCSI cable removed

Logged by: BMC; Sensor: Cable / Interconnect - SCSI ChExt Cable

Data1: Device Removed/Device Absent

0x203E4D0AC6020220 FFFF0008F61B0300

Log Entry 73: 00:00:12

Alert Level 3: Warning

Keyword: Type-02 050301 328449

The server's built-in sensors have detected an open chassis door.

Logged by: BMC; Sensor: Physical Security - Chassis Open

Data1: State Asserted

0x200000000C020570 FFFF010302050300

---

## 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 tool to help solve your problem:

- Offline Diagnostic Environment (ODE)

### Offline Diagnostic Environment (ODE)

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

**Step 1.** Power on your HP server and insert the *ODE CD*.

**Step 2.** Boot the system to the PDC prompt (BOOTADMIN, BCH, etc.). PDC prompts might 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 *ODE 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

The following commands are available at the ODE prompt:

**Table 1-4 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.

## Identifying and Diagnosing Hardware Problems

Should a hardware failure occur, the system LED and the System Event Log (SEL) will help you identify the problem:

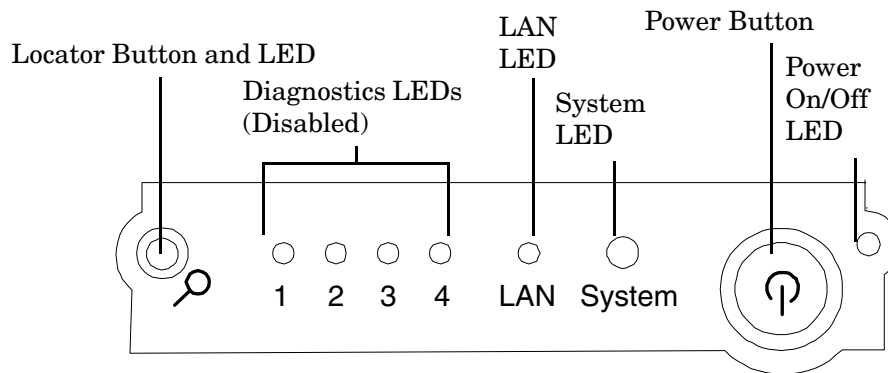
- LEDs. The lights on the front bezel of the server change color and blink in different patterns to help identify specific hardware problems. LEDs on the rear panel of the server display LAN status.
- The System Event Log (SEL) provides detailed information about the errors identified by the LEDs. Use the MP to view the SEL.

### Troubleshooting Using LEDs

If you suspect a hardware failure, the power and system LEDs, located on the front control panel, will help you identify the problem. The following sections describe their functions. Additional LEDs are provided on the system board (See “System Board LEDs” on page 30). You may want to back up your data or replace a component before it fails.

The boot process is monitored by the management processor (MP). With the current MP functionality, the four diagnostic LEDs are disabled (always off). You can monitor server operation from a console using the MP.

**Figure 1-1 Control Panel LEDs**



### Power and System LEDs

The power and system LEDs indicate the state of the system. When the system LED is blinking yellow or red, a problem exists.

**Table 1-5 System LED States**

System LED	State
Off	AC power off if power LED is off.
Solid green	Running OS.
Blinking green	Booting or running BCH.

**Table 1-5 System LED States (Continued)**

System LED	State
Blinking yellow (1/sec.)	Attention:  Alerts of levels 3-5 detected in the MP logs  The LED will turn off once the event log has been read.
Blinking red (2/sec.)	Fault:  System Alert 7 detected, LED will blink until the problem is resolved and the system boots successfully  Fatal hardware error detected by BMC, LED will blink until problem is corrected.

For system alerts of levels 3-5, you clear the attention condition on the LED by accessing the logs using the SL command available in the MP command mode.

The fault condition for system alerts of level 7 is cleared by resolving the problem and cycling power. Refer to the SL error logs for additional error information.

---

**NOTE** Always check the MP status logs in the case of a blinking yellow or red system LED before replacing any hardware.

---

## LAN LEDs

The front panel LAN LED indicates the system is communicating over the Gigabit or iLO manageability card LAN:

- Blinking green—The system is communicating over the LAN
- Solid green—LAN link is established; no current LAN activity
- Not green—No LAN cable attached; LAN network dead or the system is off

10/100/1000 LAN LEDs are on the rear panel:

**Table 1-6 10/100/1000 Base-T Ethernet LAN Connector LEDs**

LED	Description
1000BT	Blinking green—the 1000 MHz with ethernet protocol and twisted-pair wiring is enabled; off—no link
100BT	Blinking green—the 100 MHz with ethernet protocol and twisted-pair wiring is enabled; off—no link
10BT	Blinking green—the 10 MHz with ethernet protocol and twisted-pair wiring is enabled; off—no link
Activity	Blinking green—LAN activity

Four iLO manageability card LAN LEDs are also on the rear panel:

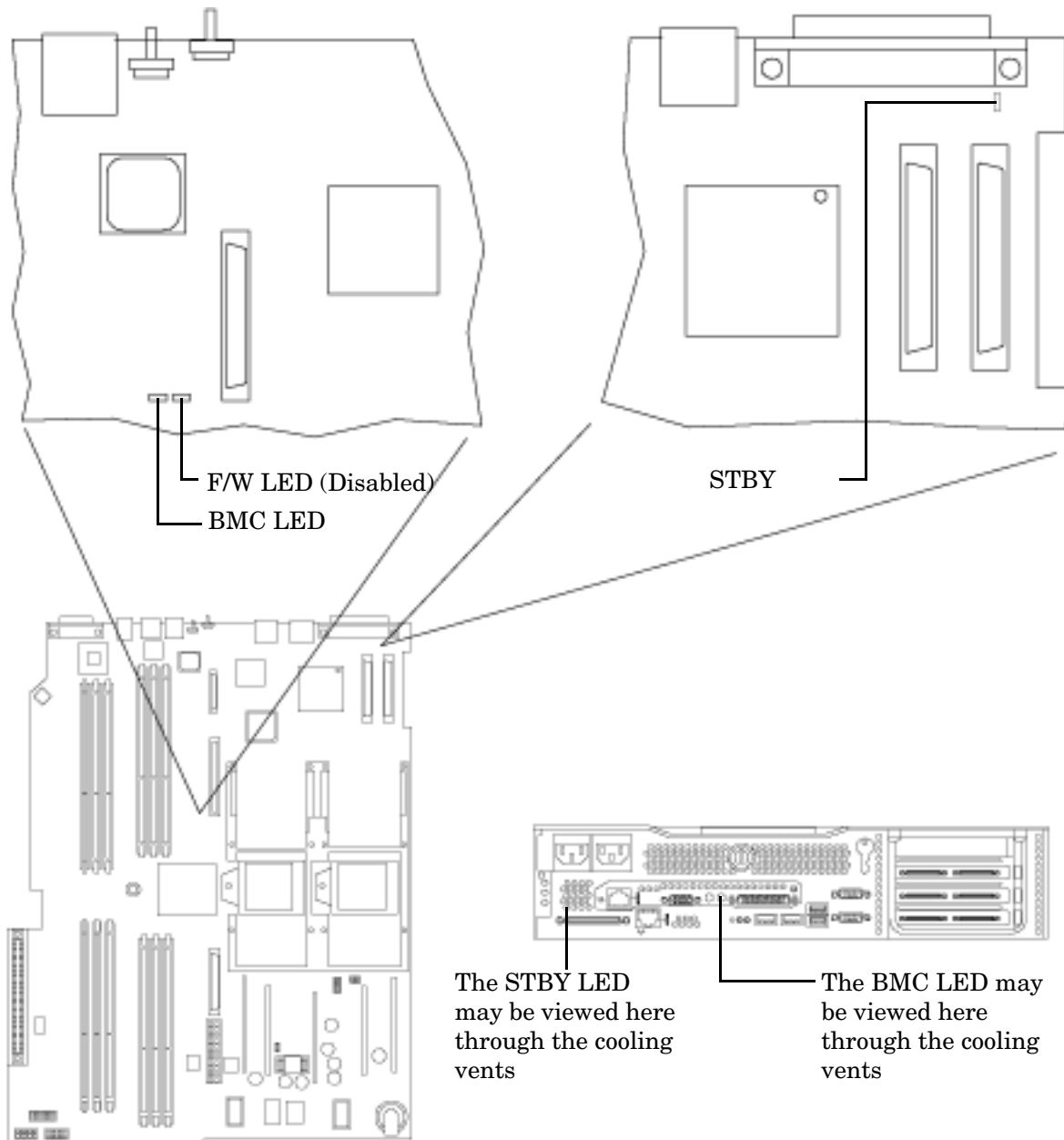
**Table 1-7 iLO Manageability Card LAN LEDs**

LAN LED	Location	Color	State
Self-test	Top	Yellow	MP running selftest or error
		Off	MP has booted
10BT	2nd from top	Green	10BT link established
		Blinking green	10BT activity
		Off	No link or 100BT link
100BT	2nd from bottom	Green	100BT link established
		Blinking green	100BT activity
		Off	No link or 10BT link
Standby power	Bottom	Green	Standby power on
		Off	Standby power off

## System Board LEDs

There are two additional LEDs that can help when troubleshooting the system. These LEDs are located on the system board close to the back of the system and are viewed through the small cooling holes in the system case.

**Figure 1-2 Location of the STBY and BMC LEDs**



**Table 1-8 System Board LEDs**

<b>LED</b>	<b>Description</b>
STBY	This standby LED comes on as soon as the system's power cord is plugged in. If this light is off when you plug it in, reseal the power supply, and if this does not work, replace the power supply.
BMC	A few seconds after the system is plugged in this LED starts blinking, which means that the baseboard management controller is active.

---

## Cleaning Procedures

The following table identifies cleaning procedures for the HP 9000 rp3410 and HP 9000 rp3440 servers.

---

**IMPORTANT** Turn off power to the server when cleaning it.

---

The following table provides instructions on how to clean the server.

**Table 1-9**            **Cleaning**

Component	Time Frame	Cleaning Procedure
Keyboard	Regularly	Dust with damp, lint-free cloth.
Monitor screen	Regularly	Use the HP Video Screen Cleaning Solution found in 92193M Master Clean Kit.
Mouse	Regularly	Refer to the mouse's manual for mouse maintenance procedures.
Cooling fans and grills	6 Months	Check functions of cooling fans and clean the intake openings on the chassis of dust, lint, and other obstructions to airflow.

---

**CAUTION**    DO NOT use petroleum-based cleaners (such as lighter fluid) or cleaners containing benzene, trichlorethylene, ammonia, dilute ammonia, or acetone. These chemicals could damage all plastic and painted surfaces.

---



---

## 2 Removing and Replacing Components

---

### Safety Information

This chapter describes replacing hardware in the HP 9000 rp3410 and HP 9000 rp3440 servers. Use care to prevent injury and equipment damage when performing these procedures. Voltages may be present within the server. Many assemblies are sensitive to damage by electrostatic discharge.

Follow the procedures listed below to ensure safe handling of components and to prevent personal injury and to prevent damage to the HP server:

- If removing or installing a hot-swap or hot-plug item, follow the instructions provided in this guide
- If installing a hot-swap item when power is applied (fans are running), reinstall the server cover immediately to prevent overheating
- If installing an assembly that is not hot-swappable, disconnect the power cable(s) from the server external power connector(s)

---

**WARNING** Ensure that the system is powered down and all power sources have been disconnected from the server prior to working with the server.

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

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

---

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

---

### 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
- Special processor tool kit, HP P/N 5069-5441

## Location of Internal Components and Connectors

Figure 2-1 Internal Physical Layout

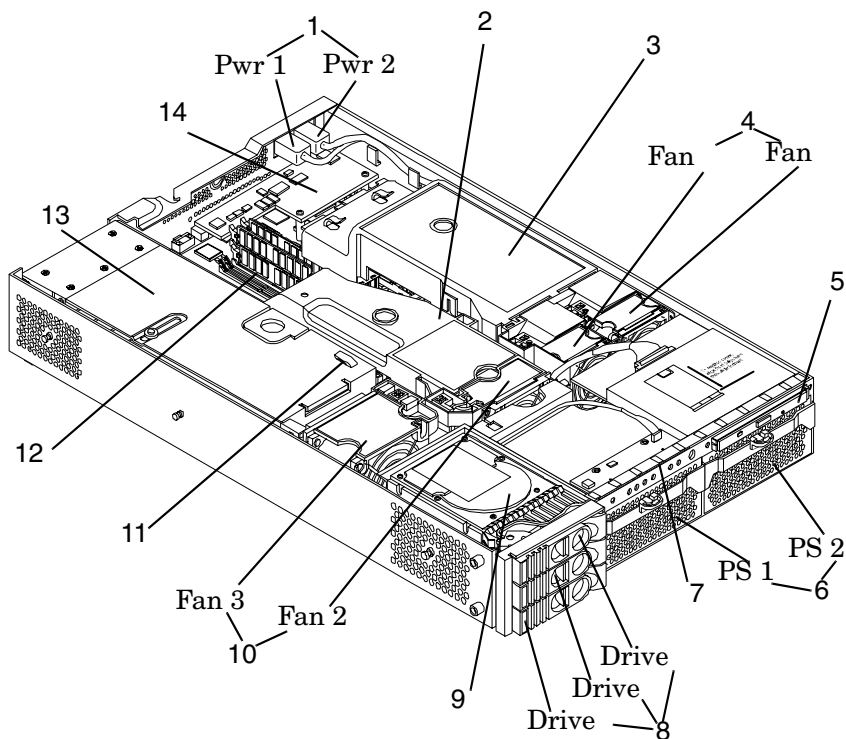
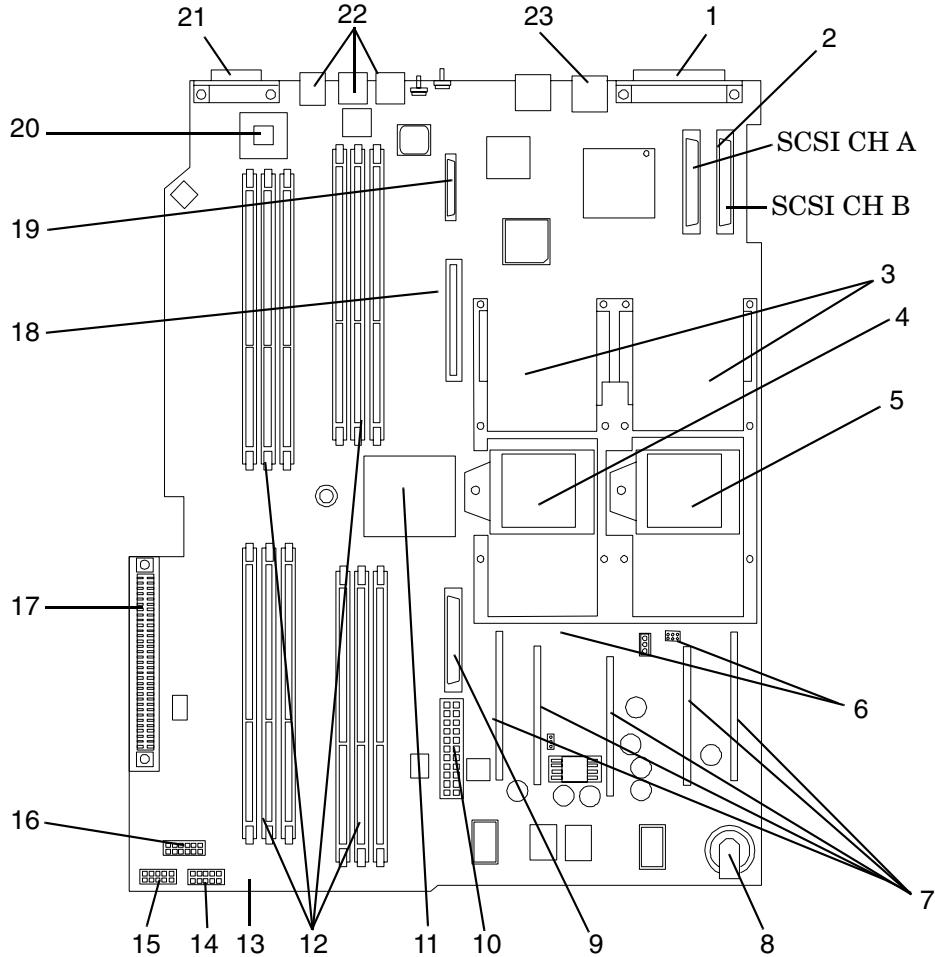


Table 2-1 Component Locations

1	Power receptacles (PWR1 left, PWR2 right)	8	Hot-pluggable hard drives (up to 3)
2	Memory airflow guide	9	Hard disk
3	Processor airflow guide	10	System fans (Fan 2 center, Fan 3 PCI card cage)
4	System fans (Fan 1A right, Fan 1B left)	11	Intrusion switch
5	Slimline optical drive	12	Memory sockets
6	Power supplies (PSU1 center, PSU2 under optical drive)	13	PCI card cage
7	Status panel board	14	iLO manageability card

**Figure 2-2 System Board Connectors and Slots**



**Table 2-2 Connector Locations**

1	External SCSI connector	9	Power supply fan connector	17	PCI backplane connector
2	SCSI connectors A & B	10	Power module power connector	18	Optical drive connector
3	CPU power pods	11	HP ZX1 memory and I/O controller (under heatsink)	19	iLO manageability card connector
4	CPU 1	12	Memory sockets	20	HP ZX1 I/O adapter
5	CPU 0	13	Status panel connector	21	Serial ports (2) (factory use only)
6	Turbo fan power connectors	14	Power module auxiliary connector	22	USB connectors (4)
7	Five VRM cards	15	SCSI backplane power connector	23	LAN connector
8	Battery	16	PCI/memory fan cable connector		

## Removing and Replacing System Cover and Bezel

To upgrade, remove, or replace most system components, you must first remove the covers from the system chassis. This section explains how to remove and replace the covers for both tower and rackmount configurations.

---

**WARNING** Do not remove the system cover without first turning the system off and unplugging the power cord from the outlet or power protection device unless you are only replacing a hot-swappable fan. Always replace the cover before turning the system on.

---

### Tower Configuration

Both the HP 9000 rp3410 and the HP 9000 rp3440 servers are available in a tower configuration or may be converted from a rack to a tower configuration. To access the internal components on a tower system, you must remove the plastic and metal left-side covers.

### Removing the Side Covers

---

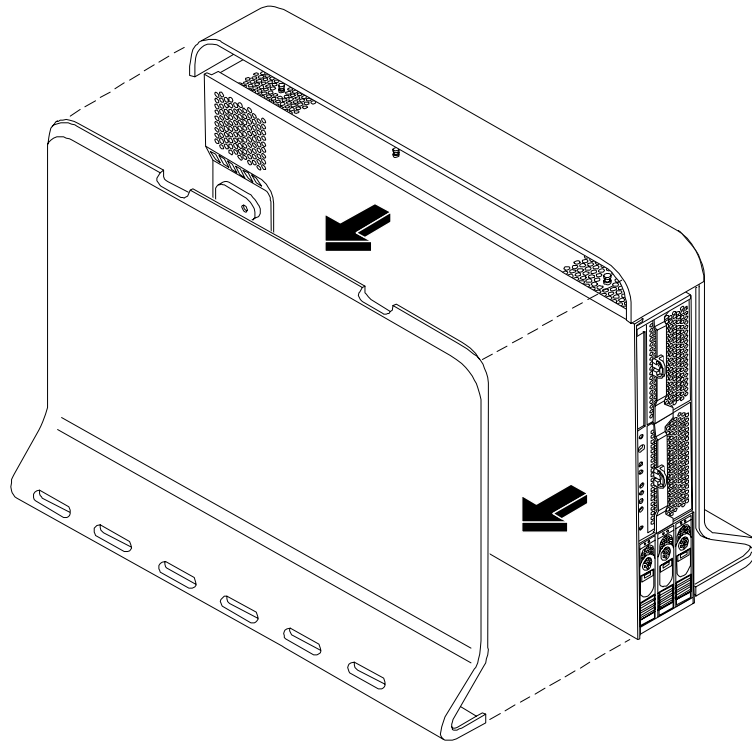
**NOTE** If you are replacing a hot-swappable item, you can leave the system on and external cables (including the power cord) connected.

---

- Step 1.** Turn off the system and disconnect the power and external cables.
- Step 2.** Remove the plastic cover.
  - a.** Grasp both indentations at the top of the side panel and pull outward.

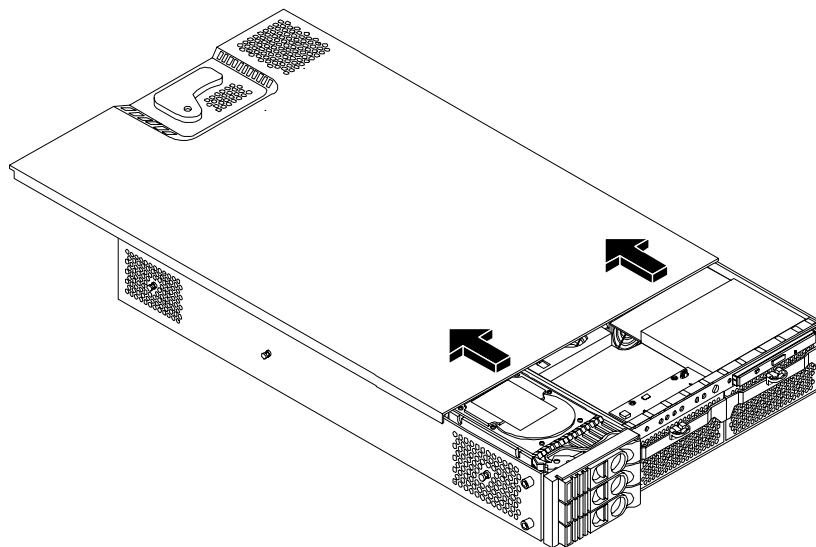
- b. Lift the plastic cover off of the system chassis.

**Figure 2-3 Removing the Plastic Cover**



- Step 3.** Remove the metal cover.

**Figure 2-4 Removing the Metal Cover**



- a. Turn the top cover lock keyswitch to the unlocked position.
- b. Rotate the blue release handle to release the latch.

- c. Slide the cover toward the back of the chassis, then lift it off.

---

**CAUTION** The HP server depends on the access panels being closed for proper cooling of internal components. Operating the system with the side cover removed can cause the system to quickly overheat.

---

### Replacing the Covers

**Step 1.** Replace the metal cover:

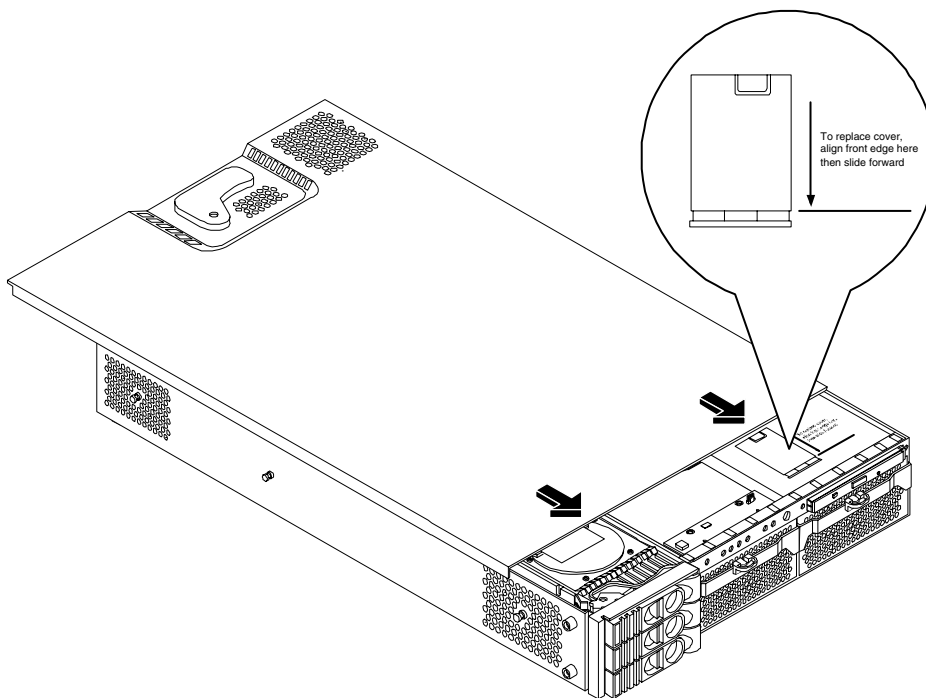
---

**CAUTION** Secure any wires or cables in your system so they do not get cut or interfere with the replacement of the cover.

---

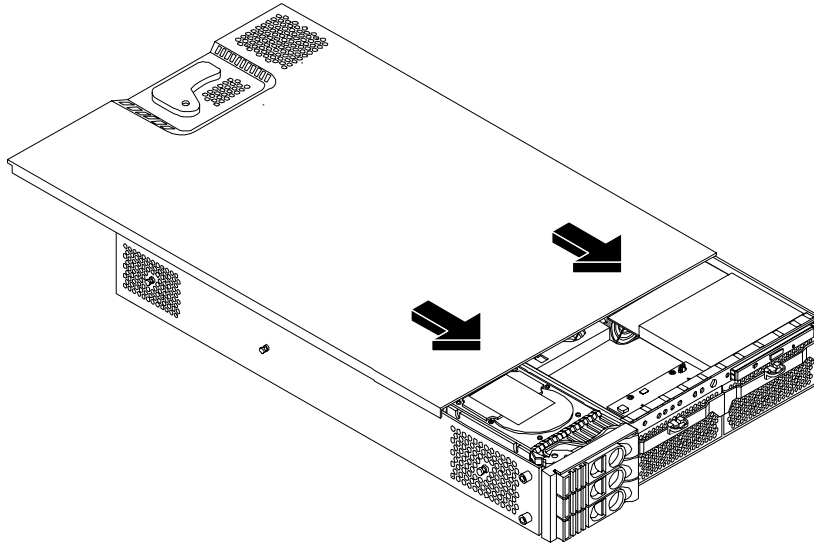
- a. Align the front edge of the metal cover with the alignment mark on the optical drive bay (Figure 2-5).

**Figure 2-5 Metal Cover Alignment Mark**



- b. Place the metal cover on the chassis and slide it toward the front of the system until the blue release lever snaps in place (Figure 2-6).

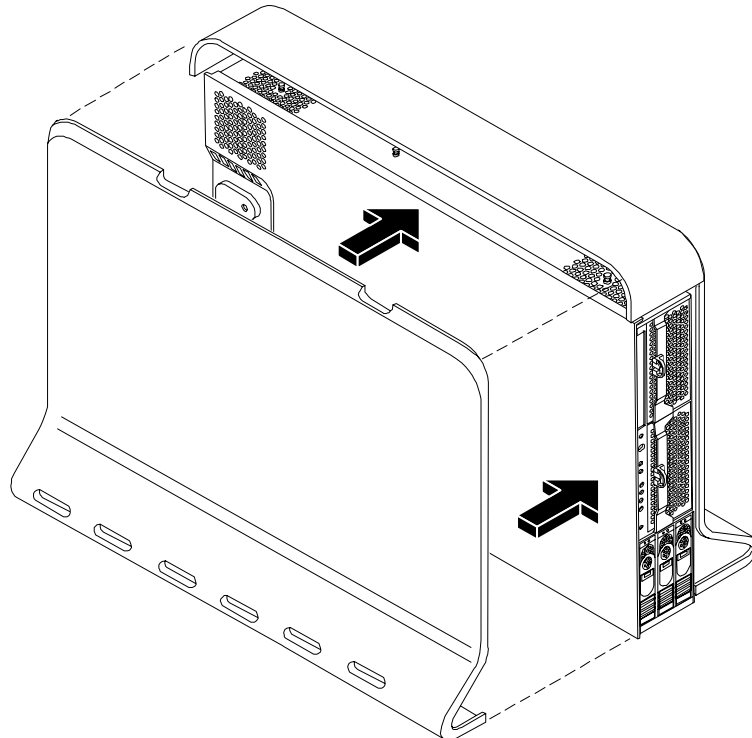
**Figure 2-6 Replacing the Metal Cover**



**Step 2.** Replace the plastic cover:

- a. Align the cover's mounting holes with the matching tabs on the system chassis.
- b. Close the cover until it snaps onto the system chassis.

**Figure 2-7 Replacing the Plastic Cover**



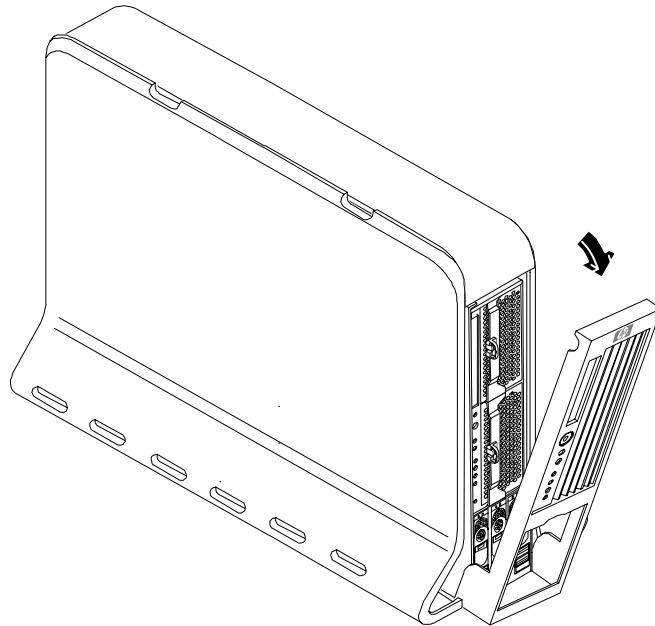
### Removing and Replacing Front Bezel

You must remove the front bezel from the chassis to gain access to the power supplies and optical drive.

#### Removing the Front Bezel

To remove the front bezel parts, perform the following steps:

**Figure 2-8**      **Front Bezel**



**Step 1.** Use the indentation at the top edge of the bezel to pull the bezel away from the chassis and to a 45 degree angle (Figure 2-8).

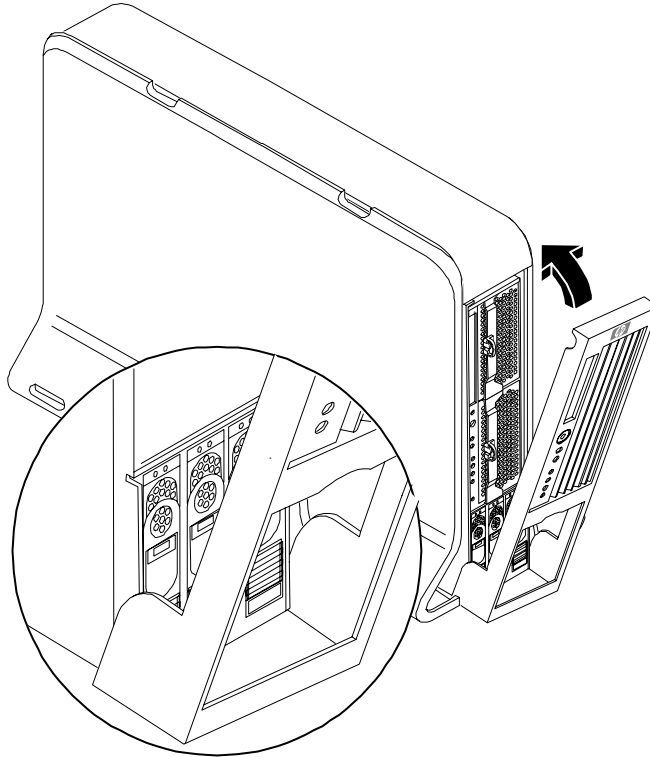
**Step 2.** Lift the bezel off the mounting tabs and away from the chassis.



## Replacing the Front Bezel

To replace the front bezel parts, perform the following steps:

**Figure 2-9**      **Aligning the Tower Front Bezel**



**Step 1.** Position the bezel at an approximate 45 degree angle and align the retaining slots at the bottom with the retaining tabs on the chassis. Press the bezel against the chassis to engage the tabs (Figure 2-9).

**Step 2.** Rotate the bezel against the chassis so that it snaps into place.

## Rack-Mount System

To access the internal components on a rack-mounted system, pull the system out onto the rail guides and remove the metal cover.

### Accessing a Rack Mounted Server

The HP 9000 rp3410 and HP 9000 rp3440 servers are designed to be rack mounted. The following procedure explains how to gain access to a server that is mounted in an approved rack. For slide installation instructions, refer to the *Installation Guide, Mid-Weight Slide Kit, 5065-7291*.

---

**WARNING**      **Ensure that all anti-tip features (front and rear anti-tip feet installed; adequate ballast properly placed, etc.) 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 to work on it.

---

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

---

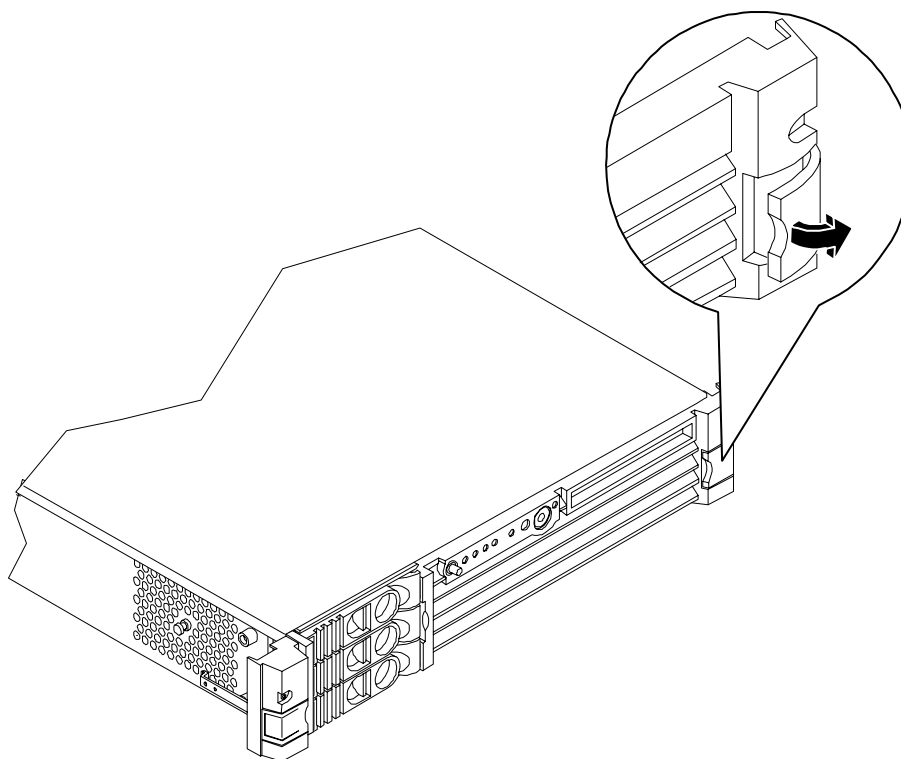
**NOTE** If you are replacing a hot-swappable item, you can leave the system on and external cables (including the power cord) connected.

---

**Step 1.** Turn off the system and disconnect the power and external cables from the back of the system.

**Step 2.** Release the rack latches by rotating them outward.

**Figure 2-10 Release the Rack Latches**



**Step 3.** Slide the system out of the rack until the guide-rail release clips are visible.

### 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.** Verify that the rack latches are closed.

## Removing and Replacing the Metal Cover

### Removing the Metal Cover

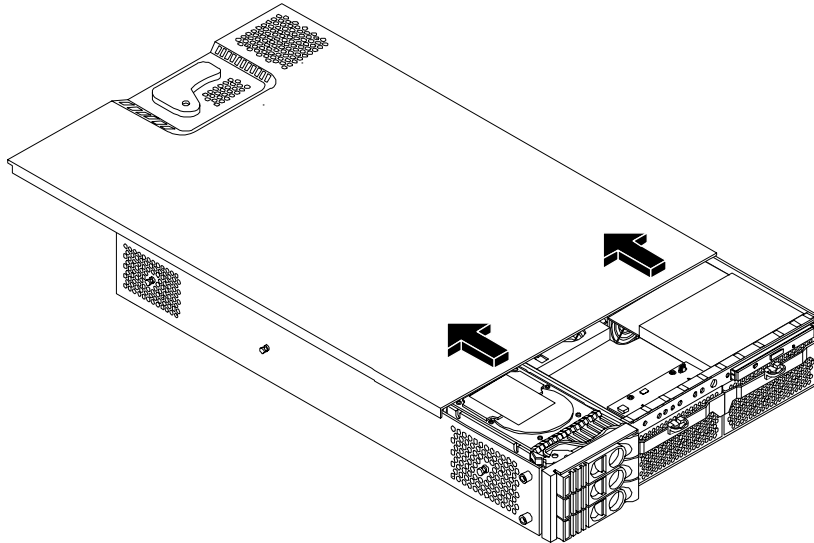
---

**NOTE** If you are replacing a hot-swappable item, you can leave the system on and external cables (including the power cord) connected.

---

- Step 1.** Turn off the system and disconnect the power and external cables from the back of the system.
- Step 2.** Ensure the top cover lock keyswitch is in the unlocked position. Rotate the blue release lever toward the back of the system and slide the cover toward the back of the system (Figure 2-11).

**Figure 2-11 Removing and Replacing the Metal Cover**



- Step 3.** Lift the cover off the system chassis.

### Replacing the Cover

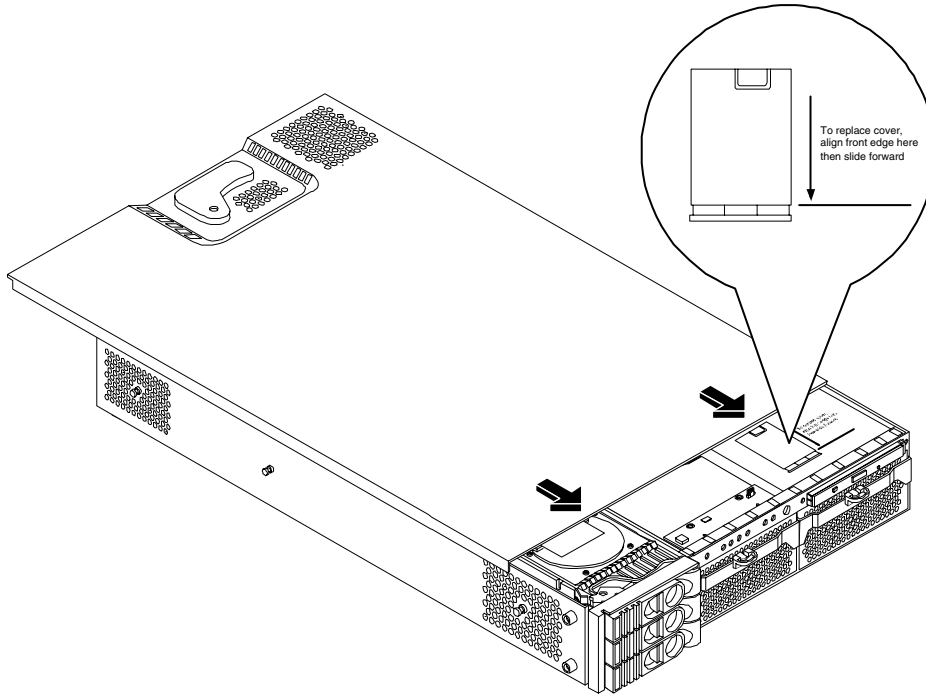
---

**CAUTION** Secure any wires or cables in your system so they will not get cut or interfere with the replacement of the cover.

---

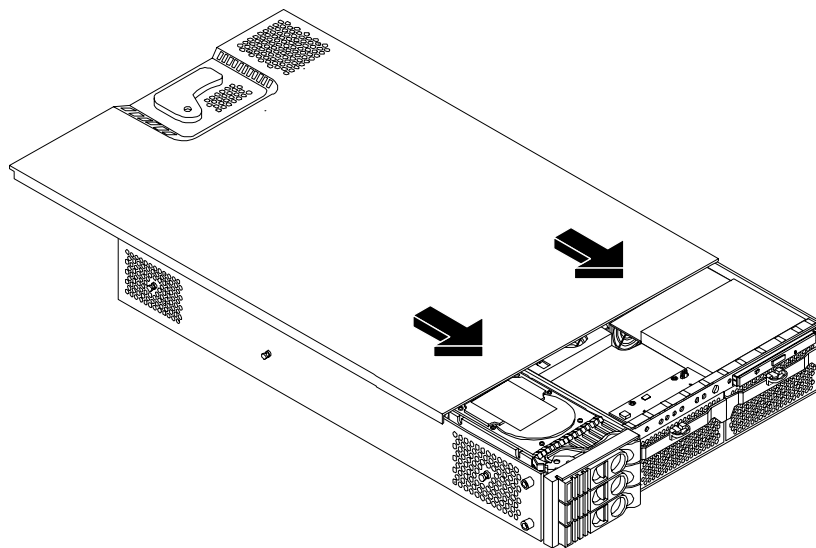
**Step 1.** Align the front edge of the cover with the alignment mark on the optical drive bay (Figure 2-12).

**Figure 2-12 Aligning the Metal Cover**



**Step 2.** Grasp the blue release lever and slide the cover toward the front of the system until the lever snaps into place (Figure 2-13).

**Figure 2-13 Closing the Metal Cover**



**Step 3.** Slide the system into the rack enclosure and reconnect the power and external cables.

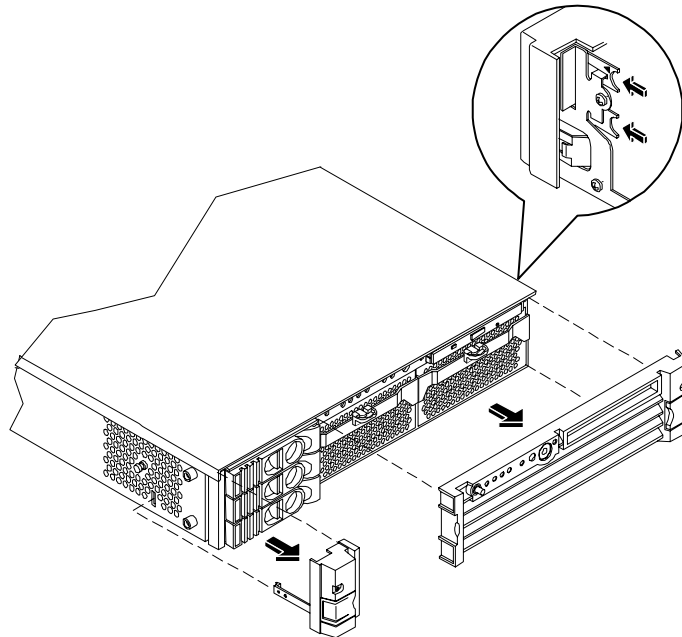
## Removing and Replacing the Front Bezel

You must remove the front bezel from the chassis to gain access to the power supplies and optical drive.

### Removing the Front Bezel

**Step 1.** Press in on the retaining clips located on the right-side of the front panel (Figure 2-14).

**Figure 2-14 Front Bezel Retaining Clip**



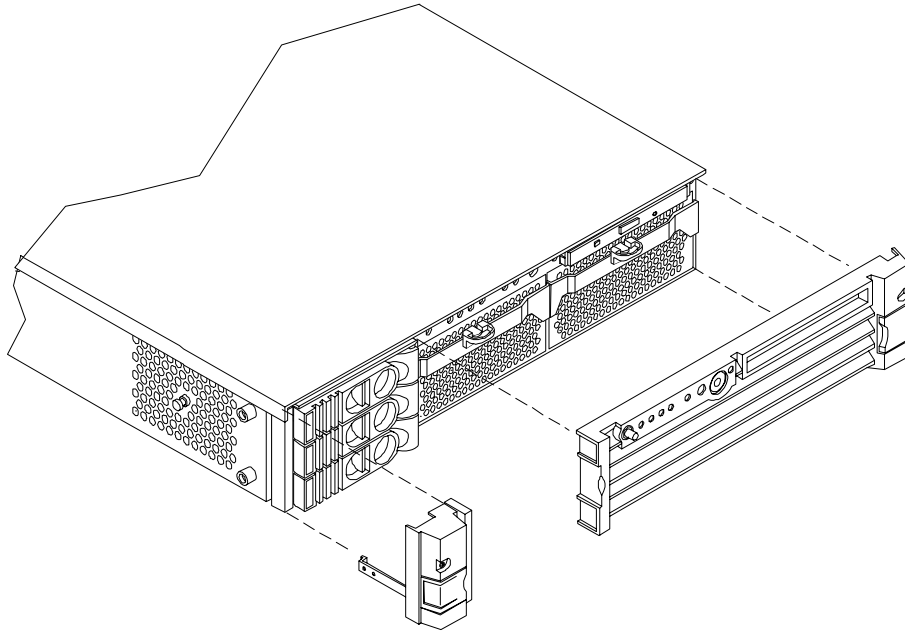
**Step 2.** Rotate the front panel outward and lift it off the system chassis.

### Replacing the Front Bezel

**Step 1.** Insert the bezel latches into the matching slots on the system chassis.

**Step 2.** Close the bezel and push toward the front of the system until it locks into place.

**Figure 2-15 Replacing the Front Bezel**



## Removing and Replacing Hot-Swap and Hot-Plug Devices

The HP 9000 rp3410 and HP 9000 rp3440 servers have hard disk drives that are hot-pluggable and power supplies and fans that are hot-swappable. This section explains how to swap these devices while the system is running:

- System fans
- Power supplies
- Hard drives

### Removing and Replacing System Fans

There are four system fans to keep the system cool when it is running. The system fans are hot-swappable, enabling you to replace a fan while the system is running.

---

**CAUTION** When the system is running, the metal cover must be replaced within 5 minutes to prevent components from overheating.

---

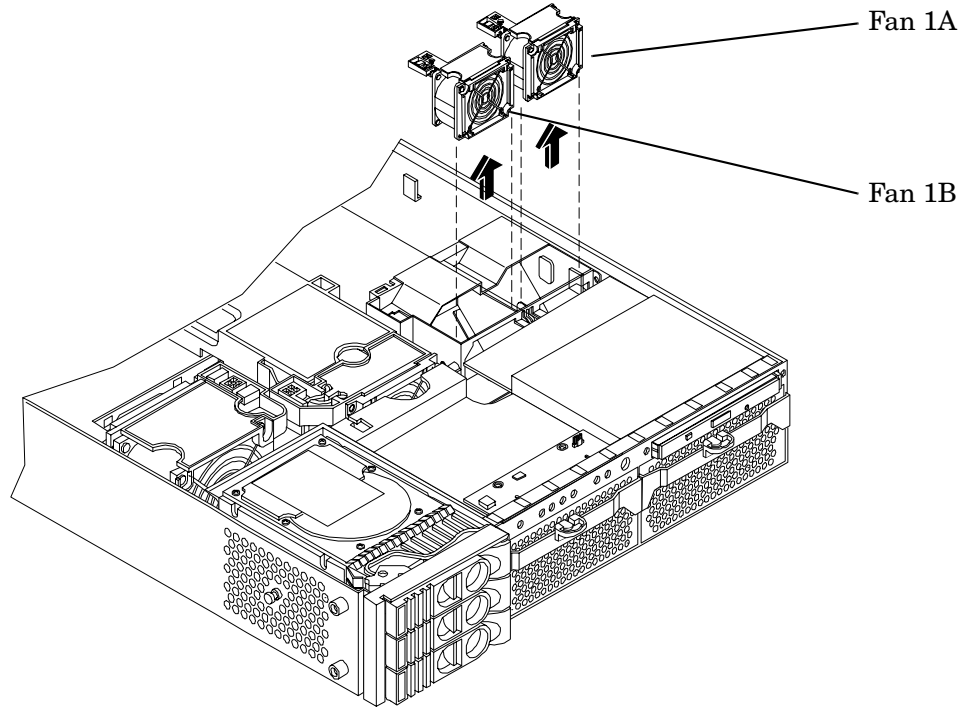
#### Removing a System Fan

**Step 1.** Remove the system cover.

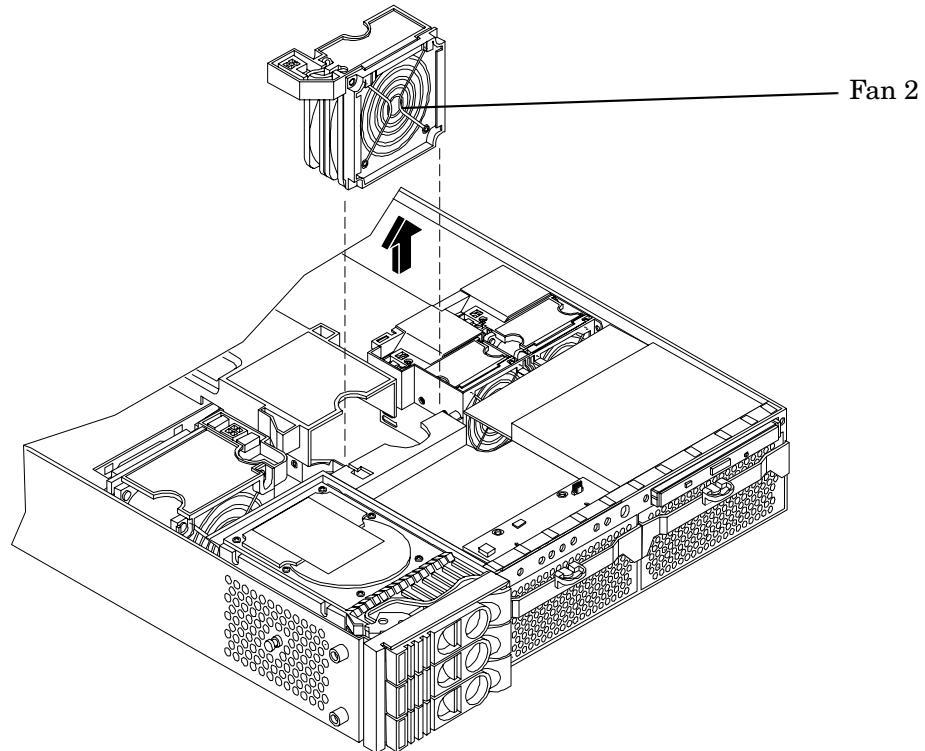
**Step 2.** Remove the fan.

- a. To remove fan 1A, 1B, 2 or 3 from a rack-mounted system, or fan 3 from a tower system, grasp the appropriate fan and lift it out of the fan socket (Figure 2-16; Figure 2-17; Figure 2-18).

**Figure 2-16 Fan 1A or Fan 1B Removal**

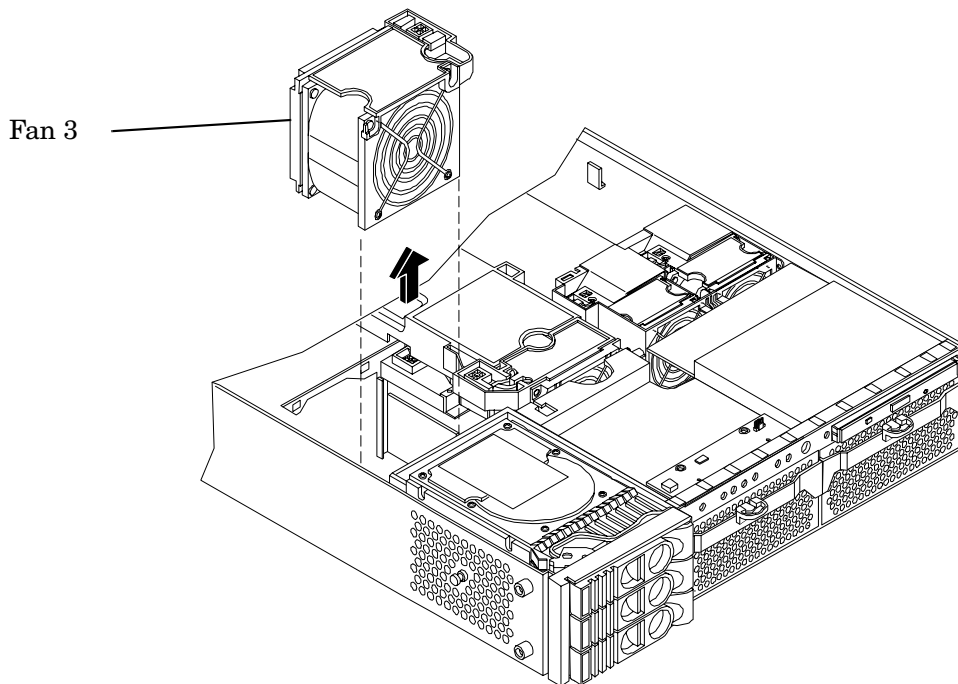


**Figure 2-17 Fan 2 Removal**





**Figure 2-18 Fan 3 Removal**



### Replacing a System Fan

- Step 1.** Grasp the replacement fan module and insert it into its fan socket.
- Step 2.** For fans 1A, 1B, or 2, connect the fan power connector.

---

**CAUTION** Replace the metal cover within 5 minutes to prevent damage to the system components.

---

- Step 3.** Replace the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 4.** Use the `PS` command of the MP to verify fan operation. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)

### Removing and Replacing the Power Supply

The power supplies in the HP server are hot-swappable, that is if one power supply stops working or exhibits voltage problems, the remaining supply can support the system until the failed unit is replaced. A power supply can be removed and replaced without turning off the system on systems that contain two power supplies.

---

**CAUTION** Before removing a power supply, make sure the second power supply is functioning properly. The two green LEDs inside the supply must both be lit on the second supply before the failed power supply can be safely removed.

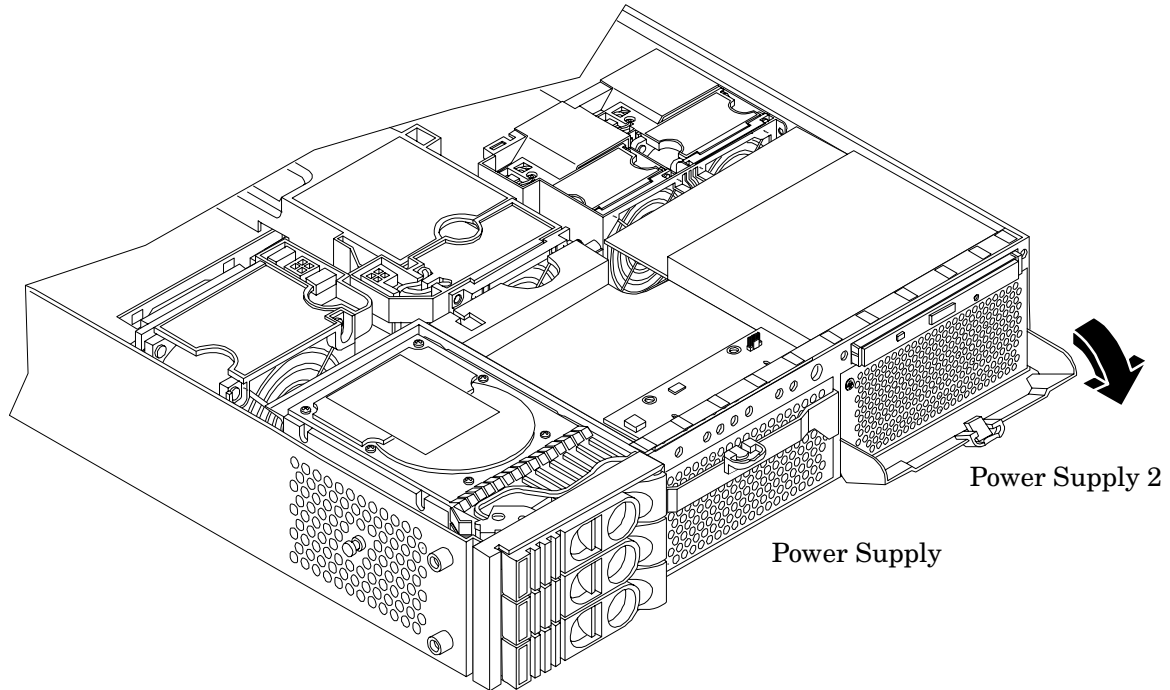
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### Removing the Power Supply

To remove the power supply, perform the following steps:

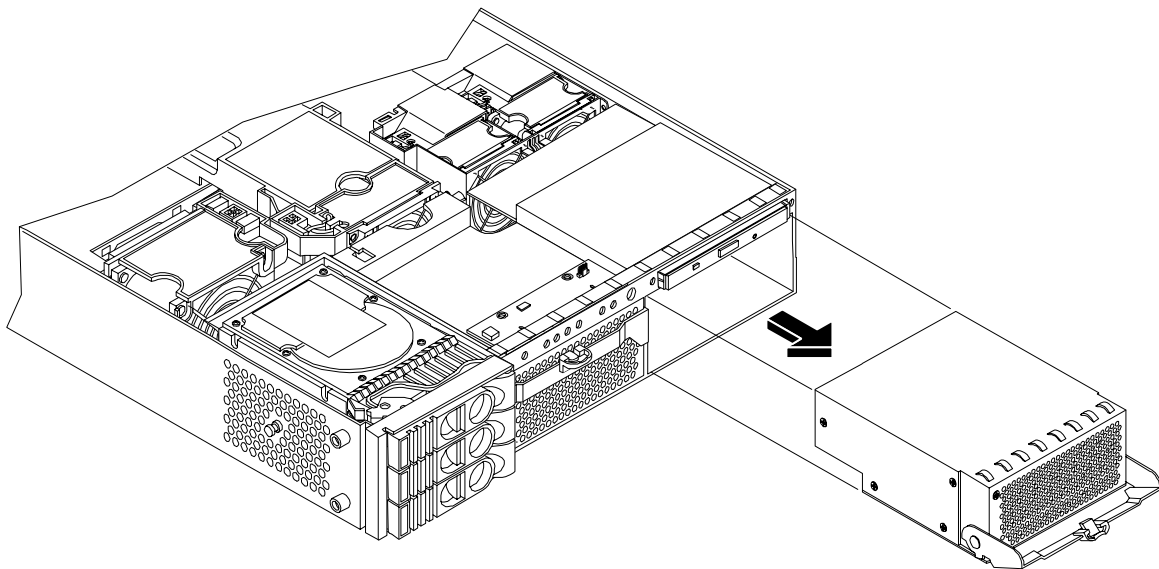
- Step 1.** Remove the front bezel from the HP server. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 2.** Press the power supply retaining clip to unlatch the power supply release lever (Figure 2-19).

**Figure 2-19 Releasing the Power Supply Retaining Clip**



- Step 3.** Press the power supply release lever down and slide the power supply out of the system (Figure 2-20).

**Figure 2-20 Removing the Power Supply**

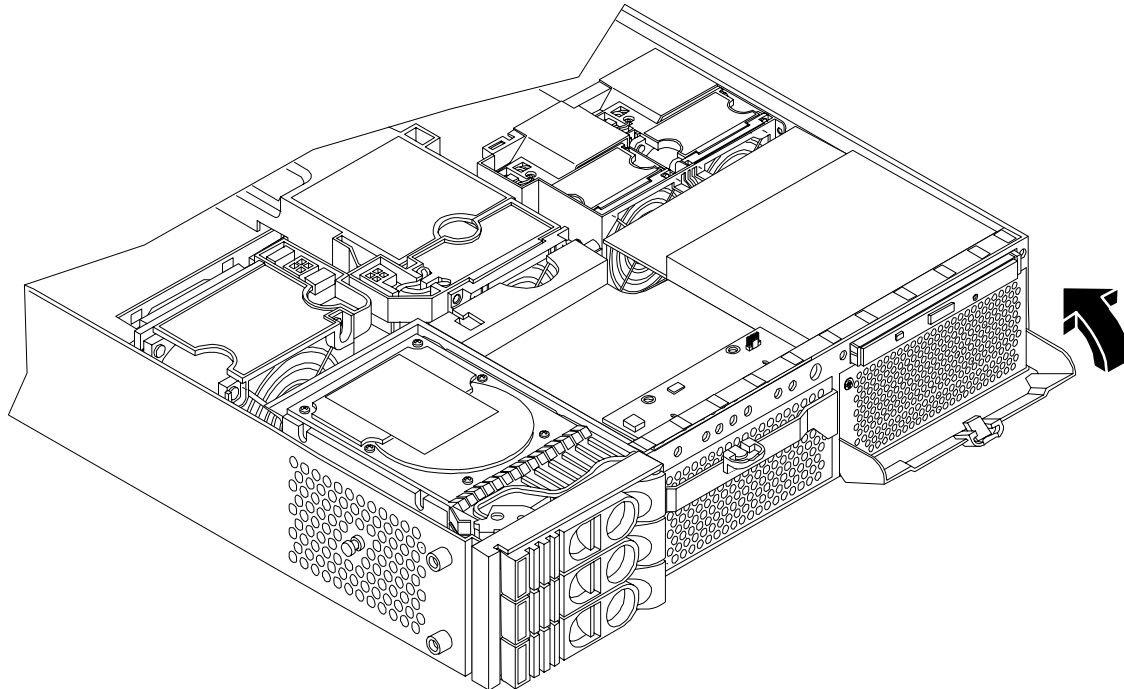


## Replacing the Power Supply

To replace the power supply, perform the following steps:

**Step 1.** Open the power supply release lever and slide the power supply into place.

**Figure 2-21 Replacing the Power Supply**



**Step 2.** Push in on the power supply release lever to lock the retaining clip in place (Figure 2-21).

**Step 3.** Replace the front bezel. (See “Removing and Replacing System Cover and Bezel” on page 36.)

**Step 4.** Verify that both power supply LEDs are lit.

**Step 5.** Use the `PS` command of the MP to verify power supply operation (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)

## Removing and Replacing an Internal Hard Disk Drive

This section provides information about removing and replacing internal hard disk drives.

The HP 9000 rp3410 or HP 9000 rp3440 server system can support up to three hot-pluggable, Low-Voltage Differential (LVD) hard disk drives. These hard disk drives are 3.5-inch form factor devices that connect to Ultra 160 Wide LVD SCSI interfaces on the disk cage backplane.

There is a significant difference between the terms hot swappable and hot pluggable:

- Hot swapping happens at the device level; that is, a hot-swappable device manages insertion or removal on its own without assistance from operating system commands
- The hot-plug process allows you to replace a defective disk drive in a high-availability system while it is running

- CAUTION** The disk drives in the HP 9000 rp3410 and HP 9000 rp3440 servers are not hot swappable; they are merely hot pluggable. A manual software procedure must be done in order to safely remove or insert disk drives while the system is running. To avoid damage to the hard drives:
- Refer to the documentation provided with the drive for additional details on inserting or removing a disk drive
  - Refer to your OS documentation for instructions on preparing the OS for inserting or removing a hard drive
- 

### Removing a Hard Disk Drive

To remove a hard disk drive, perform the following steps:

- Step 1.** If the server is powered on and the OS is running, prepare the OS to have the disk drive removed. (Refer to your OS documentation for instructions on preparing the OS for removing and inserting hard drives.)
- Step 2.** If you have locked your hard drives, you must unlock them before removing or replacing a drive:
- 

- CAUTION** When the system is running, the metal cover must be replaced within 5 minutes to prevent components from overheating.
- 

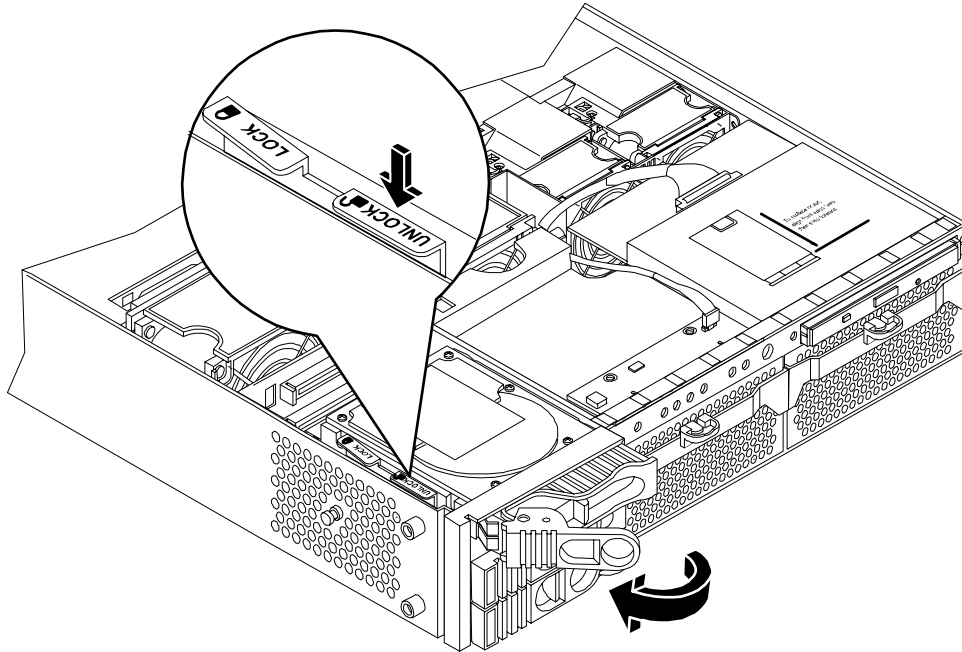
- a. Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- b. Press down on the UNLOCK lever to unlock the drive (Figure 2-22).

---

**CAUTION** If you try to remove a hard disk drive without unlocking it from the system, you will damage the hard drive bay.

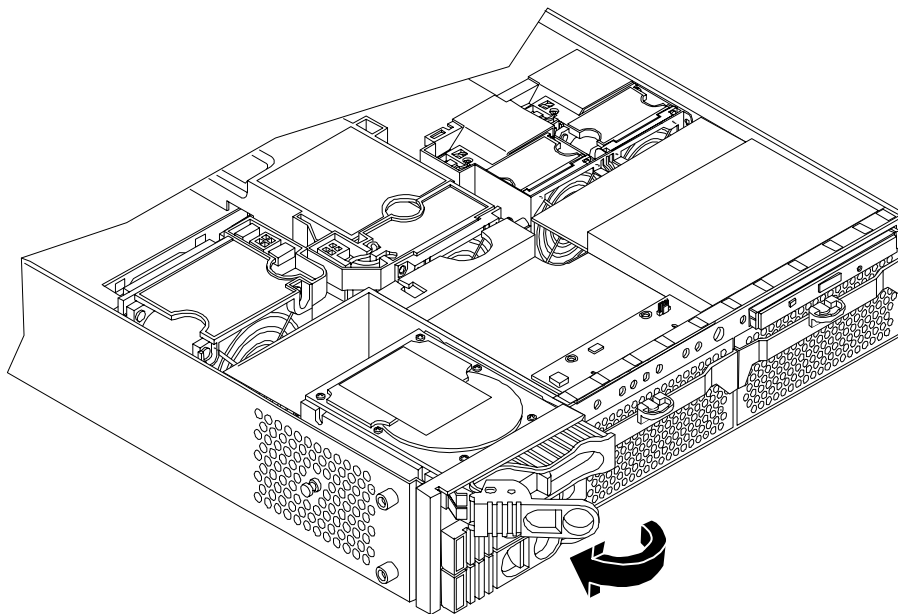
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**Figure 2-22 Unlocking the Disk Drive**



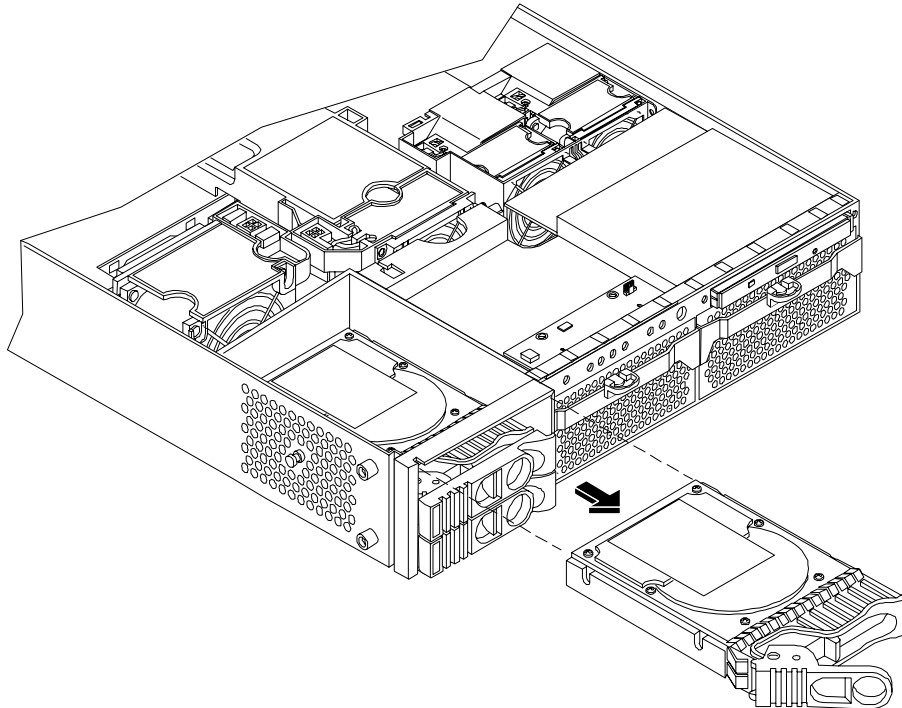
**Step 3.** Squeeze inward on the colored release clip on the hard drive release lever.

**Figure 2-23 Releasing the Disk Drive**



**Step 4.** Pull outward on the release lever to remove the drive from the system (Figure 2-23; Figure 2-24).

**Figure 2-24 Removing the Disk Drive**



### Replacing a Hard Disk Drive

To install or replace a hard disk drive, perform the following steps:

- Step 1.** If the server is powered on and the OS is running, prepare the OS to have the disk drive removed. (Refer to your OS documentation for instructions on preparing the OS for removing and inserting hard drives.)
- Step 2.** If you are locking the hard drive in place, remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

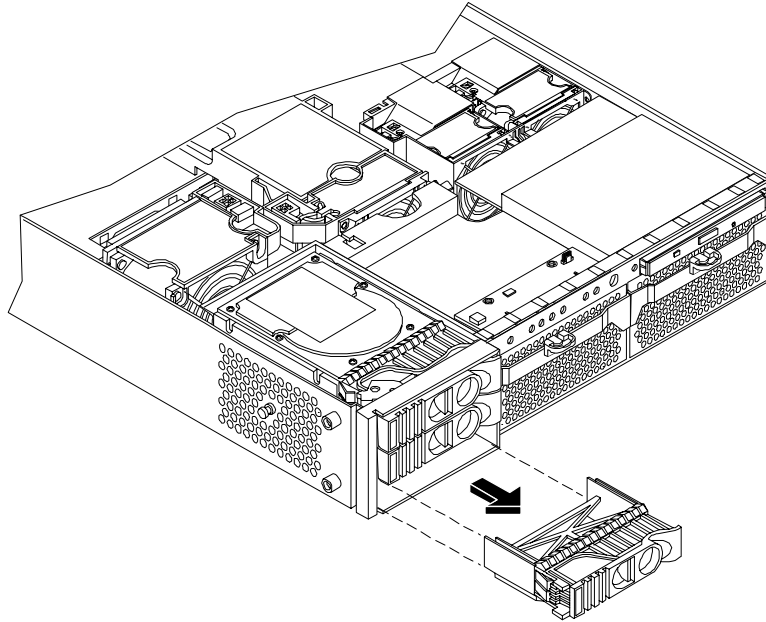
---

**CAUTION** Replace the metal cover within 5 minutes to prevent damage to the system components.

---

- Step 3.** If a disk drive slot filler is installed, remove the slot filler by pulling it from the disk drive slot (Figure 2-25).

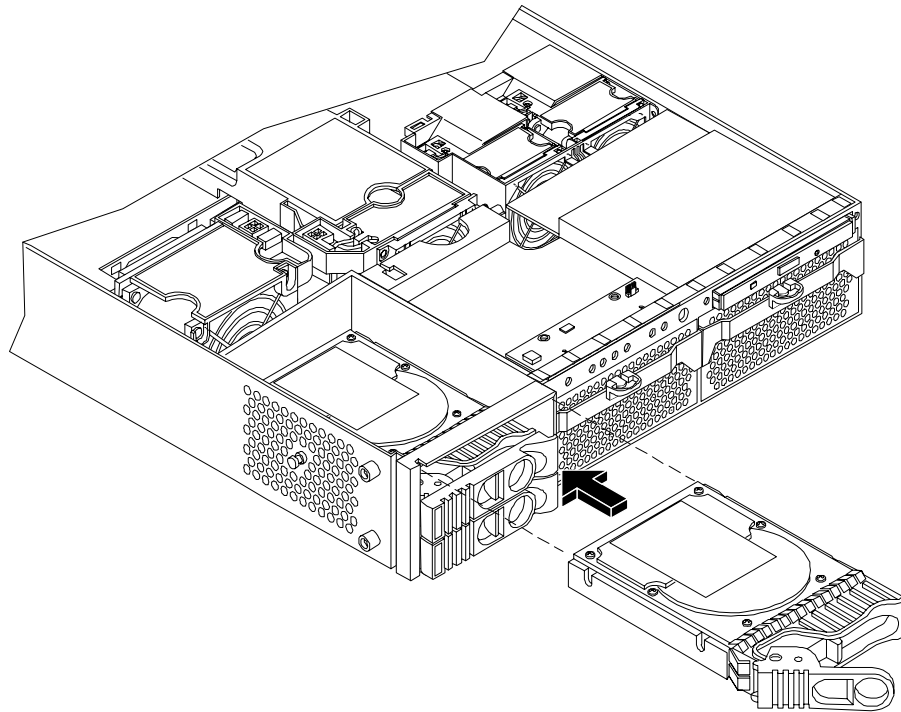
**Figure 2-25 Removing Disk Drive Slot Filler**



- Step 4.** Insert the hard disk drive into the drive bay from which you removed the drive and push inward on the release lever until the drive no longer slides forward. You must leave the release lever in the open position, as shown, when you push the drive into the system (Figure 2-26.)

**Step 5.** Push in on the release lever to secure the drive in the bay and to ensure that the drive connector is seated properly.

**Figure 2-26 Hard Disk Drive Installation**



- Step 6.** Lock the hard drives in place by press down on the LOCK lever. Replace the server cover if it was removed to unlock drives. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 7.** Verify the drive replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
  - Use diagnostics provided by the ODE to exercise the newly installed module
- Step 8.** Reset the system to the BCH Service Menu to rescan the hard drives.



## Removing and Replacing Internal Components

To upgrade, remove, or replace most system components, you must first remove the covers from the system chassis.

---

**WARNING** Do not remove the system cover without first turning the system off and unplugging the power cord unless you are only replacing a hot-swappable system fan. Always replace the cover before turning the server on.

---

### Removing and Replacing Airflow Guides

The system has the following airflow guides:

- The processor airflow guide ensures that the proper volume of air for cooling the processor module power pods, processor module(s), and voltage regulator module(s) flows over these components

You must remove the processor airflow guide:

- If it is damaged to the point that airflow across the dual processor module(s) is restricted
- To access components under the airflow guide
- The memory airflow guide ensures that the proper volume of air flows over the memory DIMMs to cool them

You must remove the memory airflow guide:

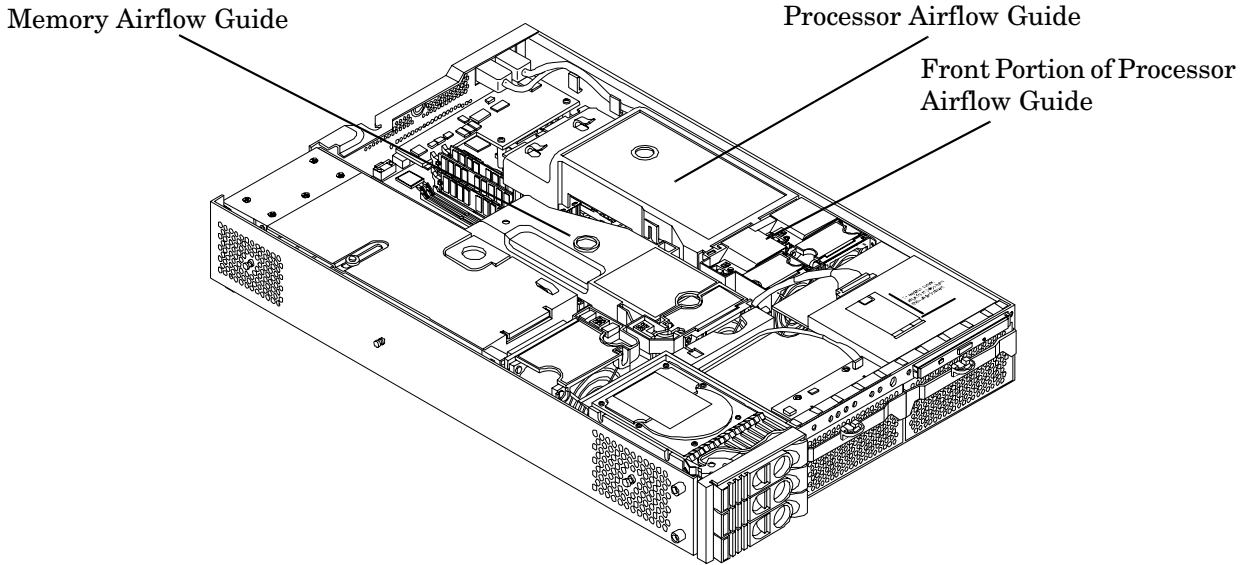
- If it is damaged to the point that airflow across the memory DIMMs is restricted
- To access memory DIMMs and sockets

---

**NOTE** Air flows through the system from front to back.

---

**Figure 2-27 Airflow Guides Locations**



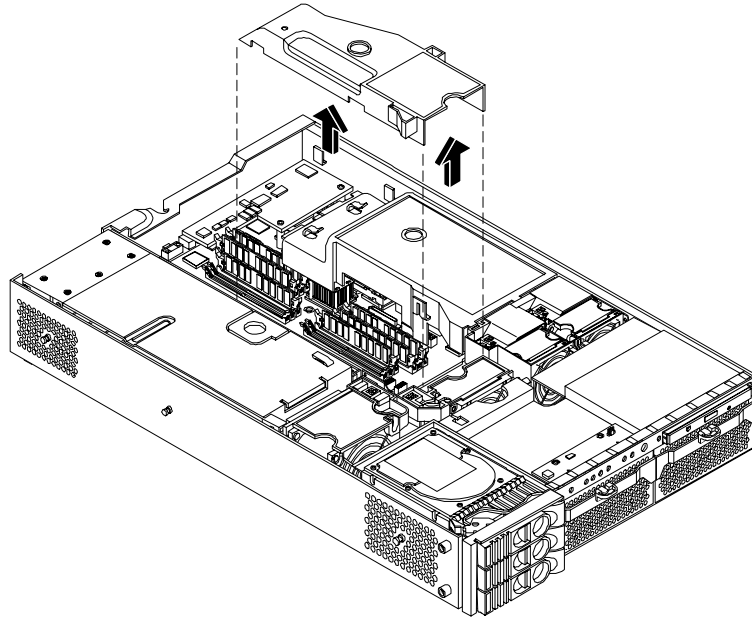
### Removing and Replacing the Memory Airflow Guide

#### Removing the Memory Airflow Guide

- Step 1.** Turn off the system and disconnect external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

**Step 3.** Grasp the memory airflow guide and lift it out of the system.

**Figure 2-28 Removing the Memory Airflow Guide**



### Replacing the Memory Airflow Guide

**Step 1.** Align the guides on both sides of the airflow guide with the slots on the chassis.

**Step 2.** Insert the memory airflow guide in the slots.

**Step 3.** Replace the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

**Step 4.** Reconnect power and external cables.

### Removing and Replacing the Processor Airflow Guide

#### Removing the Processor Airflow Guide

**Step 1.** Turn off the system and disconnect power and external cables.

**Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

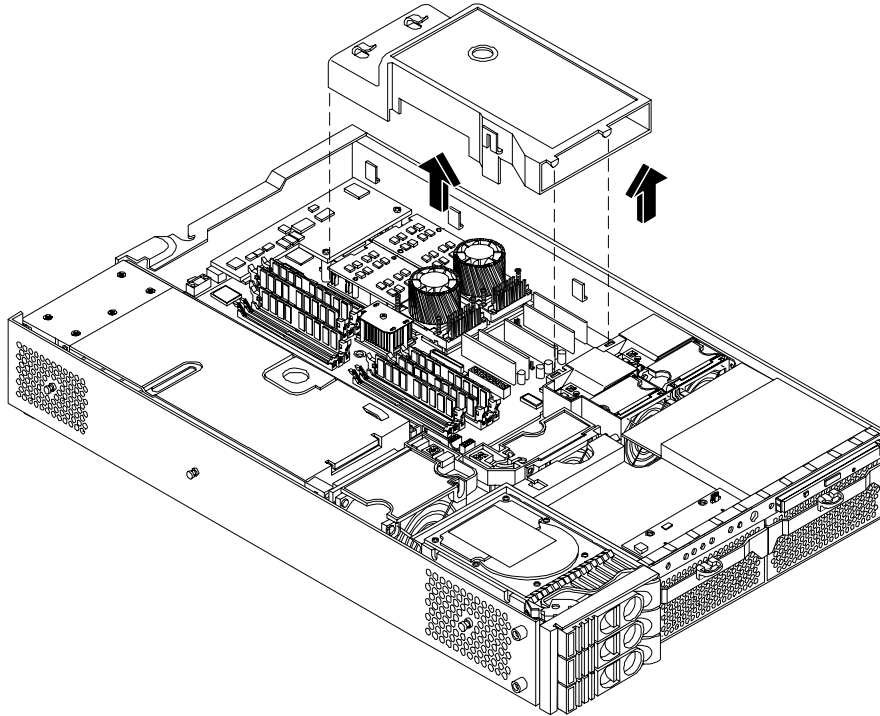
**Step 3.** Remove the IDE cable and power module cables from the processor airflow guide cable clips.

**Step 4.** Remove the main portion of the airflow guide:

- a. Hold the guide using the opening on top of the guide.

- b.** At the same time, grasp the back end of the airflow guide and lift the guide out of the system (Figure 2-29).

**Figure 2-29 Removing the Processor Airflow Guide**

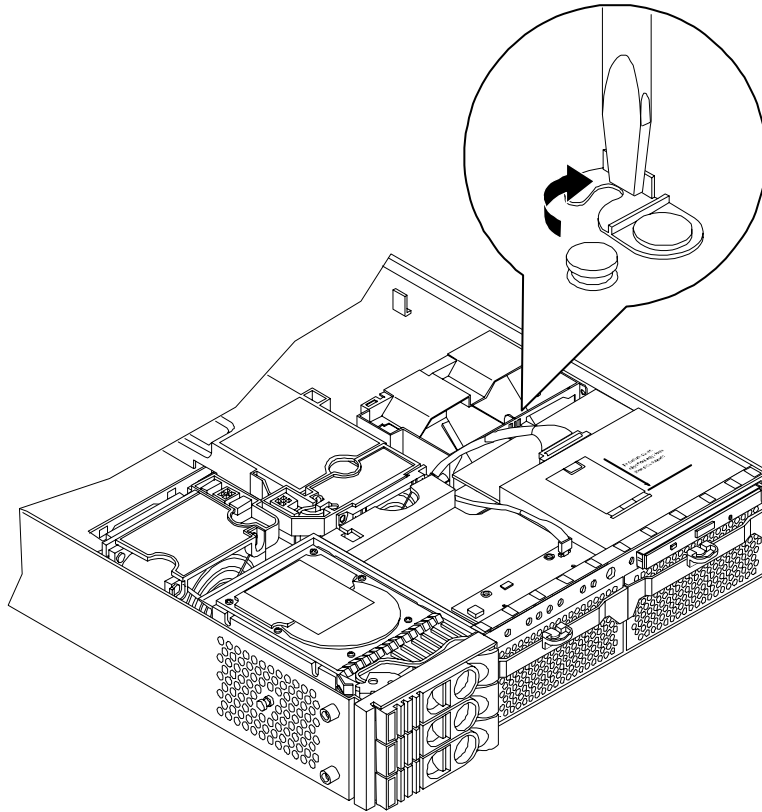


**Step 5.** Remove the front portion of the airflow guide:

- a.** Remove system fans 1A and 1B. (See “Removing a System Fan” on page 47.)
- b.** Remove the memory airflow guide. (See “Removing the Memory Airflow Guide” on page 58.)

- c. Rotate the clip clockwise to release the latch (Figure 2-30).

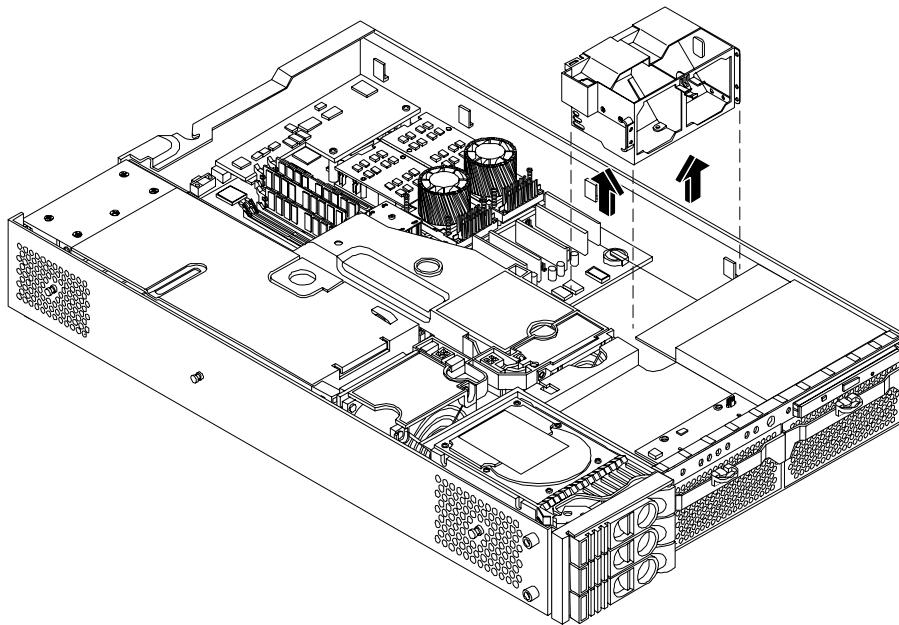
**Figure 2-30 Open the Release Clip**



- d. Disconnect the power cable connected to the guide from the system board by squeezing the clip.

- e. Lift the front portion of the processor airflow guide out of the system (Figure 2-31.)

**Figure 2-31 Remove the Front Portion of the Processor Airflow Guide**



### Replacing the Processor Airflow Guide

**Step 1.** Replace the front portion of the airflow guide:

- a. Align the release latch of the front half of the airflow guide over the release latch post and snap it in place.
- b. Connect the power connector on the front portion of the guide to the connector on the system board.

**Step 2.** Replace system fans 1A and 1B. (See “Replacing a System Fan” on page 49.)

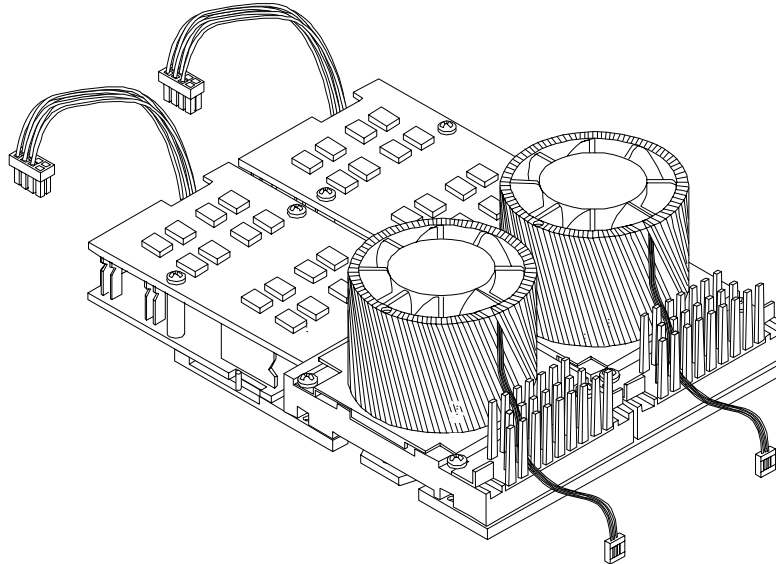
**Step 3.** Route the processor turbo fan power cables through the processor heatsink posts so that the cables will not be pinched between the heatsink posts and the processor airflow guide (Figure 2-32).

---

**CAUTION** Turbo fan power cables can be damaged if pinched between the heatsink posts and the processor airflow guide. Ensure that the cables are below the top surface of the heatsink posts before installing the processor airflow guide (Figure 2-32).

---

**Figure 2-32 Routing Power Cables through Heatsink Posts**



- Step 4.** Replace the main portion of the airflow guide:
- Hold the opening on top of the processor airflow guide.
  - At the same time, grasp the back end of the airflow guide and insert the airflow guide into the system.
  - Connect the power module cable.
  - Place the power and IDE cables in the cable clips.
  - Insert the two airflow guide retaining tabs into the two slots on the front half of the airflow guide.
- Step 5.** Replace the memory airflow guide. (See “Removing and Replacing the Memory Airflow Guide” on page 58.)
- Step 6.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 7.** Reconnect power and external cables.

## Removing and Replacing System Memory

The server has 12 memory sockets for installing DDR SDRAM memory modules. The system supports combinations from 512 MB up to six GB (HP 9000 rp 3410) and from one GB up to 32 GB (HP 9000 rp3440).

System memory DIMMs are located on the system 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.**

**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.

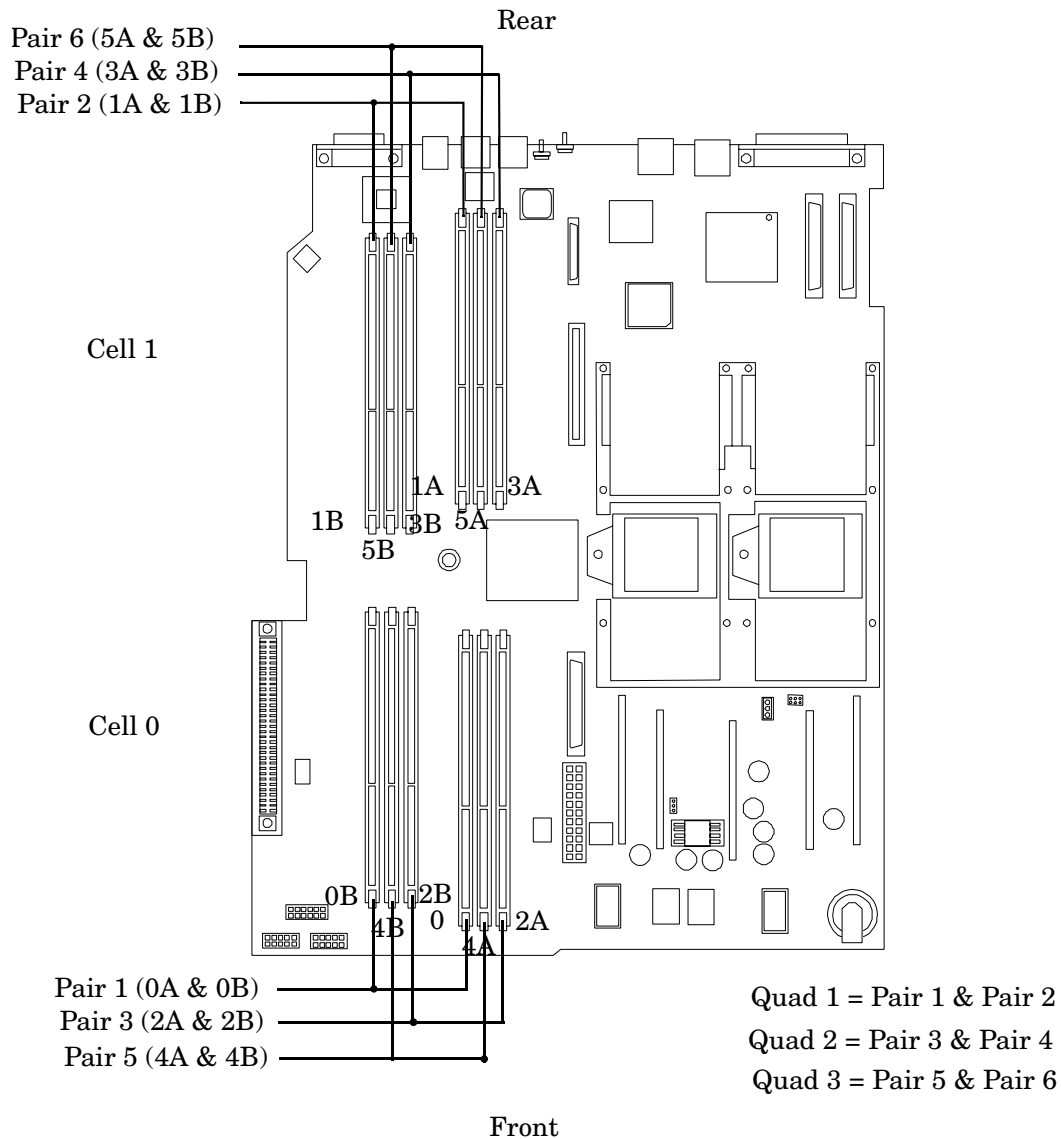
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### Supported DIMM Sizes

Supported DIMM sizes are 256 MB, 512 MB, 1 GB, 2 GB and 4 GB (HP 9000 rp3440 only). If 4 GB DIMMs are used, only one configuration (8 X 4 GB in the first eight sockets) is supported.

**Figure 2-33 DIMM Slot Identification**



### rp3410 Memory Configuration

The HP 9000 rp3410 supports DDR SDRAM DIMMs with ECC and chip spare protection. This server has 12 DIMM slots and supports a maximum of six GB of total system memory. Memory usage in the HP 9000 rp3410 server varies with the model designation. In the original server (model A7136A), memory is installed as one or two pairs in the first quad (group of four). This allows memory configurations of two, four, eight, or twelve DIMMs. In the current server (model A7136B), memory must be installed as quads. This allows memory configurations of four, eight, or twelve DIMMs. Thus, the HP 9000 rp3410 server must include a

minimum of 512 MB (model A7136A) or 1 GB (model A7136B) and may include up to six GB of memory in combinations of 256 MB, 512 MB, and 1 GB DIMMs. Different size DIMMs may be installed in the server, but all four DIMMs in a quad must be identical.

### Memory Loading Rules

- DIMMs must be installed in server load sequence (the first DIMM must be in the first slot, the second DIMM must be in the second slot, and so on)
- A minimum of 512 MB (2 x 256 MB DIMMs in a model A7136A server) or 1 GB (4 x 256 MB DIMMs in a model A7136B server) of memory must be installed in a HP 9000 rp3410 server
- Maximum memory is 6 GB
- A minimum of two DIMMs (one pair) is required in the model A7136A server
- A minimum of four DIMMs (one quad) is required in the model A7136B server
- All DIMMs within a quad must be identical

### rp3440 Memory Configuration

The HP 9000 rp3440 supports DDR SDRAM DIMMs with ECC and chip spare protection. This server has 12 DIMM slots, but maximum system memory is 32 GB due to cooling limitations. Memory must be installed as quads (group of four). This allows memory configurations of four, eight, or twelve DIMMs. Thus, the HP 9000 rp3440 server must include a minimum of 1 GB and may include up to 24 GB of memory in combinations of 256 MB, 512 MB, 1 GB, and 2 GB DIMMs, or 32 GB of memory consisting of eight 4 GB DIMMs. Different size DIMMs may be installed in the server (except when 4 GB DIMMs are used), but all four DIMMs in a quad must be identical.

---

**NOTE** There is only one configuration of 4 GP DIMMs that is supported: two (2) quads of 4 GP DIMMs. You cannot mix one quad of 4 GB DIMMs with any other quads.

---

### Memory Loading Rules

- DIMMs must be installed in server load sequence (the first DIMM must be in the first slot, the second DIMM must be in the second slot, and so on)
- Minimum memory is 1 GB (4 x 256 MB)
- Maximum memory is 32 GB (8 x 4 GB installed in the first eight slots—the remaining slots must remain empty if 4 GB DIMMs are installed)
- Memory DIMMs must be installed in groups of four (quads)
- All DIMMs within a quad must be identical

The memory subsystem supports chip spare functionality. Chip spare enables an entire SDRAM chip on a DIMM to be bypassed (logically replaced) in the event that a multi-bit error is detected on that SDRAM.

In order to use the chip spare functionality, only DIMMs built with x4 SDRAM parts are used, and these DIMMs must be loaded in quads (two DIMMs per memory cell, loaded in the same location in each memory cell).

### System Firmware Requirements

If you are using 4 GB DIMMs in a HP 9000 rp3440 server, system firmware must be greater than revision 45.10. Use the BCH command `FV`, or the MP command `SR` to display the system firmware revision status.

## Removing System Memory

To remove a DIMM, perform the following steps:

- Step 1.** Turn off the system and disconnect power and external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove the memory airflow guide. (See “Removing and Replacing the Memory Airflow Guide” on page 58.)
- Step 4.** Identify the DIMM to be removed and push the appropriate extraction levers found on either side of the DIMM connector outward to the open position. The DIMM ejects from the connector.
- Step 5.** At the same time, push the appropriate extraction levers found on either side of the DIMM connector outward to the open position. The DIMM ejects from the connector.
- Step 6.** Remove the DIMM from the socket. If the removed memory is functional, store it in a static-free container for future use.

## Installing System Memory

Memory modules must be loaded in the correct order:

- In the HP 9000 rp3410 server, the first four DIMMs must be installed as ordered pairs of equal size. The DIMM in socket 0A must match the DIMM in socket 0B. If a second pair is added (sockets 1A and 1B), the DIMMs must match the DIMMs in sockets 0A and 0B. Additional DIMMs (DIMM sockets 5 through 12) must be installed as quads (identical groups of four—two matched pairs). This requirement is summarized as:
  - 0A and 0B must be an identical pair
  - 1A and 1B must be identical to the pair in sockets 0A and 0B
  - 2A, 2B and 3A, 3B must be an identical quad (2 pairs)
  - 4A, 4B and 5A, 5B must be an identical quad (2 pairs)
- In the HP 9000 rp3440 server, DIMMs must be installed in matched quads. Two matched memory card pairs of equal size (that is, four identical DIMMs) must be installed, one pair per memory cell, as listed below:
  - 0A, 0B and 1A, 1B must be an identical quad (2 pairs)
  - 2A, 2B and 3A, 3B must be an identical quad (2 pairs)
  - 4A, 4B and 5A, 5B must be an identical quad (2 pairs)

---

**NOTE** DIMMs match if they have the same HP part number.

---

Module sizes can be mixed, as long as DIMMs in each quad match. For example:

- On HP 9000 rp3410 servers, it is acceptable to load four 256 MB DIMMs in sockets 0A, 0B, 1A, and 1B and four 512 MB or 1 GB DIMMs in sockets 2A, 2B, 3A, and 3B
- On HP 9000 rp3440 servers, it is acceptable to load a quad of 256 MB DIMMs in sockets 0A, 0B, 1A and 1B, and a quad of larger DIMMs in sockets 2A, 2B, 3A and 3B

To install DIMMs, perform the following steps:

- Step 1.** Turn off the system and disconnect power and external cables.

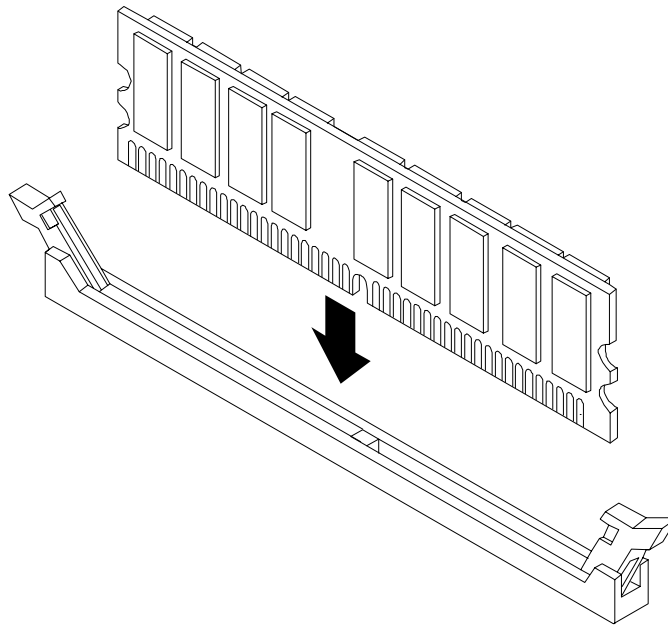
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**CAUTION** To ensure that memory modules are not damaged during removal or installation, power off the server and unplug the power cord from the AC power outlet. Wait until the LED on the back of the power supply turns off before removing or installing memory.

---

- Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove the memory airflow guide. (See “Removing the Memory Airflow Guide” on page 58.)
- Step 4.** Holding the memory module by its left and right edges, insert the module into the socket. The memory modules are keyed and can only be inserted in one direction. When the module is correctly seated, the retainer clips will return to their fully upright position.
- Step 5.** Evenly push down firmly on each end of the DIMM until it seats in the socket. Ensure the extraction levers are in the closed position and snap the clips firmly into place to ensure that the DIMMs are seated properly (Figure 2-34).

**Figure 2-34 Inserting DIMM into Connector**



- Step 6.** Replace the memory airflow guide. (See “Removing and Replacing the Memory Airflow Guide” on page 58.)
- Step 7.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 8.** Reconnect power and external cables and turn on the system.
- Step 9.** Verify the memory replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
  - Use diagnostics provided by the ODE to exercise the newly installed memory

## Removing and Replacing a Dual Processor Module

This section provides information about installing dual processor modules. The modules are located on the system board which is accessible by removing the system cover.

---

**WARNING** Ensure that the system is powered-down and all power sources have been disconnected from the server prior to removing or replacing a dual processor module.

**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.

---

---

**NOTE** Processor tool kit, HP P/N 5069-5441 is required for removal and installation of a dual processor module.

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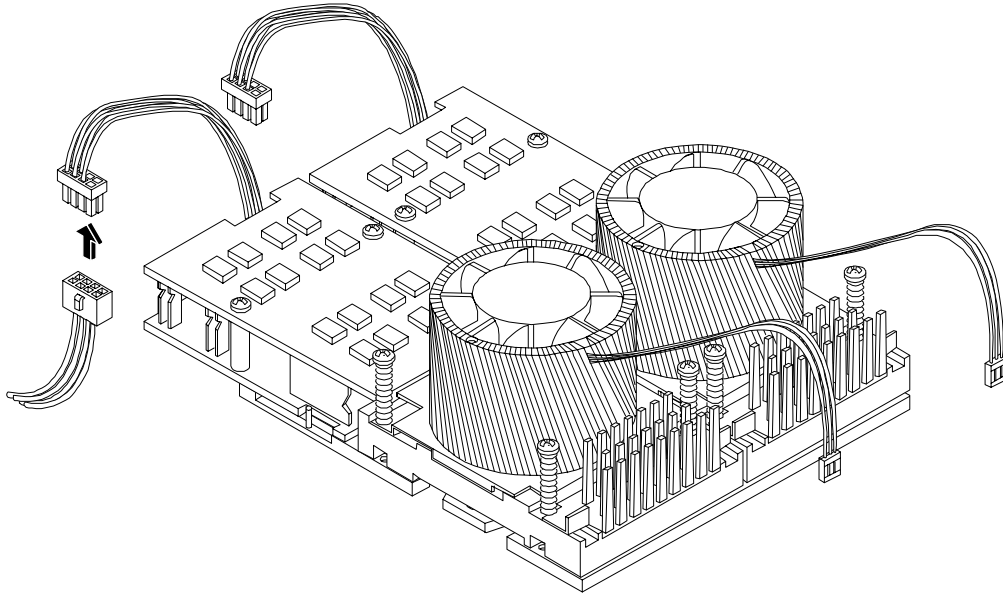
### Removing a Dual Processor Module

To remove a dual processor module, perform the following steps:

- Step 1.** Turn off the system and disconnect power and external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove the memory airflow guide and cables. (See “Removing the Memory Airflow Guide” on page 58.)
- Step 4.** Remove the processor airflow guide and cables. (See “Removing the Processor Airflow Guide” on page 59.)

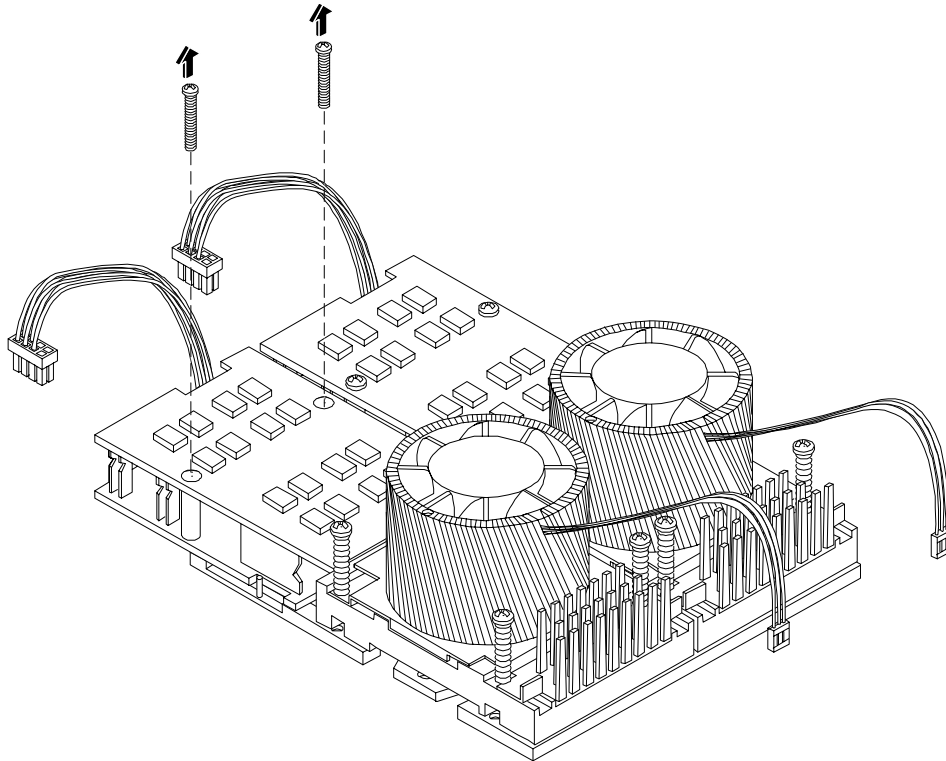
**Step 5.** Disconnect the power pod cable from the power connector on the system board (Figure 2-35).

**Figure 2-35 Disconnect Power Pod Cable**



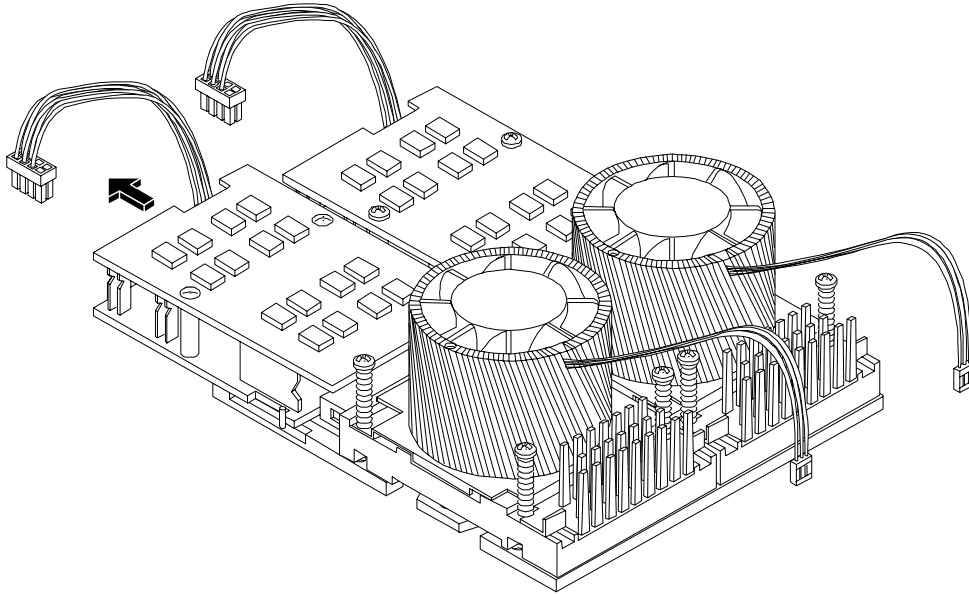
**Step 6.** Remove and retain the two power pod mounting screws.

**Figure 2-36 Remove Power Pod Mounting Screws**



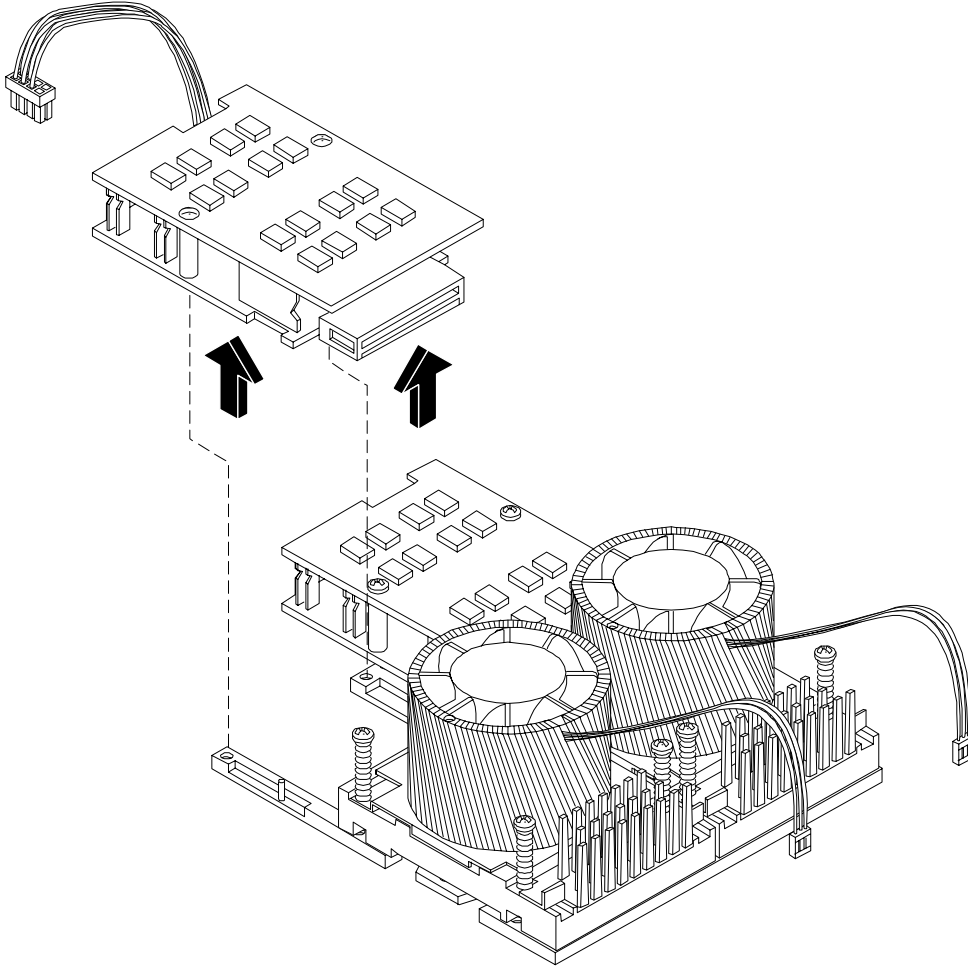
- Step 7.** Slide the power pod toward the rear of the system board so that the power pod connector disconnects from its connector on the dual processor module (Figure 2-37).

**Figure 2-37 Disconnect Power Pod from Dual Processor Module**



**Step 8.** Lift the power pod up and out of the chassis. Place the power pod into an anti-static container (Figure 2-38).

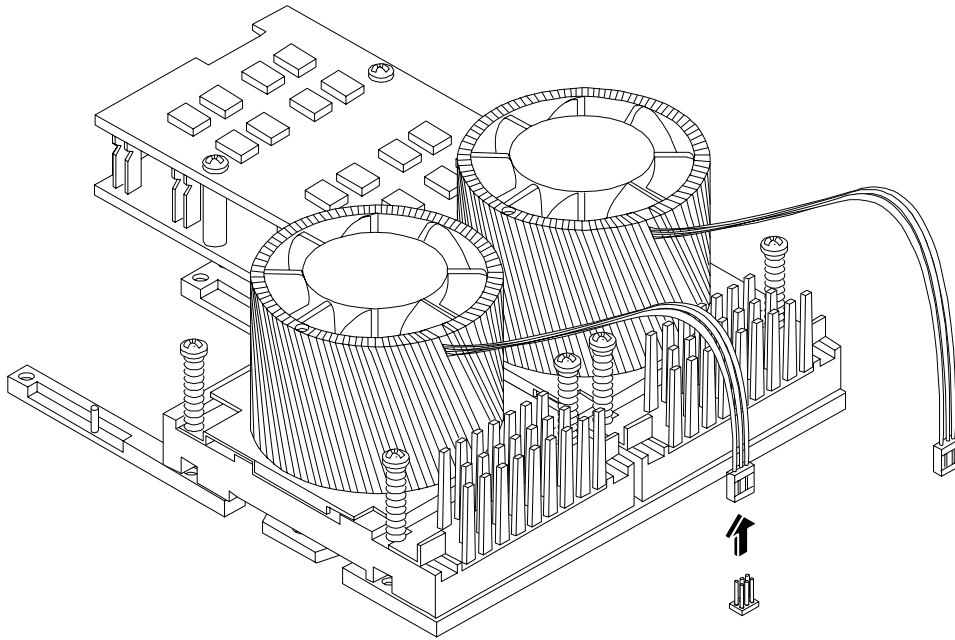
**Figure 2-38 Remove Power Pod**





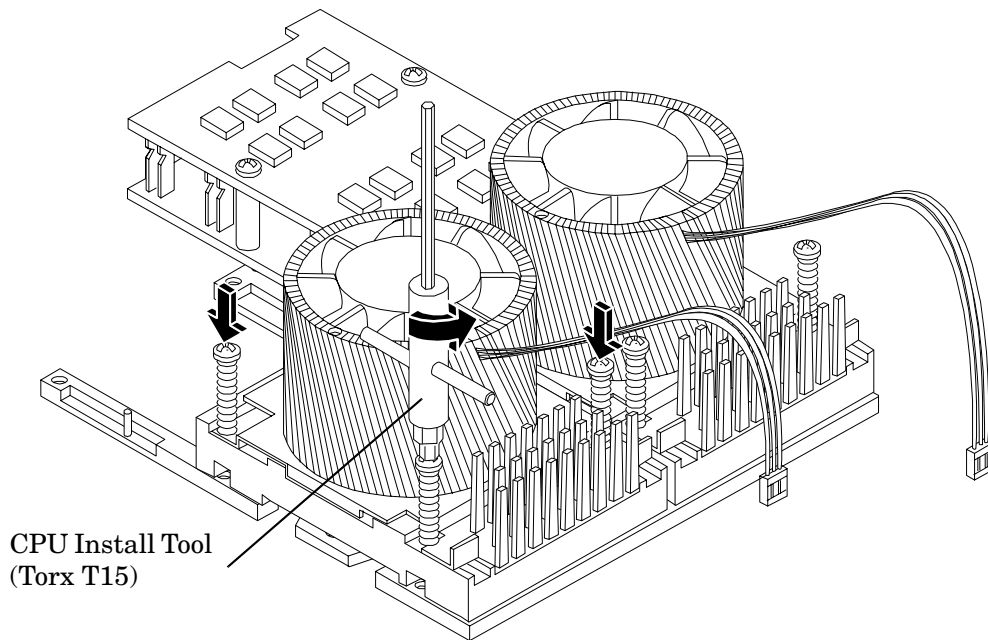
**Step 9.** Disconnect the turbo fan power cable.

**Figure 2-39 Disconnect the Turbo Fan Cable**



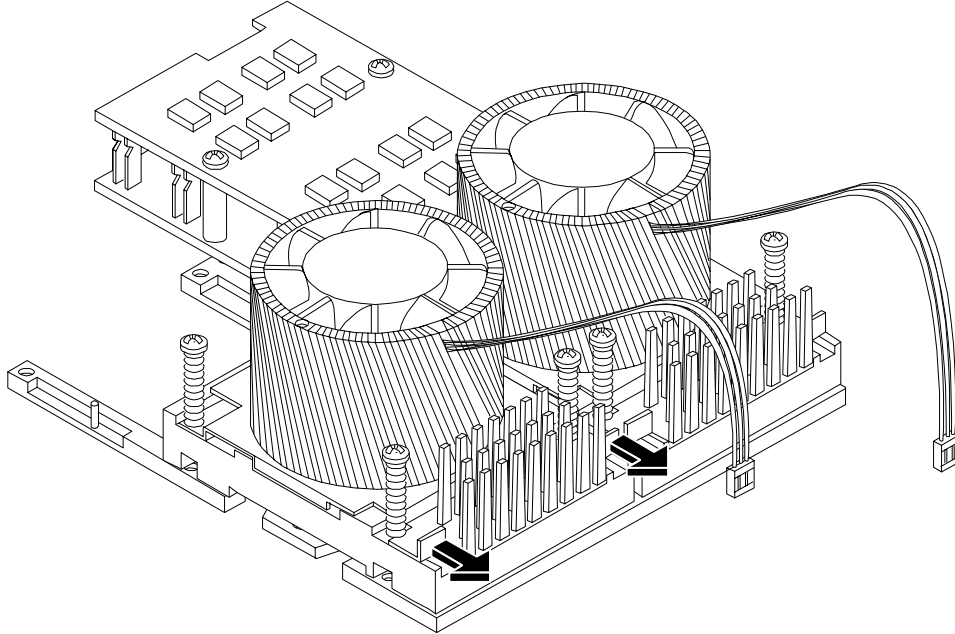
**Step 10.** Release the four heatsink captive screws on the module heat sink.

**Figure 2-40 Release Heatsink Captive Screws**



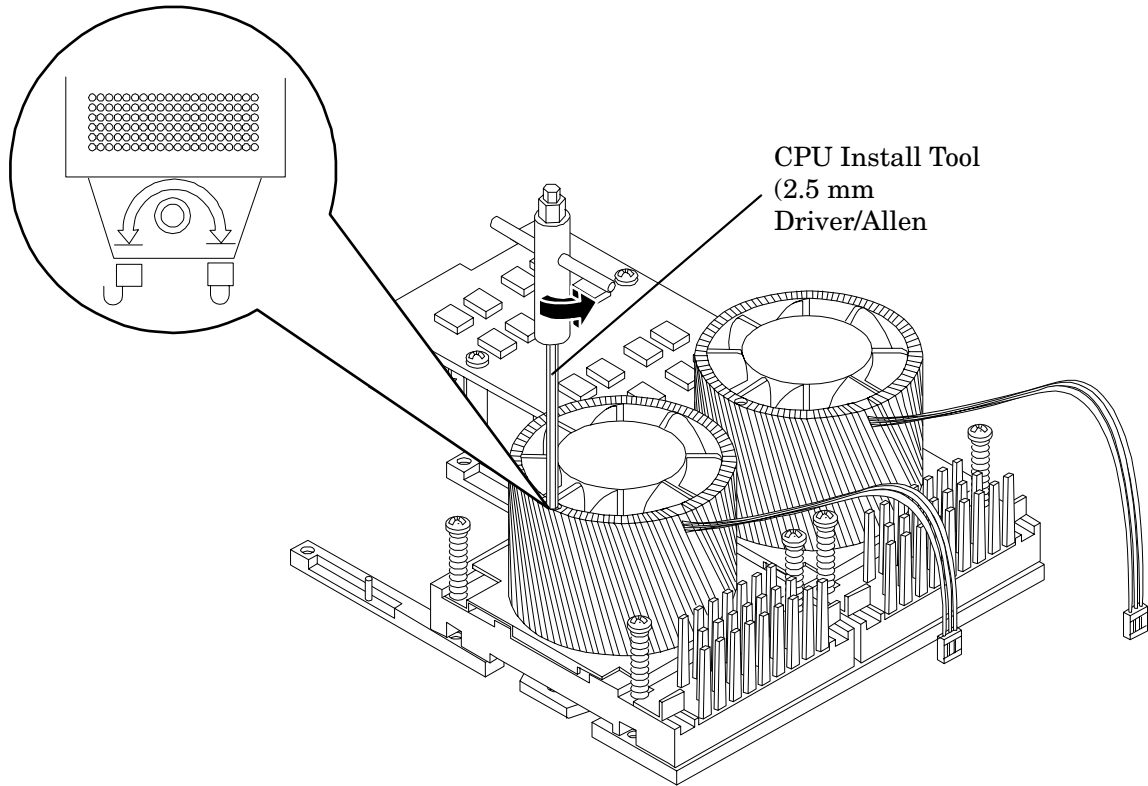
**Step 11.** Slide the sequencing retainer plate toward the back of the system to open the hole in the edge of the heatsink for insertion of the special processor tool into the processor module locking mechanism (Figure 2-41).

**Figure 2-41 Slide Sequencing Retainer Plate**



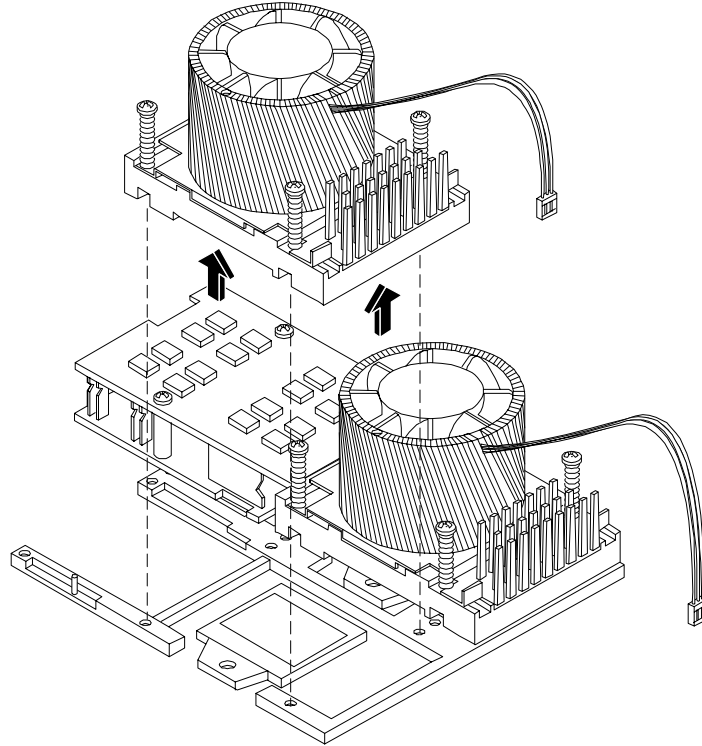
**Step 12.** Unlock the dual processor module locking mechanism using the CPU install tool. Insert the tool into the hole that runs down through the edge of the turbo fan heatsink and rotate the special processor tool 180 degrees counterclockwise (Figure 2-42).

**Figure 2-42 Unlock Dual Processor Module Locking Mechanism**

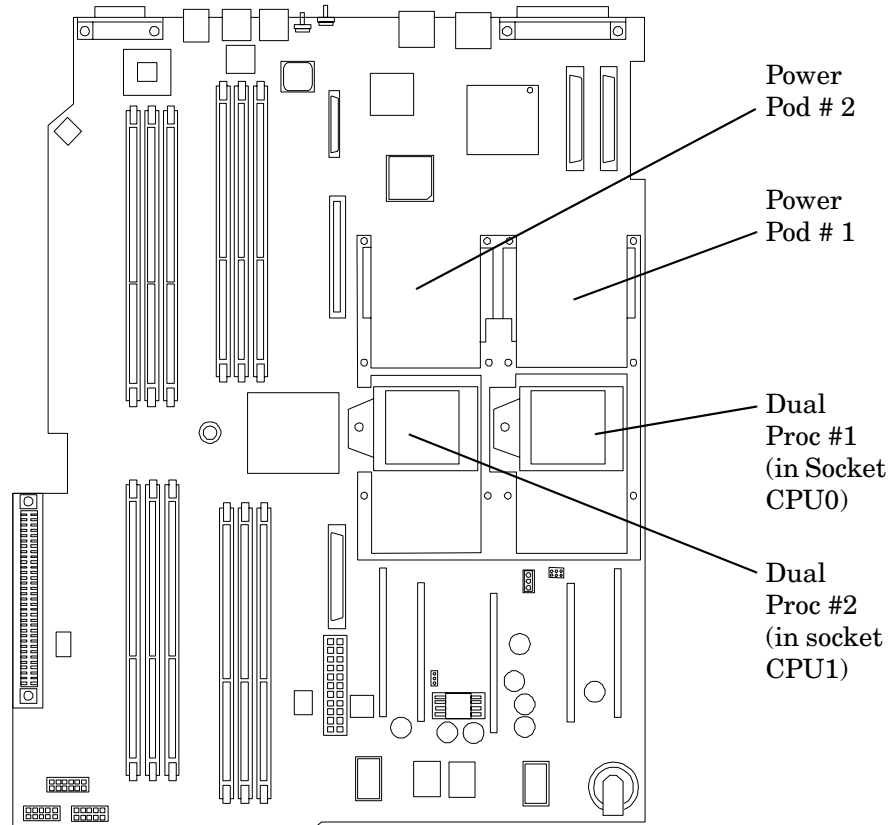


**Step 13.** Lift the dual processor module and the turbo fan assembly up and out of the chassis (Figure 2-43). If protective pin covers are available, install the cover on processor connectors to shield connector pins. Place the dual processor module in an anti-static container.

**Figure 2-43 Remove Dual Processor Module**



**Figure 2-44 Dual Processor Module Removal and Replacement**



### Installing a Dual Processor Module

Either one or two dual processor modules are located on the system board. Module #1 is located to the right of the system board and module #2 (when installed) is located on the left of the system board next to the bridge assembly. In a 1-way or 2-way configuration, the one dual processor module must be installed in the CPU0 socket.

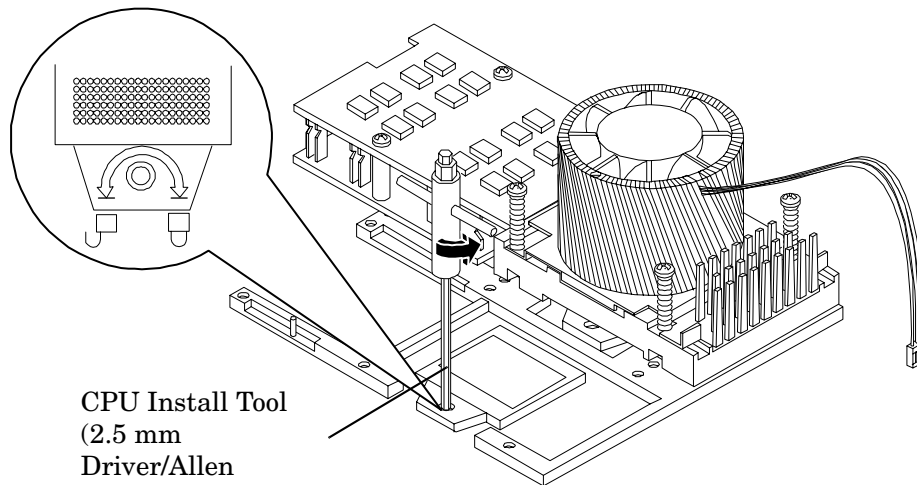
Each dual processor module has an associated power pod that is required.

Install a dual processor module as follows:

- Step 1.** Turn off the system and disconnect power and external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** If you are replacing a dual processor module, remove the old module as described in the previous procedure.

**Step 4.** Unlock the dual processor module locking mechanism using the CPU install tool. Insert the tool into the hole that runs down through the edge of the heatsink and rotate the special processor tool 180 degrees counterclockwise. Verify that the dual processor module socket locking mechanism is rotated into the unlocked position (Figure 2-45).

**Figure 2-45 Unlocking the Dual Processor Module Locking Mechanism**



**Step 5.** Remove any protective packaging from the processor modules.

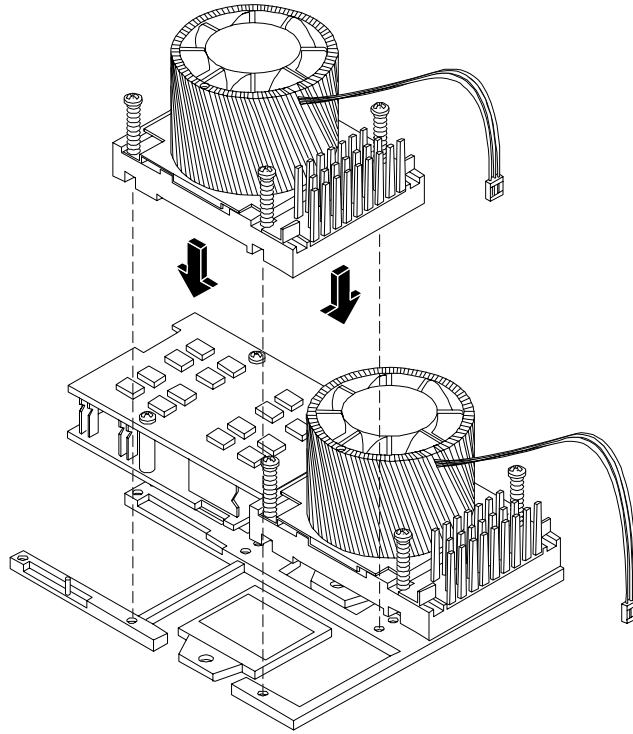
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**NOTE** Protective covers may be installed to protect connector pins. The covers can be saved for future use.

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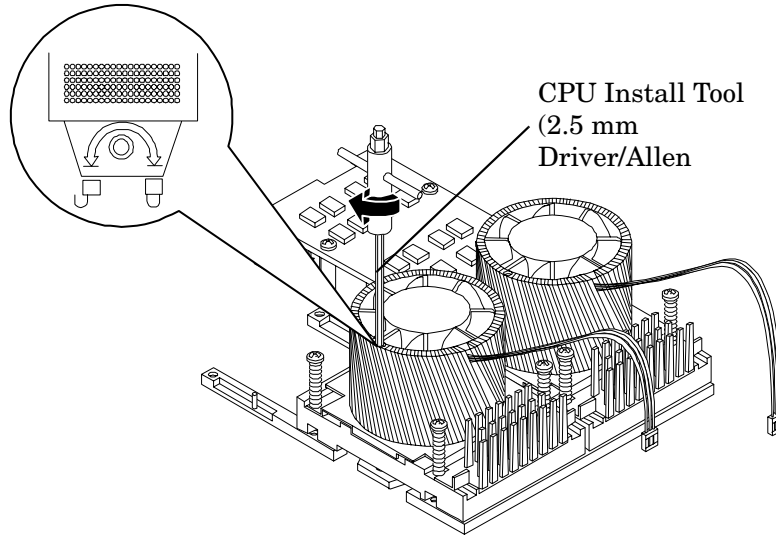
- Step 6.** Use the four locator posts on the heatsink and the turbo fan power cable to properly align the fan and dual processor module on the system board (Figure 2-46). The four locator posts will fit in locator holes on the system board processor module mount. The turbo fan power cable must be positioned so that it is located on the side of the heatsink that faces the front of the system.

**Figure 2-46 Aligning the Dual Processor Module**



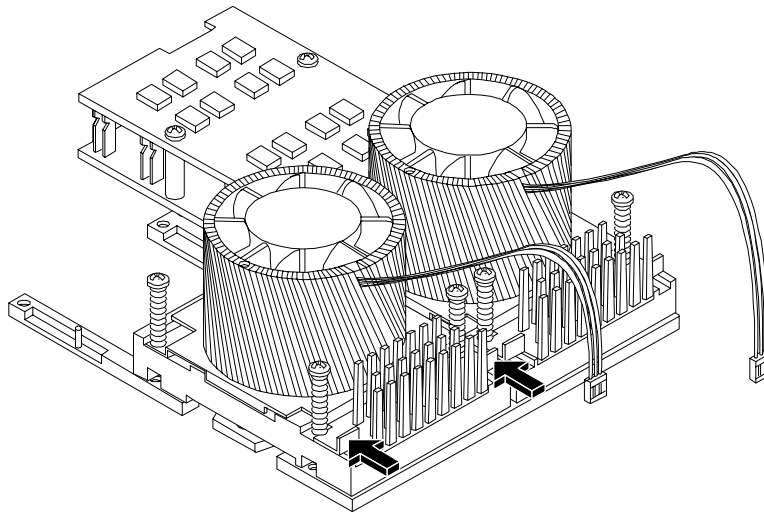
**Step 7.** Use the special processor tool to lock the dual processor module in place on the system board. To do this, insert the special processor tool into the hole that runs down the side of the heatsink and rotate it clockwise 180 degrees (Figure 2-47).

**Figure 2-47 Locking the Dual Processor Module in Place**



**Step 8.** Slide the sequencing retainer plate toward the front of the system.

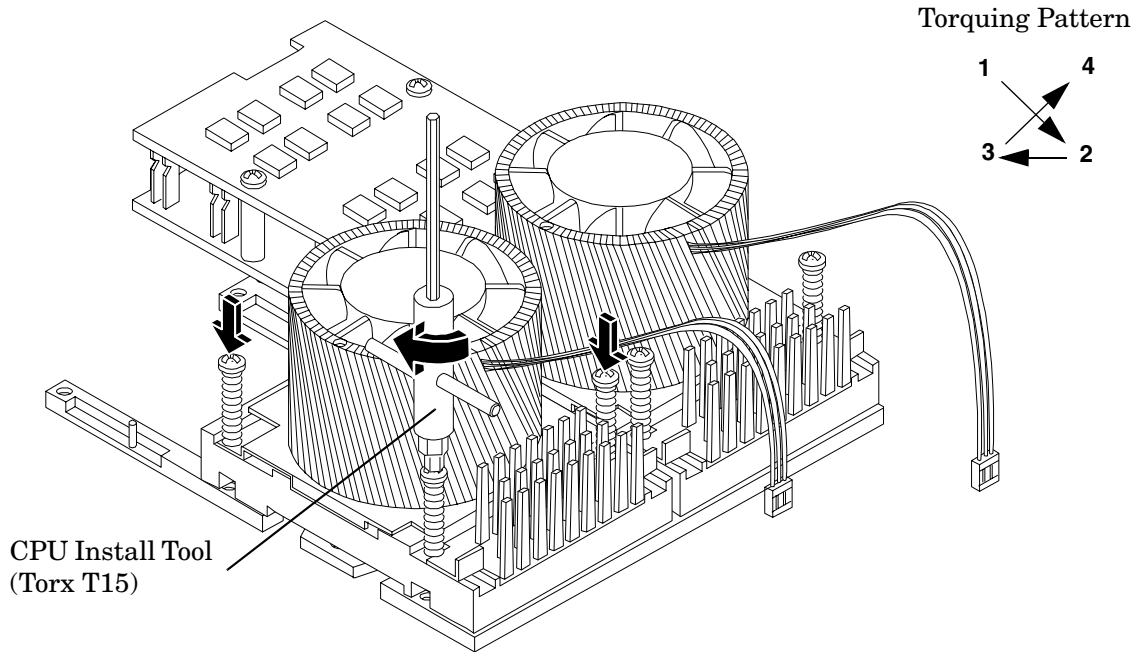
**Figure 2-48 Slide the Sequencing Retainer Plate**





- Step 9.** Screw in the four heatsink captive screws in a criss-cross torquing pattern by alternately tightening the screws so as not to completely tighten one screw before the others.

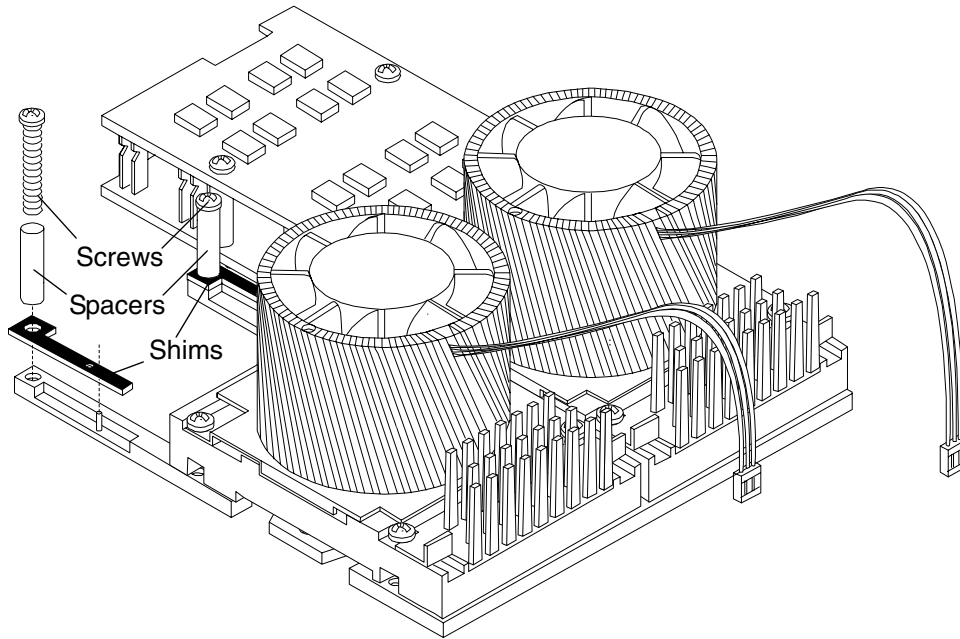
**Figure 2-49 Secure the Captive Screws**



- Step 10.** If you are installing a second dual processor module in a system which contained only one dual processor module, remove the spacers from the power module mounting: (Figure 2-50.)
- Locate the two power module shims on the system board.
  - Remove the holding screws that hold the shims in place.
  - Remove the spacers from the holding screws. Discard the spacers.

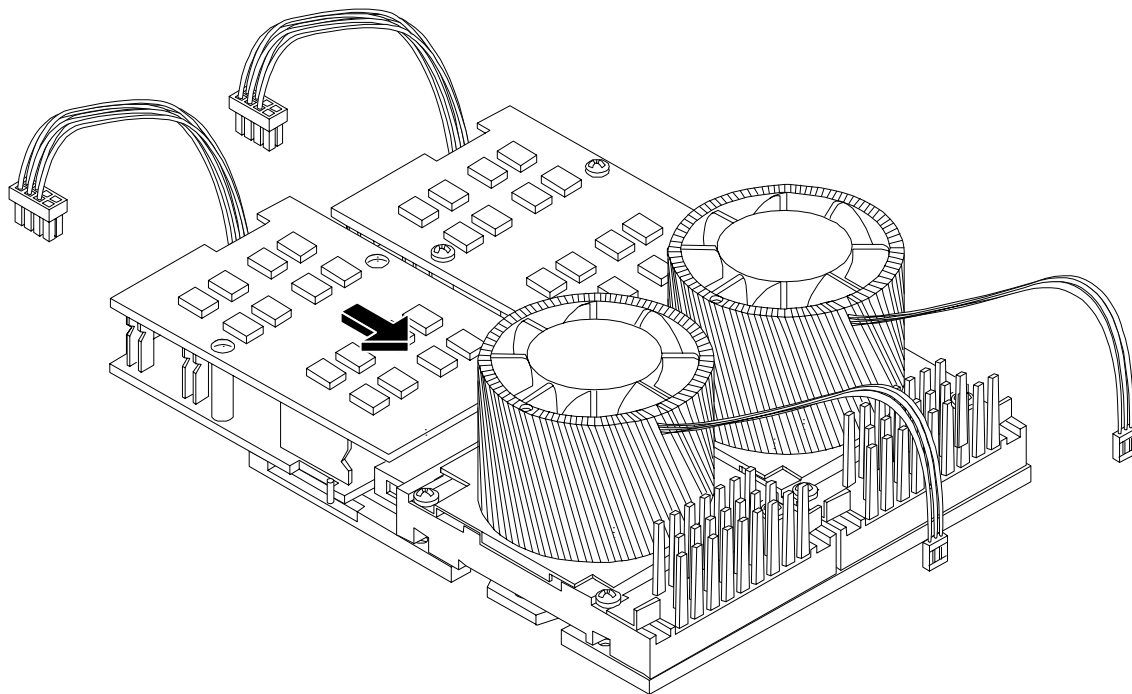
- d. Retain the screws for use when installing the power module.

**Figure 2-50 Power Module Shims**



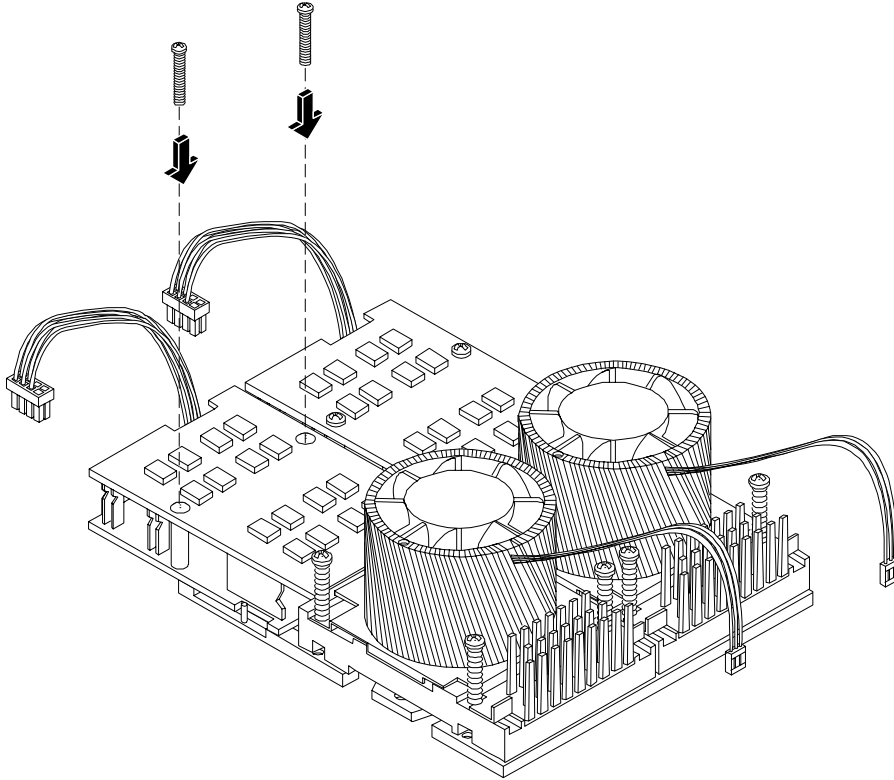
- Step 11.** Slide the power module on the system board metal mounting bracket so that the connector on the power module makes contact with its connector on the dual processor module.

**Figure 2-51 Aligning the Processor Module Power Pod**



**Step 12.** Align the two mounting screw holes on the power module with the screw holes in the shims on the system board's metal mounting bracket (Figure 2-51). Screw in the power module mounting screws (Figure 2-52). (Use the screws removed in step 10.)

**Figure 2-52 Install the Processor Module Power Pod Mounting Screws**



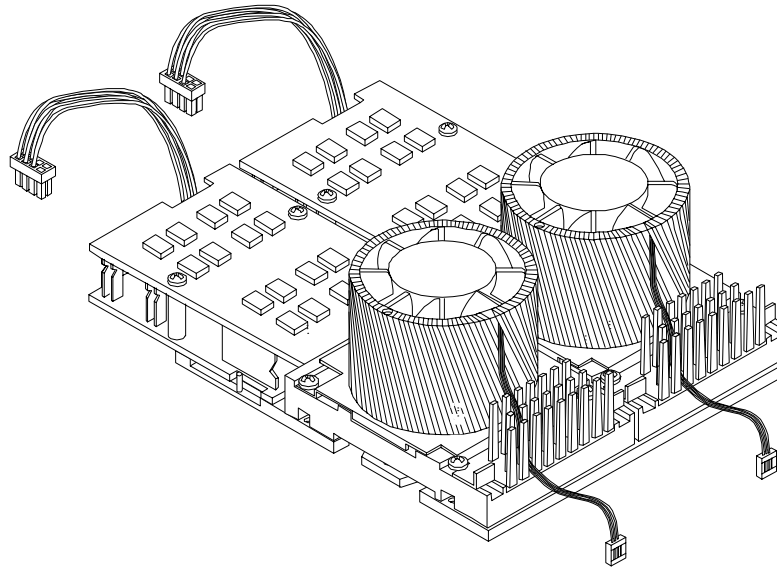
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**CAUTION** Turbo fan power cables can be damaged if pinched between the heatsink posts and the processor airflow guide. Ensure the cables are below the top surface of the heatsink posts before installing the processor airflow guide by routing the cables through the heatsink posts (Figure 2-53).

---

**Step 13.** Route the turbo fan power cables through the heatsink posts so the cables will not be pinched when the processor airflow guide is set in place (Figure 2-53).

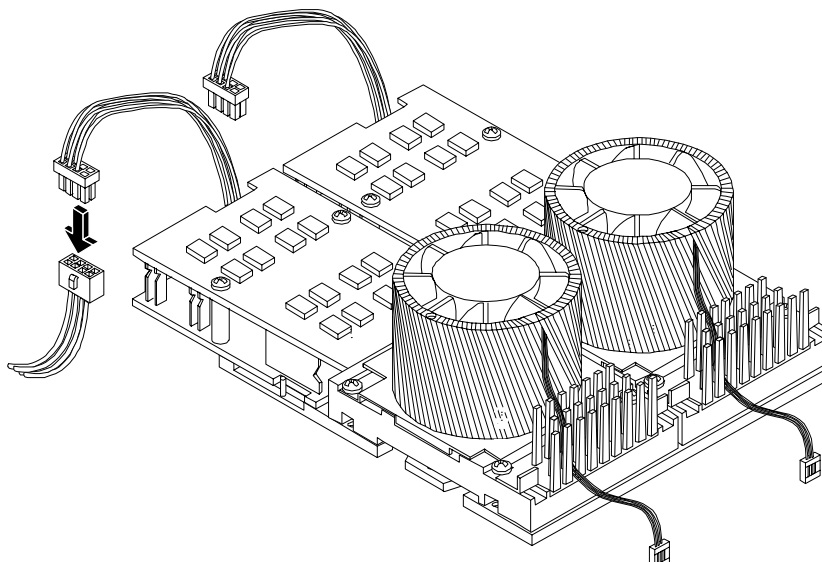
**Figure 2-53 Routing Turbofan Power Cables through Heatsink Posts**



**Step 14.** Connect the turbo fan power cable to the system board.

**Step 15.** Connect the power pod cable to the power connector on the system board.

**Figure 2-54 Connecting the Power Pod Cable**



**Step 16.** Replace the processor airflow guide. (See “Replacing the Processor Airflow Guide” on page 62.)

**Step 17.** Replace the memory airflow guide. (See “Replacing the Memory Airflow Guide” on page 59.)

**Step 18.** Replace the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

- Step 19.** Verify processor replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
  - Use MAKODIAG provided by the ODE to exercise the newly installed processor(s)

## Removing and Replacing the System Battery

The system has two batteries. The main system battery is located on the system board. The other battery is located on the underside of the iLO manageability card. (See “Removing and Replacing the iLO Manageability Card Battery” on page 98.)

### Battery Notice

This product contains a Lithium battery (P/N 1420-0386).

---

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

---

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

### Removing the System Battery

---

**IMPORTANT** Prior to removing the system battery, log the system settings such as LAN configuration settings, boot settings, and so on.

---

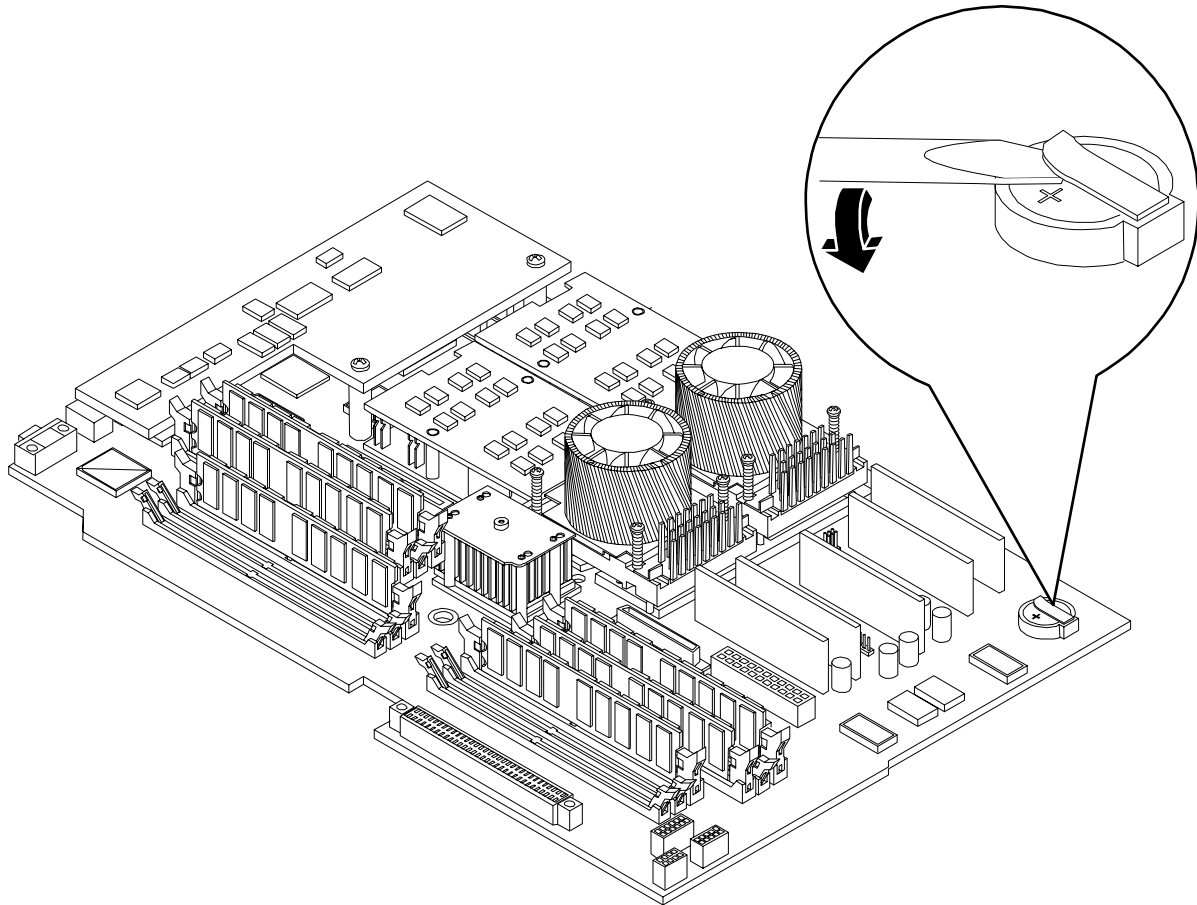
- Step 1.** Turn off the system and disconnect power and external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove the memory airflow guide. (See “Removing and Replacing the Memory Airflow Guide” on page 58.)
- Step 4.** Remove the processor airflow guide, the front portion of the processor airflow guide, and fans 1A and 1B. (See “Removing and Replacing the Processor Airflow Guide” on page 59.)
- Step 5.** Lift up on the battery retaining clip with a flat-head screwdriver and slide the battery out of its socket (Figure 2-55).

---

**CAUTION** Only lift the battery high enough to clear the holder. Excessive stress on the battery holder retaining clip may damage the clip.

---

**Figure 2-55 Removing the System Battery**



### Replacing the System Battery

**Step 1.** Lift up on the battery holder retaining clip with a flat-head screwdriver and slide the battery into the holder. The positive (+) terminal of the battery faces up.

---

**CAUTION** Only lift the battery high enough to clear the holder. Excessive stress on the battery holder retaining clip may damage the clip.

---

**Step 2.** Replace the processor airflow guide. (See “Replacing the Processor Airflow Guide” on page 62.)

**Step 3.** Replace the memory airflow guide. (See “Replacing the Memory Airflow Guide” on page 59.)

**Step 4.** Replace the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

**Step 5.** Reconnect power and external cables and turn on the system.

- Step 6.** Verify the battery replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
- Step 7.** You must reset the system time and date using the BCH date command. Once you have set the time, turn the system off, unplug the power cord, and wait for a minute before turning it back on. Execute the date command again. If the time and date are now correct, you have installed the battery correctly.
- Step 8.** Reset the LAN configuration settings, boot settings, or any other system settings.

## Removing and Replacing the PCI Card Cage

PCI cards are installed in a removable PCI card cage. This section explains how to access the PCI card cage, as well as how to remove and install PCI cards.

### Removing the PCI Card Cage

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

---

**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 cage.**

**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.**

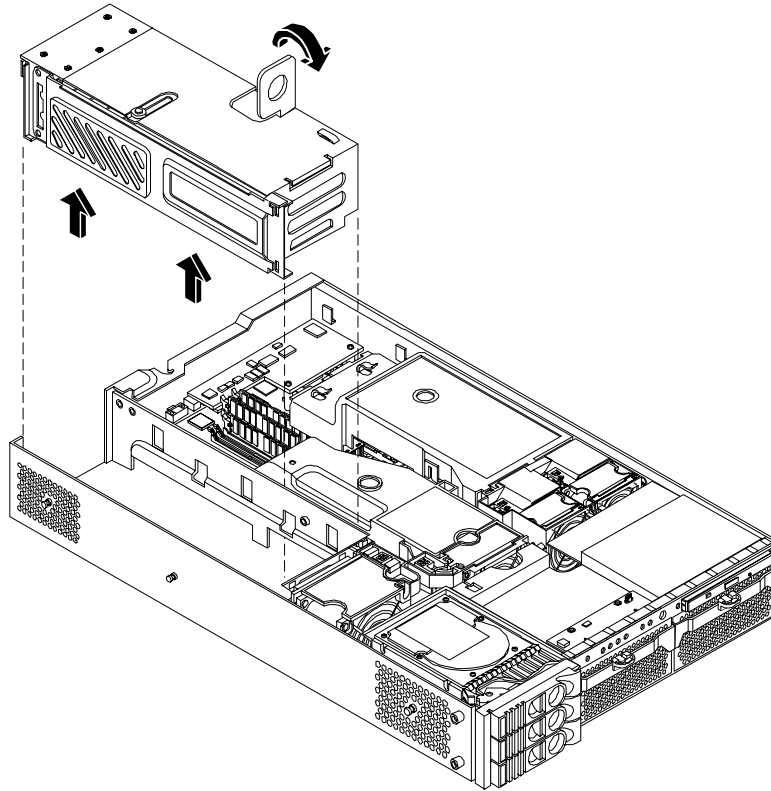
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- Step 1.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 2.** Disconnect cables from the PCI cards.



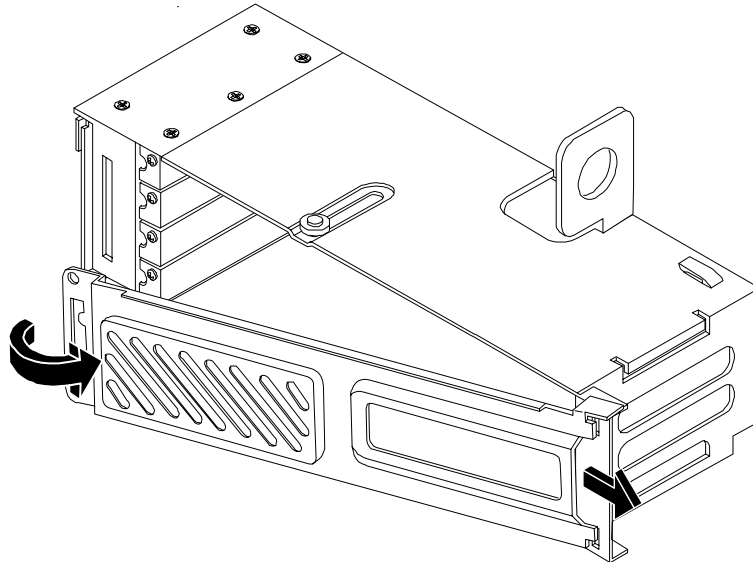
- Step 3.** Lift up on the PCI card cage release lever and the back edge of the PCI card cage and lift the PCI card cage out of the system (Figure 2-56).

**Figure 2-56 Removing the PCI Card Cage**



**Step 4.** Grasp the PCI card cage cover and slide it away from the bulkhead end of the cage, then lift the cover off (Figure 2-57).

**Figure 2-57 Removing the PCI Card Cage Cover**



**Step 5.** The PCI cards are now accessible for removal and replacement.

**Step 6.** Unscrew the bulkhead screw that holds the PCI card in place.

### Replacing the PCI Card Cage

To replace the PCI card cage into the server, perform the following steps:

**Step 1.** Hold the cover in mounting position and slide it toward the bulkhead end of the cage.

**Step 2.** Hold the PCI card cage above the chassis mounting position, such that the bulkhead end of the cage is toward the server rear panel. (See Figure 2-56.)

**Step 3.** Hold the PCI card cage release lever in the raised position and lower the PCI card cage into the server chassis.

**Step 4.** Press the PCI card cage release lever into the lowered position to lock the PCI card cage into the server chassis.

**Step 5.** Reconnect the cables to the PCI card.

### Removing and Replacing PCI Cards

The server may contain up to four PCI cards. PCI cards are located in the PCI card cage.

The HP 9000 rp3410 provides two 64-bit, 133 MHz PCI-X card sockets and the HP 9000 rp3440 server provides four 64-bit, 133 MHz PCI-X card sockets.

---

**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.

**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.

---

Carefully read the following information concerning PCI slot configuration. Inserting a PCI card into a slot that is not configured to accept it, may cause operation failure or the PCI card to operate at less than optimum speed. PCI slots are numbered 1 through 4. See the labels on the rear panel of the chassis for correct PCI slot number identification.

### **Removing a PCI or Graphics Card**

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

---

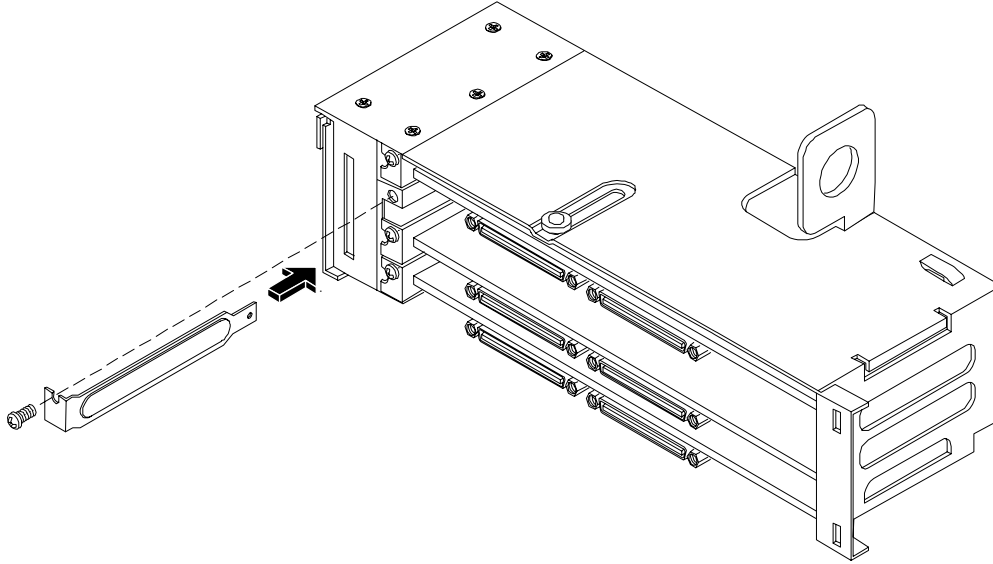
**CAUTION** Record the location of all PCI cards as they are installed. Depending on the operating system, replacing the PCI card in a different location might cause boot failure.

---

- Step 1.** Remove the PCI card cage. (See “Removing the PCI Card Cage” on page 88.)
- Step 2.** Disconnect any cables that are connected to the PCI card.
- Step 3.** Unscrew the bulkhead screw and remove the card holder (if necessary) to allow insertion of the card.
- Step 4.** Grasp the edges of the PCI card being removed and gently rock the card releasing the connector from the PCI backplane connector. Place the removed PCI card in an electrostatic container.

**Step 5.** Install a PCI slot cover to close the cavity left by the removal of the PCI card (Figure 2-58). This will maintain the proper airflow within the chassis.

**Figure 2-58 Installing a PCI Slot Cover**

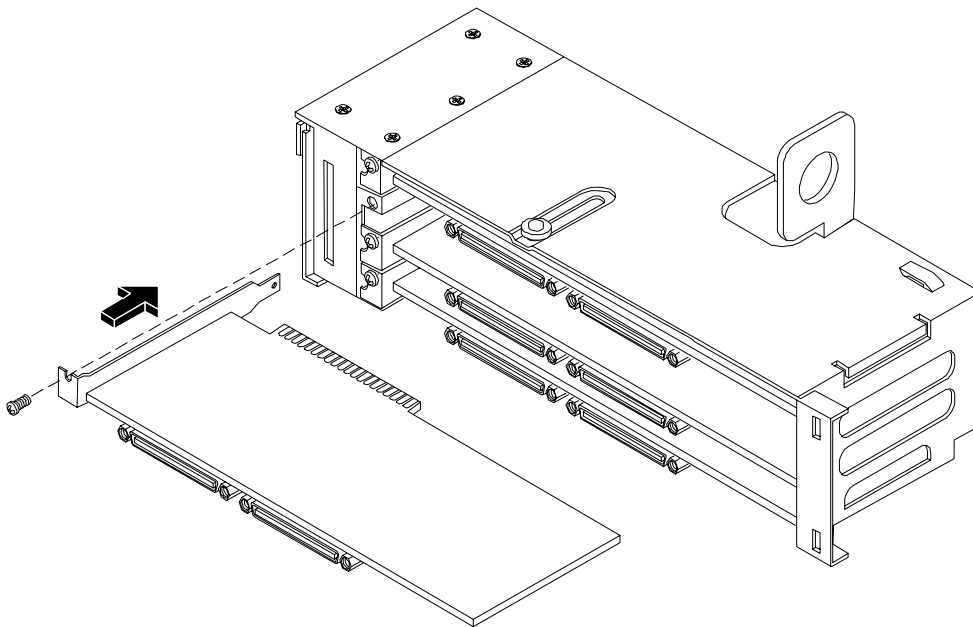


### Replacing a PCI or Graphics Card

**Step 1.** Remove the PCI card cage. (See “Removing the PCI Card Cage” on page 88.)

**Step 2.** Grasp the edges of the PCI card to be installed and gently press the card into the PCI backplane connector (Figure 2-59).

**Figure 2-59 Installing a PCI Card**



- Step 3.** Install and tighten the bulkhead screw to hold the PCI card in place.
- Step 4.** Connect any cables that are required by the PCI card.
- Step 5.** Replace the PCI card cage. (See “Replacing the PCI Card Cage” on page 90.)
- Step 6.** Replace the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 7.** Verify the PCI card replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation

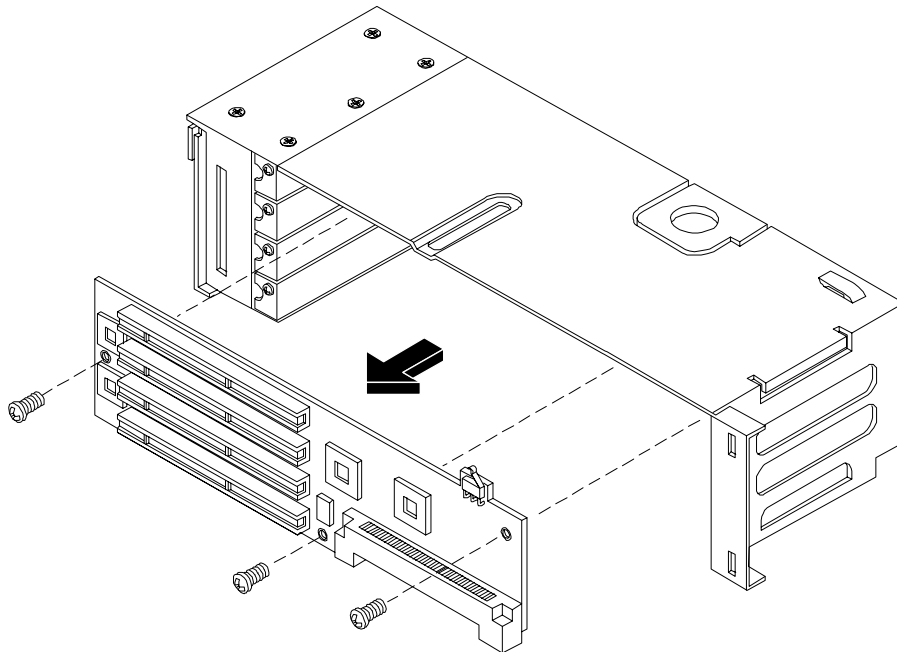
## Removing and Replacing the PCI Backplane

The HP 9000 rp 3410 and HP 9000 rp3440 server system backplane is called the PCI backplane and provides four PCI card sockets. The removal process is the same for both.

### Removing the PCI Backplane

- Step 1.** Remove the PCI card cage from the server. (See “Removing the PCI Card Cage” on page 88.)
- Step 2.** Remove all PCI and graphics cards. (See “Removing a PCI or Graphics Card” on page 91.)
- Step 3.** Unscrew the backplane mounting screws and slide the backplane board toward the bulkhead end of the PCI card cage. This unlocks the backplane from its standoffs.
- Step 4.** Lift the backplane over the top of the standoffs and slide it out of the cage (Figure 2-60).

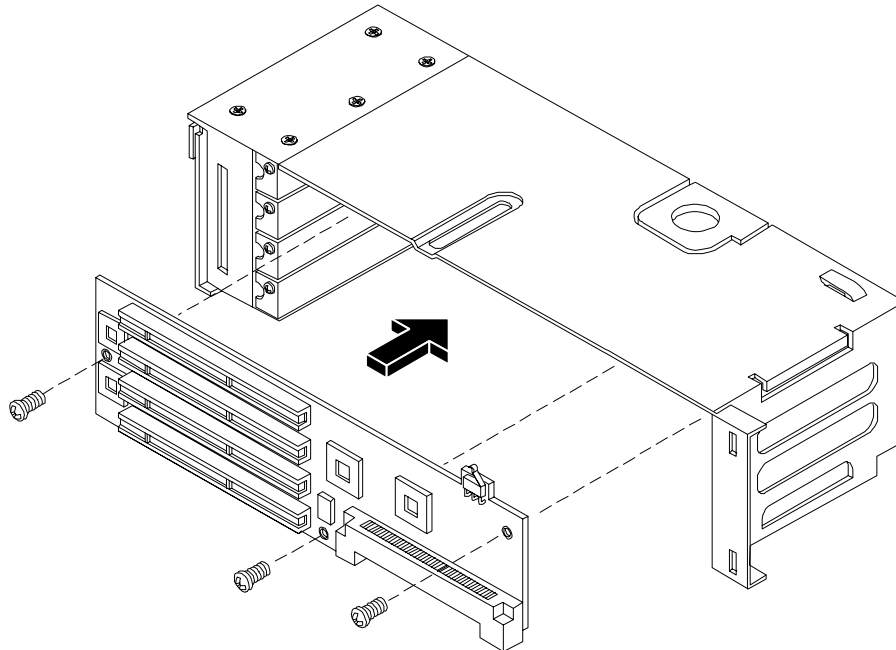
**Figure 2-60 Removing the PCI Backplane**



## Replacing the PCI Backplane

- Step 1.** Place the backplane in the cage by aligning the cage standoffs with the holes on the backplane and slide it into place.
- Step 2.** Secure the PCI backplane by screwing in its mounting screws.

**Figure 2-61 Replacing the PCI Backplane**



- Step 3.** Replace any PCI and graphics cards. (See “Replacing a PCI or Graphics Card” on page 92.)
- Step 4.** Replace the PCI card cage. (See “Replacing the PCI Card Cage” on page 90.)
- Step 5.** Verify the backplane replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation

## Removing and Replacing a Removable Media Drive

The removable media drive is located behind the front bezel.

---

**WARNING** Ensure that the system is powered-down and all power sources have been disconnected from the server prior to removing or replacing a removable media 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.

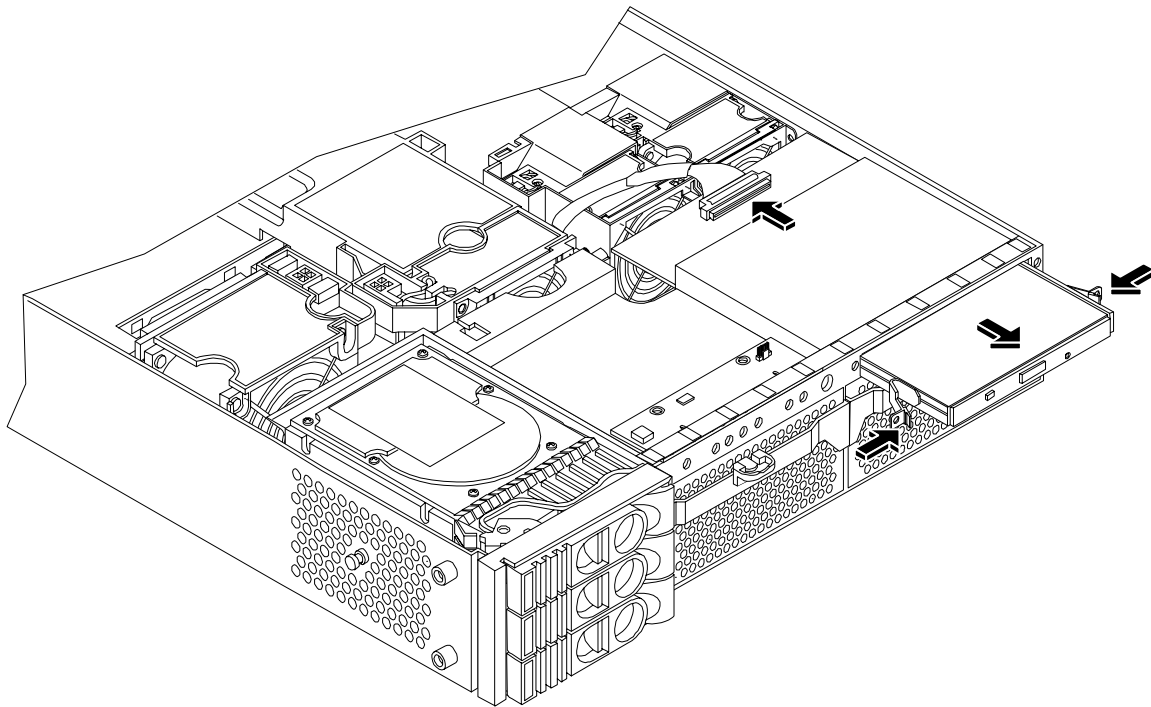
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**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server. Failure to properly complete the steps in this procedure will result in erratic system behavior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

---

**Figure 2-62 Removable Media Drive Removal and Replacement**



### Removing a Removable Media Drive

To remove a removable media drive, perform the following steps:

- Step 1.** Turn off the system and disconnect power and external cables.
- Step 2.** Remove the cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Disconnect the IDE cable from the back of the drive.
- Step 4.** Grasp the front of the drive and squeeze in on the locking tabs to release the drive.
- Step 5.** Pull the drive straight out to remove it from the chassis (Figure 2-62).

### Replacing a Removable Media Drive

To replace the removable media drive, perform the following steps:

- Step 1.** If a removable media drive has not previously been installed in the server, the drive slot is covered with a DVD drive filler. Remove the DVD drive filler.
- Step 2.** Slide the replacement drive into the drive bay until it stops sliding and the retaining clips on both sides of the drive snap into place.

- Step 3.** Connect the IDE cable on the back of the drive.
- Step 4.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 5.** Reconnect the power and external cables and turn on the system.
- Step 6.** Verify the drive replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
  - Use diagnostics provided by the ODE to exercise the newly installed module

## Removing and Replacing the iLO Manageability Card

The iLO offers remote server management through an independent management processor (MP).

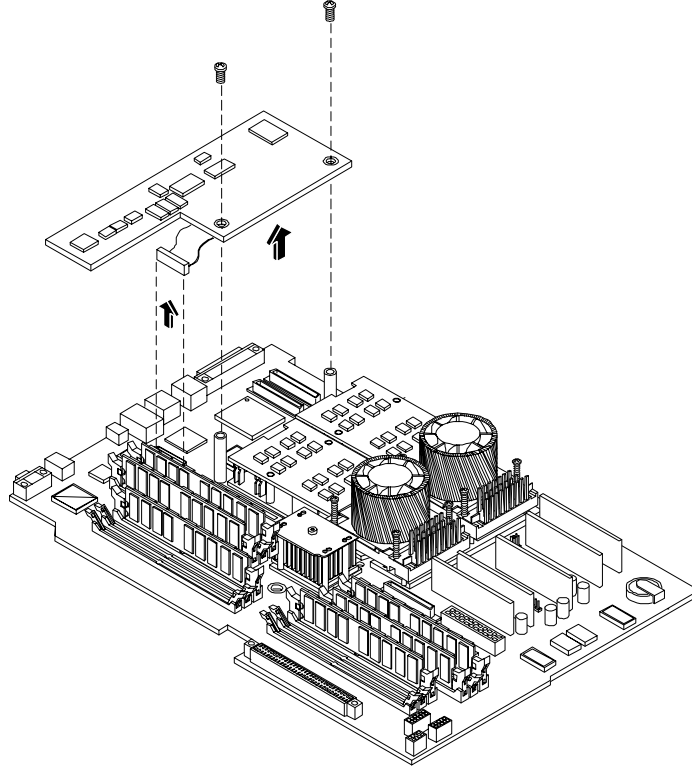
### Removing the iLO Manageability Card

- Step 1.** Turn off the system and use the MP's LS command to display network settings for your management processor. Record these network settings because you will need to input the settings when a new iLO manageability card is installed.
- Step 2.** Disconnect all power and external cables.
- Step 3.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)



- Step 4.** Unscrew the two mounting screws that connect the iLO manageability card to the internal chassis post and the two external mounting screws that are located on both sides of the 25-pin serial connector.

**Figure 2-63 Removing the iLO Manageability Card**



- Step 5.** Disconnect the iLO manageability card connector.
- Step 6.** Remove the iLO manageability card from the system by grasping it by its edges (Figure 2-63).

### Replacing the iLO Manageability Card

- Step 1.** Insert the iLO manageability card in the system by grasping its edges and placing it on the two iLO manageability card posts.
- Step 2.** Push the 10/100 management LAN, 15-pin VGA and 25-pin serial connectors through their openings on the back of the system.
- Step 3.** Connect the iLO manageability card:
- Connect the iLO manageability card cable to its connector on the system board
  - Insert and tighten the two mounting screws that connect the iLO manageability card to the internal chassis post
  - Insert and tighten the two external mounting screws that are located on both sides of the 25-pin serial connector
- Step 4.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 5.** Reconnect power and external cables. (Do not turn on the system at this time.)

- Step 6.** If you have installed a new iLO manageability card, use the MP commands to configure the system for operation. Enter the network settings recorded during iLO manageability card removal (if available).
- Step 7.** Verify the card replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
- Use the MP commands to verify operation
  - Use the BCH commands to verify operation
- Step 8.** Turn on the system.

## Removing and Replacing the iLO Manageability Card Battery

Systems have a second battery that may need replacement. The iLO manageability card battery is located on the underside of the iLO manageability card.

### Battery Notice

This product contains a Lithium battery (P/N 1420-0356).

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

---

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

### Removing the iLO Manageability Card Battery

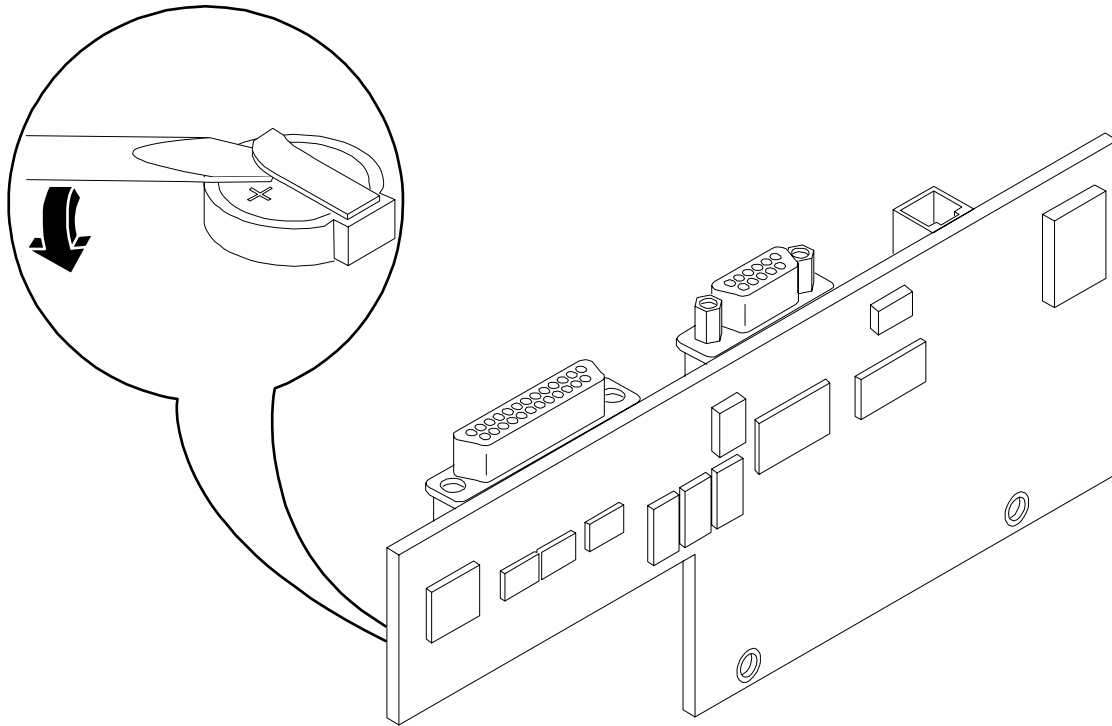
- Step 1.** Remove the iLO manageability card. (See "Removing the iLO Manageability Card" on page 96.)
- Step 2.** Locate the iLO manageability card battery on the bottom of the card. (See Figure 2-64.)
- Step 3.** Lift up on the battery retaining clip with a flat-head screwdriver and slide the battery out of its socket.

---

**CAUTION** Only lift the battery high enough to clear the holder. Excessive stress on the battery holder retaining clip may damage the clip.

---

**Figure 2-64 Removing the iLO Manageability Card Battery**



### Replacing the iLO Manageability Card Battery

**Step 1.** Lift up on the battery holder retaining clip with a flat-head screwdriver and slide the battery into the holder. The positive (+) terminal of the battery faces up.

---

**CAUTION** Only lift the battery high enough to clear the holder. Excessive stress on the battery holder retaining clip may damage the clip.

---

**Step 2.** Replace the iLO manageability card. (See “Replacing the iLO Manageability Card” on page 97.)

**Step 3.** Verify the battery replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)

- Use the MP commands to verify operation.
- Use the BCH commands to verify operation.

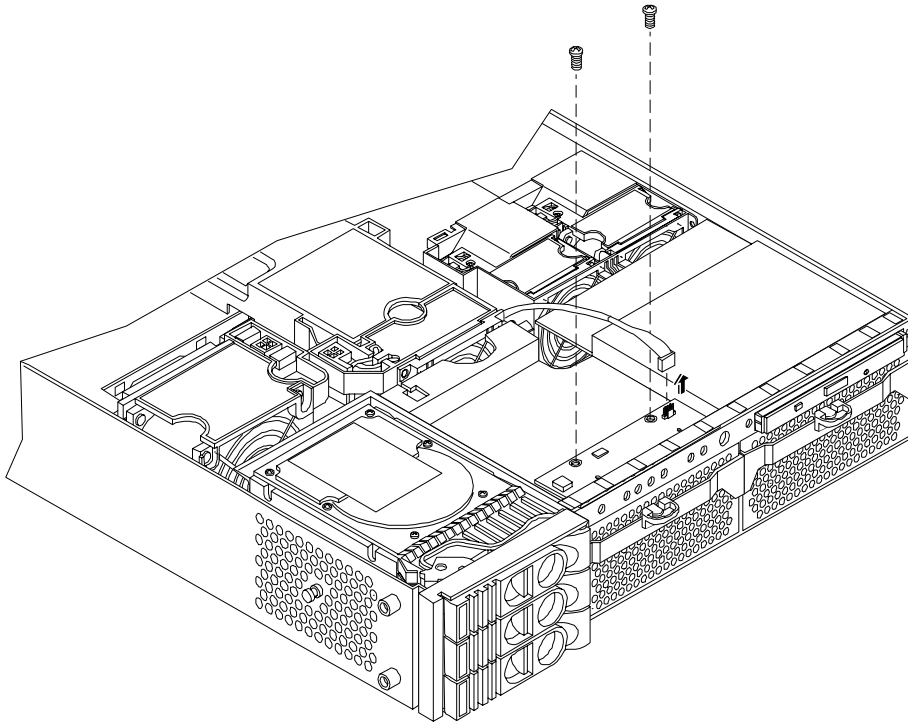
### Removing and Replacing the LED Status Panel

The LED status panel card contains the system LEDs and diagnostic LEDs.

### Removing the LED Status Panel

- Step 1.** Turn off the system and disconnect all power and external cables.
- Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Disconnect the LED status panel’s controller cable.
- Step 4.** Unscrew the two LED status panel mounting screws and remove the panel.

**Figure 2-65 Removing the LED Status Panel**



### Replacing the LED Status Panel

- Step 1.** Replace the LED status panel in the system and screw in the two LED status panel mounting screws.
- Step 2.** Connect the LED status panel controller cable.
- Step 3.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 4.** Reconnect all power and external cables.
- Step 5.** Turn on the system and verify that the system and power LEDs light up.

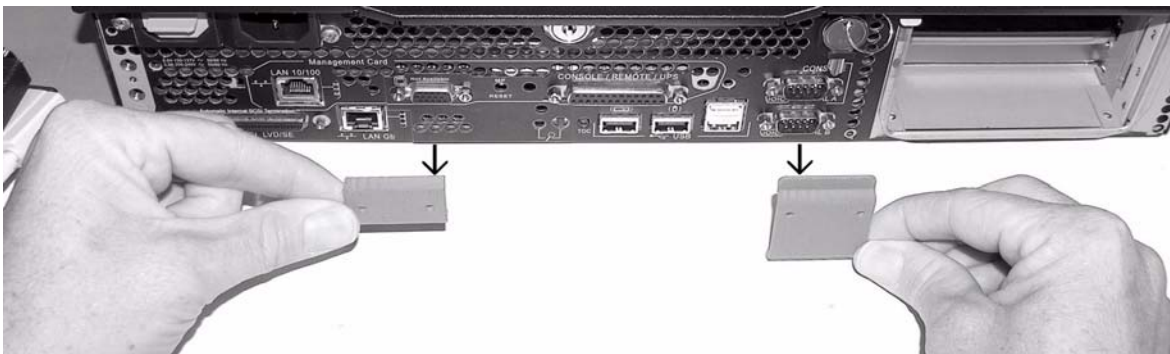
### Removing and Replacing the System Board

System information is stored on the system board. If you are installing a new system board, you must write serial number and model string information to the system board after installation.

## Removing the System Board

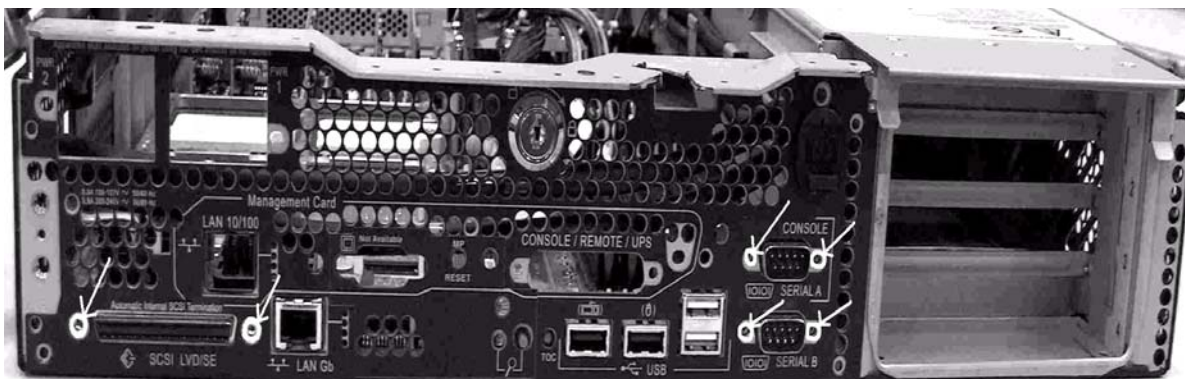
- Step 1.** Turn off the system and disconnect all power and external cables.
- Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove these components from the system board:
- System fans. (See “Removing a System Fan” on page 47)
  - PCI card cage. (See “Removing the PCI Card Cage” on page 88)
  - Memory airflow guide. (See “Removing the Memory Airflow Guide” on page 58)
  - Processor airflow guide. (See “Removing the Processor Airflow Guide” on page 59)
  - Memory (DIMMs). (See “Removing System Memory” on page 67)
  - Dual processor module(s). (See “Removing a Dual Processor Module” on page 69)
  - iLO manageability card. (See “Removing the iLO Manageability Card” on page 96)
- Step 4.** Remove the mechanical covers that are covering the VGA and DB9 ports.

**Figure 2-66 Remove Mechanical Covers**



- Step 5.** Unscrew the six backplane system board mounting screws that connect the system board to the rear of the system chassis.

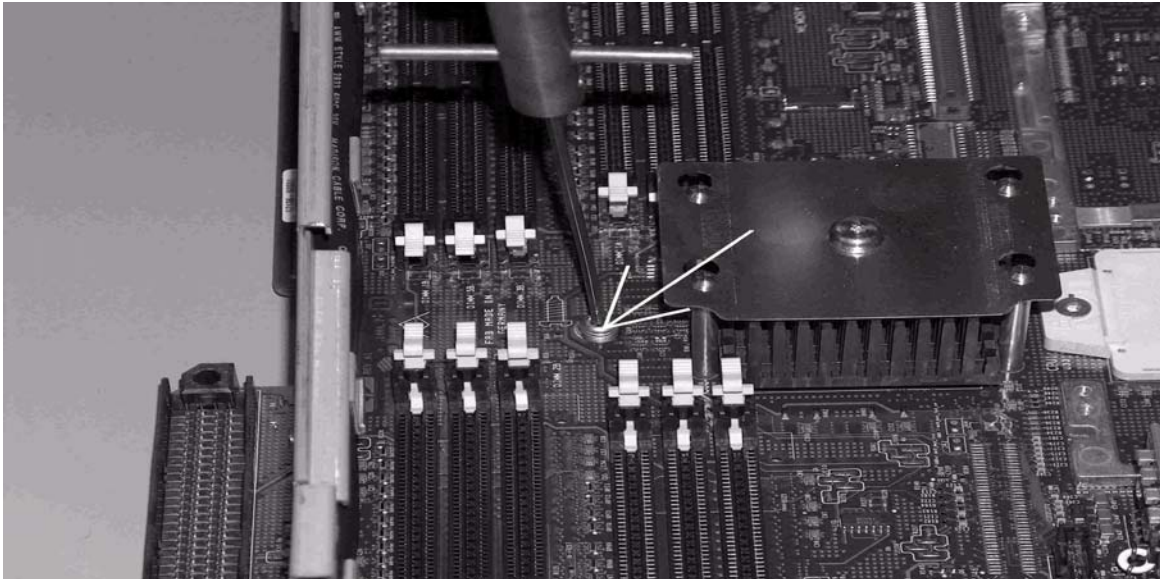
**Figure 2-67 Remove Backplane System Board Mounting Screws**



- Step 6.** Disconnect the AC power cable connectors.

- Step 7.** Disconnect all cables that are connected to the system board. To help with re-assembly, make note of which cables were connected to which connector.
- Step 8.** Lift the fan bridge to access the three power cables near the PCI card cage.
- Step 9.** Unscrew the system board mounting screw. A screw symbol is adjacent to the mounting screw.

**Figure 2-68 Remove the System Board Mounting Screw**

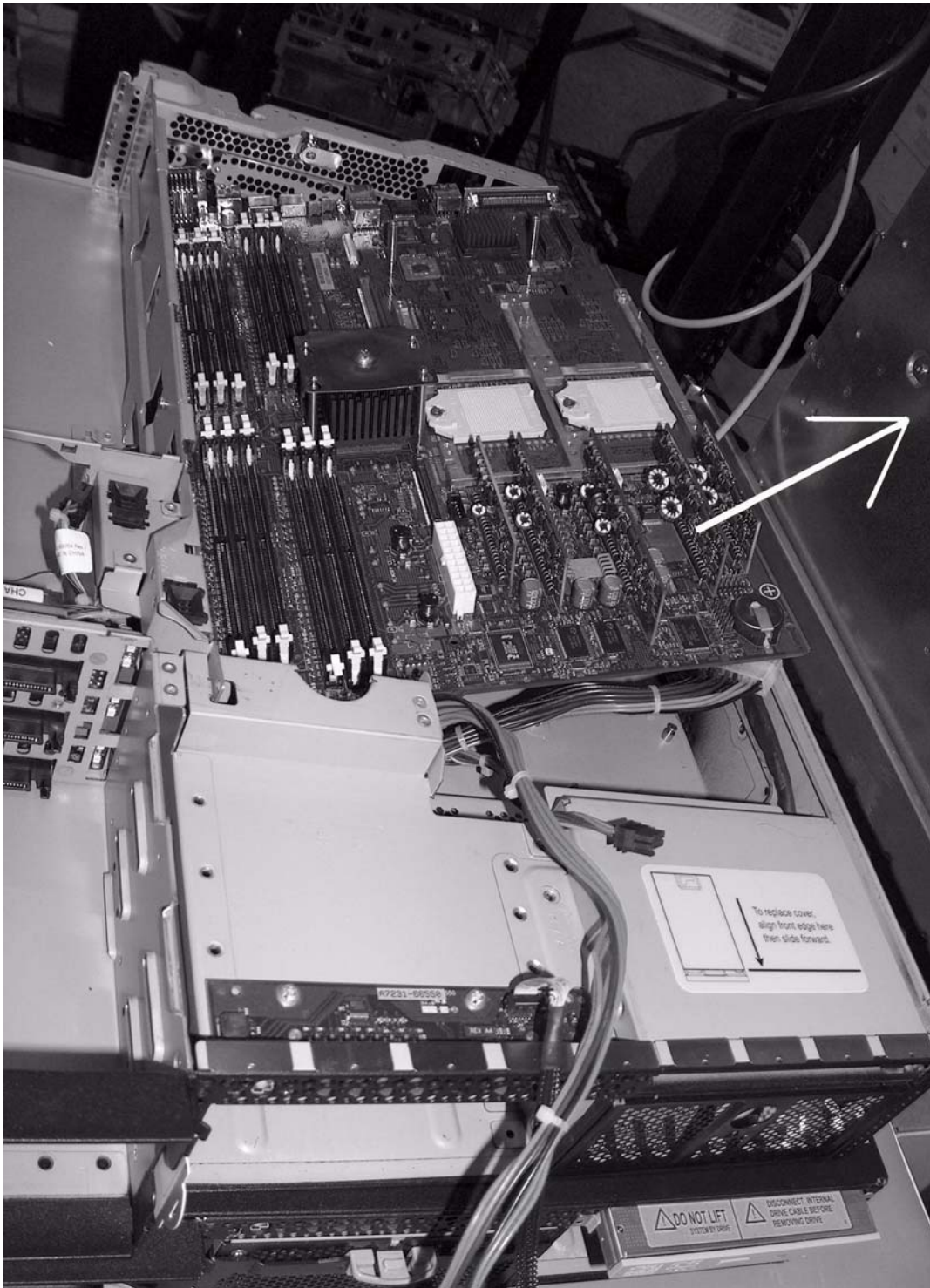


- Step 10.** Remove the system board:
  - a.** Grasp the memory controller chip heatsink and the processor module heatsink and slide the system board toward the front of the system. This releases the system board from its chassis standoffs.



- b. Lift up the processor module side of the system board and slide it free of the PCI card cage bay.

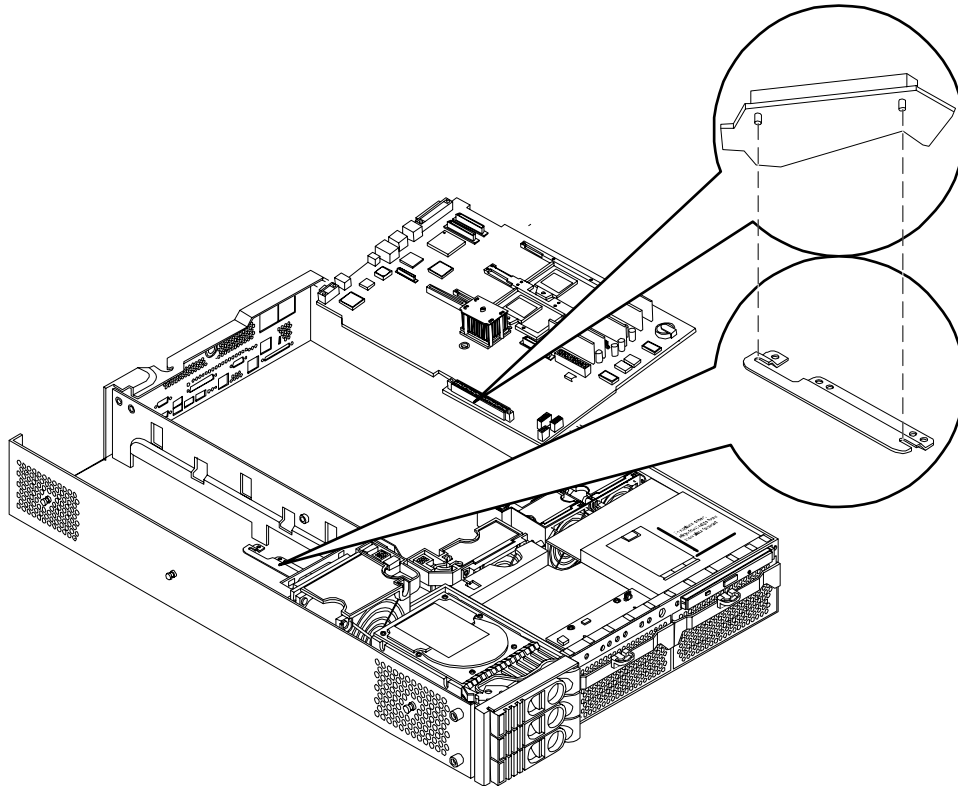
**Figure 2-69 Remove the System Board**



### Replacing the System Board

- Step 1.** Grasp the new system board by its edges and carefully align it in the system:
- a. Angle the board to allow the PCI connector to slide into the PCI card cage bay area.
  - b. Align the system board keyholes with their standoffs on the chassis.
  - c. Slide the PCI connector posts on the system board into their slots on the system chassis.

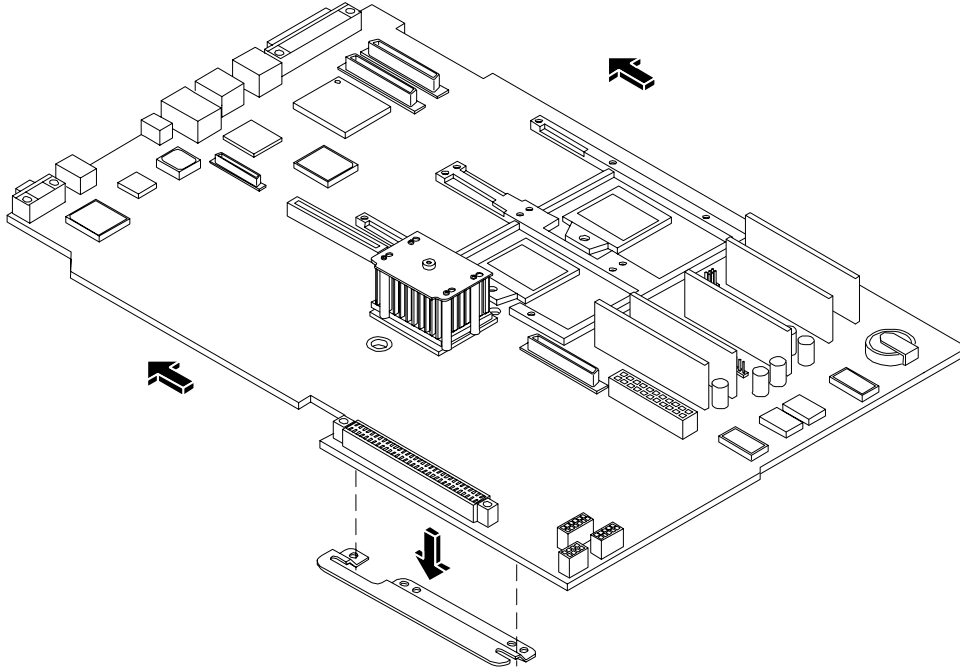
**Figure 2-70 Align the System Board PCI Connector**





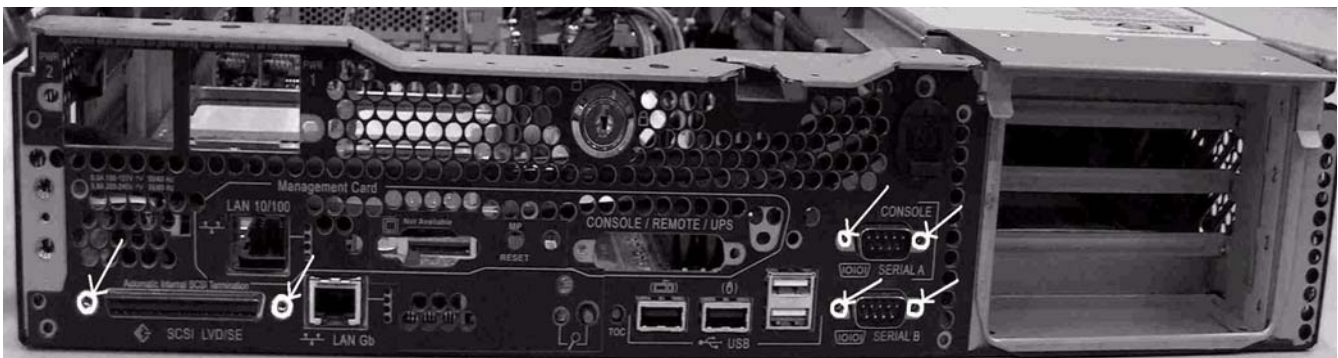
- Step 2.** Slide the system board back toward the rear of the system to secure the system board on its standoffs.

**Figure 2-71 Slide System Board in Chassis**



- Step 3.** Screw in the system board mounting screw.
- Step 4.** Connect all cables to their appropriate connectors on the system board.
- Step 5.** Screw in the six rear backplane system board mounting screws.

**Figure 2-72 Install the Rear Panel Mounting Screws**



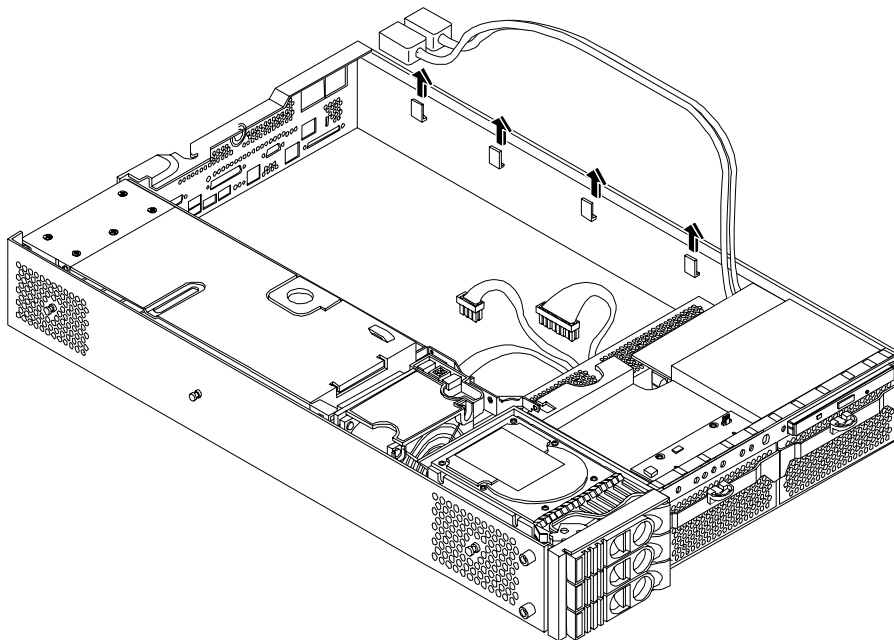
**Step 6.** Replace the mechanical covers over the VGA and DB9 ports.

**Figure 2-73 Replace Mechanical Covers**



**Step 7.** Replace the power connectors in their slots on the back of the system and screw in the power connector mounting screws.

**Figure 2-74 Reinstall the Power Connectors**



**Step 8.** Replace the following system components:

- iLO manageability card. (See “Replacing the iLO Manageability Card” on page 97)
- Dual processor module(s). (See “Installing a Dual Processor Module” on page 77)
- Memory DIMMs. (See “Installing System Memory” on page 67)
- Processor airflow guide. (See “Replacing the Processor Airflow Guide” on page 62)
- Memory airflow guide. (See “Replacing the Memory Airflow Guide” on page 59)
- PCI card cage. (See “Removing the PCI Card Cage” on page 88)
- System fans. (See “Replacing a System Fan” on page 49)

**Step 9.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)

**Step 10.** Reconnect all power and external cables and turn on the system.

**Step 11.** If you have installed a new system board, you must write serial number and model string data to the new system board. Proceed as follows:

- a. Locate the system serial number and note it for use in the following steps. The system serial number is found in two places:
  - On the left of the front bezel, but to the right of the disk drives, locate the pull tab and extend the tab from the server to display product information. A label containing the system serial number is attached to the pull tab
  - A label containing the system serial number is located on the right side of the chassis, as you face the server
- b. Monitor system startup on a terminal. At the BCH prompt, enter the command `SER` to call up the service menu. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information about BCH.)
- c. Enter the `SS_UPDATE` command to access server information.
  - Use the `SERN` command to enter the original product and serial number
  - For `PRODUCT NUMBER`, enter the appropriate number (typically A7136A or A7137A, and so on)
  - For `SYSTEM SERIAL NUMBER`, enter the serial number from the pull tab or from the side of the chassis
  - Use the `SYSMO` command to enter the `MODEL STRING`. (Select the correct model string from the following list)
    - 1: 9000/800/rp3440 PA8800 2 sockets 4 cores (used if >800Mhz)
    - 2: 9000/800/rp3440 PA8800 2 sockets 4 cores
    - 3: 9000/800/rp3410 PA8800 1 socket 2cores restricted speed DC-
    - 4: 9000/800/rp3410 PA8800 1 socket 1core restricted speed DC--
    - 5: 9000/800/rp3440#1 PA8800 1 sockets 1core
    - 6: 9000/800/rp3440 PA8900 2 sockets 4 cores (used if >800Mhz)
    - 7: 9000/800/rp3440 PA8900 2 sockets 4 cores
    - 8: 9000/800/rp3410 PA8900 1 socket 2cores restricted speed DC-
    - 9: 9000/800/rp3410 PA8900 1 socket 1core restricted speed DC--
    - 10: 9000/800/rp3440#1 PA8900 1 sockets 1 core
  - When prompted for approval of the data entry, enter **y**
- d. Enter the `RESET` command to reset the system

**Step 12.** Verify the system board replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)

- Use the MP commands to verify operation
- Use the BCH commands to verify operation

## Replacing the Resident System Board with a Replacement System Board

All A7136B, A9948A, and A9949A products within the documented serial number ranges were shipped from the factory with an incorrect system setting product number.

---

**CAUTION** A7137-69001, HP rp34x0, changing to your system settings.

If this procedure is not performed correctly, you will not be able to set your system up without the help of an HP Customer Engineer.

---

Affected Serial Numbers:

- USL0804515 - USE4444KD3
- SG40909239 - SG44719451
- JPA0409004 - JPA0444016
- DE40900020 - DE44700079

For the life of the affected systems, the factory programmed value must be maintained when entering the system product number instead of the value on the system luggage tag. Failure to do so may cause licensed customer applications to fail.

Affected Product Numbers:

For the following product numbers, A7137A must be used when entering the system setting product number, as detailed in step 5 of the following procedure:

A9948A - HP server rp3440-1 Way 800MHz Solution

A9949A - HP server rp3440-1 Way 1GHz Solution

A7136A must be used when entering the system setting product number for the A7136B - HP server rp3410-1 Way Base server 800MHz Solution, as detailed in step 5 of the following procedure.

---

**WARNING** **Ensure that the system is powered-down and all power sources have been disconnected from the server prior to removing or replacing a removable system 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.**

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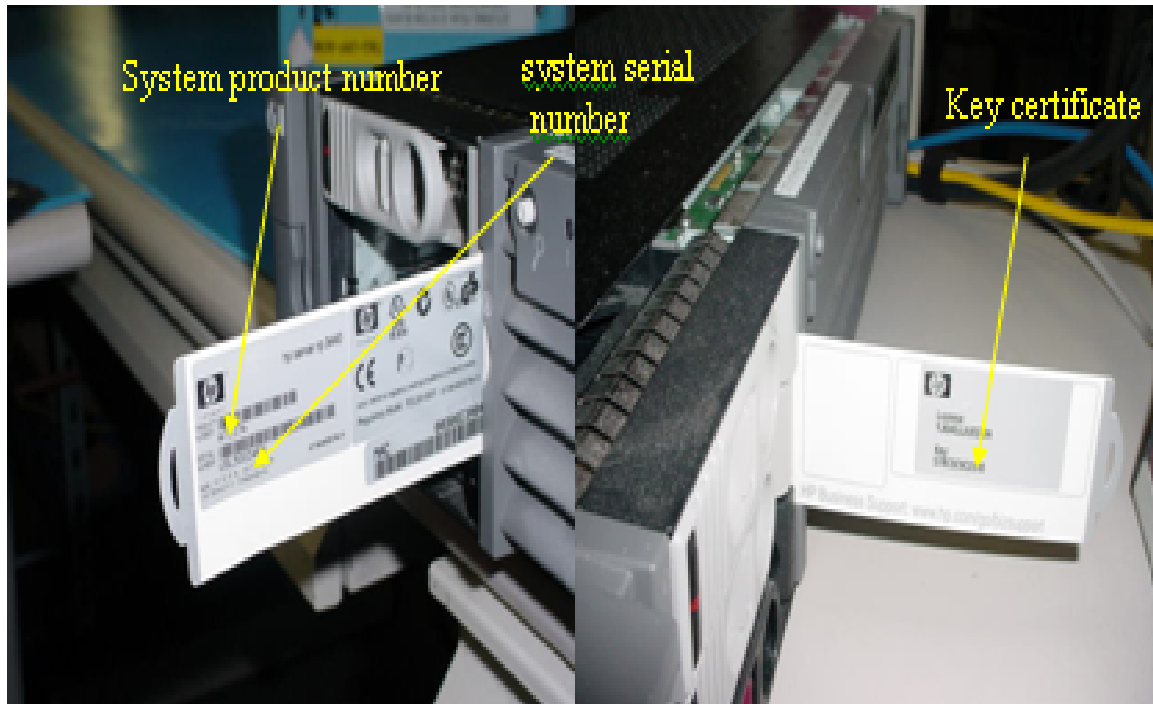
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**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server. Failure to properly complete the steps in this procedure will result in erratic system behavior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

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Before replacing the resident system board with the replacement system board (A7136-69001), you must locate the pull-out luggage tag that is on the chassis of your system. This provides you with the system product number, system serial number, and key certificate number that you need to set up the system board.

**Figure 2-75** System Product Number, System Serial Number, Key Certificate



### Replacing a System Board

You must perform the following procedure to ensure all components in the system are functional. To replace the system board, perform the following steps:

- Step 1.** Remove the system board. (See “Removing the System Board” on page 101.)
- Step 2.** Replace the system board with the replacement system board. (See “Replacing the System Board” on page 104.)
- Step 3.** Power the system on.
- Step 4.** At the BCH prompt, enter command `SER`. This will put you into the service menu.
- Step 5.** At the service menu prompt, type `init`.

---

**NOTE** The `INIT` command will only work on the repair board.

---

- Step 6.** When prompted, enter the product number located on the luggage tag. Confirm by answering **Y** when asked. If you made a mistake entering the product number, you may answer **N** and re-enter the product number when asked.

- Step 7.** Enter the system serial number when prompted. If you accidentally hit return without entering the system serial number, you will have a default value. Confirm the original serial number by entering **Y** when asked. If you made a mistake entering the serial number, you may answer **N** and re-enter the serial number when asked.
- Step 8.** If your product is a one processor 800MHz CPU, skip steps 9-12 and go to step 13 to reset your system.
- Step 9.** At the service menu prompt, enter **upgrade**. The system will ask you for the system serial number.
- Step 10.** Enter the system serial number from the luggage tag.
- Step 11.** Enter the key from the key certificate that is on the back side of the luggage tag. The key certificate number and system serial number are a pair and must be used together. If you do not enter the correct key certificate number, the system components will not be functional.
- Step 12.** The screen displays the current system value (rp3410 DC--) and the original upgraded system value. You will be prompted with the question “Do you wish to continue with this change?” Answer **Y** to confirm the change.
- Step 13.** Enter **reset** to reboot your system. perform the resetting with the changes in effect.
- Step 14.** Perform the resetting with the changes in effect.

---

**CAUTION** If this procedure is not followed, the system components will not be functional.

---

## Removing and Replacing the Power Supply Interface Module

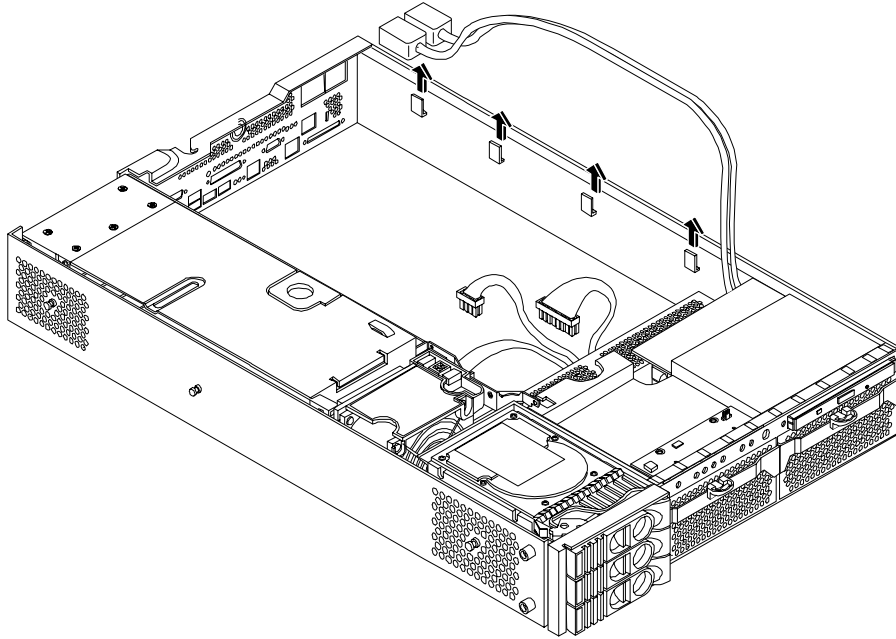
The Power Supply Interface (PSI) module supports up to two redundant power supplies.

### Removing the Power Supply Interface Module

- Step 1.** Turn off the system and disconnect all power and external cables.
- Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Remove the system board. (See “Removing the System Board” on page 101.)

**Step 4.** Lift the power cables out of their metal holding clips.

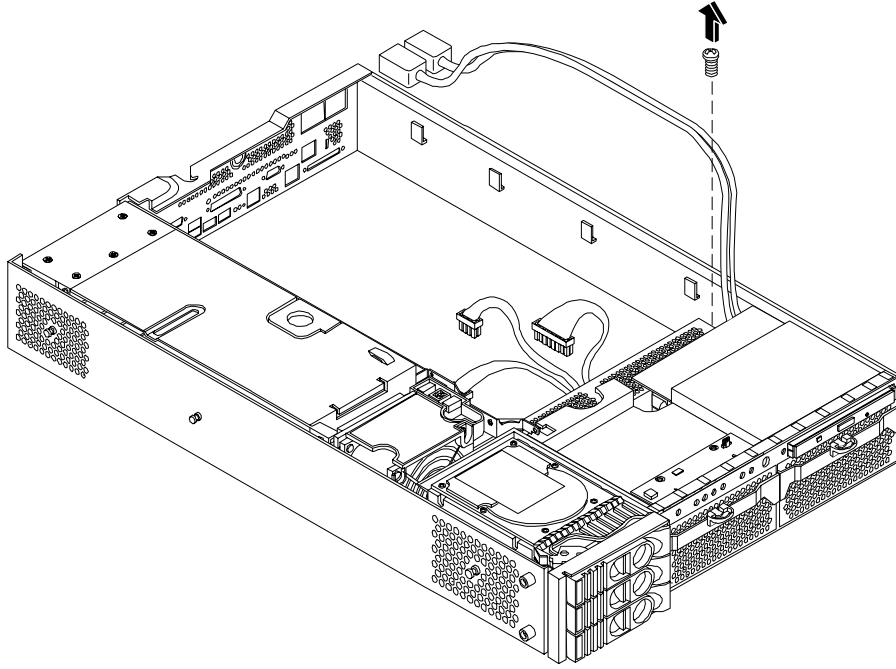
**Figure 2-76 Power Cables and Holding Clips**



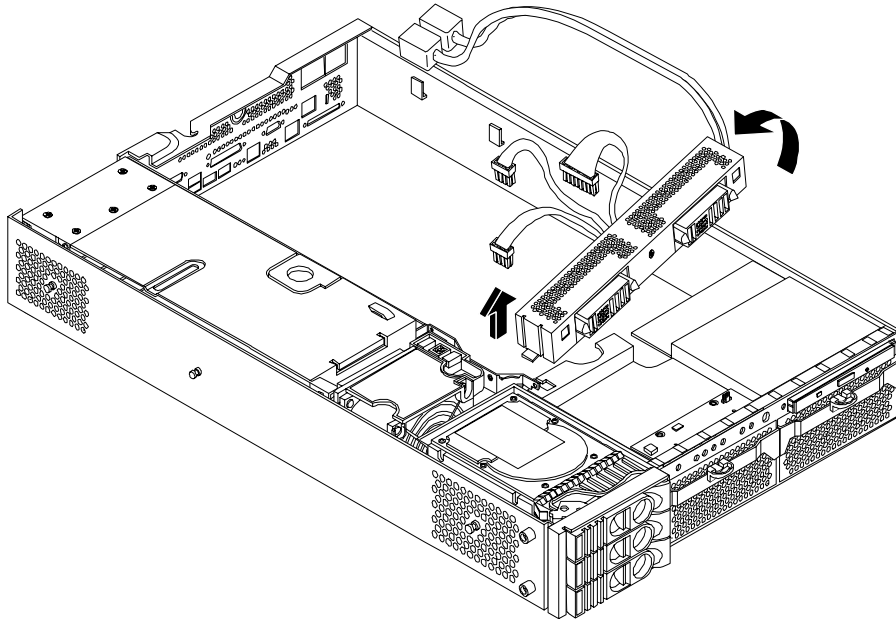


**Step 5.** Unscrew the PSI mounting screw and remove the PSI module from the system.

**Figure 2-77 Remove the Mounting Screw**



**Figure 2-78 Remove the PSI Interface Module**

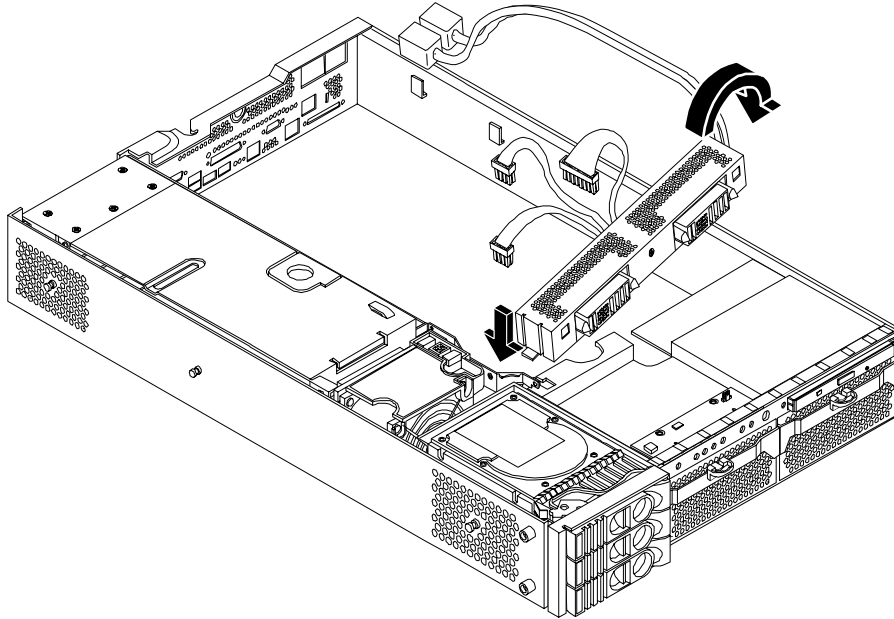




## Replacing the Power Supply Interface Module

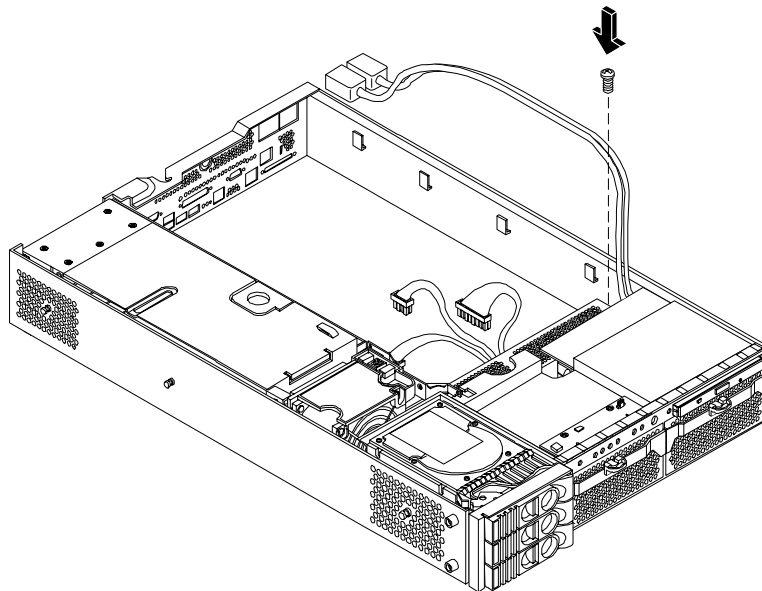
- Step 1.** Place the PSI module into the chassis by sliding the module retaining tab into the socket on the hard disk drive bay wall.

**Figure 2-79 Replacing the Power Supply Interface Module**



- Step 2.** Screw in the PSI module mounting screw and secure the power cables behind the holding clips.

**Figure 2-80 Securing the Power Supply Interface Module and Cables**



- Step 3.** Replace the system board. (See “Replacing the System Board” on page 104.)

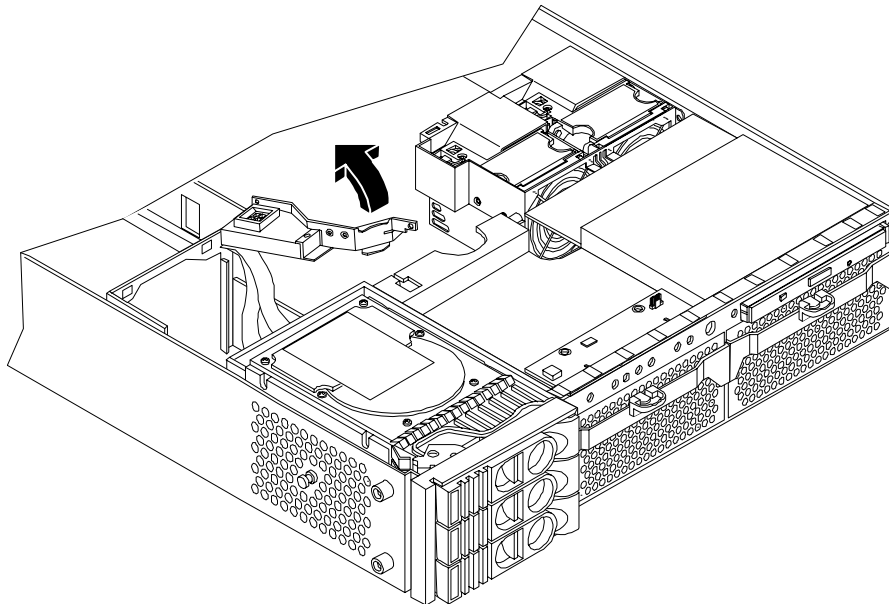
- Step 4.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 5.** Reconnect all power and external cables.
- Step 6.** Verify the PSI replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
  - Use the MP commands to verify operation
  - Use the BCH commands to verify operation

## Removing and Replacing the Hard Disk Drive (SCSI) Backplane

### Removing the Hard Drive Disk SCSI Backplane

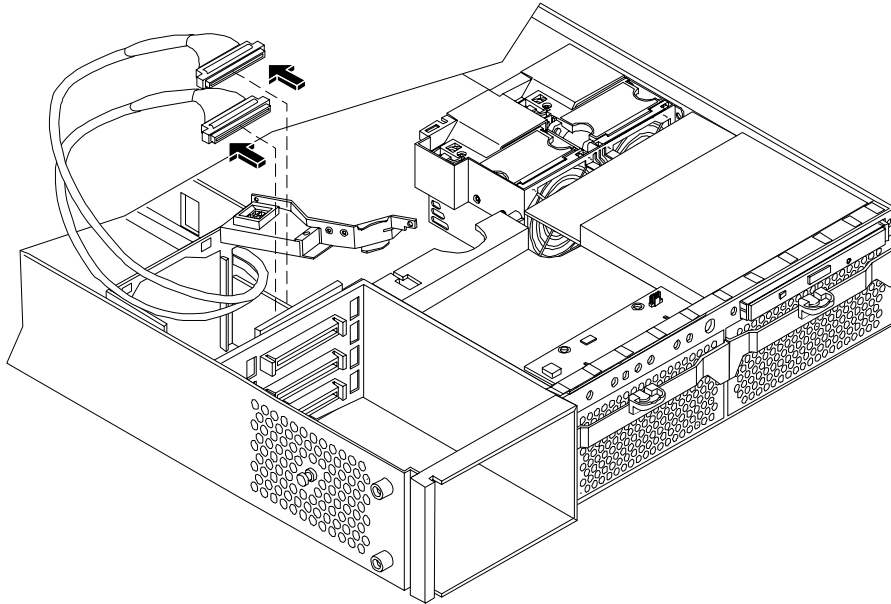
- Step 1.** Turn off the system and disconnect all power and external cables.
- Step 2.** Remove the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 3.** Lift up on the PCI card cage release lever and the back edge of the PCI card cage and lift the PCI card cage out of the system. (See “Removing and Replacing the PCI Card Cage” on page 88.)
- Step 4.** Remove fans 2 and 3. (See “Removing and Replacing System Fans” on page 47.)
- Step 5.** Lift up on the fan power bridge and disconnect the backplane power cable.

**Figure 2-81 Open the Fan Power Bridge**

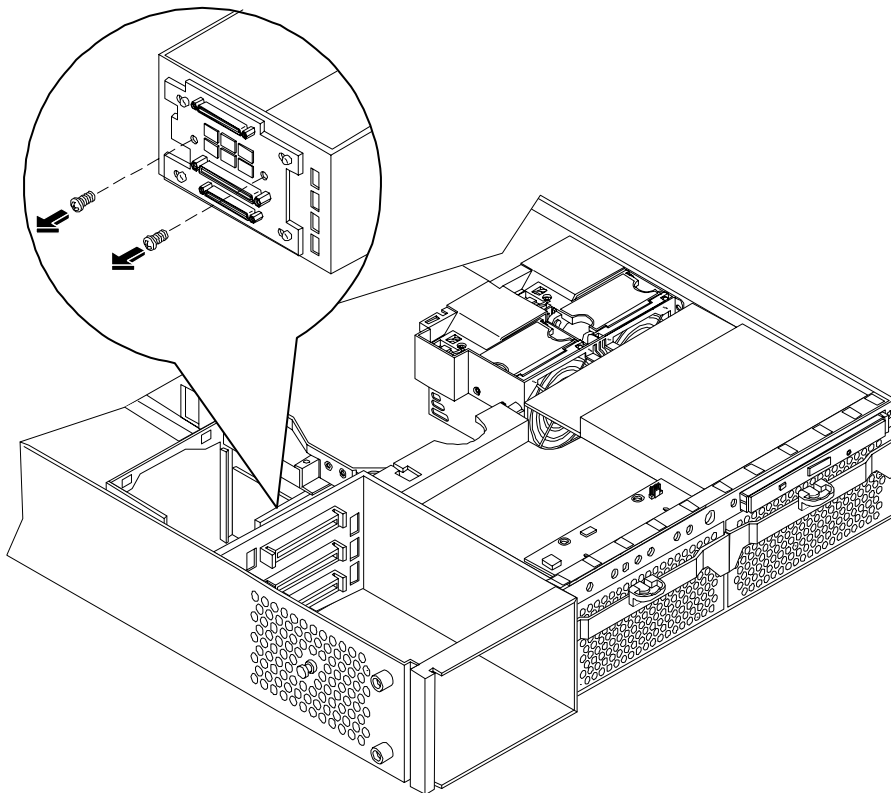


**Step 6.** Disconnect the SCSI cables and unscrew the backplane mounting screws.

**Figure 2-82 Disconnect SCSI Cables**

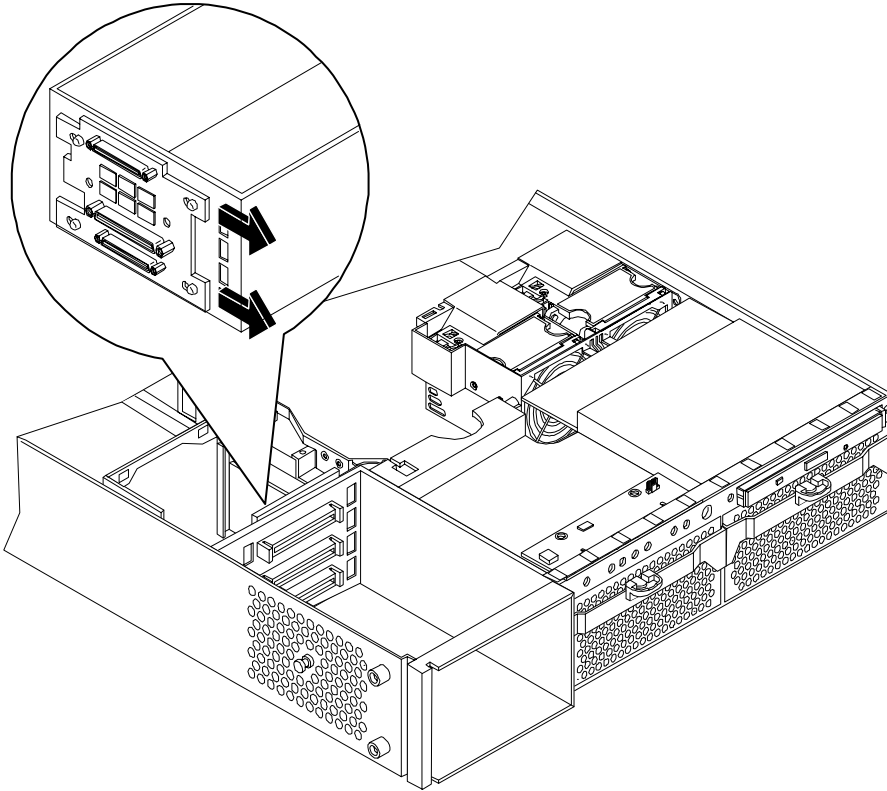


**Figure 2-83 Remove Mounting Screws**

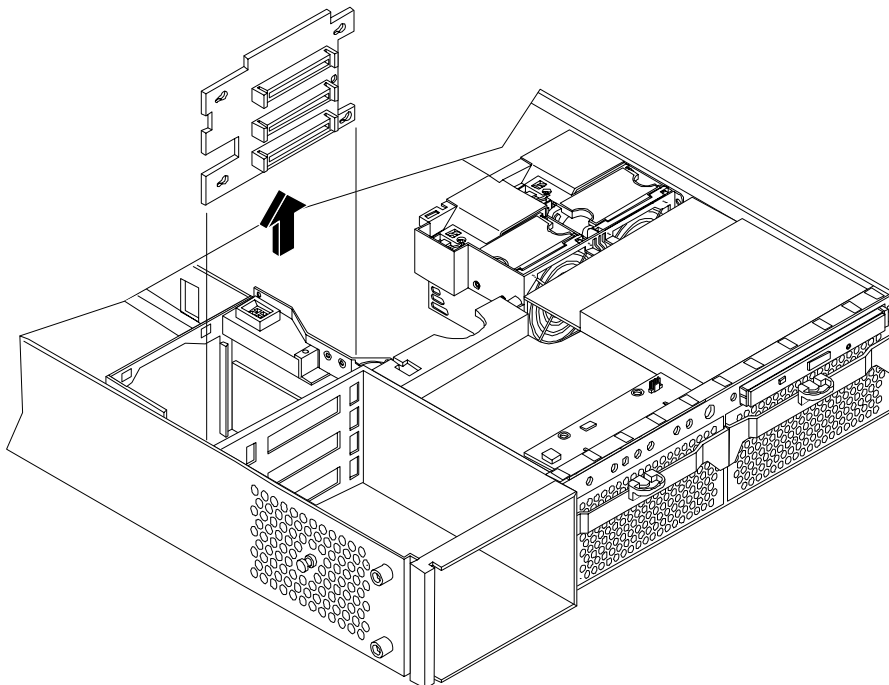


**Step 7.** Remove the hard drive backplane by sliding it in the direction of the arrow and pulling it outward from its standoff posts.

**Figure 2-84 Remove the SCSI Backplane**



**Figure 2-85 Remove the SCSI Backplane from Chassis**



### Replacing the Hard Disk Drive SCSI Backplane

- Step 1.** Insert the hard drive backplane onto its four chassis standoffs and slide it to the left as you face it. This locks the hard drive backplane in place.
- Step 2.** Screw in the two backplane mounting screws and connect the two SCSI cables.
- Step 3.** Connect the backplane power cable and lower the fan power bridge until it snaps in place.
- Step 4.** Replace fans 2 and 3. (See “Removing and Replacing System Fans” on page 47.)
- Step 5.** Replace the PCI card cage. (See “Replacing the PCI Card Cage” on page 90.)
- Step 6.** Replace the system cover. (See “Removing and Replacing System Cover and Bezel” on page 36.)
- Step 7.** Reconnect all power and external cables.
- Step 8.** Verify the backplane replacement and operation by using the system utilities. (Refer to the Utilities chapter of the *HP 9000 rp3410 and HP 9000 rp3440 Operations Guide* for additional information.)
  - Use the MP commands to verify operation
  - Use the BCH commands to verify operation

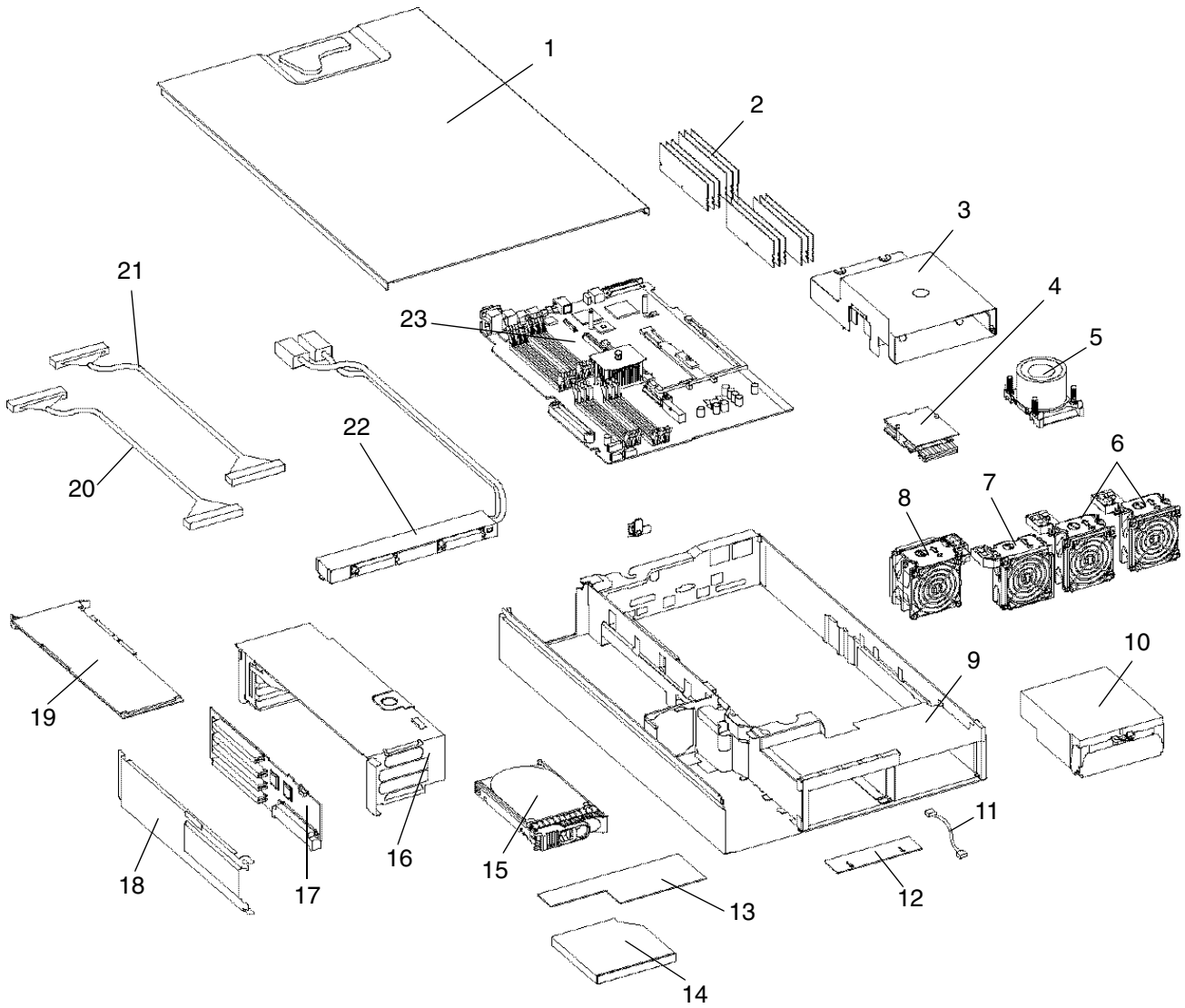


# A Parts Information

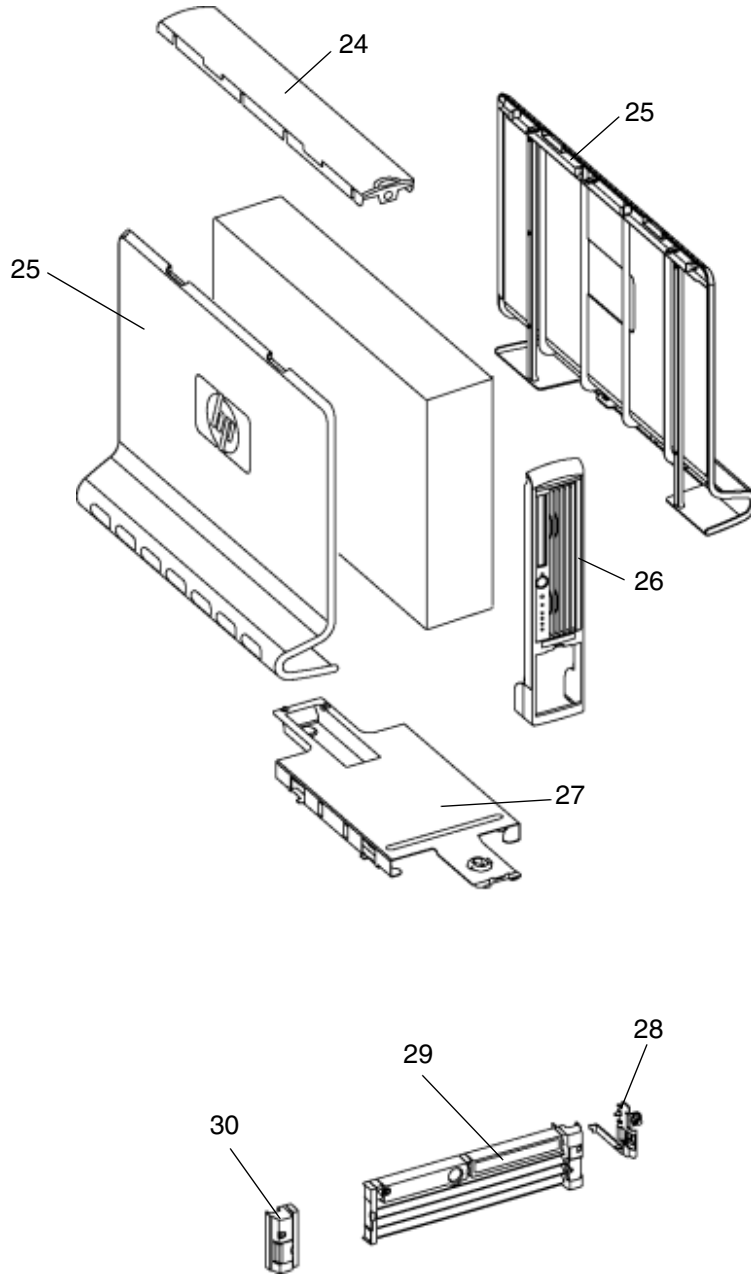
## Field Replaceable Parts (FRU) List

The items in this list and the corresponding item numbers are the Field Replaceable Units (FRUs) for the HP 9000 rp3410 and HP 9000 rp3440 servers.

**Figure A-1**      **Parts Identification**



**Figure A-2 Tower and Rack Parts**





**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 processor modules, 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
<b>PCA Boards (System Components)</b>			
22	Power supply interface module	A7231-04018	N/A
	SCSI backplane	A7231-66520	A7231-69520
23	System board (A7136-60001); 64MB cache CPUs require PDC greater than 44.52	A7136-67001	A7136-69001
17	PCI backplane/PCI Riser	A7231-66530	N/A
12	Display panel	A7231-66550	N/A
	Remote Management board (Management Processor Board/iLO Manageability Card)	A7231-66580	N/A
<b>Optical Devices</b>			
14	DVD-ROM drive, slimline (A9919A)	A7231-62012	A7231-69012
14	CD-RW/DVD-ROM combo drive, slimline (A9920A)	A7231-62024	A7231-69014
<b>Memory</b>			
2	256MB DDR-SDRAM DIMM (rp3440, rp3410 (AB542A))	A6967-67001	N/A
2	512MB DDR-SDRAM DIMM (rp3440, rp3410 (A9773A))	A6968AX	N/A
2	1 GB DDR-SDRAM (rp3440 (A9774A))	A6969AX	A6969-69001
2	2 GB DDR-SDRAM (rp3440) (A9775A)	A6970AX	A6835-69001
2	2 GB DDR-SDRAM, (rp3440) (AB561A) (There is an 8-slot restriction for this DIMM)	AB475AX	AB475-69001
<b>Internal Disks/Removable Media (Hard Disks)</b>			
15	36 GB, 15K RPM Ultra320 SCSI hot-plug disk (A9796A)	A9896-64001	A9896-69001
15	73 GB, 15K RPM Ultra320 SCSI hot-plug disk (A9897A)	A9897-64001	A9897-69001

**Table A-1 Field Replaceable Parts (FRU) List (Continued)**

Item No.	Description	Part Number Replacement	Part Number Exchange
15	146 GB, 10K RPM Ultra320 SCSI hot-plug disk (A9898A)	A9898-64001	A9898-69001
15	146 GB, 15K RPM Ultra320 SCSI hot-plug disk (AB581A)	AB461-64001	AB461-69001
	300 GB, 10K HotPlug Ultra320 SCSI LP Drive (AD049A)	0950-4532E0	A7384-69001
<b>Fans</b>			
6	Assembly—Super 80 mm fan (fan 1a/1b)	A7231-04014	N/A
7	Assembly—Thin 80 mm fan (fan 2)	A7231-04015	N/A
8	Assembly—Dual fan (fan 3)	A7231-04033	N/A
	Assembly—Standard 80 mm fan	A7231-04017	N/A
<b>Processors</b>			
5	Dual 800 MHz PA-RISC CPU with 32 MB L2 Cache (A7138-62002) (A7138A)	A7138-67002	A7138-69002
5	Dual 800 MHz PA-RISC CPU with 64 MB L2 Cache (A9952A, A9954A) (AB534A); Requires PDC greater than 44.52	AB534-62001	AB534-69001
5	Dual 1 GHz PA-RISC CPU with 32 MB L2 Cache (AB354-62001) (AB354A)	AB254-67001	AB354-69001
5	Dual 1 GHz PA-RISC CPU with 64 MB L2 Cache (A9953A) (AB535A); Requires PDC greater than 44.52	AB535-62001	AB535-69001
	Processor tool kit	5069-5441	N/A
<b>Power Supply</b>			
10	Power supply, 650 watts, redundant hot swap (A6874A)		
4	Assembly - Power Pod	0950-4294	N/A
<b>Battery</b>			
	System battery (on system board)	1420-0386	N/A
	iLO manageability card battery	1420-0356	N/A
<b>Tower and Rack Solution Kits</b>			
	Tower kit (AB242A)	N/A	N/A
27	Deskside pedestal	A7231-04028	N/A

**Table A-1 Field Replaceable Parts (FRU) List (Continued)**

Item No.	Description	Part Number Replacement	Part Number Exchange
26	Assembly—Deskside front panel	A7231-04054	N/A
24	Deskside top panel	A7231-40052	N/A
25	Assembly—Deskside side panel	A7231-04051	N/A
	Deskside nameplate—(rp3410)	A7136-40003	N/A
	Deskside nameplate—(rp3440)	A7137-40001	N/A
	Field rack kit, kit-std. slide mid weight (AB241A)	5064-9670	N/A
	Field rack kit, cable management arm (AB241A)	5065-5963	N/A
<b>Rack Server</b>			
28	Server—Assembly—Rack latch right	A7231-04023	N/A
29	Server—Assembly—Rack bezel right	A7231-04053	N/A
30	Server—Assembly—Rack left bezel with rack latch	A7231-04055	N/A
	Server rack nameplate (rp3410)	A7136-40002	N/A
	Server rack nameplate (rp3440)	A7136-40001	N/A
<b>Plastic and Metal Parts</b>			
	Filler, slimline carbon	A7231-40027	N/A
	Filler, slimline gray	A7231-40026	N/A
	HDD filler—Carbon	A6198-60003	N/A
	HDD filler—gray	A6198-60002	N/A
	Assembly—Fan cage	A7231-04004	N/A
16	Assembly—PCI card cage	A7231-04006	N/A
3	Assembly—Plastic turbocooler duct	A7231-04034	N/A
	ECI cover plate	A7231-00072	N/A
1	Screw - M3x0.5x6mm long with Torx-T15 recess	0515-2721	N/A
1	Assembly—Top cover	A7231-04003	N/A
	Assembly—Memory air flow guide	A7231-04049	N/A
<b>Cables</b>			
	IDE cable	A7231-63002	N/A
	Status panel cable	A7231-63003	N/A

**Table A-1 Field Replaceable Parts (FRU) List (Continued)**

Item No.	Description	Part Number Replacement	Part Number Exchange
	Disk power	A7231-63004	N/A
	Cable—SCSI—Channel A	A7231-63017	N/A
	Cable—SCSI—Channel B	A7231-63018	N/A
	Cable—Super 80 mm fan	A7231-63005	N/A
	Cable—80 mm fan	A7231-63006	N/A
	Single channel internal SCSI cable	A7231-63024	N/A
	Dual channel internal SCSI cables (2)	A7231-63025	N/A
	iLO manageability card M cable	A6144-63001	N/A
	Flex cable for the iLO manageability card	A7231-63008	N/A
	Audio cable	8121-0808	N/A
	Headphone	5183-9500	N/A
	PWR CORD U.S. CANADA 125 VAC	8120-1378	N/A
	PWR CORD CONT. EUROPE 250 VAC	8120-1689	N/A
	Chinese power cord, straight	8120-8376	N/A
	PWR CORD JAPAN 125 VAC	8120-4753	N/A
	PWR CORD SWITZERLAND 250 VAC	8120-2104	N/A
	PWR CORD U.K. 250 VAC	8120-1351	N/A
	I/O Cards		
	Single channel ultra 160 SCSI adapter(A6828A)	A6828-60101	A6828-69001
	PCI 4X 2-channel ultra 160 SCSI adapter (A6829A)	A6829-60101	A6829-69001
	Fibre channel card, 2 Gb, single port (A6795A)		A6795-69001
	PCI 2 port 100Base-T ultra 2 SCSI (A5838A)	A5838-60101	A5838-69101
	PCI -X dual channel 2 Gb fibre channel HBA (A6826A)	A6826-60001	A6826-69001
	PCI LAN adapter, 4 port 100Base-TX (A5506B)	A5506-60102	A5506-69102
	LAN adapter, 1000 SX Gigabit, next gen (A6847A)	A6847-67101	none
	LAN adapter, 1000 TX Gigabit, next gen (A6825A)	A6825-67101	none
	Single port 100Base TX LAN adapter (RJ-45, half length) (A5230A)		
	PCI ATM 155Mbps MMF adapter (A5513A)	A5513-60001	A5513-69002

**Table A-1 Field Replaceable Parts (FRU) List (Continued)**

<b>Item No.</b>	<b>Description</b>	<b>Part Number Replacement</b>	<b>Part Number Exchange</b>
	FDDI dual attach station LAN adapter (A3739B)		A3739-69002
	PCI token ring 4/16/100 hardware adapter (A5783A)	A5783-60101	A5783-69101



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# B System Information

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## Features Summary

The following features comprise the HP 9000 rp 3410 and HP 9000 rp3440 server.

### Processor

- 800 MHz/1.5 GB cache (HP 9000 rp3410 and HP 9000 rp3440 servers)
- 1 GHz/1.5 GB cache (HP 9000 rp3440 server only)
- Both processors are available with 32 MB or 64 MB L2 cache
- HP 9000 rp3410 servers may be 1-way and 2-way
- HP 9000 rp3440 servers may be 1-way, 2-way, and 4-way

### Memory

- 12 memory DIMM slots
- Minimum memory size is 512 MB (2 x 256 MB DIMMs in a HP 9000 rp3410, model A7136A server) or 1 GB (4 x 256 MB DIMMs in a HP9000 rp3410 model A7136B server, or in a HP 9000 rp3440 server)
- Maximum memory size is six GB (HP 9000 rp3410 server), 24 GB (HP 9000 rp3440 server with 2 GB DIMMs installed in all 12 slots) or 32 GB (HP 9000 rp3440 server with 4 GB DIMMs installed in the first eight slots)
- For the HP 9000 rp3410 server, DIMMs are 256 MB, 512 MB, and 1 GB standard 184 pins 2.5V DDR266, CL2, registered, ECC
- For the HP 9000 rp3440 server, DIMMs are 256 MB, 512 MB, 1 GB, 2 GB, and 4 GB standard 184 pins 2.5V DDR266, CL2, registered, ECC
- There is only one supported configuration for 4GB DIMMs; 2 quads (8 DIMMs); and no other DIMMs may be installed.
- DIMMs loaded by quads enable interleaved mode and chip spare
- Memory is loaded across both memory busses (two DIMMs on each bus) to ensure maximum bandwidth and performance
- 133 MHz memory bus frequency, 266MTTransfers/s data, 8.5 GB/s peak data bandwidth
- Total memory bandwidth is 8.5 GB/s, split across two 4.25 GB/s memory buses
- Open page memory latency is 80 nanoseconds

### PCI Riser

- Two (HP 9000 rp3410 server) or four (HP 9000 rp3440 server) independent PCI-X 133 MHz 64-bit 3.3V 15W slots. No 5V card and hot-plug support

### Internal Core I/O

- Dual channel SCSI U160 interface, two internal 68-pin connectors, one 68-pin external connector

- The SCSI backplane is configured either as two channels with 2+1 drives. A SAF-TE accessory (currently not available) is required to configure the SCSI backplane as one channel with three drives
- The three internal SCSI drive connectors are of the 80-pin type and provide drive electrical hot-plug capability
- The SCSI backplane is designed to support a SCSI management piggy board accessory that provides a SCSI management SAF-TE chip and shunts the backplane's channels A and B to provide three disks on channel A and leave only the external connector on channel B.
- One internal IDE connector for a slim-line optical device (CD and DVD)
- No floppy connector

## External Core I/O

- One SCSI U160 68-pin connector
- One 10/100/1000Base-T ethernet LAN connectors for copper cable
- Four USB 2.0 ports
- Three DB-9 ports (Console, UPS, and Modem) via 3-connector M cable

## Power Supply Unit

- 650W output power
- The power supply is split in a front end block (the actual power supply case) that converts the line voltage into a high DC voltage and back end voltage regulation modules (on the motherboard) that step down the front end DC voltage to the required voltages
- Redundant and hot-plug power supplies (front end block only)

## System Board Manageability

- Baseboard Management Controller (BMC)
- Temperature monitoring and fans regulation by BMC
- BMC manageability console shared with system console/general purpose serial port
- IPMI protocol for communication between BMC/system/MP
- Hardware diagnostics by BMC displayed on the front status panel
- Locator front/rear LEDs
- Field replacement units monitoring by BMC

## Enhanced Server Manageability Using the Management Processor

- LAN telnet console
- Web GUI
- Serial port for local console
- Serial port for modem console
- Duplication of console screen content across all consoles



## Hard Disk Drives

- Three half-height hard disk drives (1-inch height)

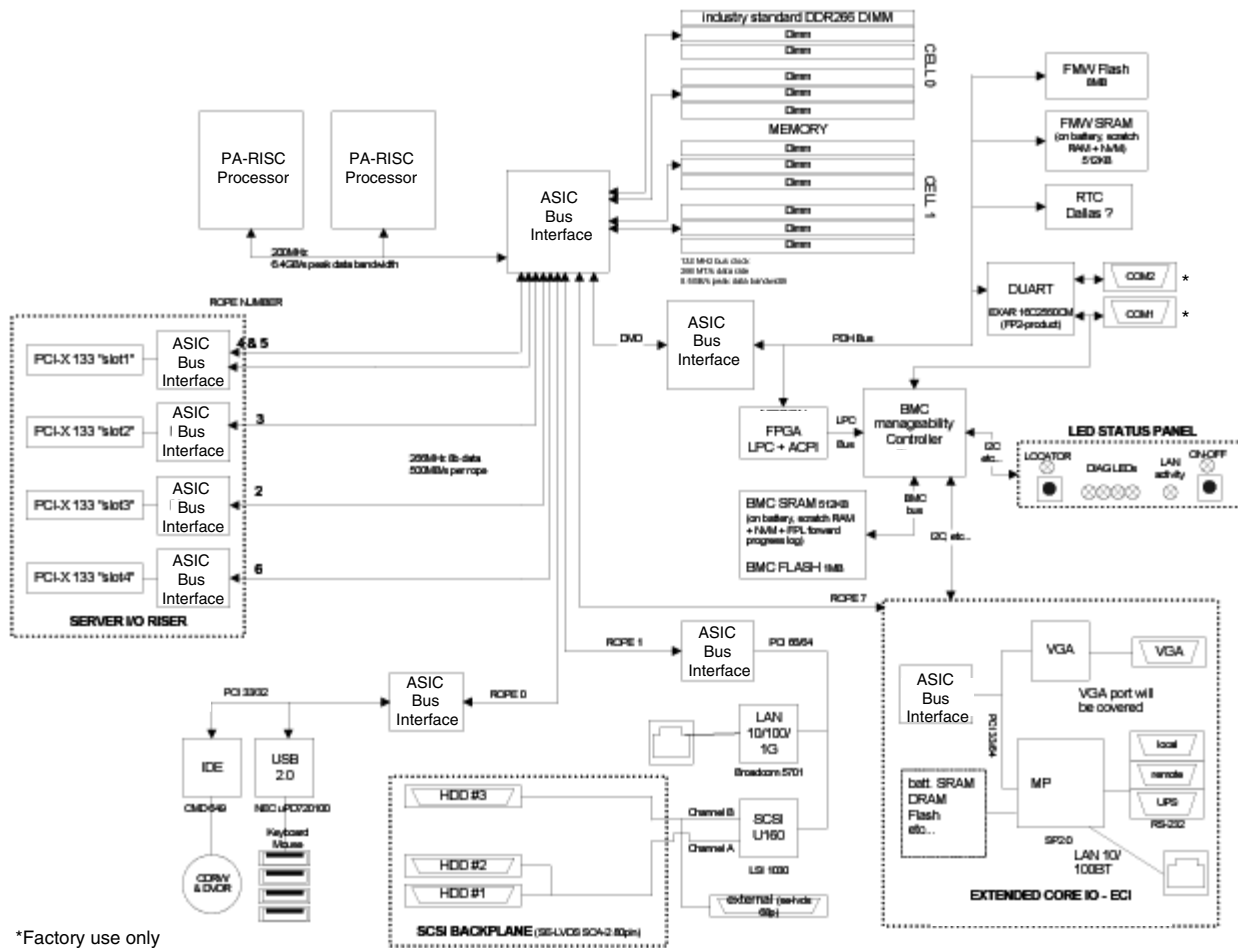
## Internal RAID

- The A9890A and A9891A RAID cards are supported to provide RAID for the embedded drives
- The A9827A cabling kit is required for internal RAID. Refer to the *HP 9000 rp3410 and HP 9000 rp3440 Upgrade Guide* for complete RAID installation instructions

## System Board

This section provides a block diagram of the system board and descriptions of key components (integrated circuits) on the board.

**Figure B-1 System Block Diagram**



## System Board Components

The following describes the main components of the system board:

- Dual PA-RISC processors (one or two processors enabled in HP 9000 rp3410 server/one, two, or four processors enabled in HP 9000 rp3440 server)
- ZX1 I/O and memory controller
- ZX1 PCI bus controller
- Processor dependent hardware controller

- Field processor gate array controller
- Baseboard management controller
- SCSI controller
- IDE controller
- USB controller
- 10/100/1000 LAN

## PA RISC Processor

The system board consists of two Zero Insertion Force (ZIF) processor sockets, the Core Electronic Complex (CEC), and circuits for clock and power generation and distribution, boundary Scan, In-target Probe (ITP), and debug.

The Front Side Bus (FSB) is the IA64 processor bus based on bus protocol from Intel. This allows processor FRUs (Field Replaceable Units) to be dropped in, provided that electrical and mechanical compatibility and support circuitry exist. A processor FRU consists of a dual processor module with heatsink assembly.

One end of the FSB is terminated with an I/O ASIC. The other end of the bus is terminated with a FRU. An additional FRU can be loaded in the middle. For the system to function properly, the processor farthest away from the I/O ASIC must be loaded at all times to electrically terminate the FSB.

Each processor module plugs directly into and is powered by its own 12V to 1.2V power-pod. Other power for the system board comes from multiple on-board DC/DC converters. Each processor module is attached to the board through a ZIF socket and the entire FRU secured down by a heatsink bolster plate.

## Processor Bus

The processor bus (Front Side Bus [FSB]) in this product runs at 200 MHz. Data on the FSB are transferred at a double data rate, which allows a peak FSB bandwidth of 6.4 Gb/sec.

## ZX1 I/O and Memory Controller

The HP 9000 rp3410 and HP 9000 rp3440 servers support the following features of the ZX1 I/O and memory controller chip:

- 3.3 GB/s peak IO bandwidth
- Provides eight communication paths
- Peak memory bandwidth of 8.5 GBs
- 2 memory cells, 144 data bits each

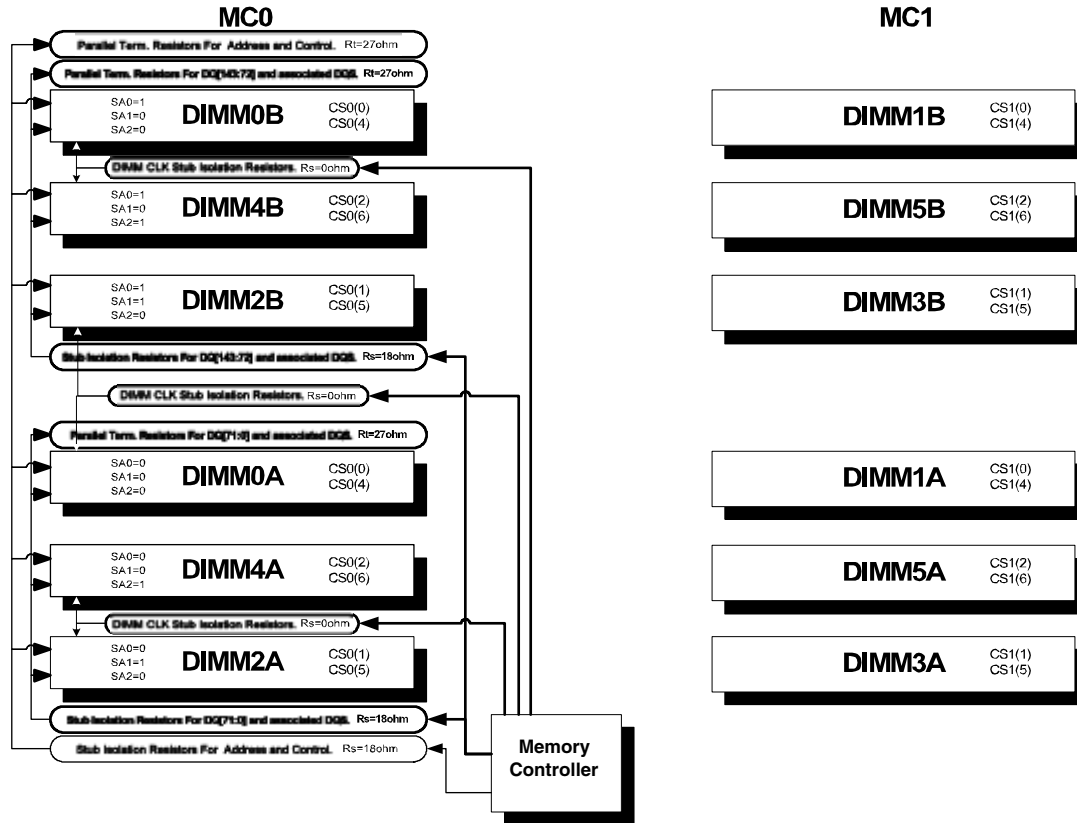
## Memory

The memory subsystem provides two memory cells, each of which is 144 data bits wide. Each cell has six DIMM slots, which means a total of 12 DIMM slots are available. The memory bus clock speed is 133 MHz, and the data transfer rate is 266Mtransfers/second as data is clocked on both edges of the clock. The peak data bandwidth for this memory subsystem design is 8.5 GB/s. DIMMs must be loaded in quads with qualified modules, with the exception of 256 MB DIMMs which is loaded in pairs. Memory is protected by data error correction code (ECC), and the hardware implementation supports the chip-spare feature.

The minimum amount of memory that you can install is 512 MB (2x256 MB modules in a HP 9000 rp3410 model A7136A server), and 1 GB (4x256 MB modules in other HP 9000 rp34x0 servers). The maximum amount of memory that you can install is limited to 24 GB (12 x 2 GB modules) or 32 GB (8 x 4 GB modules) in a HP 9000 rp3440 server.

This design does not support any non industry-standard DDR DIMMs. Only qualified DIMMs are supported.

**Figure B-2 Memory Block Diagram**



## Memory Architecture

The I/O ASIC memory interface supports two DDR cells, each of which is 144 data bits wide. The memory subsystem physical design uses a comb-filter termination scheme for both the data and address/control buses. This part of the topology is similar to other DDR designs in the computer industry. Clocks are distributed directly from the I/O ASIC; each clock pair drives two DIMMs.

Memory data is protected by ECC. Eight ECC bits per DIMM protect 64 bits of data. The use of ECC allows correction of single-bit errors, and detection of multi-bit errors. Only DIMMs with ECC are qualified or supported.

## DIMMs

The memory subsystem only supports DDR SDRAM (Double Data Rate Synchronous Dynamic Random Access Memory) technology utilizing industry-standard PC-1600 type DDR SDRAM DIMMs, 1.2" tall. This is currently being used by high-volume products. The DIMMs use a 184-pin JEDEC standard connector.

DIMMs are loaded in groups of four, known as a rank or quad (except for 256 MB DIMMs, which is loaded in pairs). All four DIMMs in a rank or quad must be the same size. The following table summarizes the memory solutions.

### Memory Array Capacities

Min/Max Memory Size Single DIMM Size DDR SDRAM Count, Type and Technology

- 0.5 GB/3 GB 256 MB DIMM 18 x 32 MB x 4 DDR SDRAMs (128 MB)
- 2 GB/6 GB 512 MB DIMM 36 x 32 MB x 4 DDR SDRAMs (128 MB)
- 4 GB/12 GB 1024 MB DIMM 36 x 64 MB x 4 DDR SDRAMs (256 MB)
- 8 GB/24 GB 2048 MB DIMM 36 x 128 MB x 4 DDR SDRAMs (512 MB)
- 16 GB/32 GB 4096 MB DIMM 36 x 256 MB x 4 DDR SDRAMs (1024 MB)

### Chip Spare Functionality

Chip spare enables an entire DDR SDRAM chip on a DIMM to be bypassed in the event that a multi-bit error is detected on the DDR SDRAM. In order to use the chip spare functionality on your system, only DIMMs built with x4 DDR SDRAM parts are used, and these DIMMs must be loaded in quads.

The memory subsystem design supports the I/O ASIC chip's spare functionality. Chip spare enables an entire SDRAM chip on a DIMM to be bypassed/replaced in the event that a multi-bit error is detected on that SDRAM. In order to use the chip spare functionality, only DIMMs built with x4 SDRAM parts are used, and these DIMMs must be loaded in quads (2 DIMMs per memory cell, loaded in the same location in each memory cell). Each DIMM within a quad must be identical to all the other DIMMs in the quad.

Using the DIMM loading order figure from above, chip spare is achieved if four identical DIMMs are loaded in the slots labeled "1st" and "2nd." If more DIMMs are added, they must be loaded in quads in order to maintain the chip spare functionality. If more DIMMs are added to the example case, four identical DIMMs (identical to each other, but can be different from the original quad that was loaded) must be loaded in the slots labeled "3rd" and "4th."

Maximum memory capability of the HP 9000 rp3440 server is 24 GB or 32 GB. If 4 GB DIMMs are used, install eight DIMMs in the first eight slots. The remaining slots (9-12) must remain empty when 4 GB DIMMs are used.

### Serial Presence Detect

Each DIMM contains an I<sup>2</sup>C EEPROM whose content describes the module's characteristics: speed, technology, revision, vendor, etc. This feature is called serial presence detect (SPD). Firmware typically uses this information to detect unmatched pairs of DIMMs, and configure certain memory subsystem parameters. The SPD information for DIMMs loaded in the system are also accessible to the baseboard management controller (BMC) through the I<sup>2</sup>C bus.

### I/O Bus Interface

The I/O bus interface has these features:

- Provides industry standard PCI 33 MHz and 66 MHz, PCI-X 66 MHz to 133 MHz, 32 or 64 data bit support
- Uses 3.3V PCI only, and it does not support 5V PCI
- Optimizes for DMA performance
- Supports 3.3V or universal-keyed PCI cards. 5V-keyed PCI cards are not supported

## Processor Dependent Hardware (PDH) Controller

The Processor Dependent Hardware (PDH) controller provides these features:

- 16-bit PDH bus with reserved address space for
  - Flash memory
  - Nonvolatile memory
  - Scratch RAM
  - Real time clock
  - UARTs
  - External registers
  - Firmware read/writable registers
  - Two general purpose 32-bit registers
  - Semaphore registers
  - Monarch selection registers
  - Test and reset register
- Reset and INIT generation

## Field Programmable Gate Array (FGPA)

The Field Programmable Gate array (FPGA) provides ACPI and LPC support for the PDH bus and provides these features:

- ACPI 2.0 interface
- LPC bus interface to support BMC
- Decoding logic for PDH devices

## Baseboard Management Controller (BMC)

The baseboard management controller supports the industry-standard Intelligent Platform Management Interface (IPMI) specification. This specification describes the management features that have been built into the system board. These features include: diagnostics (both local and remote), console support, configuration management, hardware management and troubleshooting.

The BMC provides the following:

- Compliance with IPMI 1.0
- Tachometer inputs for fan speed monitoring
- Pulse width modulator outputs for fan speed control
- Push-button inputs for front panel buttons and switches
- One serial port, multiplexed with the system console port
- Remote access and intelligent chassis management bus (ICMB) support
- Three I<sup>2</sup>C master/slave ports (one of the ports is used for intelligent platform management bus (IPMB))

- Low Pin Count (LPC) bus provides access to three Keyboard Controller Style (KCS) and one-Block Transfer (BT) interface
- 32-bit ARM7 RISC processor
- 160-pin Low Profile Flat Pack (LQFP) package
- Firmware is provided for the following interfaces:
  - IPMI
  - IPMB

## SCSI Controller

The SCSI controller is a LSI Logic 53C1030 chip. This chip is fully compliant with the SCSI Peripheral Interface-4 Specification (SPI-4). It has two independent SCSI channels supporting devices at speeds up to 320 MB/sec each. The 53C1030 adheres to the PCI-X addendum, to the PCI Local Specification, and is hard-wired to PCI ID 1 which corresponds to bit 17 of the PCI AD bus.

## IDE Interface

The IDE controller (PCI649) supports the ATAPI zero (0) to five (5) modes (from 16 to 100 MB/s). The usable speed on this system is limited to 16 MHz (ATA-33 mode, 33 MB/s) because the slimline CD/DVD devices do not support the ATA-66 and 100 modes.

The primary IDE channel is the only channel that is implemented. The IDE cable provides only one drive connector, of the master type, for the optical storage peripheral.

## 1 GB System LAN

The 1 GB System LAN port provides:

- Main system LAN
- 10/100/1000 MB capable

## USB Connectors

The USB connectors provide:

- High speed 480 MB/sec. capable
- Full speed 12 MB/sec. and low speed 1.5 MB/sec.
- Support for USB keyboard and mouse
- HP-UX supports HP USB keyboard and mouse

## 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 B-1 Internal Disk and DVD Paths**

Slot	Function Associated with Path	Location	ACPI Path
Disk slot 0	Ultra 3 SCSI I/O for bottom removable disk	Bottom disk slot	0/1/1/0.0.0
Disk slot 1	Ultra 3 SCSI I/O for middle removable disk	Middle disk slot	0/1/1/0.1.0
Disk slot 2	Ultra 3 SCSI I/O for top removable disk	Top disk slot	0/1/1/1.2.0
DVD slot	IDE I/O for DVD	DVD slot	0/0/2/0.0.0

**Table B-2 Extended Core I/O Paths**

Slot	Function Associated with Path	Location'	ACPI Path
Core I/O	USB port	Rear panel (with mouse symbol)	0/0/1/0
Core I/O	USB port	0/0/1/0	Rear panel (top/ white connector)
Core I/O	USB port	Rear panel (with keyboard symbol)	0/0/1/1
Core I/O	USB port	Rear panel (bottom/ white connector)	0/0/1/1
Core I/O	USB port	Internal	0/0/1/2
Core I/O	IDE controller	System board	0/0/2/0
Core I/O	LAN 100 port	Rear panel (with LAN 10/100 label)	0/0/3/0
Core I/O	Ultra 3 SCSI Channel A	System board	0/1/1/0
Core I/O	Ultra 3 SCSI Channel B	System board	0/1/1/1



**Table B-2 Extended Core I/O Paths (Continued)**

Slot	Function Associated with Path	Location <sup>4</sup>	ACPI Path
Core I/O	Ultra 3 SCSI I/O—external SCSI	Rear panel (with “SCSI LVD/SE” label)	0/1/1/1.x.y
Core I/O	LAN 1000 port	Rear panel (with LAN GV label)	0/1/2/0
Console port	Interface with external console (ECI)	Rear panel (accessible thru W cable)	0/7/1/1
Remote port	Interface with UPS (ECI)	Rear panel (accessible thru W cable)	0/7/1/0
UPS port	Interface with UPS	Rear panel (accessible thru W cable)	N/A
ECI (VGA port)	Not used (disabled)	Rear panel (with VGA label)	0/7/2/0
N/A	Baseboard console port (CLI)	Rear panel (with Serial A label)	Factory use only
N/A	Baseboard serial port	Rear panel (with Serial B label)	Factory use only

**Table B-3 PCI I/O Paths**

Slot	Function Associated with Path	Location <sup>4</sup>	ACPI Path
Slot 1	64-bit, 133 MHz PCI-X card	Top connector/slot in PCI card cage	0/4/1/0
Slot 2	64-bit, 133 MHz PCI-X card	Second connector/slot in PCI card cage	0/3/1/0
Slot 3	64-bit, 133 MHz PCI-X card (active for rp3440 only)	Third connector/slot in PCI card cage	0/2/1/0
Slot 4	64-bit, 133 MHz PCI-X card (active for rp3440 only)	Bottom connector of PCI card cage	0/6/1/0



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