HP ProLiant DL320 Generation 2 Server Maintenance and Service Guide

September 2003 (Fourth Edition)
Part Number 293164-004

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Contents

About This Guide

This maintenance and service guide can be used for reference when servicing an HP ProLiant DL320 Generation 2 server.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs can create conditions that are hazardous.

Audience Assumptions

This guide is for service technicians. HP assumes you are qualified in the servicing of computer equipment, trained in recognizing hazards in products with hazardous energy levels, and familiar with weight and stability precautions for rack installations.

Technician Notes

WARNING: Only authorized technicians trained by HP should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, do not exceed the level of repairs specified in these procedures. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create conditions that are hazardous.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- **Disconnect power from the system by unplugging all power cords from the power supplies.**
- **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
- **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**

CAUTION: To properly ventilate the system, you must provide at least 7.6 cm (3.0 in) of clearance at the front and back of the server.

CAUTION: The computer is designed to be electrically grounded (earthed). To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

NOTE: Any indications of component replacement or printed wiring board modifications may void any warranty.

Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- User documentation
- *Service Quick Reference Guide*
- Service training guides
- Service advisories and bulletins
- QuickFind information services
- Insight Manager software
- *HP Servers Troubleshooting Guide*

Integrated Management Log

The server includes an integrated, nonvolatile management log that contains fault and management information. The contents of the Integrated Management Log (IML) can be viewed with Insight Manager.

Telephone Numbers

For the name of the nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.

For HP technical support:

- In the United States and Canada, call 1-800-652-6672.
- Outside the United States and Canada, refer to

  www.hp.com

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Illustrated Parts Catalog

This chapter provides the illustrated parts breakdown and spare parts list for the HP ProLiant DL320 Generation 2 server. The table in this chapter provides names and ordering numbers for all referenced spare parts.

Mechanical Parts Exploded View

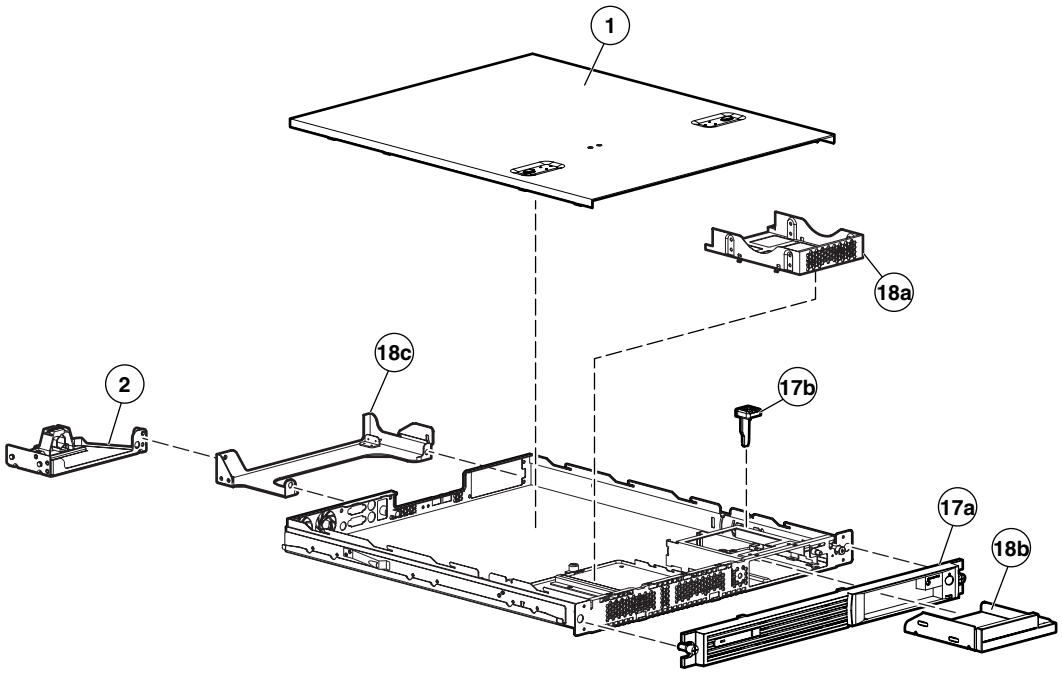

Figure 1-1: Mechanical parts exploded view

System Components Exploded View

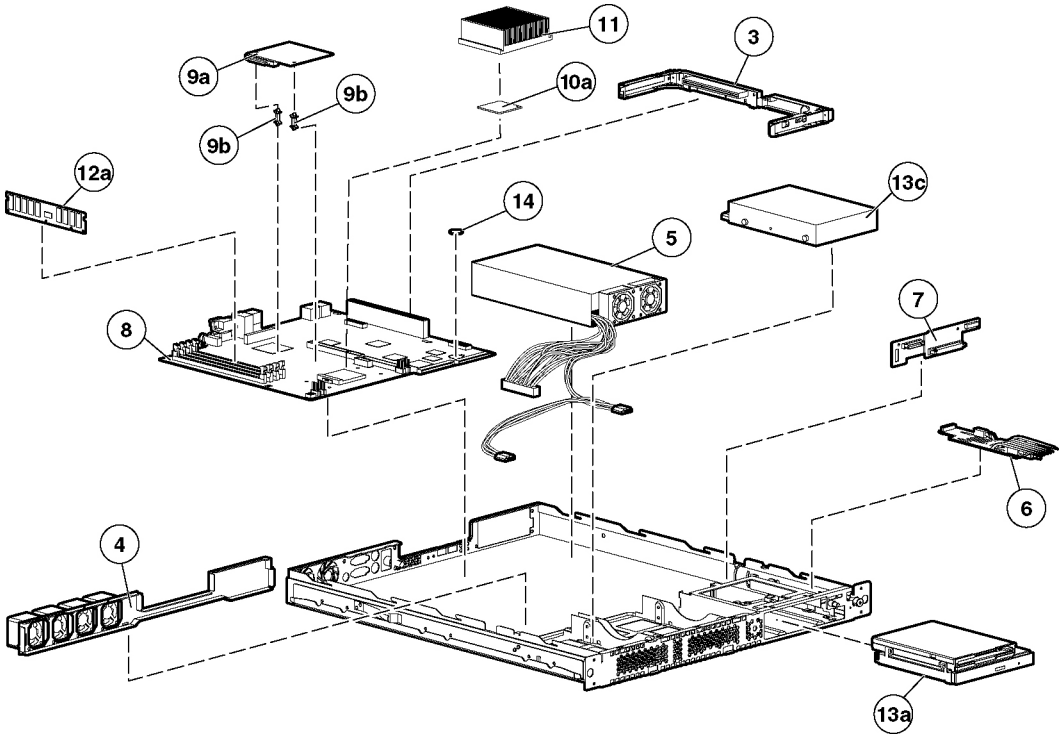

Figure 1-2: System components exploded view

Mechanical Parts and System Components Spares List

Table 1-1: Mechanical and System Spare Parts List

Item	Description	Spare Part Number
	Mechanical Components	
1	Access panel	307130-001
2	Fixed cable tray	173839-001
3	PCI riser board assembly	293365-001
4	Center wall bracket with fans	293366-001
	Power	
5	180-Watt power supply	293367-001
	Boards	
6	User interface board	207725-001
7	Optical device/diskette drive assembly backplane	336782-001
8	System board	293368-001
9	a) Single channel, Ultra3 slotless SCSI controller module	293618-001
	b) Support posts (SCSI models only)	
	Processor	
10	a) 2.26-GHz Intel® Pentium® 4 processor	293370-001
	b) 2.66-GHz Intel Pentium 4 processor*	326509-001
	c) 3.06-GHz Intel Pentium 4 processor*	344041-001
11	Heatsink	293377-001
	Memory	
12	a) PC2100 DDR ECC Registered DIMM 128-MB	300691-001
	b) PC2100 DDR ECC Registered DIMM 256-MB*	300699-001
	c) PC2100 DDR ECC Registered DIMM 512-MB*	300700-001
	d) PC2100 DDR ECC Registered DIMM 1-GB*	300701-001
	Mass Storage Devices	
13	Optical devices/diskette drive assembly	
	a) CD-ROM/diskette drive assembly	293371-001
	b) DVD-ROM/diskette drive assembly*	269046-001
	c) ATA hard drive, 80 GB	287685-001
	d) Optical drive/diskette drive assembly*	345567-001

* Not shown

continued

Table 1-1: Mechanical and System Spare Parts List *continued*

Item	Description	Spare Part Number
	Miscellaneous	
14	Replacement battery, 3-V lithium	234556-001
15	Two-device terminated SCSI cable (Ultra3)*	293373-001
16	Hard drive cable kit*	293372-001
	a) ATA hard drive cables (2)*	
	b) Optical device/diskette assembly drive cable*	
17	Miscellaneous plastics kit	293374-001
	a) Bezel	
	b) Shipping/ejector key	
	c) PCI card guide*	
	d) Bezel screws*	
18	Hardware kit	293375-001
	a) Hard drive tray	
	b) Bezel blank	
	c) Cable support bracket	
	d) PCI slot cover*	
19	Rack mounting kit (fixed rack rails)*	173845-001
20	Return kit*	207732-001
21	Country kit*	293376-001
	Option Kit Spares	
	Remote Insight Lights-Out Edition II*	232386-001
	Sliding rails and cable management system kit*	177852-001
	Telco rack-mounting kit*	177853-001
	Third-party cabinet rack-mounting kit*	177854-001

* Not shown

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Removal and Replacement Procedures

This chapter provides subassembly and module-level removal and replacement procedures for HP ProLiant DL320 Generation 2 servers. After completing all necessary removal and replacement procedures, run the diagnostics program to verify that all components operate properly.

The following diagnostic programs and tools may be used:

- Phillips screwdriver
- Shipping/ejector key
- SmartStart CD
  - — ROM-Based Setup Utility (RBSU)
  - — Array Diagnostics Utility (ADU)
  - — Diagnostics software
- Wrist strap

Electrostatic Discharge Information

An electrostatic discharge (ESD) can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are required to prevent damage. To prevent damage due to ESD, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover workstations with approved static-dissipating material. Use a wrist strap connected to the work surface as well as properly grounded tools and equipment.
- Keep the work area free of nonconductive materials such as ordinary plastic assembly aids and foam packing.
- Ensure proper grounding before touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Always place drives with the Printed Circuit Board (PCB) assembly-side down.
- Use conductive field service tools.

Symbols on Equipment

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching it.

To reduce the risk of injury from electric shock hazards, do not open this enclosure.

WARNING: Any surface or area of the equipment marked with these symbols indicates the presence of electric shock hazards. The enclosed area contains no operator-serviceable parts.

This symbol indicates the presence of electric shock hazards. The enclosed area contains no user or field-serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This label or equivalent is located on the surface of the CD-ROM or DVD-ROM drive. This label indicates that the product is classified as a Class 1 Laser Product.

Rack Warnings

WARNING: To reduce the risk of personal injury or damage to equipment, always ensure that the rack is adequately stabilized before extending a component outside the rack. A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- **The leveling jacks are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **The stabilizers are attached to the rack, if it is a single rack installation.**
- **The racks are coupled together in multiple rack installations.**

WARNING: When installing the server in a telco rack, make certain that the rack frame is adequately secured to the building structure at the top and bottom.

WARNING: To reduce the risk of personal injury or damage to the equipment, at least two people are needed to safely unload the rack from the pallet. An empty 42U rack weighs 115 kg (253 lb), is over 2.1 m (7 ft) tall, and may become unstable when being moved on its casters. Do not stand in front of the rack as it rolls down the ramp from the pallet. Handle the rack from both sides.

Server Warnings and Precautions

WARNING: To reduce the risk of personal injury from hot surfaces, allow the hot-plug drives and the internal system components to cool before touching them.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
- **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**
- **Unplug the power cord from the power supply to disconnect power to the equipment.**

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

CAUTION: The server must always be operated with the system access panel closed. Proper cooling is not achieved if the system access panel is removed.

Removal and Replacement Procedures

This chapter discusses preparing the server for servicing and provides step-by-step instructions for the removal or replacement of the:

- Access panel
- Shipping/ejector key
- Bezel blank
- Optical device/diskette drive assembly
- Bezel
- Hard drives
  - — ATA hard drives
  - — SCSI hard drives
- Single Channel Wide Ultra3 SCSI controller module

- Integrated ATA RAID controller module
- Optical device/diskette drive assembly backplane
- PCI riser board assembly
- Expansion board
- PCI card guide
- Center wall
- Cables
  - Two-device terminated SCSI cable
  - ATA cables
  - Optical device/diskette drive assembly cable
- Power supply
- Battery
- Memory modules
- Processor
- System board

Powering Down the Server

The server does not completely power down when the front panel power button is pressed. The button toggles server power between On and Standby. In Standby, the server removes power from most electronics and drives, portions of the power supply and some internal circuitry remain active. To completely remove all power from the system, disconnect the power cord from the server.

WARNING: To reduce the risk of injury from electric shock, remove the power cord to completely disconnect power from the system.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

WARNING: Because the rack allows you to stack computer components in a vertical rather than a horizontal plane, you must take precautions to provide for rack stability and safety to protect both personnel and property. Heed all cautions and warnings throughout the installation instructions that come with the server.

WARNING: To reduce the risk of personal injury or damage to the equipment, place the server on a sturdy table or workbench whenever it is removed from the rack for device accessibility. Refer to the *HP ProLiant DL320 Generation 2 Server Setup and Installation Guide* for further information on working with racks.

CAUTION: Moving the Power On/Off switch to the Off position does not completely remove system power. Some portions of the power supply and some internal circuitry remain active. Disconnect all power cords from the server to remove all power from the system.

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. For more information, see "Electrostatic Discharge Information" in this chapter.

NOTE: Microsoft Windows NT® users may use the Power Down Manager to power down the server. For information on this system utility, refer to the NTREADME.HLP file on Diskette 1 of the NT Software Support Diskettes.

To power down the server:

1. Press the power button to toggle the server to standby. The power LED above the power button changes from green to amber.
2. Listen for the fan noise to stop to indicate that the server is powered down.
3. Disconnect the power cord first from the AC outlet and then from the server. The power LEDs turn off.
4. Disconnect all remaining cables on the server rear panel, including cables extending from external connectors on expansion boards.
5. Remove the server from the rack and position it securely on a workbench or other solid surface for stability and safety.

Access Panel

To access the system board, processor, memory modules, expansion slot, and other internal components, remove the access panel. Observe the following warnings and cautions.

WARNING: The front panel Power On/Off switch does not completely shut off all system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Do not operate the server without the access panel installed. The access panel is required for proper airflow. Operating the server without the access panel prevents proper airflow and results in improper cooling and possible thermal damage.

CAUTION: Before removing the server access panel, be sure that the server is powered down and that the power cord is disconnected from the server or the electrical outlet.

CAUTION: To avoid the risk of damage to the system or expansion boards, remove all power cords before installing or removing expansion boards. When the Power On/Off switch is in the Off position, auxiliary power is still connected to the PCI expansion slot and may damage the card.

CAUTION: Electrostatic discharge can damage electronic components. Ensure proper grounding before beginning any installation procedure.

To remove the access panel:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Press and hold down the locking latches (1).
3. Slide the access panel approximately 1.25 cm (0.5 in) toward the rear of the unit and lift the panel to remove it (2).

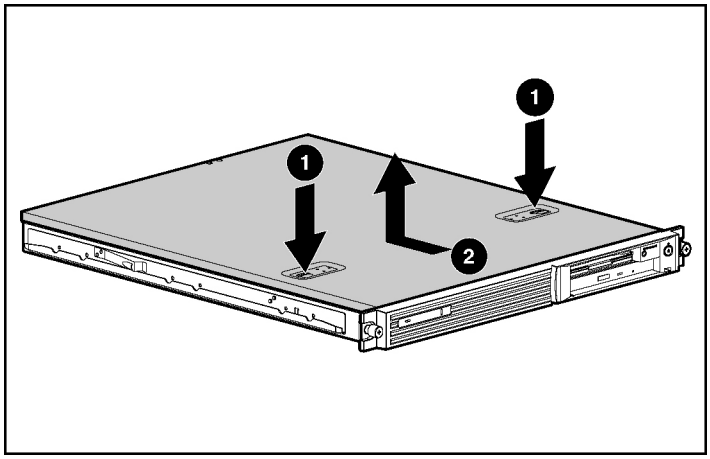

Figure 2-1: Removing the access panel

To replace the access panel, reverse steps 1 through 3.

Shipping/Ejector Key

The server includes a shipping/ejector key that secures the optical device/diskette drive assembly or the bezel blank during shipping. This key should be removed before deploying the server. This key is also used to eject an assembly or the blank.

CAUTION: Always install the shipping/ejector key in its storage location inside the chassis before shipping the server. Failure to do so can result in damage to the optical device/diskette drive assembly.

To remove the shipping/ejector key:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Access Panel" in this chapter.
3. Identify and lift the shipping/ejector key from its storage location inside the chassis.

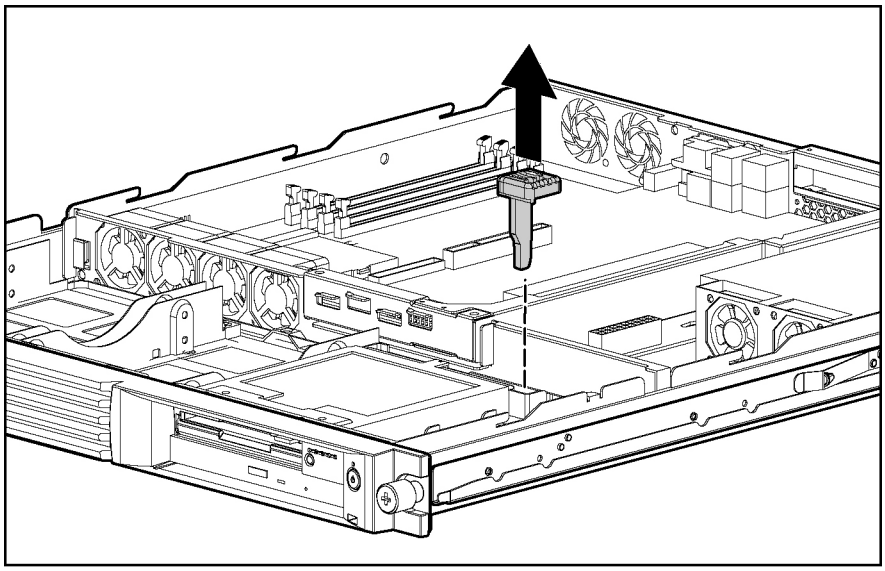

Figure 2-2: Removing the shipping/ejector key

Reverse steps 1 through 3 to replace the shipping/ejector key.

Bezel Blank

To remove the bezel blank:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the shipping/ejector key from the chassis if you have not already done so. See “Shipping/Ejector Key” in this chapter.
3. Insert the end of the shipping/ejector key approximately 1.25 cm (0.5 in) into the optical device/diskette drive assembly ejector port on the lower right corner of the server front panel (1) to eject the blank (2).

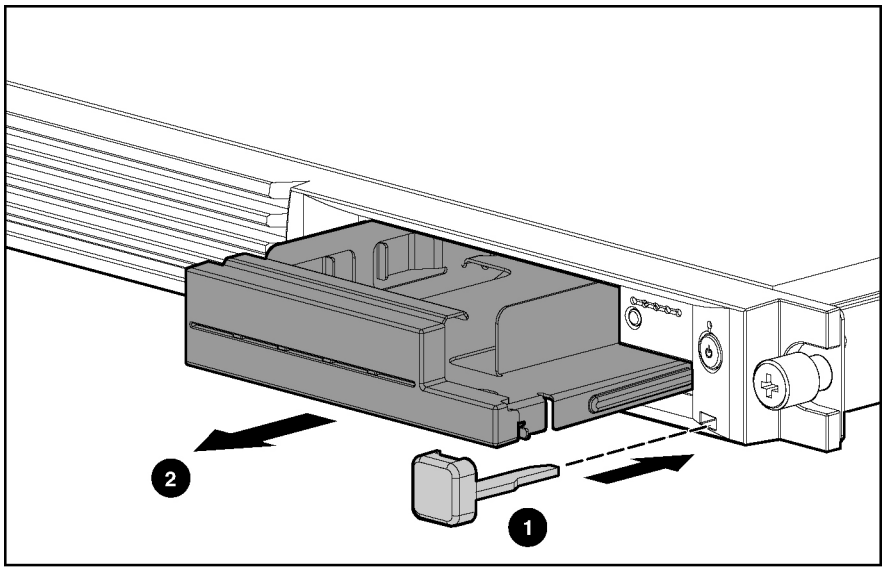

Figure 2-3: Removing the bezel blank

To replace the bezel blank, slide the blank into the empty bay until it locks into place. Store the shipping/ejector key in the chassis or other safe location for future use.

Optical Device/Diskette Drive Assembly

The optical device/diskette drive assembly option is for either a CD-ROM/diskette drive or a DVD-ROM/diskette drive combination. The following procedure applies to both options.

To remove the optical device/diskette drive assembly:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the shipping/ejector key from the chassis if you have not already done so. See "Shipping/Ejector Key" in this chapter.
3. Insert the shipping/ejector key approximately 1.25 cm (0.5 in) into the optical device/diskette drive assembly ejector port on the lower right corner of the server front panel (1) to eject the optical device/diskette drive assembly (2).

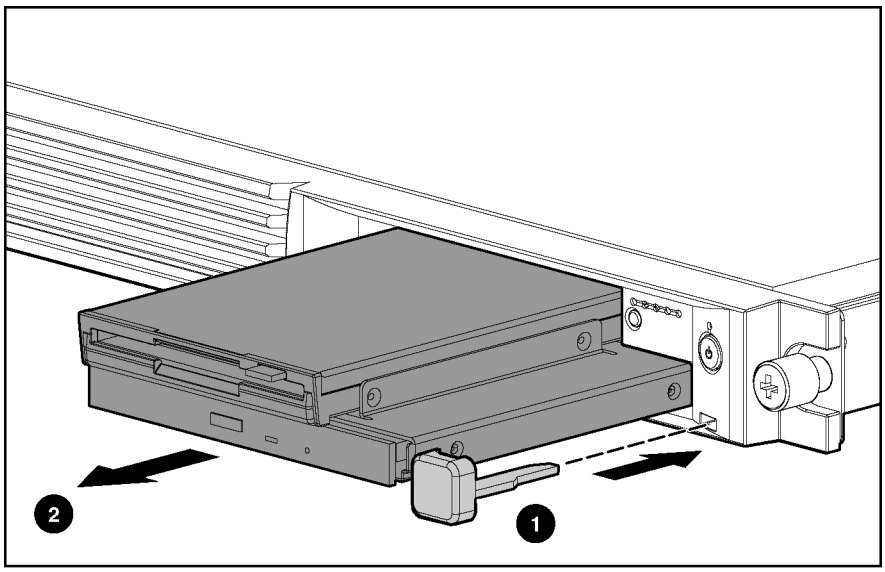

Figure 2-4: Ejecting the optical device/diskette drive assembly

CAUTION: To reduce the risk of thermal damage, do not operate the server without either the optical device/diskette drive assembly or the bezel blank installed.

To replace the assembly, slide the assembly into the bay until it is fully seated.

Fully Seated Optical Device/Diskette Drive Assembly

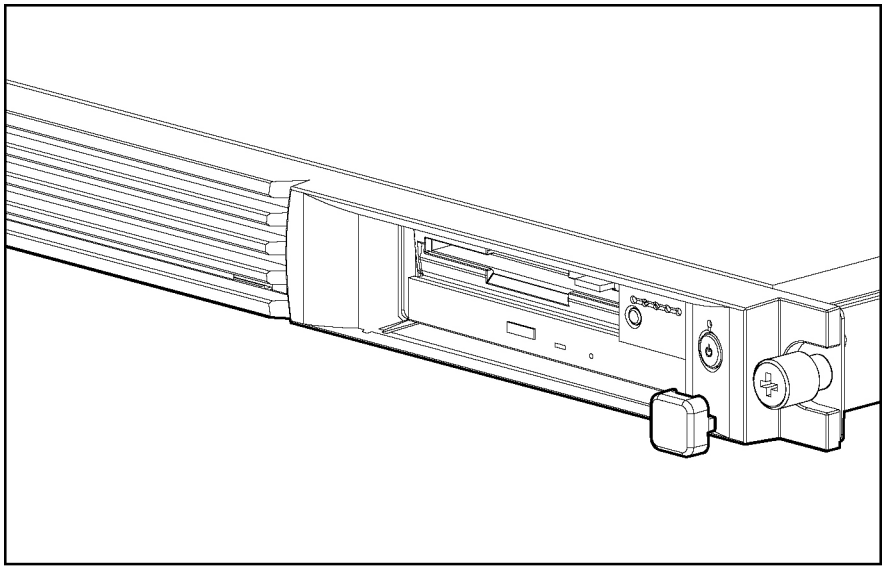

Figure 2-5: Fully seated optical device/diskette drive assembly (ejector key shown stored in ejector port)

When frequent optical device/diskette drive assembly ejection is anticipated, leave the key in the ejector port for easy access, as shown in Figure 2-5. Otherwise, store the shipping/ejector key inside the chassis for future use.

Bezel

To remove the bezel:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. If necessary, remove the optical device/diskette drive assembly or bezel blank. See “Optical Device/Diskette Drive Assembly,” or “Bezel Blank” in this chapter.
4. Remove the four screws that secure the bezel to each side of the chassis.

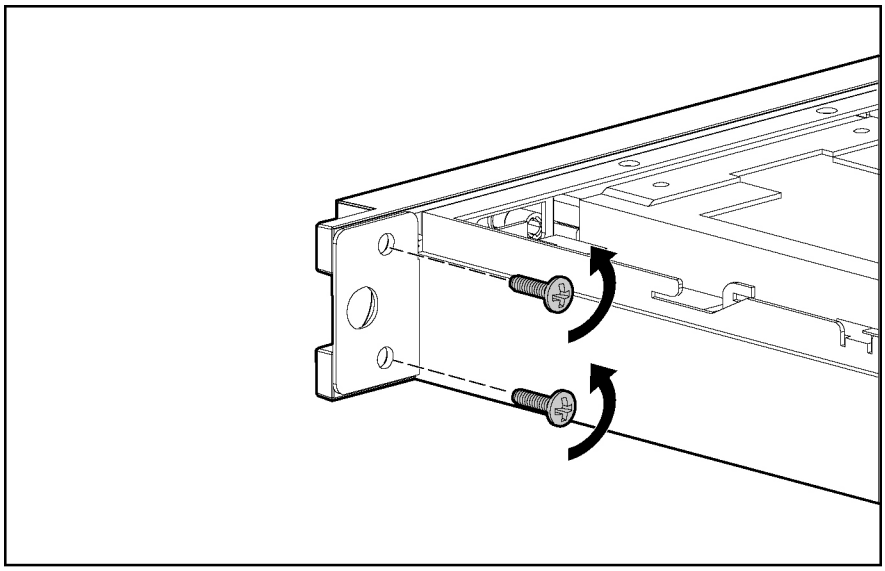

Figure 2-6: Removing the bezel screws

5. Release the bezel from the chassis by pushing the tabs up from the inside front edge of the chassis (1).
6. Rotate the bezel away from the top edge of the chassis (2).
7. Lift the bezel off the locating tabs on the bottom edge of the chassis (3).

IMPORTANT: Avoid damaging the light pipes on the user interface board when removing the bezel.

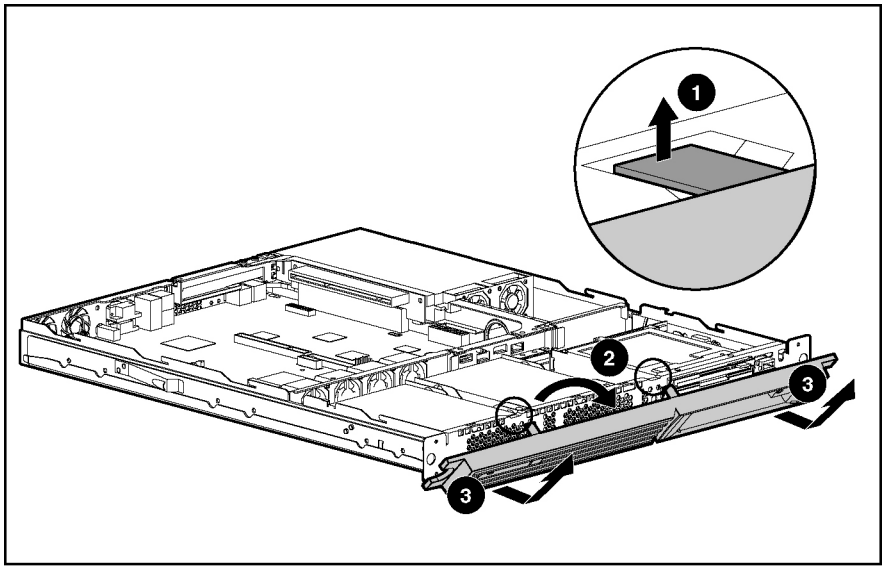

Figure 2-7: Removing the bezel from the chassis

To install the bezel, reverse steps 1 through 7, omitting step 5. When the bottom of the bezel is hooked securely in place, the bezel top snaps into the chassis tabs.

Hard Drive Overview

The server contains two drive bays for either ATA or SCSI hard drives. There are two ATA channels and the server ships standard with two 1-inch drive trays and is preconfigured for two 1-inch ATA hard drives. The following sections provide general guidelines and installation procedures for installing or upgrading hard drives.

Guidelines for Installing ATA Hard Drives

When installing ATA hard drives in the server, observe the following general guidelines:

- Populate hard drive bays starting with the lowest ATA device number. Device 0 serves as the primary boot drive.
- Set the jumpers on both ATA drives to Cable-Select mode.
- Do not add more than two ATA drives per channel.

IMPORTANT: ATA hard drives must be configured to the Cable-Select mode.

NOTE: ATA drives are set to Cable-Select mode by default.

NOTE: Refer to the documentation shipped with the hard drive to determine how to set the jumpers on the ATA hard drives to Cable-Select mode, if they are not already set in Cable-Select mode.

Guidelines for Installing SCSI Hard Drives

Each SCSI hard drive installed in the server must be configured with a unique SCSI ID number. Unique identification allows the system to search for the lowest numbered drive to use as a bootable partition. By default, the jumpers on SCSI hard drives are set to ID 0 and may need to be reset when the drive is installed as an optional or replacement drive in the server.

CAUTION: Installing unsupported hard drives may damage the system by consuming power and generating heat in excess of the server's operating tolerance. This condition may result in a loss of system and/or data integrity.

NOTE: Refer to the documentation shipped with the hard drive to determine how to set the jumpers on the SCSI hard drives.

Hard Drive Identification Numbers

The servers include two 1-inch hard drive trays. Hard drives installed in the server are labeled as Device 0 and Device 1 in the following illustration for clarification.

IMPORTANT: Always populate hard drive bays starting with the lowest ATA device number or recommended SCSI ID number.

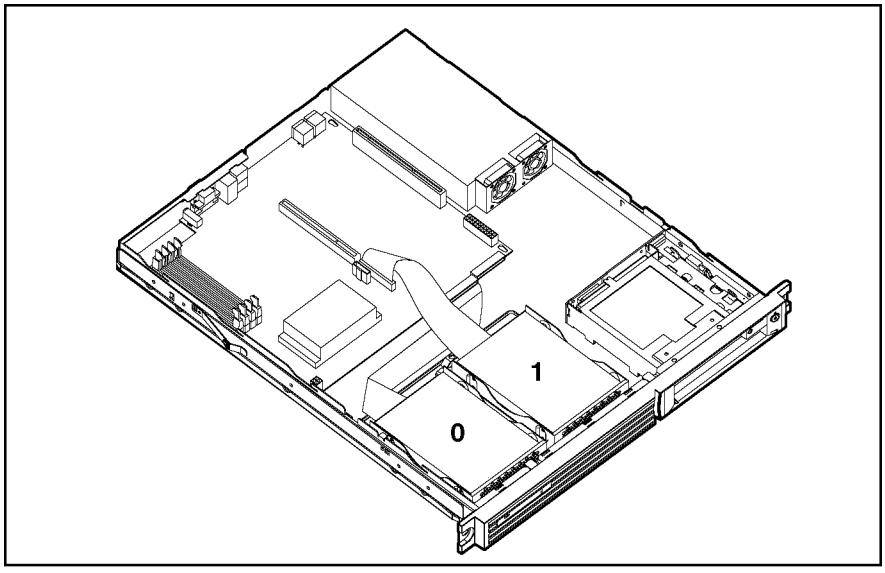

Figure 2-8: ATA device numbers or recommended SCSI ID numbers

Hard Drives

To remove a hard drive from the hard drive bay:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Disconnect the SCSI or ATA cables from the hard drives.

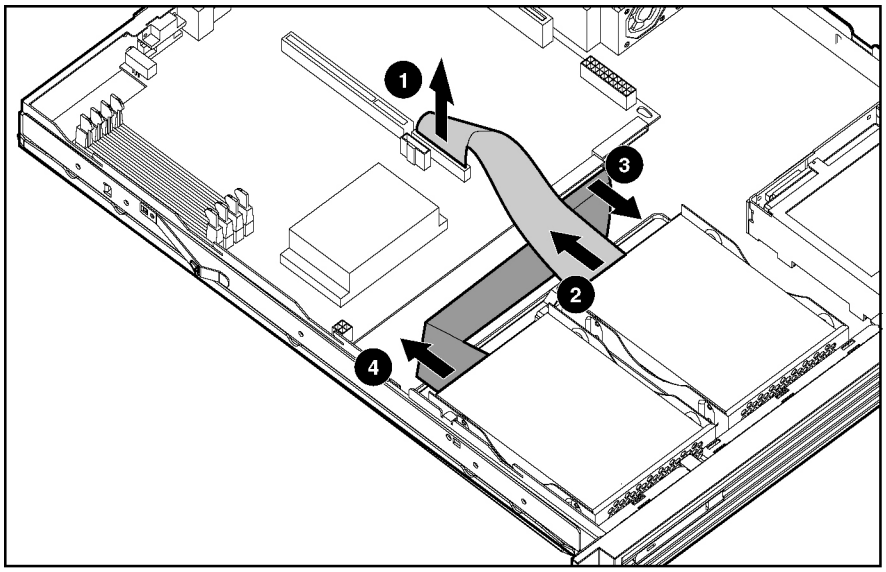

Figure 2-9: Disconnecting the cables from the ATA hard drives

Table 2-2: Hard Drive Cable Removal Sequence

Item	Description
1	ATA secondary controller connector
2	Secondary drive cable
3	ATA primary controller connector
4	Primary drive cable

4. Disconnect the power cables from the hard drives.

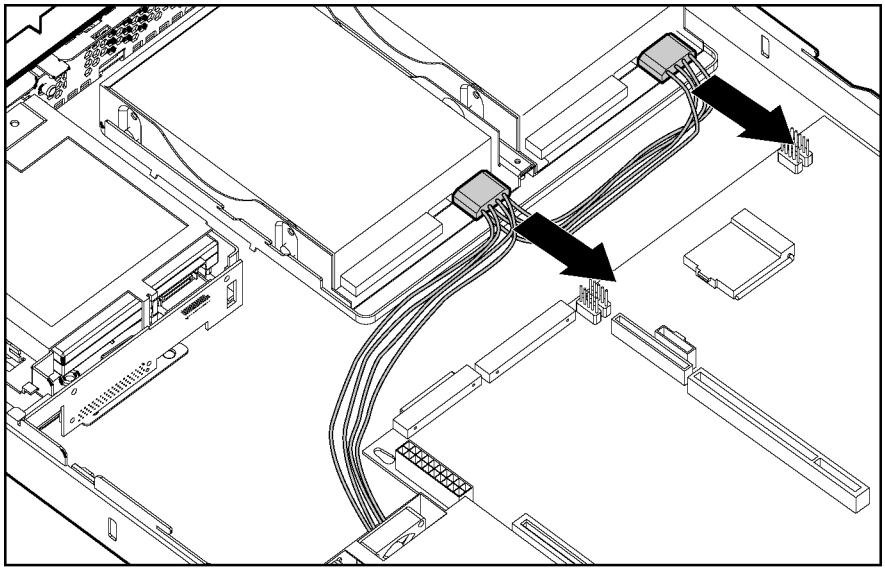

Figure 2-10: Disconnecting the hard drive power cables

5. Remove the hard drive and hard drive tray:
   a. Loosen the thumbscrew that secures the hard drive tray to the chassis (1).
   b. Slide the tray toward the rear of the server and lift the tray out of the chassis (2).

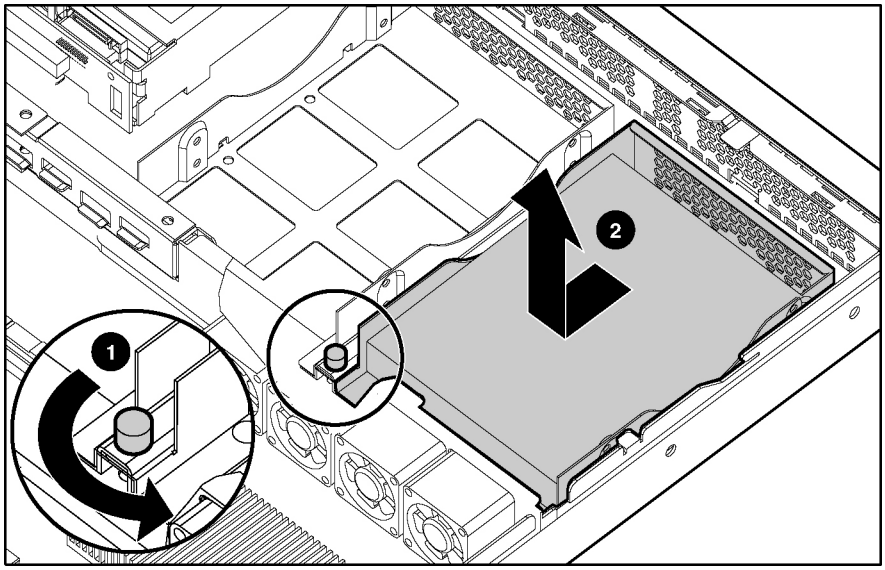

Figure 2-11: Removing the hard drive tray from the chassis

6. Remove the four 6-32 Phillips-head screws that secure the hard drive to the hard drive tray (1).
7. Remove the hard drive from the hard drive tray (2).

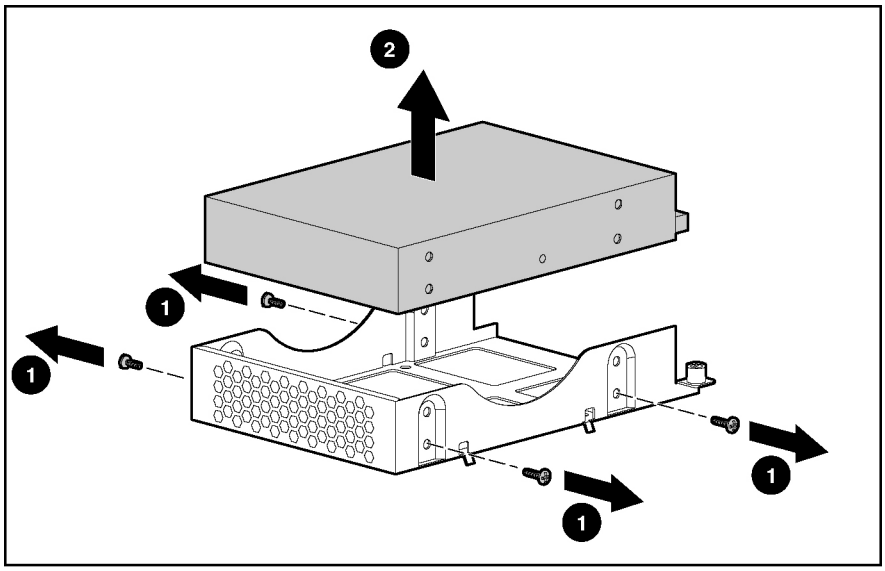

Figure 2-12: Removing the hard drive from a hard drive tray

CAUTION: Review "Guidelines for SCSI Hard Drives" and "Guidelines for ATA Hard Drives" in this chapter to ensure proper jumper settings and hard drive configuration.

CAUTION: When connecting the power cable to the hard drives, ensure that the connectors are installed so that the red wire faces right when viewed from the front of the server.

IMPORTANT: Ensure that the hard drives are installed with the data and power connectors along the bottom of the tray, facing away from the front vent holes.

Reverse steps 1 through 7 to replace the hard drive.

Single Channel Wide Ultra3 SCSI Controller Module

To remove the SCSI module:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.

CAUTION: Prevent damage to the connector pins by lifting the SCSI module evenly and with equal pressure on the board. Tilting the board causes the connector pins to bend.

3. Remove the SCSI module by pinching the tops of the support posts and carefully lifting the SCSI module from the system board.
4. Disconnect the SCSI cable from the SCSI controller connector on the module.

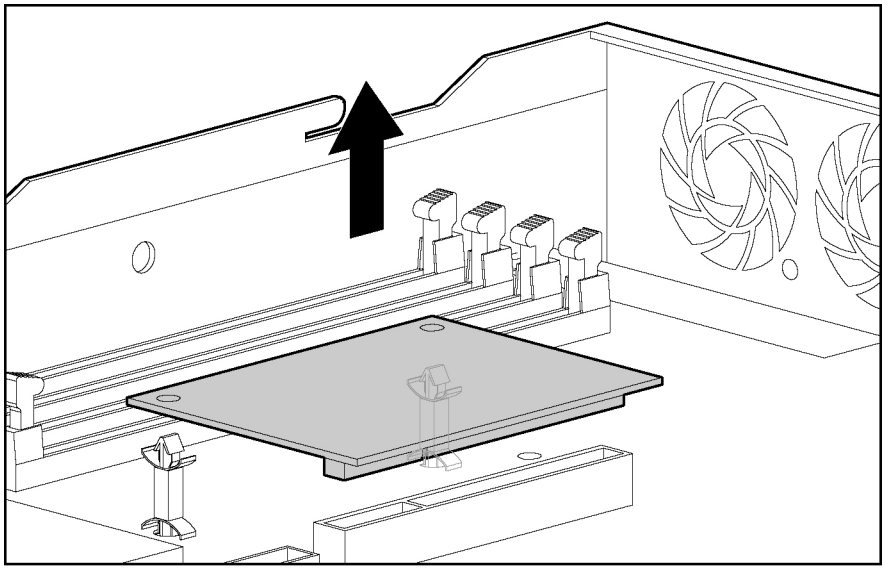

Figure 2-13: Removing the SCSI module from the system board

To replace the SCSI module, reverse steps 1 through 4, ensuring that the SCSI module seats securely on the support posts.

Optical Device/Diskette Drive Assembly Backplane

To remove the optical device/diskette drive assembly backplane:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Server Access Panel" in this chapter.
3. Remove the shipping/ejector key. See "Shipping/Ejector Key" in this chapter.
4. Remove the optical device/diskette drive assembly or bezel blank. See "Optical Device/Diskette Drive Assembly" or "Bezel Blank" in this chapter.
5. Disconnect the optical device/diskette drive assembly cable from the optical device/diskette drive assembly backplane (1).
6. Carefully pull back and hold the plastic retaining clip (2).
7. Lift the backplane vertically until it unseats from the drive bracket and user interface board (3).

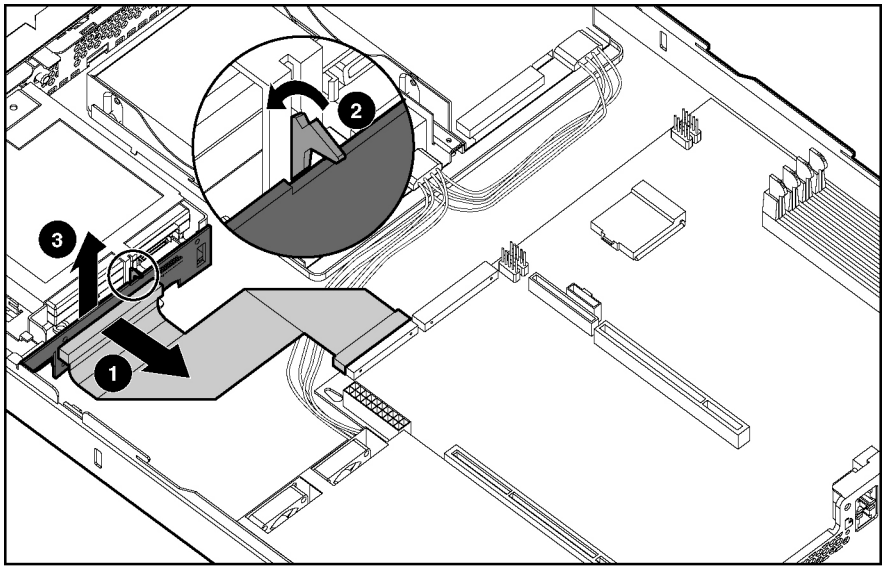

Figure 2-14: Removing the optical device/diskette drive assembly backplane (center wall removed for clarity)

Reverse steps 1 through 7 to replace the optical device/diskette drive assembly backplane.

User Interface Board

To remove the user interface board:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the shipping/ejector key. See “Shipping/Ejector Key” in this chapter.
4. Remove the optical device/diskette drive assembly or bezel blank. See “Optical Device/Diskette Drive Assembly” or “Bezel Blank” in this chapter.
5. Remove the optical device/diskette drive assembly backplane. See “Optical Device/Diskette Drive Assembly Backplane” in this chapter.
6. Slide the user interface board toward the rear of the server and lift to remove the board.

IMPORTANT: Remove the user interface board carefully to avoid damaging the light pipes.

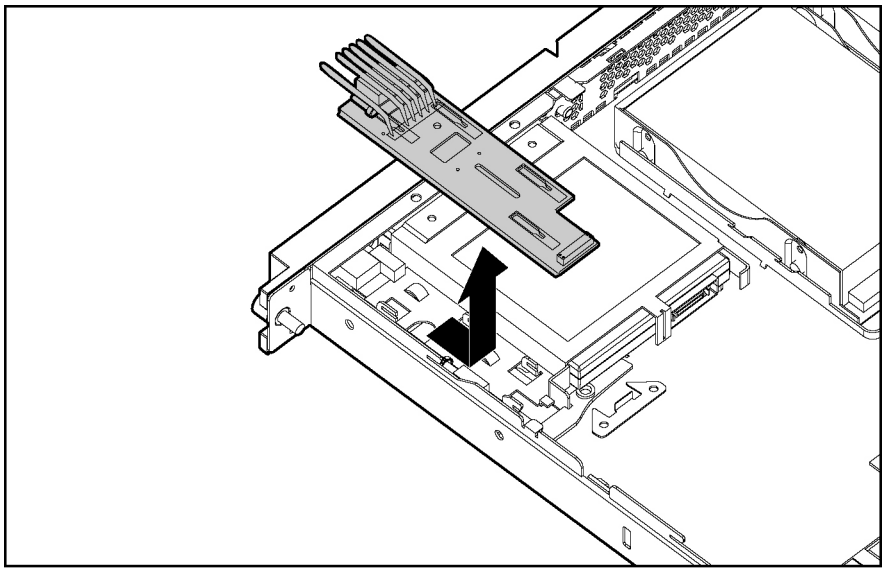

Figure 2-15: Removing the user interface board

Reverse steps 1 through 6 to replace the user interface board.

PCI Riser Board Assembly

To remove the PCI riser board assembly:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Access Panel" in this chapter.
3. Disconnect any cables connecting an existing expansion board to the system board.
4. Loosen the PCI riser board thumbscrew (1).
5. Lift and remove the assembly from the server chassis (2).

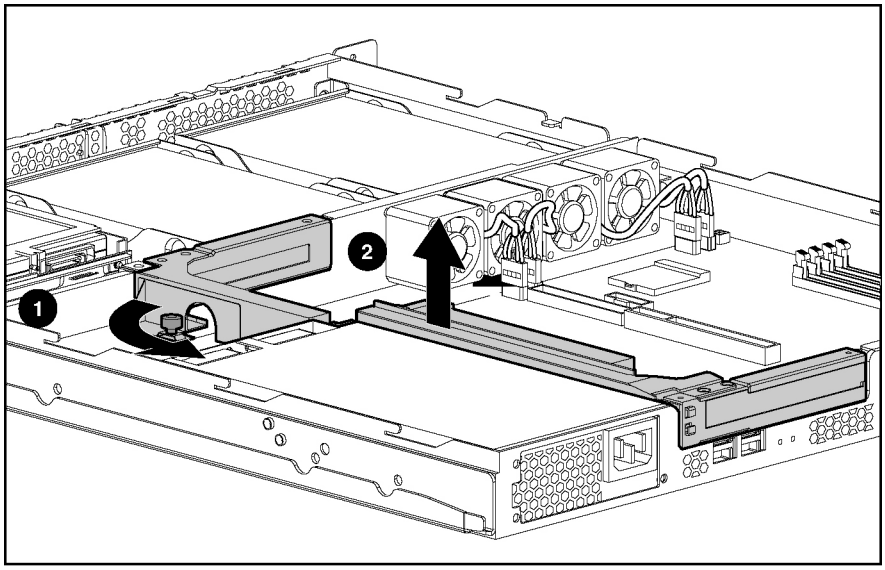

Figure 2-16: Removing the PCI riser board

CAUTION: When removing the PCI riser board assembly, avoid damage to the system board power cable.

When replacing an expansion board, refer to "Expansion Board" following this procedure.

IMPORTANT: Do not replace the PCI riser board assembly in the chassis unless all installation and cabling procedures are complete.

Reverse steps 1 through 5 to replace the PCI riser board assembly, ensuring that the assembly seats properly in the retainers on the rear of the chassis.

Expansion Board

To remove an expansion board:

CAUTION: To avoid the risk of damage to the system or expansion boards, remove all power cords before installing or removing an expansion board. When the front panel power switch is off, auxiliary power is still connected to the PCI expansion slot and may damage the card.

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Access Panel" in this chapter.
3. Disconnect all cables from the expansion board.
4. Remove the PCI riser board assembly. See "PCI Riser Board Assembly" in this chapter.
5. Apply even pressure to pull the expansion board out of its socket in the PCI riser board assembly.

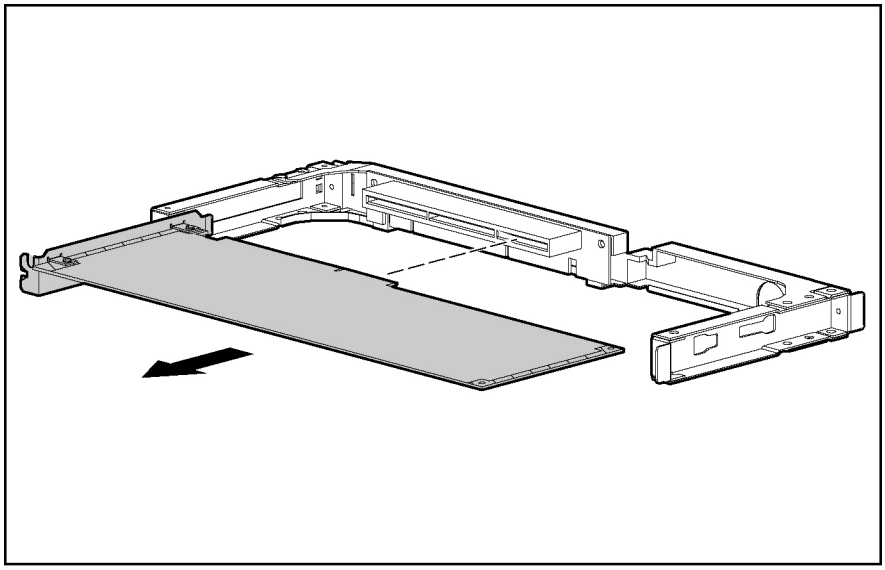

Figure 2-17: Removing an expansion board from the PCI riser board assembly

Reverse steps 1 through 5 to replace an expansion board. Use the PCI card guide on the assembly to position the board in the socket.

IMPORTANT: Ensure that the expansion board is seated securely in the expansion slot before replacing the PCI riser board assembly and access panel.

PCI Card Guide

To remove a PCI card guide:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the PCI riser board assembly. See “PCI Riser Board Assembly” in this chapter.
4. Remove the expansion board. See “Expansion Board” in this chapter.
5. Press and hold the guide latch to release the PCI card guide (1).
6. Slide the PCI card guide toward the open end of the riser board assembly for removal (2).

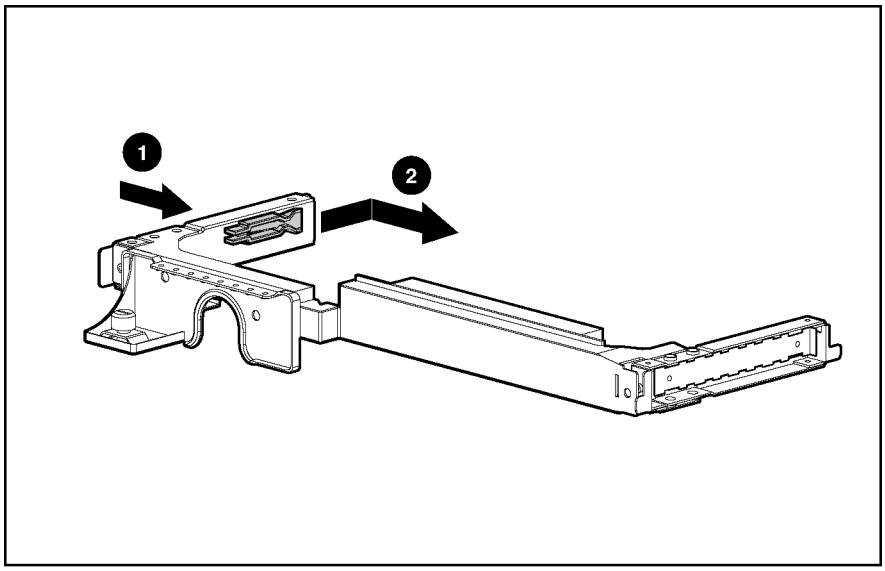

Figure 2-18: Removing the PCI card guide

Reverse steps 1 through 6, omitting step 5, to replace a PCI card guide.

Center Wall

To remove the center wall:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the PCI riser board assembly. See “PCI Riser Board Assembly” in this chapter.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

4. Disconnect the center wall fan cables from the fan connectors on the system board.

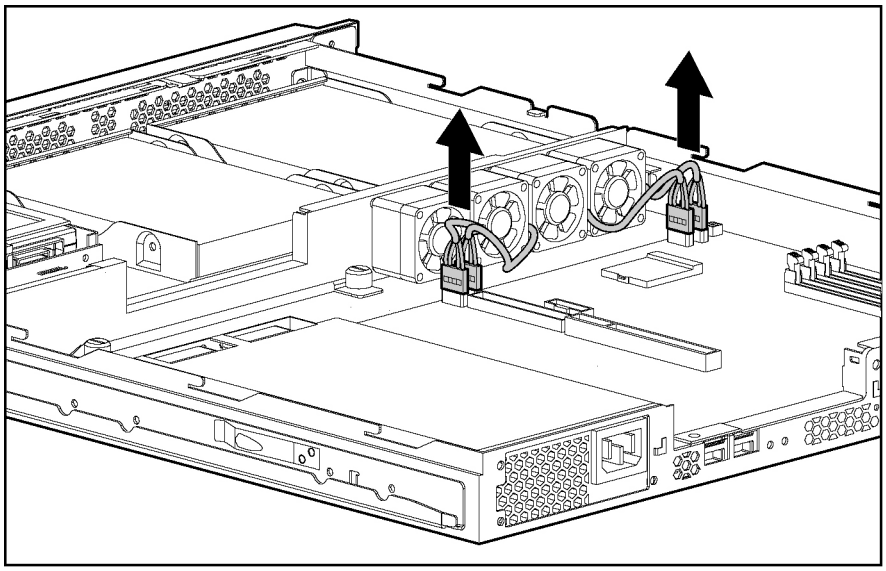

Figure 2-19: Disconnecting the center wall fan cables (processor removed for clarity)

5. Loosen the center wall thumbscrew (1).
6. Push in and hold the tab next to the center wall fans to unlock the center wall from the chassis (2).
7. Raise the locking end of the center wall from the chassis (3).

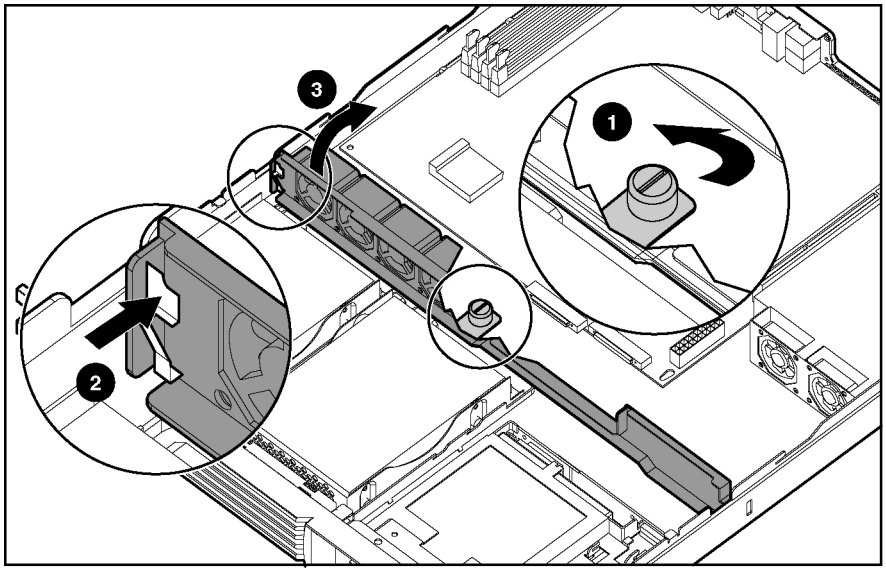

Figure 2-20: Unlocking the center wall

8. Rotate the center wall to clear the center wall alignment tab from the alignment slot (1), and lift the center wall out of the chassis (2).

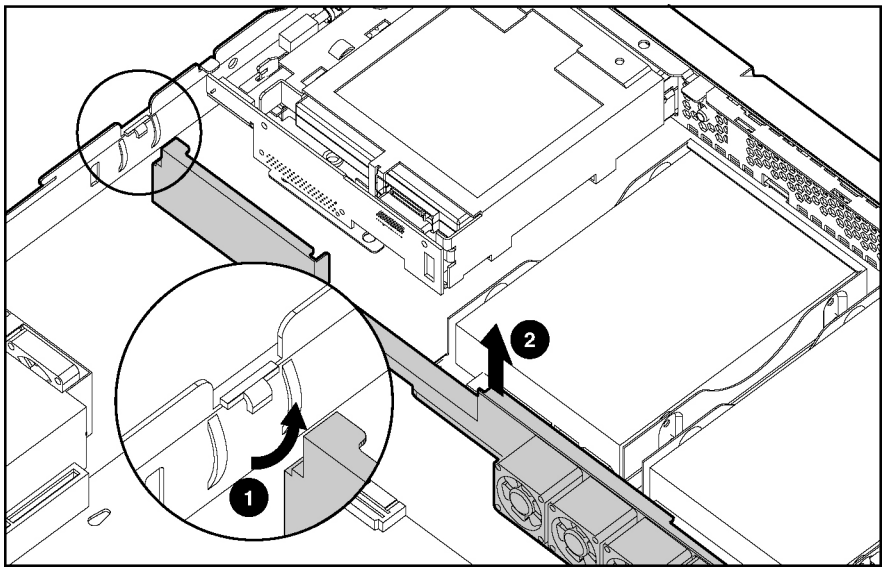

Figure 2-21: Clearing the center wall alignment tab

Reverse steps 1 through 8, omitting step 6, to replace the center wall.

Fans

The server contains six fans. Four fans are located on the center wall, and two are located in the power supply unit.

IMPORTANT: A “Fan 5 Error” indicates an error from either one of the fans located in the power supply. When this error occurs, replace the entire power supply unit.

Use the following figure and table to locate the system fans.

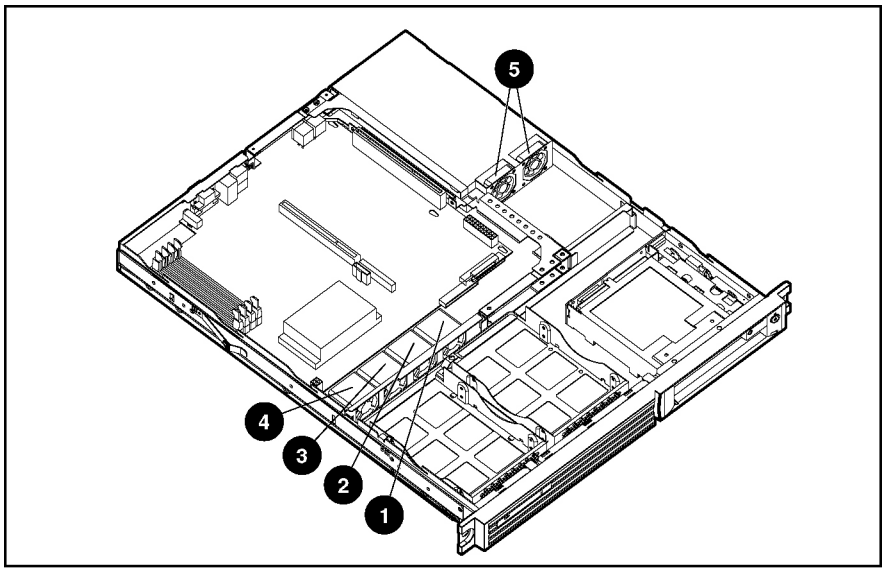

Figure 2-22: Locating the system fans

Table 2-3: System Fans

Item	Component
1	Fan 1
2	Fan 2
3	Fan 3
4	Fan 4
5	Power supply fans

Cables

The following sections of this guide contain removal and replacement procedures for the standard cables that ship with the server:

- Two-Device Terminated SCSI cable
- ATA cables
- Optical Device/Diskette Drive Assembly cable

Two-Device Terminated SCSI Cable

To remove the two-device terminated SCSI cable:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Access Panel" in this chapter.
3. Remove the PCI riser board assembly. See "PCI Riser Board Assembly" in this chapter.
4. Remove the center wall. See "Center Wall" in this chapter.
5. Disconnect the SCSI cable from the hard drives (1).
6. Disconnect the SCSI cable from the SCSI module (2).

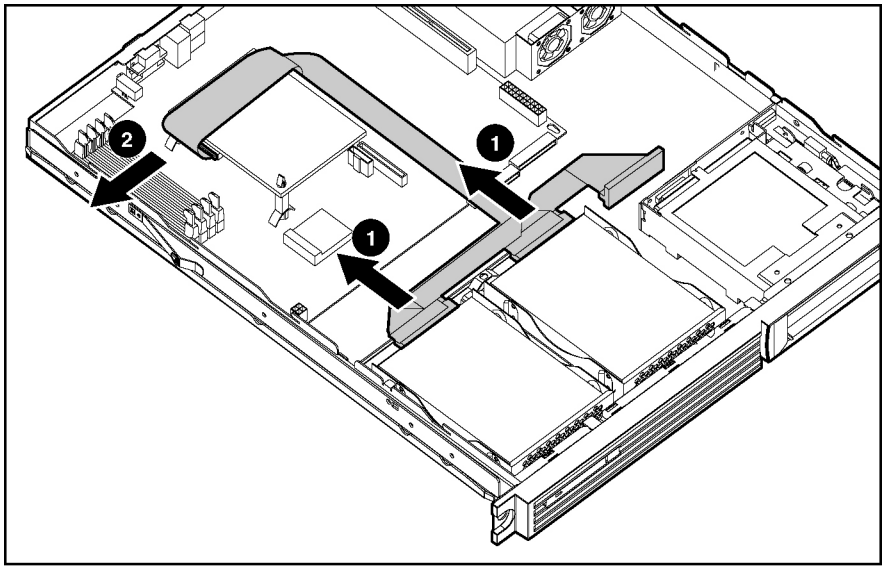

Figure 2-23: Disconnecting the two-device terminated SCSI cable

Reverse steps 1 through 6 to replace the two-device terminated SCSI cable.

ATA Cables

To remove the ATA cables:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the PCI riser board assembly. See “PCI Riser Board Assembly” in this chapter.
4. Remove the center wall. See “Center Wall” in this chapter.
5. Disconnect the ATA cable from the secondary ATA controller (1) and hard drive connector (2).
6. Disconnect the ATA cable from the primary ATA controller (3) and hard drive connector (4).

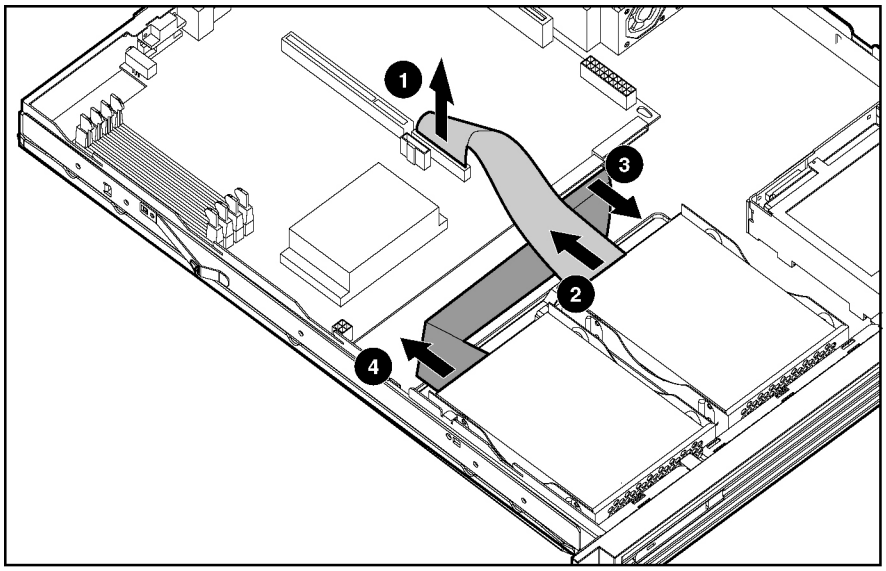

Figure 2-24: Disconnecting the ATA cables

Reverse steps 1 through 6 to replace the ATA cables.

Optical Device/Diskette Drive Assembly Cable

To remove the optical device/diskette drive assembly cable:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the PCI riser board assembly. See “PCI Riser Board Assembly” in this chapter.
4. Remove the center wall. See “Center Wall” in this chapter.
5. Disconnect the optical device/diskette drive assembly cable from the optical device/diskette drive assembly backplane (1).
6. Disconnect the optical device/diskette drive assembly cable from the system board (2).

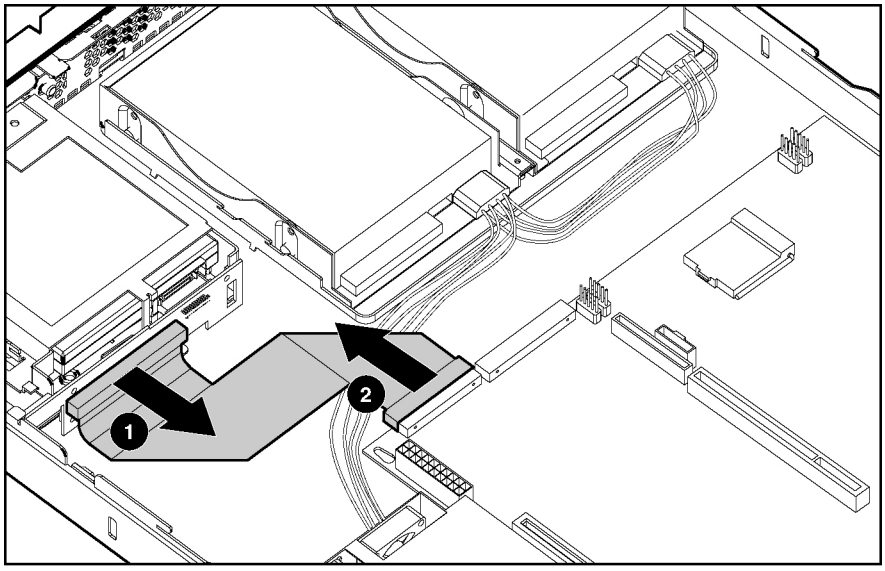

Figure 2-25: Disconnecting the optical device/diskette drive assembly cable

Reverse steps 1 through 6 to replace the optical device/diskette drive assembly cable.

Power Supply

IMPORTANT: A "Fan 5 Error" indicates an error from one of the fans located in the power supply. When this error occurs, replace the entire power supply unit.

To remove the power supply:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Server Access Panel" in this chapter.
3. Remove the PCI riser board assembly. See "PCI Riser Board Assembly" in this chapter.
4. Remove the center wall. See "Center Wall" in this chapter.
5. Disconnect the hard drive power cables from the hard drives (1).
6. Disconnect the power supply cable from the power supply connector on the system board by pressing the locking tab on the side of the connector and pulling upwards (2).
7. Remove the two Phillips-head screws that secure the power supply unit to the chassis (3).
8. Slide the power supply away from the back of the chassis and lift it from the server (4).

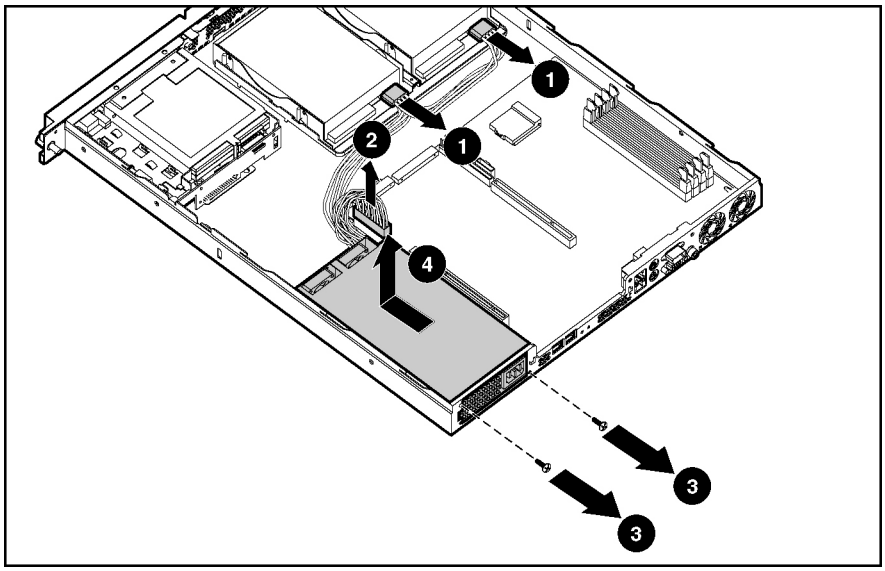

Figure 2-26: Removing the power supply

Reverse steps 1 through 8 to replace the power supply.

Battery

If the server no longer automatically displays the correct date and time, check the battery that provides power to the real-time clock. If necessary, replace a used battery with a CR2032 lithium battery. Under normal use, battery life is at least 5 years.

WARNING: This server contains either an internal lithium manganese dioxide, or a vanadium pentoxide battery. There is a risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

- **Do not attempt to recharge.**
- **Do not expose to temperatures higher than 60°C (140°F).**
- **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**
- **Replace only with the spare designated for this product.**

CAUTION: Loss of BIOS settings occurs when the battery is removed. BIOS settings must be reconfigured whenever the battery is replaced.

CAUTION: Batteries, battery packs, and accumulators should not be disposed of together with general household waste. Use the public collection system or return used batteries to your authorized partners or their agents for proper recycling and disposal.

IMPORTANT: Run the ROM-Based Setup Utility (RBSU) to configure the system after replacing the battery. Refer to the *HP Servers Troubleshooting Guide* or setup and installation guide for more information.

To remove the battery:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Locate the battery on the system board.

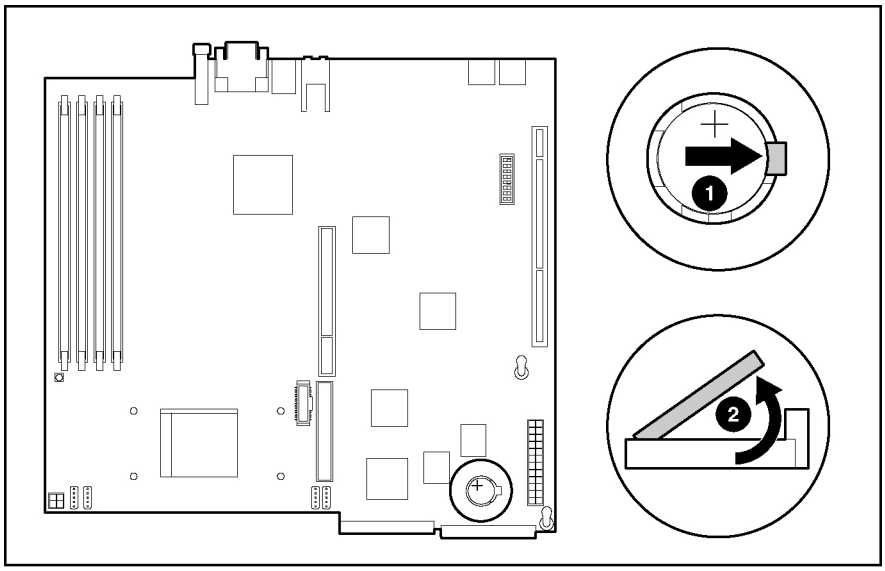

Figure 2-27: Locating and removing the system battery

4. If necessary, remove the PCI riser board assembly to access the battery location. See “PCI Riser Board Assembly” in this chapter.
5. Press the battery release lever away from the battery (1).
6. Lift the battery on the lever side and pull it out of the holder (2).

IMPORTANT: Do not bend the retaining clip during battery replacement. For proper operation, the clip must maintain a position of contact with the battery.

Reverse steps 1 through 6 to replace the battery, ensuring that the new battery is installed with the positive side up.

Memory Modules

The server supports up to four PC2100 DDR ECC registered 266-MHz SDRAM DIMMs installed in four sockets on the system board.

NOTE: Populate the DIMM sockets in descending sequential order, starting with DIMM socket 4.

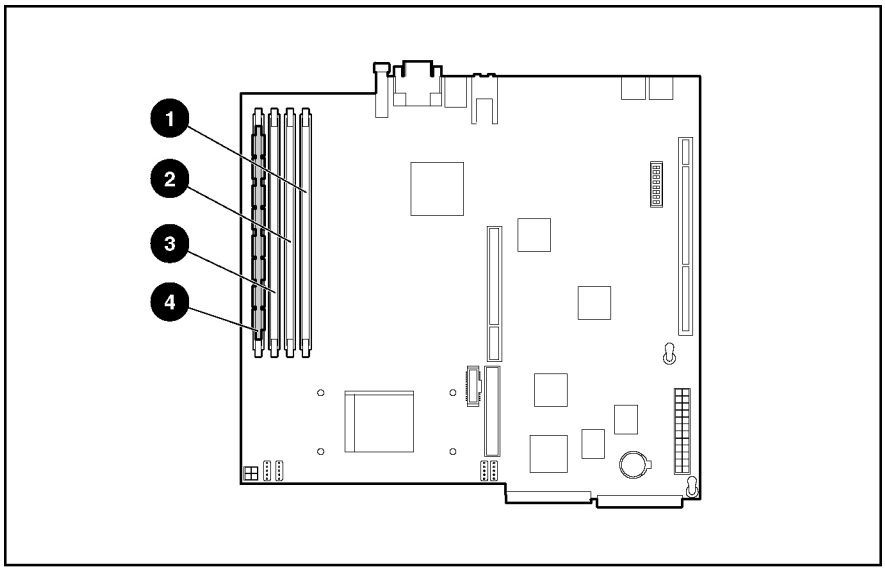

Figure 2-28: Identifying DIMM sockets on the system board (center wall removed for clarity)

Table 2-1: DIMM Socket Identification

Item	Description
1	DIMM socket 1
2	DIMM socket 2
3	DIMM socket 3
4	DIMM socket 4 (populated)

Observe the following guidelines when installing additional memory:

- DIMMs must be industry-standard, 128-MB, 256-MB, 512-MB, or 1-GB, 3-cm (1.2-in), 184-pin PC2100, 266-MHz DDR ECC memory DIMMs. The DDR memory DIMMs must support CAS Latency 2, where CL=2 or greater. They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information.
- DIMMs installed in the server must be registered DDR, 2.5 volts and 64-bits wide.
- Do not mix ECC and non-ECC DIMMs or DIMMs of different speeds. If different types of DIMMs are mixed, the system will not properly function.

IMPORTANT: A DIMM can be installed only one way. Be sure to match the key slots on the module with the tabs on the memory slot. Push the module down into the slot until it is fully inserted and properly seated. The system will not recognize improperly aligned or seated DIMMs.

To replace a DIMM from the system board:

1. Power down the server. See "Powering Down the Server" in this chapter.

CAUTION: ESD can damage electronic components. Ensure that you are properly grounded before beginning any installation procedure. Refer to "Electrostatic Discharge Information" in this chapter.

2. Remove the access panel. See "Access Panel" in this chapter.
3. Press both memory module socket latches outward (1). This action releases the module and partially lifts it out of the socket.
4. Lift out the memory module (2).

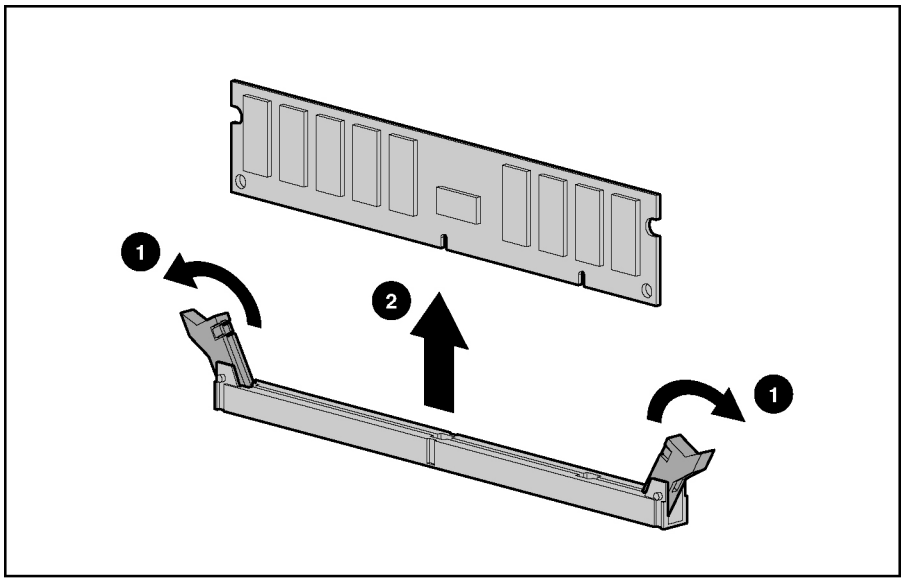

Figure 2-29: Removing a DIMM from a DIMM socket

5. Align the key slot in the bottom edge of the DIMM with the tab in the expansion socket.

6. To install a DIMM, gently push the DIMM into the socket on the system board (1). As the DIMM enters the socket and is properly seated, the latches close (2).

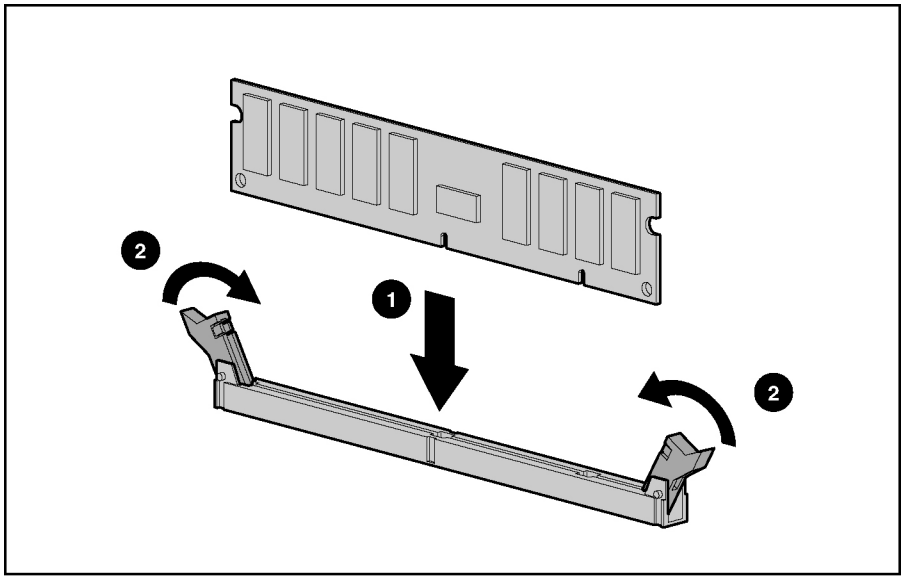

Figure 2-30: Installing a DIMM in a DIMM socket

CAUTION: Use only HP supplied DIMMs. DIMMs from other sources can adversely affect data integrity.

7. Press down firmly on the DIMM while pushing the latches inward until the latches snap into place.

Processor

CAUTION: Always use a new heatsink when replacing processors. Failure to use new components can cause damage to the processor.

To remove the processor:

1. Power down the server. See "Powering Down the Server" in this chapter.
2. Remove the access panel. See "Access Panel" in this chapter.
3. Locate the processor on the system board.

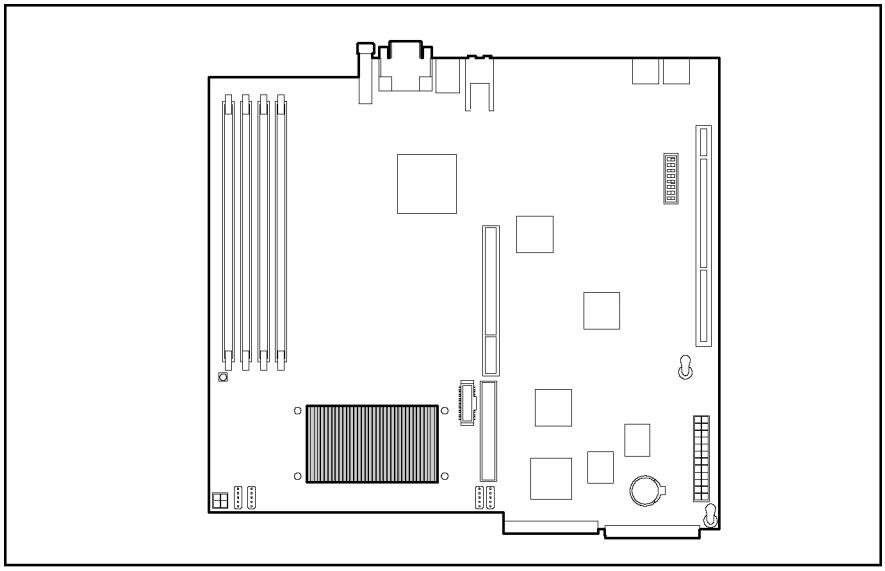

Figure 2-31: Locating the processor on the system board (center wall removed for clarity)

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: The processor socket must be populated at all times. Failure to replace the processor results in the system failing to boot and halting during the POST. This error prevents the system from functioning properly.

4. Disengage the retaining clips on each side of the heatsink.

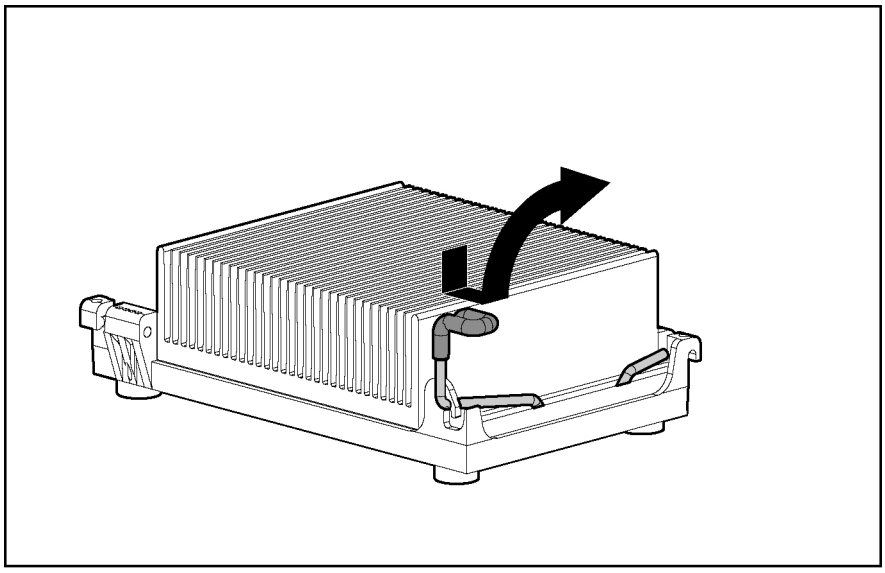

Figure 2-32: Disengaging the heatsink retaining clips (one on each side)

5. Remove the heatsink from the top of the processor.

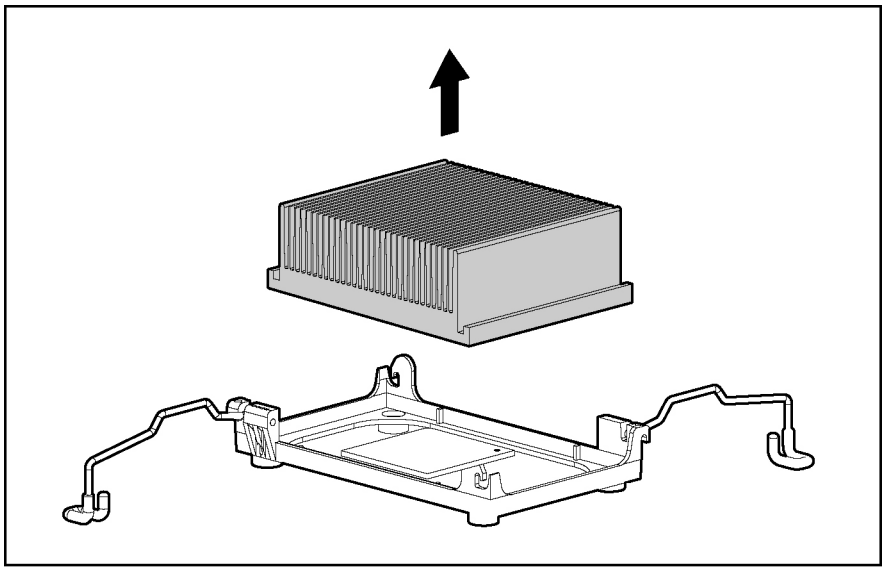

Figure 2-33: Removing the heatsink (both retaining clips disengaged)

6. Lift the processor locking lever (1) and lift the processor from the socket (2).

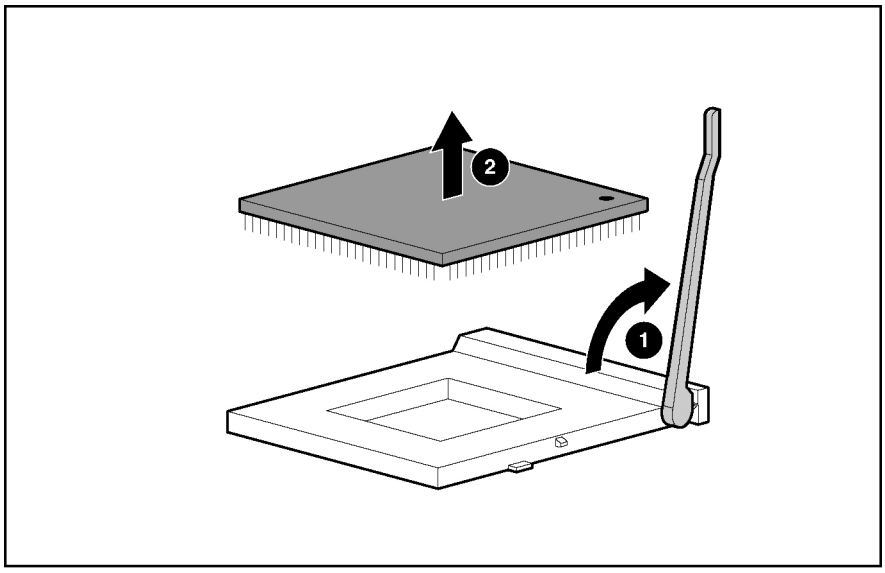

Figure 2-34: Removing the processor from the system board

Reverse steps 1 through 6 to reinstall the processor and heatsink.

CAUTION: Always use a new heatsink when replacing processors. Failure to use new components may result in damage to the processor.

System Board

To remove the system board:

1. Power down the server. See “Powering Down the Server” in this chapter.
2. Remove the access panel. See “Access Panel” in this chapter.
3. Remove the PCI riser board assembly. See “PCI Riser Board Assembly” in this chapter.
4. Disconnect the fan cables 1 through 4. See “Fans” in this chapter.
5. Remove the center wall. See “Center Wall” in this chapter.
6. Remove the SCSI module (if installed). See “Single Channel Wide Ultra3 SCSI Controller Module,” in this chapter.
7. Remove any DIMMs. See “Memory Modules” in this chapter.
8. Disconnect the power supply from the system board. See “Power Supply” in this chapter.
9. Disconnect the optical device/diskette drive assembly cable from the system board. See “Optical Device/Diskette Drive Assembly Cable” in this chapter.
10. Disconnect the SCSI or ATA drive cables from the hard drives. See “Hard Drives” in this chapter.
11. Remove the system battery. See “Battery” in this chapter.

12. Remove the processor. See “Processor” in this chapter.

CAUTION: Always use a new heatsink when replacing processors on the system. Failure to use new components may result in damage to the processor. See “Processor” in this chapter.

13. Identify the alignment keys and keyhole locations, 1 through 6, on the system board.

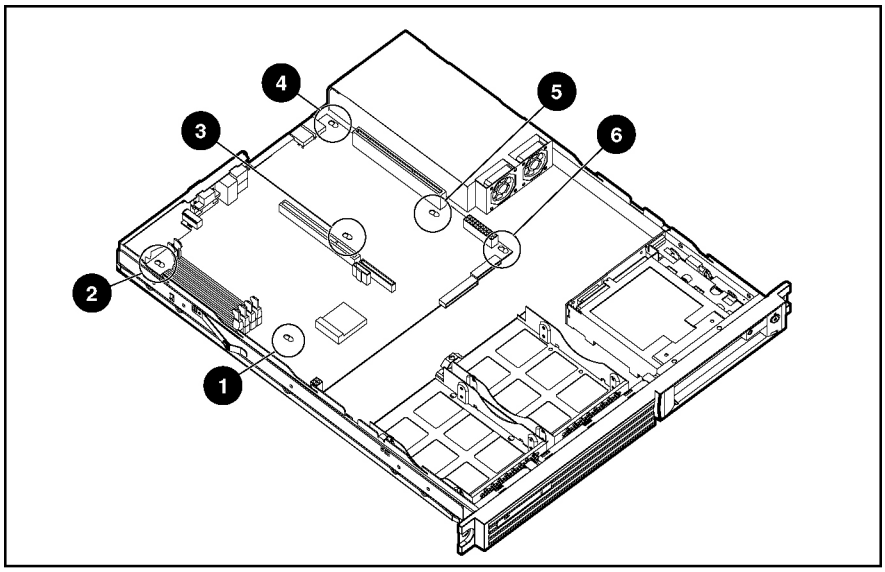

Figure 2-35: Identifying system board alignment keys and keyhole locations

14. Remove all Phillips head screws that secure the system board to the chassis (1).
15. Slide the system board 0.7 mm (0.25 in) toward the front of the chassis, ensuring that the board unseats from all the alignment keys, and lift the board up and away from the keys (2).

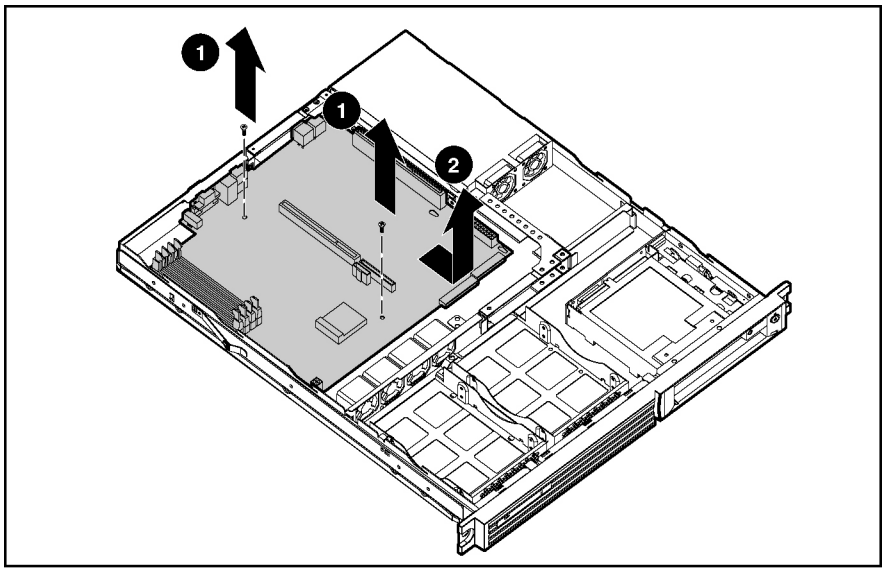

Figure 2-36: Removing the system board

Reverse steps 1 through 14 to replace the system board.

IMPORTANT: The server serial number must be re-entered through RBSU after replacing the system board. Refer to "Re-entering the Server Serial Number" in this chapter.

Re-entering the Server Serial Number

After replacing the server host module or clearing the NVRAM, the server serial number must be re-entered. To re-enter the serial number:

During the server startup sequence, press the **F9** key to access RBSU.

1. Select the **System Options** menu.
2. Select **Serial Number**. The following warning is displayed:

   ```
   WARNING! WARNING! WARNING! The serial number is loaded into the
   system during the manufacturing process and should NOT be
   modified. This option should ONLY be used by qualified service
   personnel. This value should always match the serial number
   sticker located on the chassis.
   ```

   Press the **Enter** key to clear the warning.
3. Enter the serial number and press the **Enter** key.
4. Press the **Escape** key to close the menu.

5. Press the **Escape** key to exit RBSU.
6. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

3

Diagnostic Tools

This chapter provides an overview of the software and firmware diagnostic tools available for HP ProLiant DL320 Generation 2 servers.

Diagnostic Tools Utility Overview

The following utilities assist in diagnosing problems, testing hardware, and monitoring and managing server operations.

Table 3-1: Diagnostic Tools

Tool	What it is	How to run it
LX32 Enterprise Diagnostics	A tool to assist testing and/or verifying operation of hardware. If problems are found, the diagnostics package isolates failures down to the replaceable part, whenever possible.	Diagnostics and utilities must be accessed when a system configuration error is detected during Power-On Self-Test (POST). For a complete list of POST error messages, refer to the *HP Servers Troubleshooting Guide*. Diagnostics software is also available on the SmartStart and Software Support CD.
Inspect Utility	A utility that provides a report detailing system information.	Run the Inspect Utility from the Diagnostics program.
Insight Manager	A client/server application used to manage hardware remotely within a network environment. Insight Manager reports hardware fault conditions (both failure and pre-failure) and collects data for reporting and graphing.	For more information, refer to the Management CD and the *Insight Manager User Guide*. More information on viewing and printing the event list can be found in the *HP ProLiant DL320 Generation 2 Server Setup and Installation Guide*.

continued

Table 3-1: Diagnostic Tools *continued*

Tool	What it is	How to run it
Survey Utility	An online information-gathering agent that runs on servers to collect critical hardware and software information from various sources. If a significant change occurs between data-gathering intervals, previous information is marked and the survey text file is overwritten to reflect the latest configuration and changes since the last configuration. This utility provides a historical record of change events for server hardware and software.	Install the Survey Utility from SmartStart, or the Management CD.
SmartStart	The intelligent way to set up the server. Located on the SmartStart CD, SmartStart includes ROMPaq Utility, driver updates, and assisted operating system installations.	Use the information provided in the Server Setup and Management pack.
Integrated Management Log (IML)	A log of system events such as system failures or nonfatal error conditions. View events in the IML from within: • Insight Manager • Survey Utility • LX32 Enterprise Diagnostics	The IML requires operating system-dependent drivers. Refer to the SmartStart and Software Support CD for instructions on installing the appropriate drivers.

continued

Table 3-1: Diagnostic Tools *continued*

Tool	What it is	How to run it
ROM-Based Setup Utility (RBSU)	A utility used to configure the hardware installed in or connected to the server. Specifically, it can: • Resolve resource conflicts in areas such as memory, port addresses, and interrupts (IRQs). • Configure PCI boards automatically. • Provide switch and jumper settings. • Manage installation of memory, processor upgrades, and mass storage devices such as hard drives, tape drives, and diskette drives. • Store configuration information in nonvolatile memory. • Assist in installation of an operating system.	Run RBSU directly by pressing the **F9** key during POST.
Automatic Server Recovery (ASR)	A tool that lets the server restart automatically after a catastrophic operating system failure. • Available Recovery–software error recovery and environmental recovery • Unattended Recovery–logs the error information to the IML, resets the server, and tries to restart the operating system	This tool is a function of the combined hardware and software system through the RBSU. Set the ASR to enable.
ROMPaq Utility	A utility that upgrades the current system ROM.	Run this utility from the ROMPaq diskette after powering up the system unit.

4

Connectors, Switches, and LED Indicators

This chapter contains illustrations and tables identifying and describing connectors, switches, and LED indicator locations on the front panel, rear panel, system board, and hard drives for the HP ProLiant DL320 Generation 2 server.

Connectors

This section contains figures and tables showing connector locations on the front panel, rear panel, PCI riser board assembly, and the system board of the server.

Rear Panel Connectors

The following figure and table show the connectors on the rear panel of the server.

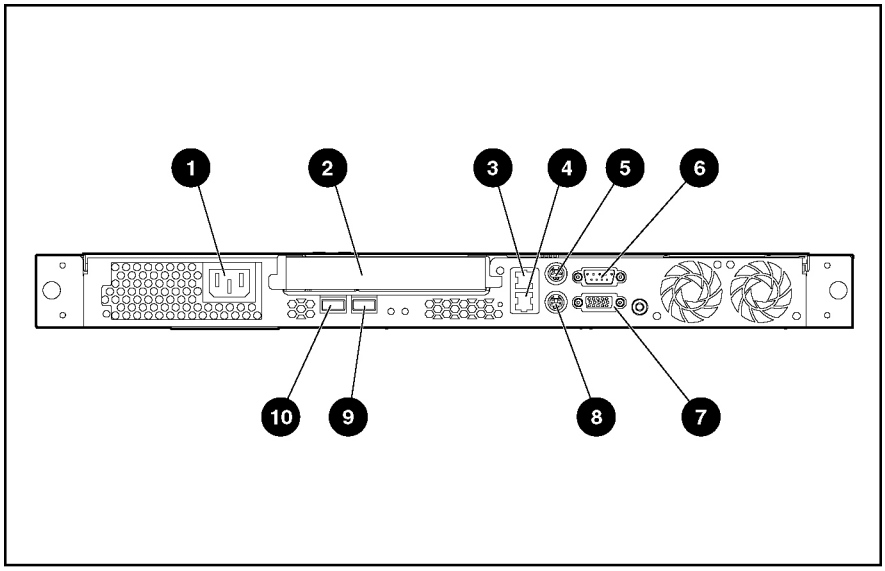

Figure 4-1: Rear panel connectors

Table 4-1: Rear Panel Connectors

Item	Description
1	Power connector
2	Expansion slot
3	RJ-45 Fast Ethernet connector for NIC 2
4	RJ-45 Fast Ethernet connector for NIC 1 (supports PXE)
5	Mouse connector
6	Serial connector
7	Video connector
8	Keyboard connector
9	USB 1 connector
10	USB 2 connector

Expansion Slot Connector

The following figure and table shows the PCI expansion board slot connector and expansion board slot cover.

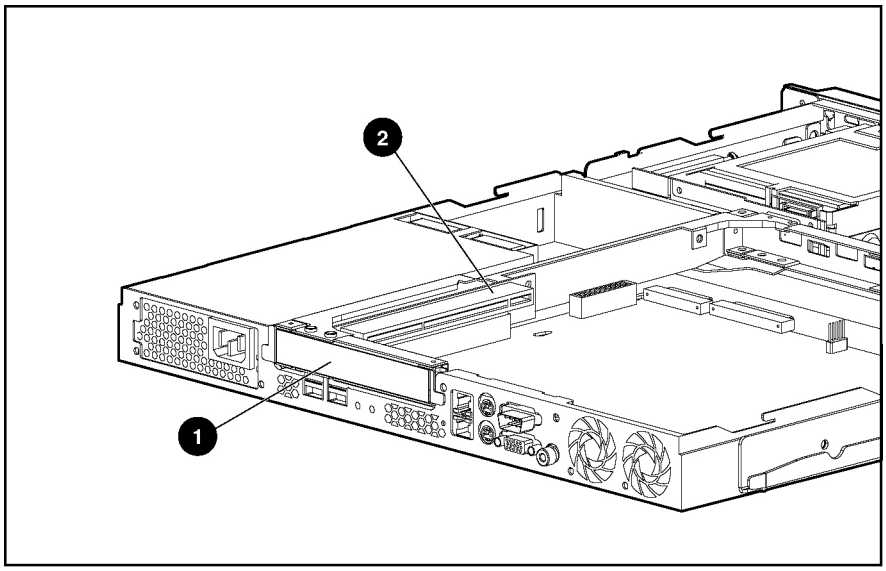

Figure 4-2: Expansion slot connector

Table 4-2: Expansion Slot

Item	Description
1	Expansion board slot cover
2	64-bit 33-MHz PCI slot

System Board Connectors

The following figure and table show system board connectors on the system board.

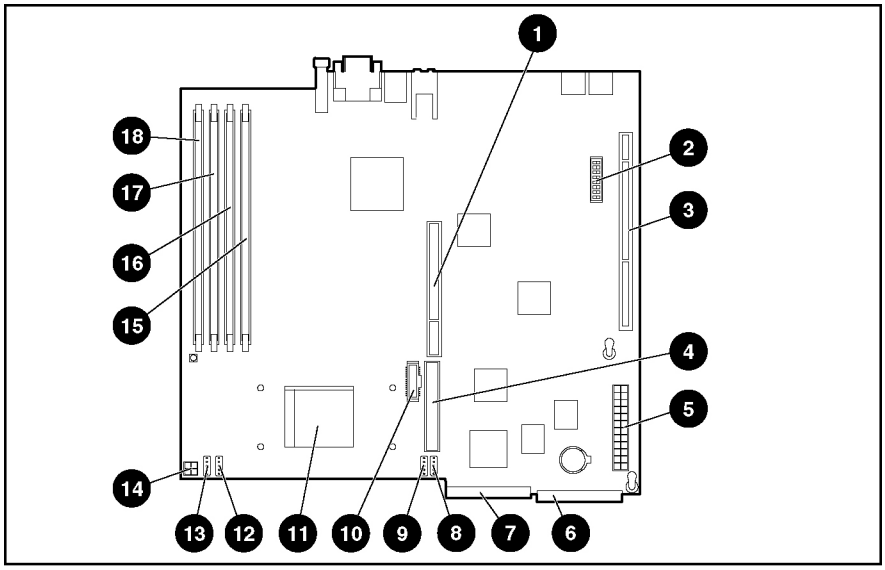

Figure 4-3: System board connectors

Table 4-3: System Board Connectors

Item	Description	Item	Description
1	Slotless SCSI module connector (option)	10	Remote Insight Lights-Out Edition II connector
2	System configuration switch (SW4)	11	Processor socket (populated)
3	64-bit 33-MHz PCI riser board assembly connector	12	Fan 3 connector
4	ATA controller (secondary)	13	Fan 4 connector
5	Power supply connector	14	Processor power connector
6	Optical device/diskette drive assembly cable connector	15	DIMM socket 1
7	ATA controller (primary)	16	DIMM socket 2
8	Fan 1 connector	17	DIMM socket 3
9	Fan 2 connector	18	DIMM socket 4 (populated)

System Switches

The server has a switch bank (SW1) for system configuration and a non-maskable interrupt (NMI) switch that is used in the event of a service emergency that requires a complete data dump prior to restarting the operating system.

Refer to the labels on the inside of the server access panel or to the following sections for the proper switch settings. The following figure and table show the location of the system switches.

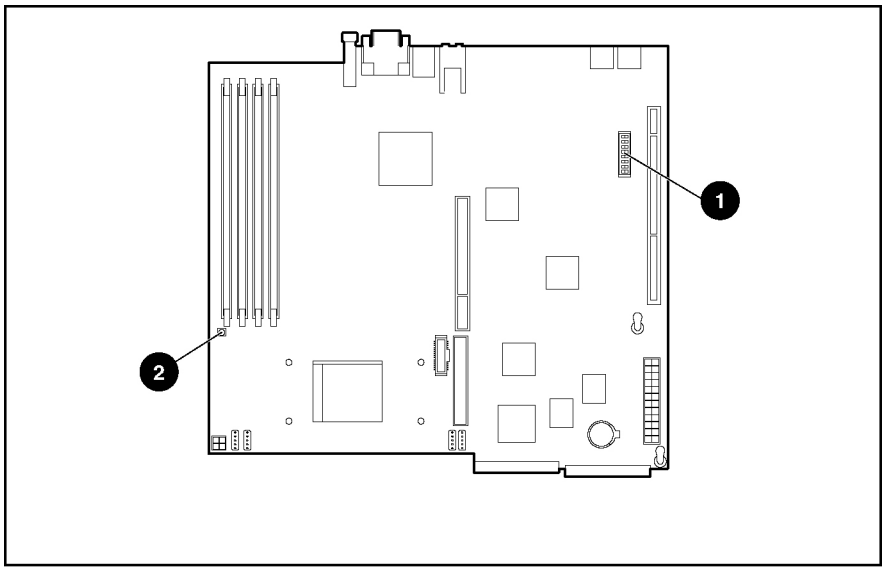

Figure 4-4: System switches

Table 4-4: System Switches

Item	Description
1	System configuration switch (SW1)
2	Non-maskable interrupt (NMI) switch

System Configuration Switch (SW1)

The system configuration switch (SW1) is an eight-position switch used for system configuration. Refer to the labels attached to the inside of the server access panel for proper system configuration settings. The following table shows the shipping system configuration switch settings of SW1.

Table 4-5: System Configuration Switch (SW1) Settings

Position	Function	Default	Description
S1	Reserved	Off	
S2	Lock configuration	Off	Open (off) = Normal Operation Closed (on) = RBSU will not commit any configuration changes.
S3	Reserved	Off	
S4	Enable floppy boot	Off	Open (off) = Normal Closed (on) = Override RBSU setting and enable floppy boot.
S5	Password override	Off	Open (off) = Normal, honor RBSU setting Closed (on) = Override RBSU setting and override password prompts.
S6	Invalidate CMOS/NVRAM	Off	Open (off) = Normal Closed (on) = BIOS will clear CMOS and NVRAM.
S7	Reserved	Off	
S8	Reserved	Off	

NOTE: "On" activates the function.

Non-Maskable Interrupt Switch (NMI)

When an operating system crashes, system administrators can initiate a non-maskable interrupt (NMI) event by pressing a dump switch. The NMI event enables a hung system to once again become responsive.

The NMI switch is used **only** in the event of a service emergency that requires a complete data dump in preparation for recovering the system from a catastrophic failure.

LED Indicators

This section contains illustrations and descriptions for the following internal and external server LEDs:

- Front panel
- Rear panel
- System board

Front Panel LED Indicators

Front panel status LEDs allow constant monitoring of basic system functions while the server is operating.

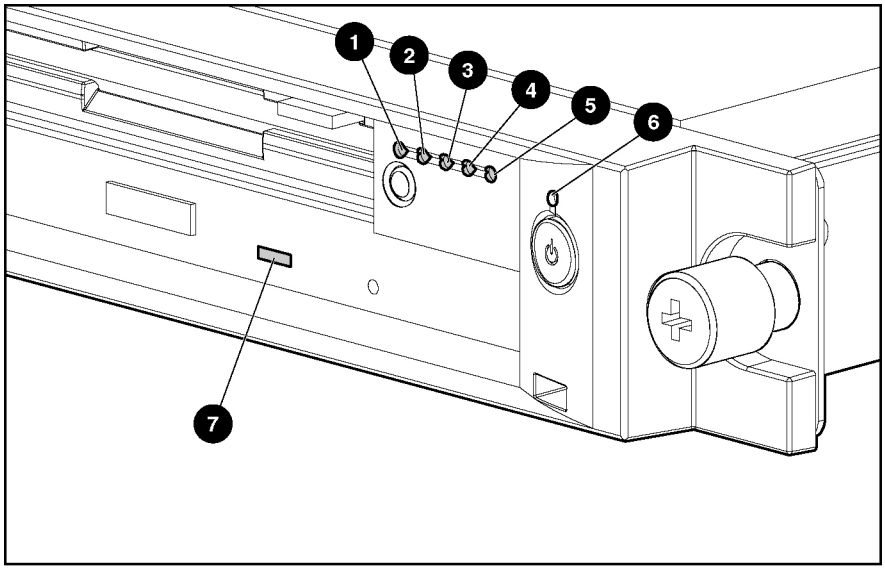

Figure 4-5: Front panel LEDs

Table 4-6: Front Panel LEDs

Item	LED Description	Status
1	Front unit identification	On = Local management Blinking = Remote management Off = Deactivated
2	NIC 2 link/activity	On = Link Off = No link Blinking = Activity

continued

Table 4-6: Front Panel LEDs *continued*

Item	LED Description	Status
3	NIC 1 link/activity	On = Link Off = No link Blinking = Activity
4	System health	Green = Good Amber = Degraded Red = Critical error
5	Hard drive activity	On = Activity Off = No activity
6	Power On/Off	Green = Power on Amber = Standby Off = Power off
7	Optical drive activity	On = Activity Off = No activity

Rear Panel LED Indicators

The server rear panel contains three LEDs that allow monitoring of network activity and server identification.

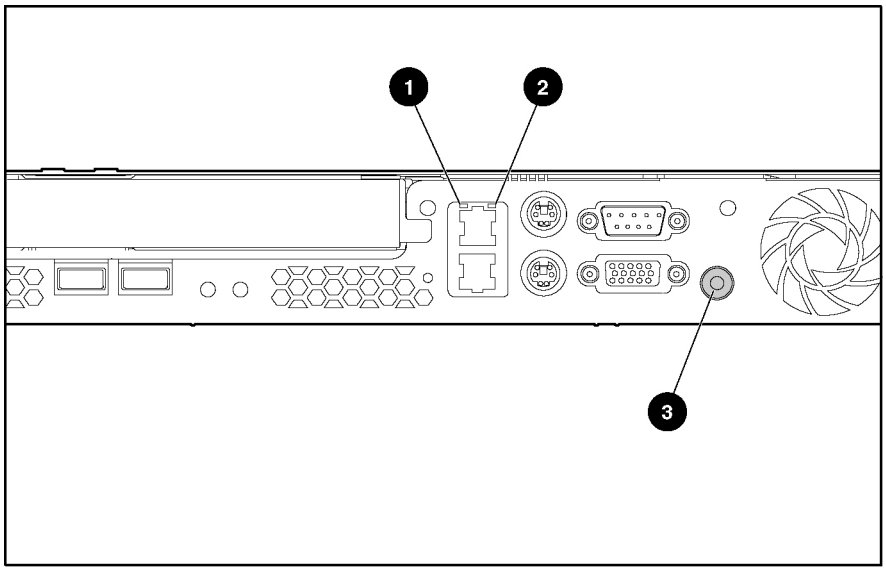

Figure 4-6: Rear panel LEDs

Table 4-7: Rear Panel LEDs

Item	Description	Status
1	NIC 1 link/activity	On = Link Off = No link Blinking = Activity
2	NIC 2 link/activity	On = Link Off = No link Blinking = Activity
3	Rear unit identification LED	On = Local management Blinking = Remote management Off = Deactivated

Internal LED Indicator

The system board contains an internal power status LED for use during troubleshooting operations. When the LED is illuminated, adequate power is available to the system from the power supply. If the LED is not illuminated, either the power cord is not connected or the power supply has failed.

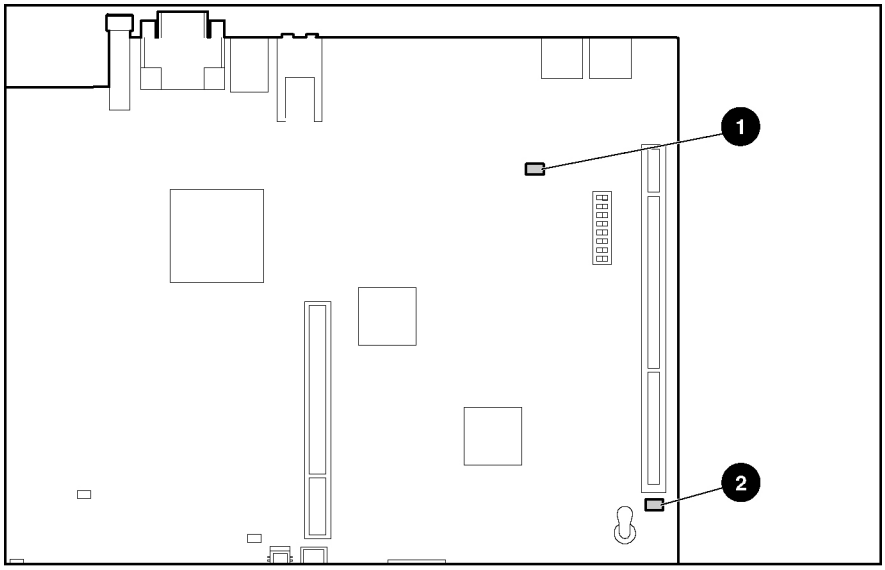

Figure 4-7: Power status LEDs

Item	Description
1	Power supply
2	Auxiliary power supply

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Specifications

This chapter provides operating and performance specifications for HP ProLiant DL320 Generation 2 server components and optional hardware, including:

- System unit
- Power supply
- Memory
- CD-ROM/diskette drive assembly
  - — Low-profile 1.44-MB diskette drive
  - — Low-profile IDE CD-ROM drive
- DVD-ROM/diskette drive assembly
  - — Low-profile 1.44-MB diskette drive
  - — Low-profile IDE DVD-ROM drive
- Single Channel Wide Ultra3 SCSI controller module
- Integrated Ultra ATA/100 controller
- Optional hard drives
  - — Ultra3 SCSI hard drives
  - — ATA hard drives
- NC7760 Fast Ethernet NIC 10/100/1000 Wake On LAN

System Unit

Table 5-1: System Unit Specifications

Item	Description
Height	4.19 cm (1.65 in)
Depth	65.45 cm (25.75 in)
Width	42.55 cm (16.75 in)
Weight (maximum)	11.81 kg (26 lb)
Weight (no drives installed)	9.54 kg (21 lb)
U.S. and international input voltage requirements	
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	2.8 A (110 V) to 1.4 A (220 V)
Rated input power	307 W
Maximum peak power	200 W (for max. duration of two minutes)
BTUs per hour	1048
Temperature range[1]	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-40°C to 70°C (-40°F to 158°F)
Relative humidity (noncondensing)[2]	
Operating	10% to 90%
Non-operating	5% to 95%
Maximum wet-bulb temperature	28°C (82.4°F)

[1]Operating temperature has an altitude derating of 1°C per 308.4 M (1.8°F per 1000 ft). No direct sunlight.

[2]Storage maximum humidity of 95 percent based on maximum temperature of 45°C (113°F). Altitude minimum for storage is 70 kpa.

Power Supply

Table 5-2: Power Supply Specifications

Item	Description
Input voltage specifications	
Rated input voltage	100 VAC to 240 VAC
Rated input line	180 VAC to 264 VAC (90 VAC to 132 VAC)
Frequency range	47 to 63 Hz
Rated input power	307 W
Rated input current	3.3 A, 1.7 A (110 V, 220 V)
Steady state power	180 W
Maximum peak power	200 W for two minutes
Ambient temperature range	
Operating	10°C to 35°C (50°F to 95°F)
Non-operating	-40°C to 70°C (-40°F to 158°F)
Relative humidity (non-condensing)	
Operating	10% to 90%
Non-operating	5% to 95%
Dielectric voltage withstand	
Input to output	3000 VAC/minute
Input to ground	1500 VAC/minute
Maximum wet-bulb temperature	28°C (82.4°F)

Memory

Table 5-3: SDRAM DIMM Specifications

Item	Description
Size	128 MB, 256 MB, 512 MB and 1GB
Speed	200/266 MHz
Width	64 bits
Type	PC2100 ECC registered DDR SDRAM DIMMs
Note: DIMMs must be industry-standard 184-pin PC2100 DDR DIMMs. The DDR DIMMs must support CAS Latency 2, or greater. They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD). Use HP supplied SDRAM only.	

Optical Device/Diskette Drive Assembly

Low-Profile 1.44-MB Diskette Drive

Table 5-4: Low-Profile 1.44-MB Diskette Drive Specifications

Item	Description
Size	8.89 cm (3.5 in)
LED (front panel)	Green
Read/write capacity per diskette (high/low density)	1.44 MB/720 KB
Drives supported	1
Drive height	1.52 cm (0.6 in)
Drive rotation	300 rpm
Transfer rate bits/sec (high/low)	500/250 Kbps
Bytes/sector	512
Sectors/track (high/low)	18/9
Tracks/side (high/low)	80/80
Access times	
Track-to-track (high/low)	6 ms/3 ms
Access times	
Track-to-track (high/low)	6 ms/3 ms
Average (high/low)	174 ms/94 ms
Settling time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

Low-Profile IDE CD-ROM Drive

Table 5-5: Low-Profile IDE CD-ROM Drive Specifications

Item	Description
Applicable disk formats	CD-DA, CD-ROM (mode 1 and 2); CD-XA (mode 2, Form 1 and 2), CD-1 Ready; CD-Extra; Photo CD (single and multiple session); CDi ready
Capacity	550 MB (mode 1, 12 cm) 640 MB (mode 2, 12 cm)
Block size	2638, 2352 bytes (mode 0); 2352, 2340, 2336, 1024 bytes (mode 1); 2352, 2340, 2336, 2048, 1024 bytes (mode 2)
Dimensions	
Height	1.27 cm (0.5 in)
Depth	13.00 cm (5.12 in)
Width	13.11 cm (5.16 in)
Weight	<340 g (<11.98 oz)
Data transfer rate	
Sustained	150 KBps (sustained 1X)
Burst	2100 to 4800 KBps
Access times (typical)	
Full stroke	<350 ms
Random	<150 ms
Disc diameter	12 cm, 8 cm (4.7 in, 3.15 in)
Disc thickness	0.12 cm, 0.51 cm (0.047 in x 0.20 in)
Track pitch	1.6 µm
Cache/buffer	128 KB
Startup time	<7s
Stop time	<4s (single); <30s (multi-session)
Laser parameters	
Type	Semiconductor Laser
Wave length	700 ± 25nm
Divergence angle	53.5° ± 1.5°
Output power	0.13 mW
Operating conditions	
Temperature	5° to 45°C (41° to 118°F)
Humidity	5% to 90% (10% to 80%)

Low-Profile IDE DVD-ROM Drive

Table 5-6: Low-Profile IDE DVD-ROM Drive Specifications

Item	Description
Applicable disk formats	DVD (single and double layer), DVD-5, DVD-9, DVD-10, DVD-R, CD-ROM (mode 1 and 2), CD-DA, CD-XA (mode 2, Form 1 and 2), CD-I (Mode 2, Form 1 & 2), CD-I Ready, CD-Bridge, CD-R, Photo CD (single and multiple session)
Disc diameter	12 cm, 8 cm (4.72 in, 3.15 in)
Capacity	4.7 GB (DVD-5) 8.5 GB (DVD-9) 9.4 GB (DVD-10) 550 MB (mode 1, 12 cm) 640 MB (mode 2, 12 cm) 180 MB (8 cm)
Disc thickness	1.2 mm (CD-ROM) 1.2 mm (DVD-ROM)
Track pitch	1.60 μm (CD-ROM) 0.74 μm (DVD-ROM)
Block size	Mode 0 2352 Bytes Mode 1 2352, 2340, 2336, 2048 Bytes Mode 2 2352, 2340, 2336, 2048 Bytes DVD-ROM 2048 Bytes
Performance	
Access times (typical)	
Full stroke	DVD-ROM <300 ms, CD-ROM <200 ms
Random	DVD-ROM <180 ms, CD-ROM <120 ms
Data transfer rate (1KB = 1024 bytes)	150 KBps (sustained 1X CD-ROM mode) 1552 to 3600 KBps (24X CAV CD-ROM mode) 4463 to 10800 KBps (8X CAV DVD-ROM mode)
Bus rate	16.6 MBps (burst) with DMA support
Cache/buffer	128 KB (Minimum)
Startup time	<15s (typical)
Stop time	<4s (typical)
Dimensions	
Height	1.27 cm (0.5 in)
Depth	13.00 cm (5.12 in)
Width	13.11 cm (5.16 in)
Weight	<350 g (<12.35 oz)
Operating conditions	Operating / Storage
Temperature	5° to 55°C (41° to 131°F) / -30° to 60°C (-22° to 140°F)
Humidity	10% to 80% / 5% to 90%

Single Channel Wide Ultra3 SCSI Controller Module

Table 5-7: Single Channel Wide Ultra3 SCSI Controller Module Specifications

Item	Description
Temperature range (non-condensing)	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-20°C to 50°C (-4°F to 122°F)
Relative humidity (non-condensing)	
Operating	8% to 90%
Non-operating	5% to 95%
Maximum drives supported	Up to 15 per channel
Logical drives supported	15
Simultaneous drive transfer channels	1
Data transfer method	64-bit PCI bus master
Total transfer rate	160 MBps
SCSI electrical interface	Low-voltage differential (LVD) and single-ended
PCI bus transfer rate (maximum)	133 MBps
SCSI port connectors (internal)	68-pin Ultra3 SCSI connector
Protocol	Wide Ultra3 SCSI
Software upgradeable firmware	Yes

Integrated Ultra ATA/100 Controller

Table 5-8: Ultra ATA/100 Controller Specifications

Item	Description
Temperature range (non-condensing)	
Operating	0°C to 70°C (32°F to 158°F)
Shipping	-40°C to 125°C (-40°F to 257°F)
Relative humidity (non-condensing)	
Operating	10% to 90%
Non operating	5% to 95%
Simultaneous drive transfer channels	2 channels
Transfer rate synchronous (Max)	100 MBps
Data transfer method	32-bit PCI bus master
Drive support	Ultra ATA, EIDE & Fast ATA-2
PCI bus transfer rate (maximum)	133 MBps
Data transfer modes	UDMA Modes 5/4/3/2/1/0, DMA Modes 2/1/0, PIO Modes 4/3/2/1/0
Protocol	ATA/100 compatible
Feature	CRC (Cyclical Redundancy Check)
Buffer size	128 byte

Optional Hard Drives

Ultra3 SCSI Hard Drives

Table 5-9: Ultra3 SCSI Hard Drive Specifications

Item	9.1 GB	18.2 GB
Formatted capacity	9,100 MB	18,209 MB
Height	Third, 2.54 cm (1.0 in)	Third, 2.54 cm (1.0 in)
Size	8.89 cm (3.5 in)	8.89 cm (3.5 in)
Interface	Ultra3 SCSI	Ultra3 SCSI
Transfer rate synchronous (maximum)	160 MBps	160 MBps
Single track	0.8 ms	0.8 ms
Average	5.4 ms	7.5 ms
Full stroke	12.2 ms	16.0 ms
Rotational speed	10,000 rpm	10,000 rpm
Bytes/sector	512	512
Logical blocks	17,773,524	35,556,080
Operating temperature		
Celsius	10° to 35°	10° to 35°
Fahrenheit	50° to 95°	50º to 95°

ATA Hard Drives

Table 5-10: ATA Hard Drive Specifications

	40 GB	80 GB
Formatted capacity	40,021 MB	80,026 MB
Height	Third, 2.54 cm (1.0 in)	Third, 2.54 cm (1.0 in)
Size	8.89 cm (3.5 in)	8.89 cm (3.5 in)
Interface	ATA/100	ATA/100
Transfer rate synchronous (max)	100 MBps	100 MBps
Single track	0.8 ms	0.8 ms
Average	5.4 ms	7.5 ms
Full stroke	12.2 ms	16.0 ms
Rotational speed	7,200 ±0.1% rpm	7,200 ±0.2% rpm
Bytes/sector	512	512
Logical blocks	78,165,380	156,301,488
Operating temperature		
Celsius	10° to 35°	10° to 35°
Fahrenheit	50° to 95°	50º to 95°

Integrated NC7760 Gigabit Server Auto-Switching Network Interface Controller (NIC)

Table 5-11: Integrated NC7760 Gigabit Server Auto-Switching Network Interface Controller (NIC) Specifications

Item	Description
Network interface	10Base-T/100Base-TX/1000Base-T Ethernet
Compatibility	IEEE 802.2, 802,3, 803.3u
Data transfer method	32-bit, PC 33-MHz bus master
Network transfer rate	10/100/1000 Mbps
Connector	RJ-45
I/O address and interrupt	Plug and Play PCI
Emissions standards	FCC class A

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