HP ProLiant DL320 Generation 2 Server Setup and Installation Guide

This guide provides IT administrators and technicians setup and installation requirements, precautions, and instructions pertaining to the servers. The guide explains how to install hardware options for enhanced system performance, how to install and configure memory, how to install expansion boards, how to install the server in the rack, and how to cable and configure the servers.

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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades for the HP ProLiant DL320 Generation 2 server.

Intended Audience

This guide is intended for anyone configuring a ProLiant DL320 Generation 2 server. A moderate level of server-based knowledge and experience is assumed.

⚠ Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:

> ⚠ **WARNING: This symbol, in conjunction with any of the following symbols, indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.**

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The 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.

This symbol on an RJ-45 receptacle 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 symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

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

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

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

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg
Weight in lb

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability

> **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 stabilizing feet are attached to the rack, if it is a single-rack installation.**
>
> - **The racks are coupled together in multiple-rack installations.**
>
> - **Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.**

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

> **WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.**

> **CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Text Conventions

This document uses the following conventions:

- *Italic type* is used for complete titles of published guides or variables. Variables include information that varies in system output, in command lines, and in command parameters in text.

- **Bold type** is used for emphasis, for onscreen interface components (window titles, menu names and selections, button and icon names, and so on), and for keyboard keys.

- `Monospace typeface` is used for command lines, code examples, screen displays, error messages, and user input.

- Sans serif typeface is used for uniform resource locators (URLs).

Related Documents

For additional information on the topics covered in this guide, refer to the following documentation:

- *HP ProLiant DL320 Generation 2 Server Maintenance and Service Guide*

- ProLiant Servers Cabling Matrix:
  www.hp.com

- *HP ProLiant DL320 Generation 2 Server Hardware Installation and Configuration Poster*

- *Servers Troubleshooting Guide:* www.compaq.com/support/home/index.asp (Reference Library)

- *HP ProLiant DL320 Generation 2 Server High-Density Deployment* white paper

- General online reference and specifications: www.compaq.com/quickspecs

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

HP Technical Support

In North America, call the HP Technical Support Phone Center at 1-800-652-6672. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored. Outside North America, call the nearest HP Technical Support Phone Center. For telephone numbers of worldwide Technical Support Centers, go to

www.hp.com

Before calling, refer to the *Servers Troubleshooting Guide* for a list of information to have available.

HP Website

For information on this product, as well as the latest drivers and flash ROM images, go to www.hp.com.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

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

- In Canada, call 1-800-263-5868.

- Elsewhere, refer to www.hp.com for locations and telephone numbers.

Reader's Comments

HP welcomes your comments on this guide. Please send your comments and suggestions by email to `ServerDocumentation@hp.com`.

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Server Features

HP ProLiant DL320 Generation 2 Server Features

For a list of features which are standard on the server, refer to

www.compaq.com/quickspecs

A generation identifier (G2), located on the front of the server, indicates the model of the server purchased. The generation identifier is required to accurately identify the model for service and support.

Warranties

The server is equipped with several standard warranties. For more information, refer to the *Important Warranty Information* card shipped with the server.

Server Configuration and Management

The server offers an extensive set of features and optional tools to support effective server management and configuration. Refer to Chapter 5, "Server Configuration and Utilities," for detailed information on each of these utilities.

Security

Security features for this server include the following:

- Power-on password

- Administrator password

- Network server mode

- Diskette write control

- QuickLock

- Redundant ROM support

Most security features are established through RBSU. Refer to Chapter 5, "Server Configuration and Utilities," or the *ROM-Based Setup Utility User Guide*, for detailed information on RBSU. For additional information concerning server security features, refer to the SmartStart CD included in the shipping box.

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Planning the Server Installation

If planning to deploy and configure multiple servers in a single rack, consult the *HP ProLiant DL320 Generation 2 Server High-Density Deployment* white paper at

www.hp.com

Server Installation Overview

The following steps give an overview of the required procedures for installing the ProLiant DL320 Generation 2 server:

IMPORTANT: Before beginning the following procedures, refer to the *Important Safety Information* guide that shipped with the server.

1. Select an appropriate site for the server.

2. Unpack the server and rack-mounting hardware.

3. Install other options.

   Refer to Chapter 3, "Installing Hardware Options." Other options include additional memory, hard drives, expansion boards, and external storage devices. Install hardware options before running the System Configuration Utility. The System Configuration Utility is run during the SmartStart portion of the installation sequence.

   IMPORTANT: Do not attempt to change the factory settings for reserved switches. Inaccurate settings can seriously degrade system performance.

4. Set internal switches, if necessary. For detailed information on relevant switches, refer to Appendix E, "LEDs, Switches, and Jumpers."

5. Use the rack template to identify the proper location for server installation. Refer to "Measuring with the Template," in Chapter 4, "Server Installation."

6. Install the fixed rack rails. Refer to "Installing the Fixed Rack Rails," in Chapter 4, "Server Installation."

7. Install the fixed cable tray for managing cables on the server rear panel.

   These cables include keyboard, mouse, monitor, network, and power cables. Refer to "Attaching the Fixed Cable Tray," in Chapter 4, "Server Installation."

8. Mount the server in the rack. Refer to "Inserting the Server into the Rack," in Chapter 4, "Server Installation."

9. Connect the power cord and peripheral devices. Refer to "Connecting the Peripheral Device Cables and the Power Cord," in Chapter 4, "Server Installation."

10. Secure the power cord and peripheral device cables in the fixed cable tray. Refer to "Securing the Cables in the Fixed Cable Tray," in Chapter 4, "Server Installation."

Optimum Environment

When installing these servers in a rack, select a location that meets the environmental standards described in the following paragraphs.

Space and Airflow Requirements

To allow for servicing and adequate airflow, observe the following spatial requirements when deciding where to install an HP, Compaq, Telco, or third-party rack:

- Leave a minimum clearance of 63.5 cm (25 inches) in front of the rack.

- Leave a minimum clearance of 76.2 cm (30 inches) behind the rack.

- Leave a minimum clearance of 121.9 cm (48 inches) from the back of the rack to the rear of another rack or row of racks.

HP servers draw in cool air through the rack front door and expel warm air through the rack rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet and warm air to escape from the rear of the cabinet.

IMPORTANT: Do not block the ventilation openings.

NOTE: It is recommended that rows of racks be arranged where front panels on one row face the front panels of opposite rows and the back panels of racks face the backs of racks in opposite rows.

When there is any vertical space in the rack not filled by servers or rack components, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

Compaq branded 9000 and 10000 Series racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

$\triangle$ **CAUTION:** When using a Compaq branded 7000 Series rack, the high airflow rack door insert must be installed [P/N 327281-B21 (42U) and P/N 157847-B21 (22U)] to provide proper front-to-back airflow and cooling.

$\triangle$ **CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors: if the 42U server rack includes closing front and rear doors, 5,350 sq cm (830 square inches) of holes evenly distributed from top to bottom must be available to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).

- Side panels: The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 inches).

$\triangle$ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

Temperature Requirements

To ensure continued safe and reliable equipment operation, install or locate the system in a well-ventilated, climate-controlled environment.

The HP maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

Power Requirements

> ⚠ **WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over the facility's wiring and installation requirements.**

The installation of this equipment shall be in accordance with local/regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA 75, 1992 Edition (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product's rating label or the user documentation supplied with that option.

When installing more than one server, additional power distribution devices may be required to safely provide power to all devices. Observe the following guidelines:

- The power load must be balanced between available AC supply branch circuits.

- The overall system AC current load must not exceed 80 percent of the branch circuit AC current rating.

Grounding Requirements

For proper operation and safety, the server must be properly grounded. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code) Article 250, as well as any local and regional building codes. In Canada, the equipment must be installed in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, the installation must follow any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) 364, parts 1 through 7. Furthermore, you must ensure that all power distribution devices used in the installation—such as branch wiring and receptacles—are listed or certified grounding-type devices.

Because of the high ground leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a power distribution unit (PDU) that is either permanently wired to the building's branch circuit or includes a non-detachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. HP does not recommend using common power outlet strips for this equipment.

Rack Planning Resources

For Rack Builder Pro Configuration Tool and Rack Products documentation, go to

www.compaq.com/rackbuilder

Rack Warnings and Cautions

Before installing a rack, carefully review the following warnings and cautions:

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

⚠ **WARNING: To reduce the risk of personal injury or equipment damage, ensure 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 for single-rack installation.**

- **The racks are coupled together in multiple-rack installations.**

⚠ **WARNING: When installing the server in a Telco rack, ensure that the rack frame is adequately secured to the top and bottom of the building structure.**

⚠ **WARNING: To reduce the risk of personal injury or equipment damage, at least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and may become unstable when moved on its casters.**

Never stand in front of the rack when it is rolling down the ramp from the pallet; always handle the rack from both sides.

⚠ **CAUTION:** Always begin by mounting the heaviest item on the bottom of the rack. Continue to populate the rack from the bottom to the top.

Server Warnings and Cautions

Before installing the server, carefully review the following warnings and cautions:

⚠ **WARNING: To reduce the risk of personal injury from hot surfaces, allow the 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:** Do not operate the server for long periods without the access panel. Operating the server without the access panel results in improper airflow and improper cooling that can lead to thermal damage.

Server Shipping Contents

Unpack the server box and locate the materials and documentation for installing the server. All rack-mounting hardware for installing the server into the rack are included with the rack or the server.

In addition to these supplied items, the following additional items may be needed:

- Application software diskettes
- Options to be installed
- Phillips screwdriver

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Installing Hardware Options

This chapter provides information and procedures for installing hardware options on ProLiant DL320 Generation 2 servers. For additional instructions, refer to the installation documentation shipped with each option kit, the hardware installation and configuration poster shipped with the server, and the labels attached to the inside of the server access panel.

To streamline the installation process, read the installation instructions for all of the hardware options and identify similar steps before beginning installation.

After installing all hardware options, proceed with the server installation procedures in Chapter 4, "Server Installation."

Accessing Internal Server Components

This section defines standard procedures to access internal server components. Procedures will vary depending on whether the server is in the rack and powered on, or out of the rack.

Accessing Internal Components When the Server Is Out of the Rack

When the server is not installed in the rack, accessing internal components requires removal of the access panel.

Removing the Access Panel

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

> △ **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:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure.

To remove the access panel:

1. Press and hold down the locking latches on each side of the access panel.

2. Slide the access panel toward the rear of the unit, about 1.25 cm (0.5 inch), and lift the panel to remove it.

Accessing Internal Components When the Server Is In the Rack

When the rack management solution option is installed (ball-bearing slide rails and a cable management system), many hardware procedures may be performed without removing the server from the rack.

To access internal components:

1. Power down the server.

   a. Shut down the operating system as directed in the operating system instructions.

   > ⚠ **CAUTION:** Whenever installing hardware or performing maintenance procedures requiring access to internal components, it is recommended that all server data be backed up to avoid loss.

   b. Press the unit identification switch on the server front panel (1). An LED illuminates blue on the server front and rear panels (2).

   c. Press the server Power On/Off switch (3) to power down the server. The LED (4) changes from green to amber indicating standby mode.
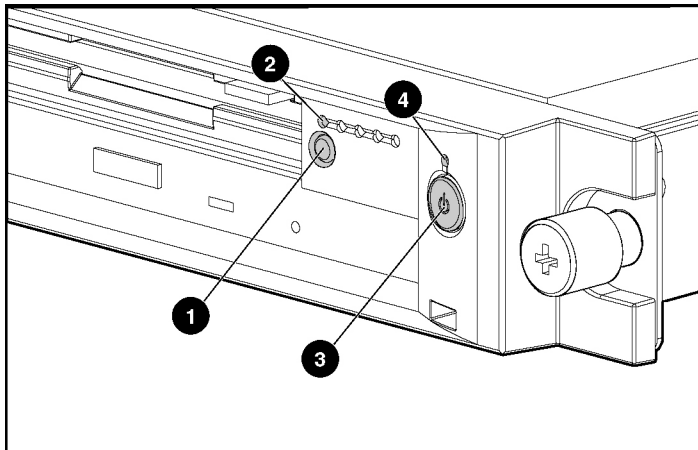

Figure 3-1: Activating the front unit identification LED and powering down the server

2. When the server has a sliding rail solution:

   a. Loosen the thumbscrews securing the server in the rack.

   b. Slide the server out of the rack until the rail locks engage.

   c. Disconnect the power cord.

d. Remove the access panel. Refer to the "Removing the Access Panel" section earlier in this chapter.

3. When the server has a fixed rail solution:

a. Disconnect the power cord and cables from the server rear panel (including cables extending from expansion boards), moving from left to right.

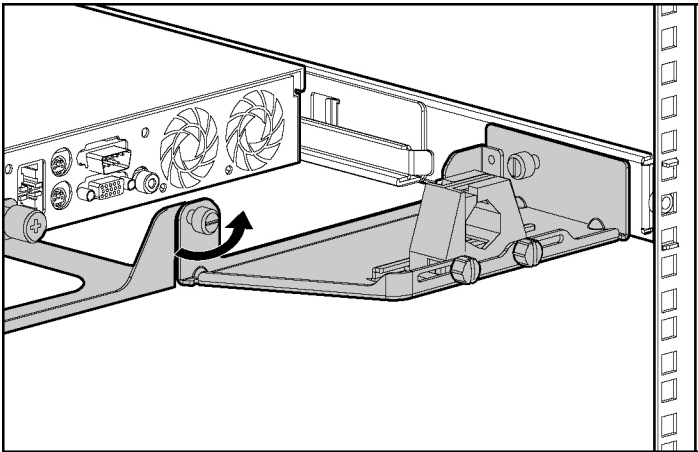b. Loosen the server thumbscrew securing the fixed cable tray to the server.

Figure 3-2: Loosening the server thumbscrew that secures the fixed cable tray to the server

   c.   Move to the front of the rack and loosen the thumbscrews securing the server in the rack (1).

   d.   Grasp the front panel thumbscrews, and extend the server from the rack. The cables remain clamped in the fixed cable tray. The rail release latches engage automatically.

   e.   Press in and hold the rail release latches (2).

   f.   Holding the rail release latches, extend the server until the latches clear the rack.

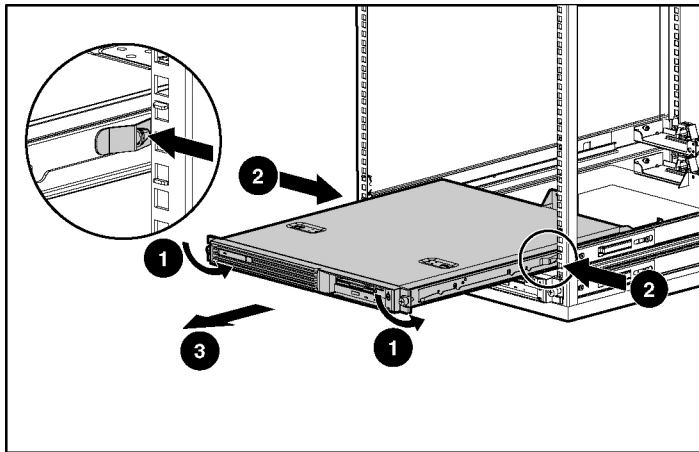   g.   Pull the server completely out of the rack (3) and set it on a flat, level surface.

Figure 3-3: Removing the server from the rack

4.   Remove the access panel. Refer to the "Removing the Access Panel" section earlier in this chapter.

Identifying System Board Components

Use the following figure and table to identify the system board connectors and components for option installation or service events.
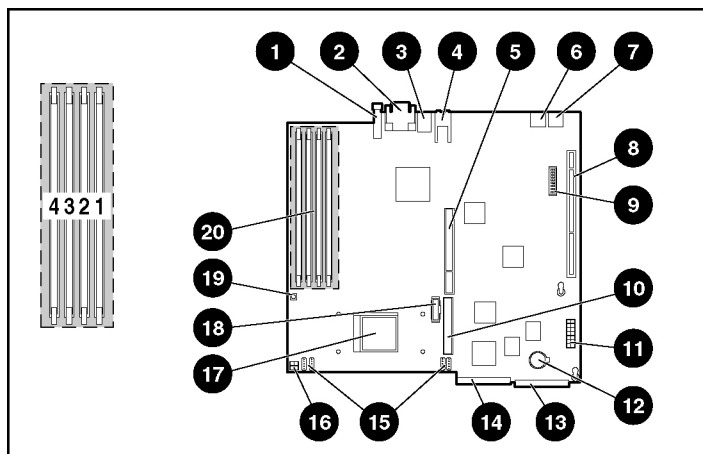

Figure 3-4: Identifying system board components

Table 3-1: System Board Connectors and Components

Location	Component	Location	Component
1	Unit Identification (UID) LED/button	7	USB connector 2
2	Serial (top) and video (bottom) connectors	8	64-bit 33-MHz PCI riser board assembly connector
3	Mouse (top) and keyboard (bottom) connectors	9	System configuration switch (SW1)
4	RJ-45 fast Ethernet connectors for NIC 1 (bottom) and NIC 2 (top)	10	ATA controller (secondary)
5	Slotless SCSI module slot	11	Power connector
6	USB connector 1	12	System battery

continued

Table 3-1: System Board Connectors and Components *continued*

Location	Component	Location	Component
13	CD-ROM/diskette or DVD/diskette connector	17	Processor socket (populated)
14	ATA controller (primary)	18	Remote Insight Lights-Out Edition II connector
15	Center wall fan connectors	19	NMI debug button
16	Processor power connector	20	DIMM sockets (1-4)

Installing Additional Memory

Server memory can be expanded by installing Double Data Rate Synchronous DRAM (DDR SDRAM). The system supports up to four PC2100 ECC registered DDR SDRAM Dual Inline Memory Modules (DIMMs) installed in four sockets on the system board. Memory can be added one module at a time.

Refer to Figure 3-4 and to Table 3-1 for DIMM slot location and socket numbers. This information is also available on the hood label.

The server memory can be expanded to 4 GB. In the maximum memory configuration, all four DIMM sockets are populated with 1-GB, PC2100 ECC registered DDR SDRAM DIMMs.

Observe the following guidelines when installing additional memory:

- DIMMs installed in the server must be PC2100 registered DDR SDRAM, 2.5 V, 64 bits wide, and ECC.

- All DIMMs installed must be the same speed. Do not install DIMM modules supporting different speeds, for example, 266 MHz and 200 MHz.

- Install the DIMMs in descending sequential order, starting with DIMM socket 4.

- Use only HP recommended DIMMs. DIMMs from other sources can adversely affect data integrity

- Use only the 3.05 cm (1.2 inch) DIMMs.

Refer to www.compaq.com/quickspecs for DIMM option kits.

⚠ **CAUTION:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. Refer to Appendix B, "Electrostatic Discharge," for more information.

To install a DIMM onto the system board:

1. Access internal server components. Refer to the "Accessing Internal Server Components" section earlier in this chapter.

2. Open the DIMM socket latches.

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

   IMPORTANT: Misaligned DIMMs do not seat.

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

5. Reverse the procedures performed in the "Accessing Internal Server Components" section earlier in this chapter.

Installing an Expansion Board

To install an expansion board, complete the procedures described in the following subsections.

Removing the PCI Riser Board Assembly

To remove the PCI riser board assembly:

⚠ **CAUTION:** To avoid damaging the system or expansion boards, remove all AC power cords before installing or removing an expansion board. When the front panel power switch is in the Off position, auxiliary power is still connected to the PCI expansion slot and may damage the card.

1. Access internal server components. Refer to the "Accessing Internal Server Components" section earlier in this chapter.

2. Disconnect any cables leading from any existing expansion board in the system board.

3. Loosen the PCI riser board thumbscrew (1).

4. Lift the assembly from the server chassis (2).
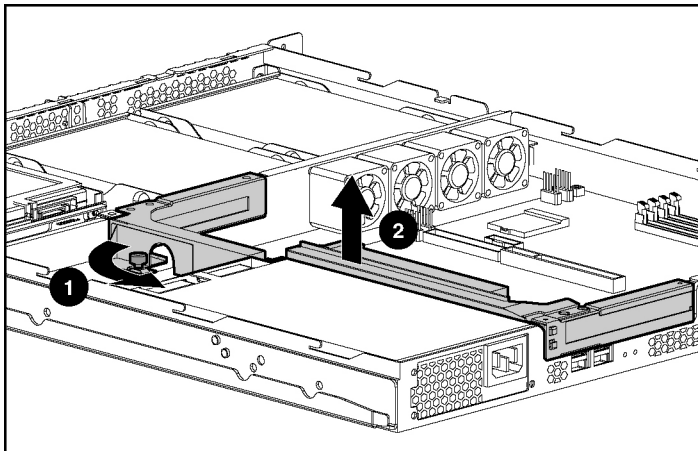
Figure 3-5: Removing the PCI riser board assembly (expansion board removed for clarity)

Installing the Expansion Board

To install an expansion board:

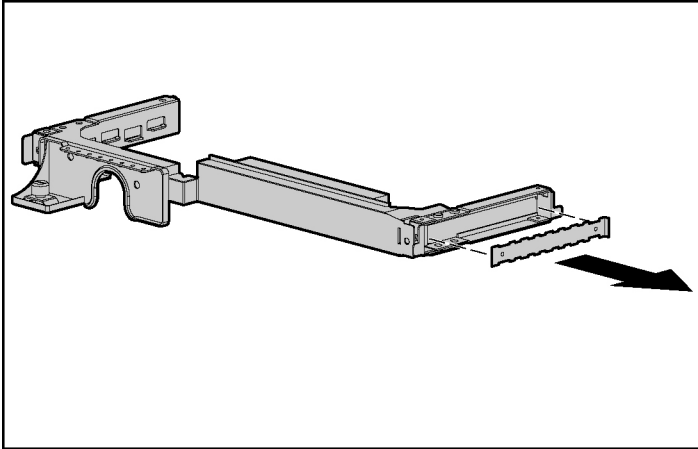1. Remove the expansion slot cover by pressing outward on its inner face.

Figure 3-6: Removing the expansion slot cover

> ⚠ **CAUTION:** Do not discard the expansion slot cover. If the PCI expansion board is removed in the future, the expansion slot cover must be reinstalled to maintain proper cooling.

2. Insert an expansion board into the expansion slot by aligning the expansion board with the guiding groove and sliding the expansion board into the slot until the board seats firmly.
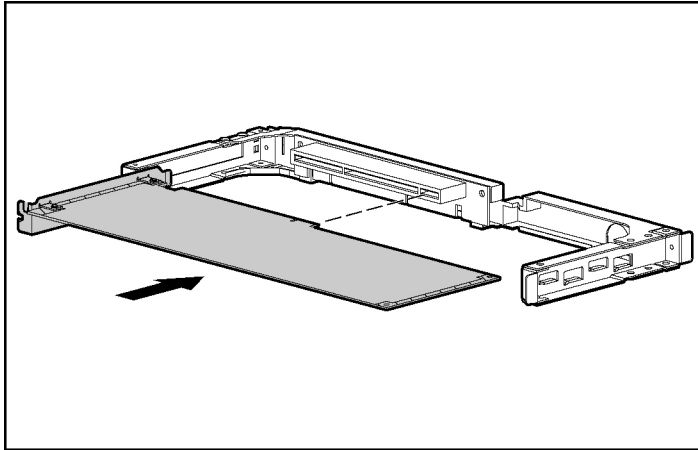
Figure 3-7: Inserting an expansion board into the expansion slot

IMPORTANT: If the expansion board ships with an ISA extender bracket, remove it from the expansion board before inserting the board into the expansion slot of the PCI riser board assembly.

3. Install the PCI riser board assembly:

   a. Lay the PCI riser board assembly in the chassis.

   b. Align the tabs (1) along the lower rear corners of the assembly with the retainers (2) on the rear panel of the chassis.
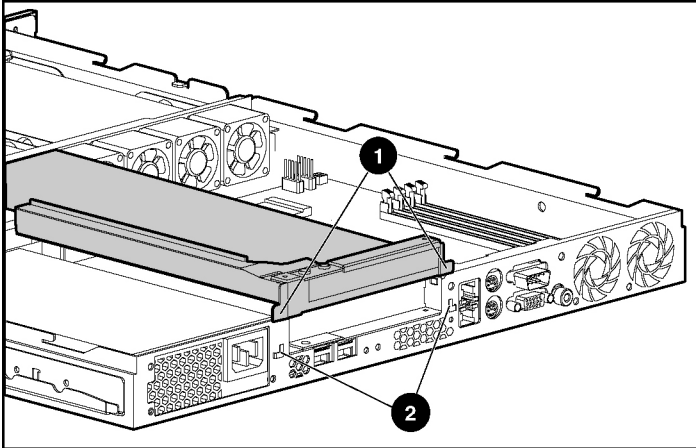
Figure 3-8: Aligning the tabs of the PCI riser board assembly with the rear panel of the chassis

c. Press down firmly above the expansion slot until the assembly is seated in the expansion slot (1).

> ⚠ **CAUTION:** The server does not power up if the PCI riser board assembly is not properly seated.

d. Tighten the PCI riser board thumbscrew (2).
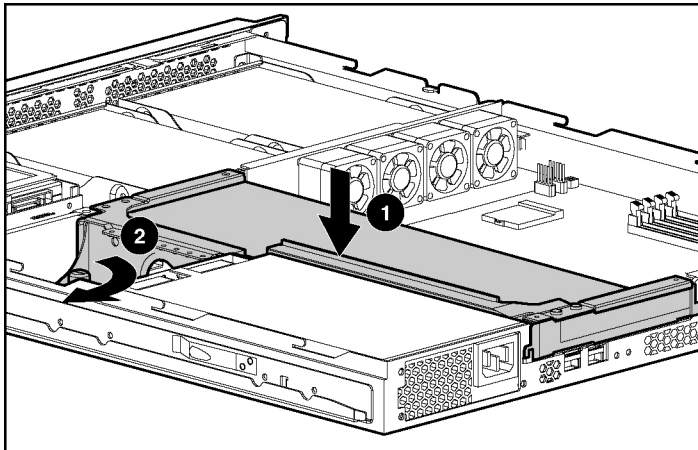
Figure 3-9: Installing the PCI riser board assembly

4. Attach any cabling required for operating the expansion board.

    a. To cable the Remote Insight Lights-Out Edition II expansion card, connect the adapter cable included with the option kit to the expansion card and to the connector on the system board. To complete external cabling and setup, refer to the "Cabling the Remote Insight Lights-Out Edition II (Optional)" section in Chapter 4, "Server Installation."
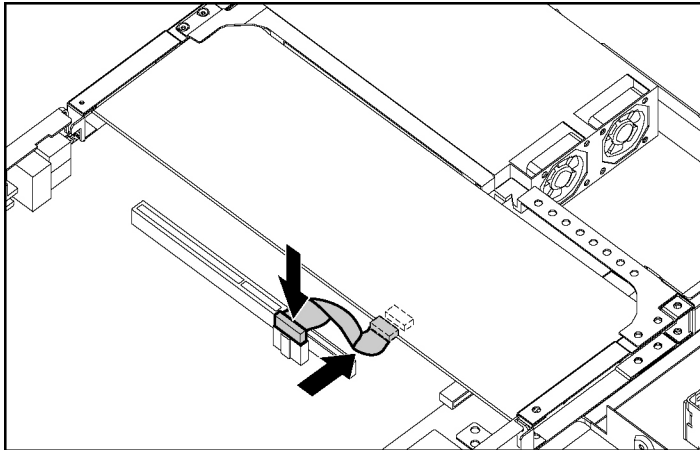

Figure 3-10: Cabling the Remote Insight Lights-Out Edition II to the system board

b. To cable a Smart Array Controller expansion board, remove the center wall, connect the SCSI cable and hard drive power cable to the SCSI hard drives, and reinstall the center wall. Be sure the SCSI cable lies flat across the opening in the center wall.

IMPORTANT: When connecting the power cable to the hard drives, ensure that the connectors are installed with the red wires facing right (as viewed from the front of the server).
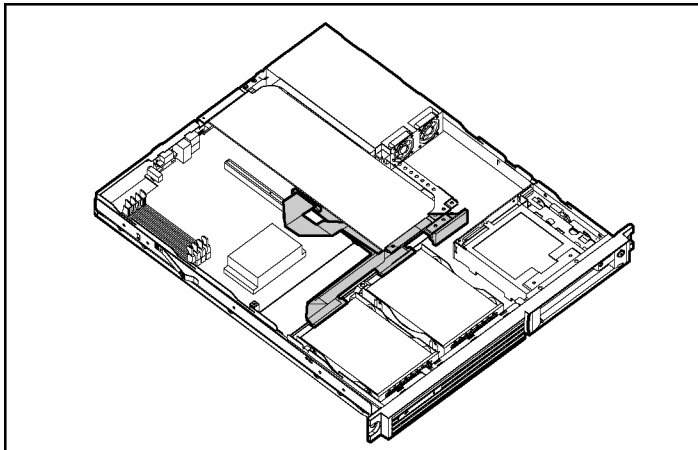

Figure 3-11: Smart Array controller cabled to SCSI hard drives

c. To cable other expansion boards, refer to the instructions included with the board.

5. Reverse the procedures performed in the "Accessing Internal Server Components" section earlier in this chapter.

Installing a CD-ROM/diskette or DVD-ROM/diskette Drive Assembly (Optional)

The CD-ROM/diskette drive and the DVD-ROM/diskette drive procedures are the same.

△ **CAUTION:** Do not operate the server without a bezel blank or either a CD-ROM/diskette or DVD-ROM/diskette drive assembly installed. Improper cooling can damage the system.

△ **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 CD-ROM/diskette or DVD-ROM/diskette drive assembly.

To install the CD-ROM/diskette or DVD-ROM/diskette drive assembly:

1. Remove the shipping/ejector key from the inside of the server or, if the key was previously removed, go to step 2.

   NOTE: The shipping/ejector key secures either the CD-ROM/diskette or DVD-ROM/diskette drive assembly or the bezel blank during shipping. It is also used to eject the assembly or the blank.

   a. Access internal server components. Refer to the "Accessing Internal Server Components" section earlier in this chapter.

   b. Remove the shipping/ejector key from its storage location.
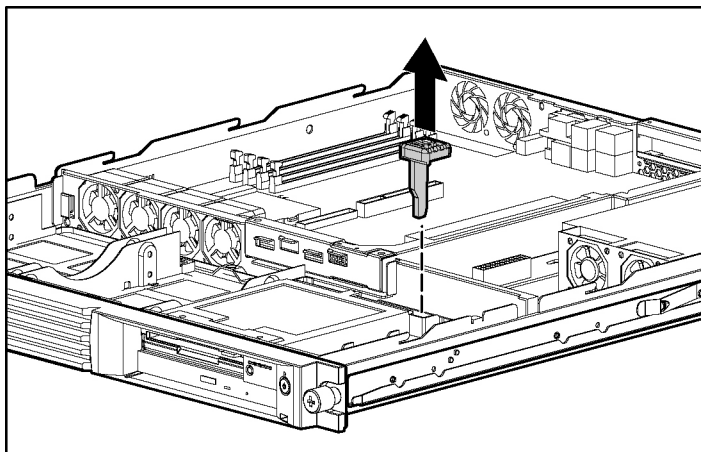

Figure 3-12: Removing the shipping/ejector key

2. Insert the end of the shipping/ejector key into the CD-ROM/diskette or DVD-ROM/diskette drive assembly ejector port, located immediately below the Power On/Off switch on the server front panel.

3. Push the shipping/ejector key (1) into the port to eject the bezel blank (2).
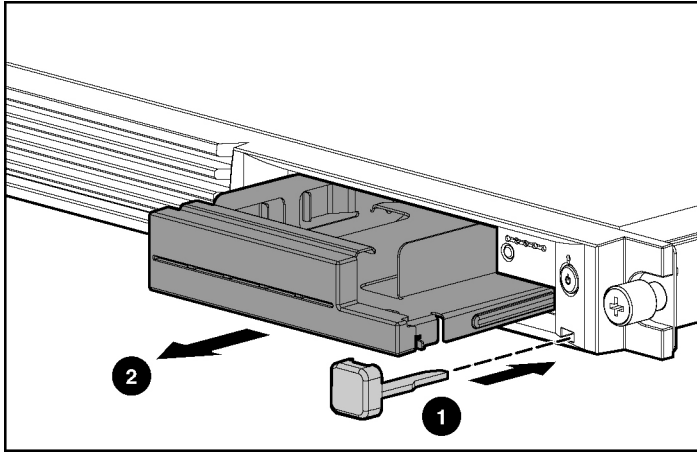

Figure 3-13: Ejecting the bezel blank

NOTE: If you intend to use the CD-ROM/diskette or DVD-ROM/diskette drive assembly ejection feature frequently, leave the shipping/ejector key in the ejector port for easy access. Otherwise, store the shipping/ejector key for future use.

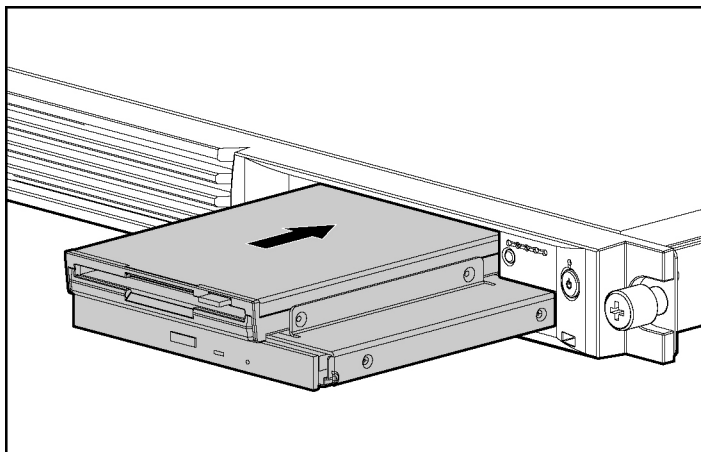4. Install the CD-ROM/diskette or DVD-ROM/diskette drive assembly in the empty bay.

**Figure 3-14: Installing a CD-ROM/diskette or
DVD-ROM/diskette drive assembly**

5. Keep the shipping ejector key. The shipping/ejector key can be retained in the ejector key port on the front of the server or reinstalled in its storage location inside the chassis.

The CD-ROM/diskette or DVD-ROM/diskette drive assembly can be removed for use in another ProLiant DL320 Generation 2 server or to prevent unwanted software installation.

Installing Hard Drives

Optional mass storage devices can be connected to the server through the optional SCSI module or an array controller expansion board.

Installing ATA Hard Drives

This server model comes pre-configured for two 1-inch ATA hard drives and has two ATA channels.

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

- Do not add more than two ATA devices per channel.

- Always populate hard drive bays starting with the lowest ATA device number.

- Configure ATA hard drives through the Cable-Select mode.

- Set the jumpers on both ATA drives to Cable-Select mode. Doing so enables the ATA cable to set a unique address, such as Device 0 or Device 1, for each hard drive.

<table>
<tr><td>⚠</td><td>**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.</td></tr>
</table>

<table>
<tr><td>⚠</td><td>**CAUTION:** When supporting a mixed environment of ATA drives and SCSI drives in the server, the ATA drive must be the boot device.</td></tr>
</table>

ATA hard drives installed in the server appear as Devices 0 and 1, from left to right when viewed from the front of the server. Refer to Figure 3-21.

To install an ATA hard drive:

1. Access internal server components. Refer to the "Accessing Internal Server Components" section earlier in this chapter.

2. Set the jumpers on the ATA hard drive to Cable-Select mode. Refer to the documentation included with the hard drive option kit.

> ⚠ **CAUTION:** Whenever installing hardware or performing maintenance procedures requiring access to internal components, it is recommended that all server data be backed up to avoid loss.

3. Remove the PCI riser board assembly. Refer to the "Removing the PCI Riser Board Assembly" section earlier in this chapter.

4. Remove the center wall. Use the following procedure to remove the center wall:

   a. Disconnect the center wall fan cables from the fan connectors on the system board.
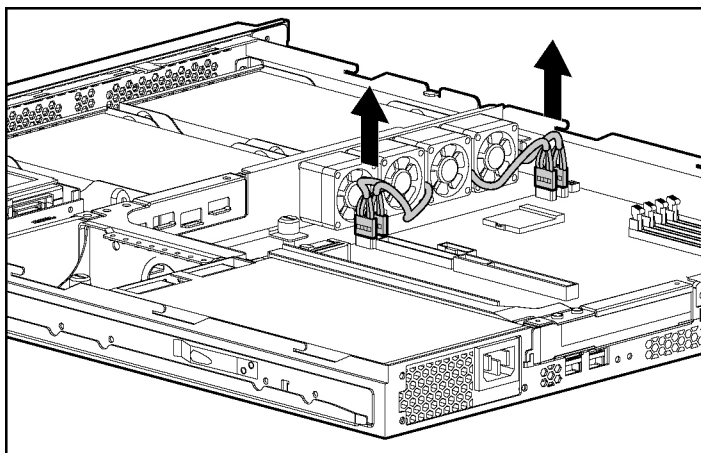
Figure 3-15: Disconnecting the center wall fan cables

b. Loosen the thumbscrew (1).

c. Push in the tab next to the center wall fans to unlock the center wall from the chassis (2).

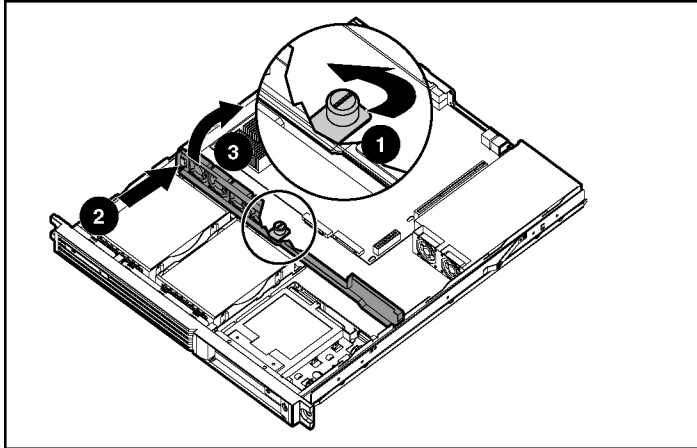d. Raise the locking end of the center wall from the chassis (3).

Figure 3-16: Unlocking the center wall

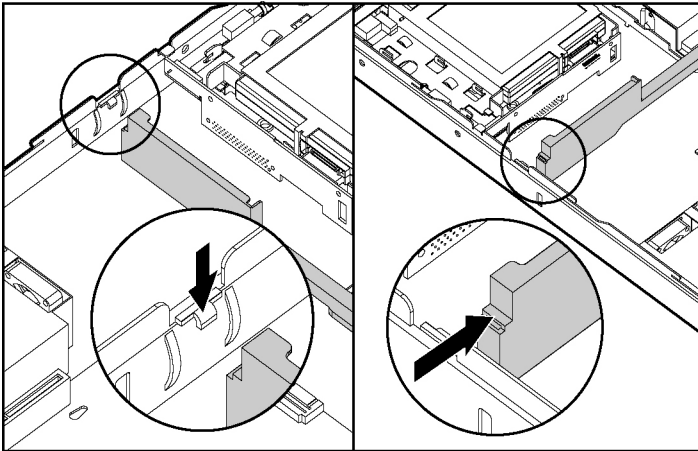e. Clear the center wall alignment tab from the alignment slot.

**Figure 3-17: Clearing the center wall alignment tab from
the alignment slot**

5. Identify the tray into which the ATA hard drive is to be installed.

6. Remove the tray by loosening the thumbscrew securing the hard drive trays to the chassis (1) and sliding the tray toward the rear of the server and lifting (2).
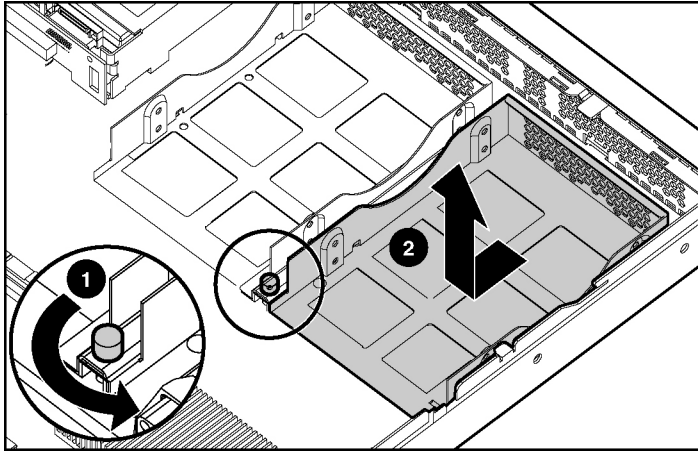
Figure 3-18: Removing the hard drive tray

IMPORTANT: These servers ship with the ATA cables already installed. The module cables are threaded through the opening in the center wall and are connected to the ATA module. The device connectors lay in the hard drive bay.

7. Align the new hard drive in the tray (1), and secure it with four 6-32 Phillips-head screws (2).
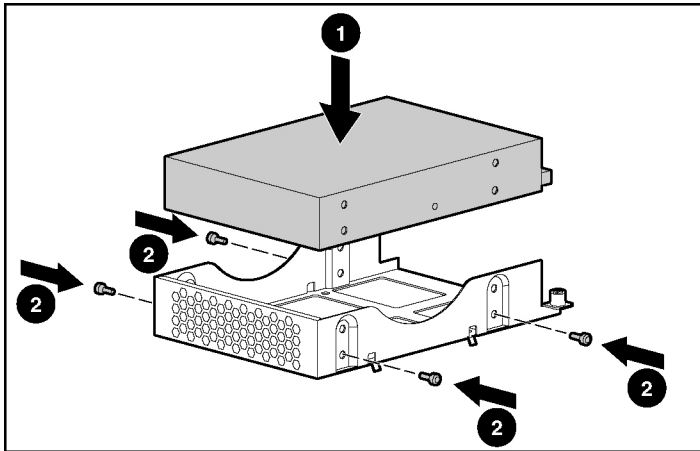
Figure 3-19: Securing a hard drive into a hard drive tray

IMPORTANT: Be sure that the hard drives are installed with the data and power connectors along the bottom of the tray and facing away from the front grill.

NOTE: The Phillips screws for this operation are shipped along the top edge of the PCI riser board assembly.

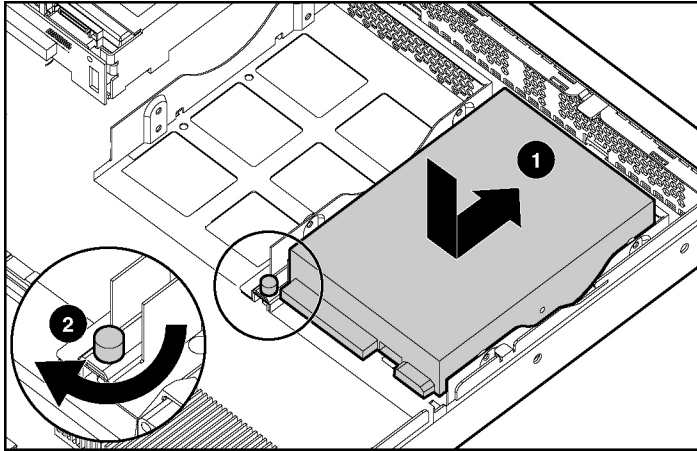8. Install the hard drive tray into the chassis (1), and secure it by tightening the hard drive tray thumbscrew (2).

Figure 3-20: Installing a hard drive tray into the chassis

9. Repeat steps 6 through 8 to install a second ATA hard drive.
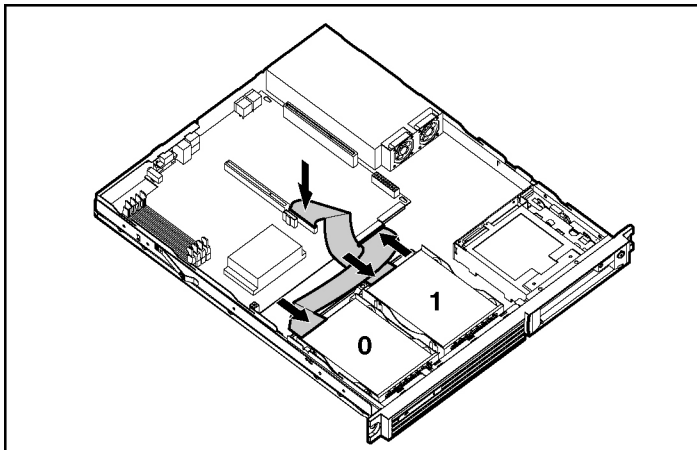
10. Connect the ATA cables as shown below.

Figure 3-21: Cabling the ATA hard drives

11. Connect the hard drive power cable to the ATA hard drives.

> **IMPORTANT:** When connecting the power cable to the hard drives, be sure that the connectors are installed with the red wire facing right (as viewed from the front of the server).

12. Replace the center wall by reversing step 4.

> △ **CAUTION:** When lowering and locking the center wall, do not pinch any of the drive cables connecting the front drive area with the rear system and power areas.

> **IMPORTANT:** Be sure that cables are routed through the opening in the center wall.

13. Reverse the procedures performed in the "Accessing Internal Server Components" section earlier in this chapter.

Installing SCSI Hard Drives

Use only supported hard drives in these servers. For a listing of supported drives, refer to the ProLiant DL320 Generation 2 server Quickspecs at

www.compaq.com/quickspecs

> △ **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.

Each SCSI hard drive must be assigned a unique ID. The system begins searching the drive with the lowest numbered ID for a bootable partition. The jumpers on a factory-installed hard drive are set to ID 0. For illustration purposes in this document, we assume the devices are numbered ID 0 and ID 1, with ID 0 containing the desired boot partition. Refer to Figure 3-21 for an example.

When installing SCSI hard drives, either a slotless SCSI module or a SCSI Smart Array controller expansion board must be installed.

> △ **CAUTION:** When supporting a mixed environment of ATA drives and SCSI drives in the server, the ATA drive must be the boot device.

IMPORTANT: Always populate hard drive bays starting with the lowest SCSI ID number.

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

To install SCSI hard drives:

1. Install the SCSI module card as described in the following "Installing a Slotless SCSI Module Upgrade Kit" section of this chapter.

2. Install hard drives following steps 1 through 9 in the "Installing ATA Hard Drives" section earlier in this chapter.

3. Connect the SCSI cable and the hard drive power cable to the SCSI hard drives. Refer to the following "Installing a Slotless SCSI Module Upgrade Kit" section.

    IMPORTANT: When connecting the power cable to the hard drives, be sure that the connectors are installed with the red wire facing right (as viewed from the front of the server).

4. Set the jumpers for the SCSI device. Refer to the instructions that shipped with the SCSI hard drive.

5. Reverse the steps in "Accessing Internal Server Components" earlier in this chapter.

Installing a Slotless SCSI Module Upgrade Kit

This server supports the addition to the system board of a single-channel, slotless SCSI module. Once installed, SCSI hard drives can be added to the server.

To install the SCSI module:

NOTE: Steps 1 through 3 apply only to servers that have already been installed in a rack.

1. Access the internal server components. Refer to the "Accessing the Internal Server Components" section earlier in this chapter.

2. Remove the PCI riser board assembly. Refer to the "Removing the PCI Riser Board Assembly" section earlier in this chapter.

3.   Remove the center wall. Refer to step 4 in the "Installing ATA Hard Drives" section earlier in this chapter.

4.   Remove the ATA cable from the system board and store for later use. Refer to Figure 3-21.

5.   Remove the ATA hard drives if necessary.

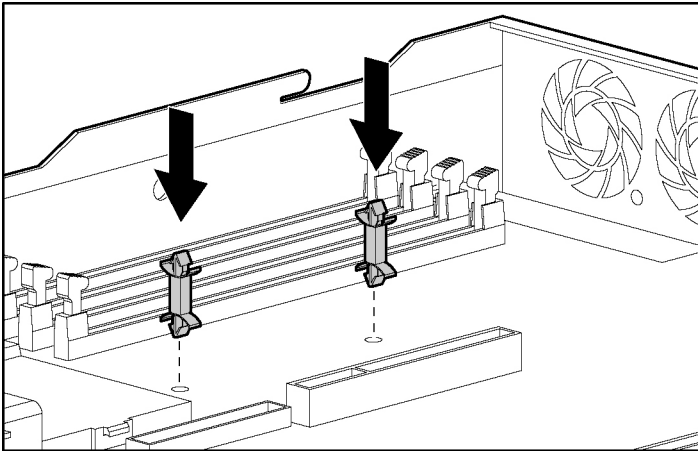6.   Insert the SCSI module stand-offs.

Figure 3-22: Inserting the SCSI Module stand-offs

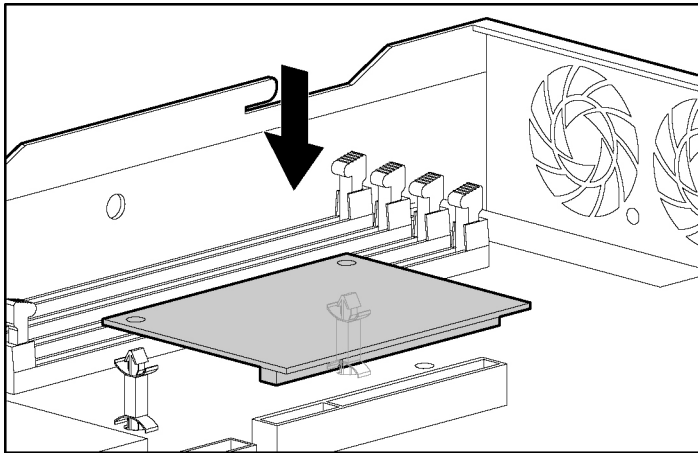7. Insert the SCSI module into the SCSI module slot on the system board.

Figure 3-23: Installing the SCSI module into the SCSI module slot

8. Attach the SCSI cable to the SCSI module (1).

9. Install the hard drive (3). Refer to the "Installing ATA Hard Drives" section earlier in this chapter.

10. Connect the SCSI cables (4) to the SCSI hard drives (3).

11. Install the center wall and PCI riser board assembly. Be sure that the cables run through the opening in the center wall (2).
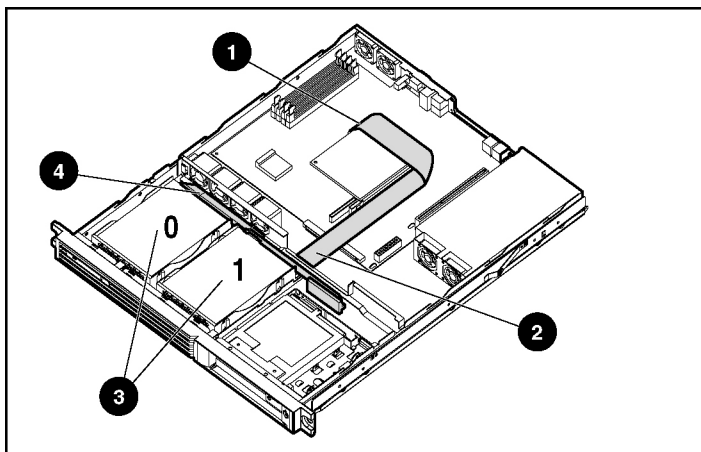
Figure 3-24: Cable configuration of the slotless SCSI module

12. Install the access panel.

13. Configure any devices attached to the SCSI module before powering up the server. Refer to the documentation that ships with the slotless SCSI module upgrade kit.

External Mass Storage

This server supports external mass storage devices only through an optional PCI expansion board. For detailed information, refer to the documentation that ships with the optional PCI expansion board.

4

Server Installation

Server Installation Procedures

To install the rack-mounted server into a Compaq branded rack, complete the procedures described in the following subsections:

Measuring with the Template

The template is two-sided (front and back) and printed with arrows that show where items will be inserted, both for the fixed rack rails and for the thumbscrews that secure the server faceplate to the front of the rack.

> ⚠ **CAUTION:** Always mount the heaviest item on the bottom of the rack, and work from the bottom to the top.

IMPORTANT: Determine the server's place in the rack **before** starting installation of the fixed rack rails. Refer to the Rack Builder report that was printed during planning of the rack configuration.

1. Starting at the bottom of the rack, or at the top of a previously mounted component, secure the front side of the template against the front of the rack by pressing the two push tabs. Match the hole pattern on the template with the holes on the vertical rails of the rack.
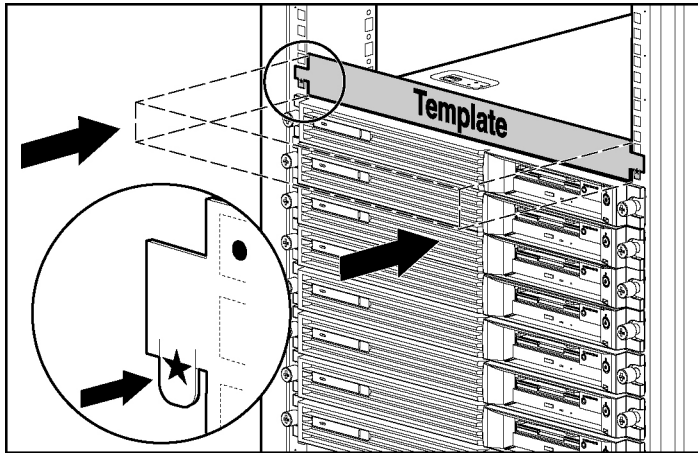
Figure 4-1: Measuring with the template

2. Align the template so that the sides of the template are squared up with the sides of the rack. Tick marks on the rack's vertical rails help maintain the proper alignment. The tick marks allow identification of the U-spaces.

3. Using a pencil, mark the locations on the rack where the fixed rack rail tabs will be inserted (1).

4. On the rack, mark the top and bottom edges of the template (2). This step helps align the template for the next component.
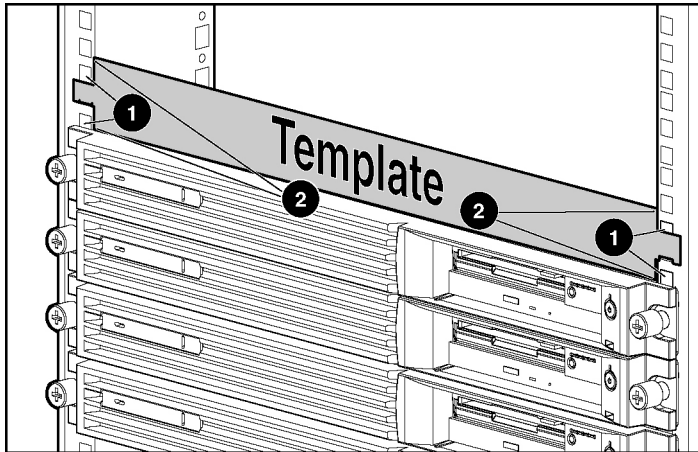
Figure 4-2: Marking the rack for server installation

5. Move to the rear of the rack. Turn the template over and use the back side of the template.

6. Repeat steps 1 through 4 with the back of the template on the rear of the rack.

7. After marking the front and rear of the rack, remove the template from the rack. Attach the fixed rack rails to the rack. Refer to the "Installing the Fixed Rack Rails" section in this chapter.

Installing the Fixed Rack Rails

Use the following procedures to install the fixed rack rails to the rack:

1. Measure with the template. Refer to "Measuring with the Template" earlier in this chapter.

2. From the rear of the rack, identify the inside front holes that will be used to secure the front tabs of the fixed rack rail.

> **IMPORTANT:** Ensure that the inner side of the fixed rack rail (rail guide) faces the inside of the rack.

3. Carefully align the two front tabs on the front of the fixed rack rail with the holes identified at the front of the rack.
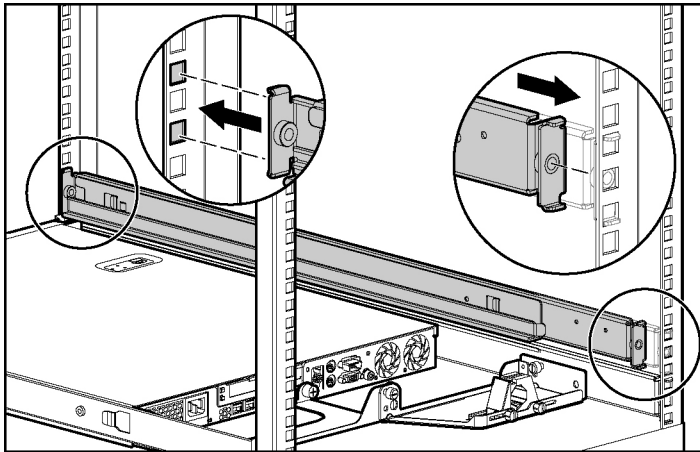

Figure 4-3: Aligning and inserting the fixed rack rail

4. Insert the front tabs of the fixed rack rail into the rack.

5. Compress the fixed rack rail toward the front of the rack until the rear tabs are aligned with the inner holes at the back of the rack.

6. Insert the rear tabs into the rear holes, and release the rail. The rail should lock in place securely.

7. Repeat steps 2 through 6 for the second fixed rack rail.

After both fixed rack rails are installed, begin the procedure for "Attaching the Fixed Cable Tray."

Attaching the Fixed Cable Tray

Use the following procedure to attach the fixed cable tray:

1. Move to the rear of the rack.

2. Insert the tabs on the right edge of the fixed cable tray into the slots on the rack rail (1) and fasten the rail thumbscrew that secures the fixed cable tray to the rail (2).
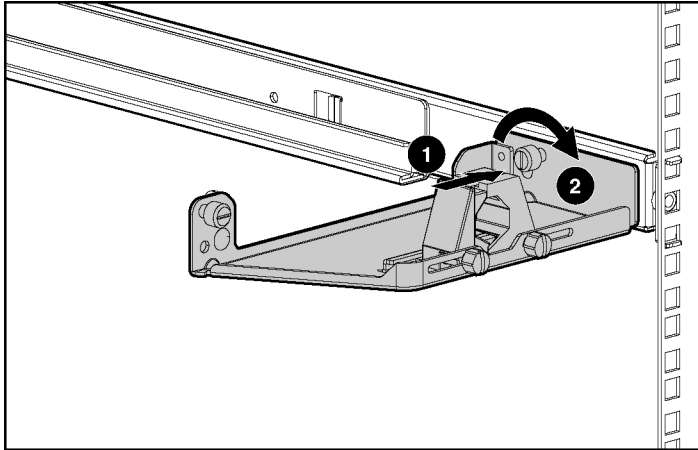

Figure 4-4: Inserting and attaching the fixed cable tray (rear view)

Installing the Cable Support Bracket on the Server

The Cable Support Bracket enables the use of the rack management solutions available for this server.

Use the following procedure to attach the Cable Support Bracket:

1. Access internal server components. Refer to the "Accessing Internal Server Components" section in Chapter 3, "Installing Hardware Options."

2. Insert the alignment tab into the alignment slot above the left corner of the server rear panel (1) and tighten the thumbscrews to secure the cable support bracket to the server rear panel (2).
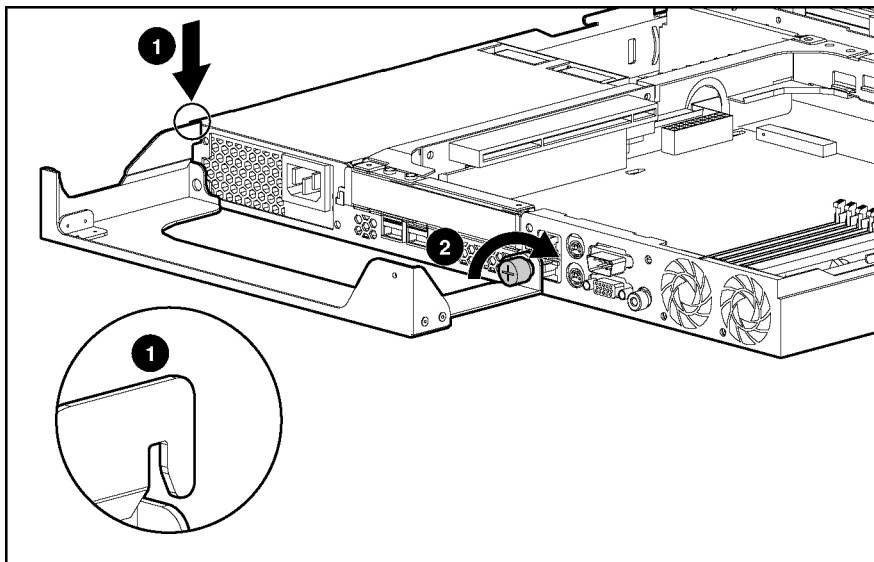
Figure 4-5: Installing the cable support bracket

3. Reverse procedures performed in the "Accessing Internal Server Components" section in Chapter 3, "Installing Hardware Options."

Inserting the Server into the Rack

⚠ **CAUTION:** To avoid destabilizing the rack, install multiple servers starting from the bottom of the rack.

To insert the server into the rack:

1. Align the rear end of the fixed server rails (1), on the sides of the server, with the front end of the fixed rack rails (2).
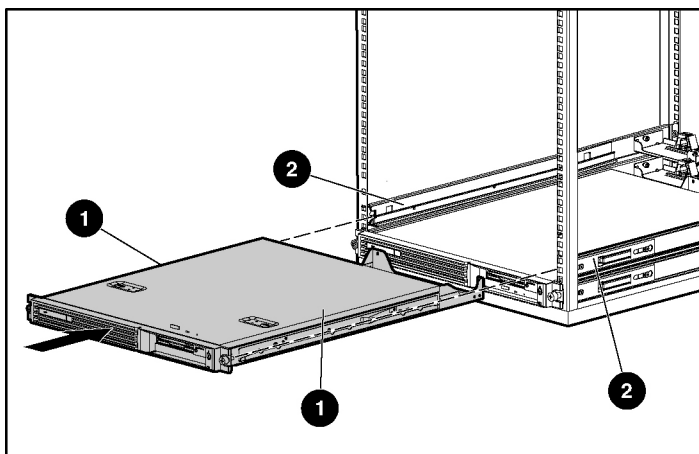
Figure 4-6: Aligning the rear end of the fixed server rails with the front end of the fixed rack rails

⚠ **WARNING: To avoid personal injury, press the rail release latches and slowly slide the server into the rack. The rail release latches can pinch your fingertips.**

2. Insert the server fully into the rack, ensuring that the fixed server rails slide inside the fixed rack rails.

⚠ **CAUTION:** Keep the server parallel to the floor when sliding the fixed server rails into the slide rails. Tilting the server can damage the rails.

3. Tighten the thumbscrews on the front panel to secure the server to the rack.

4. At the rear of the rack, tighten the server thumbscrew that secures the fixed cable tray to the server.
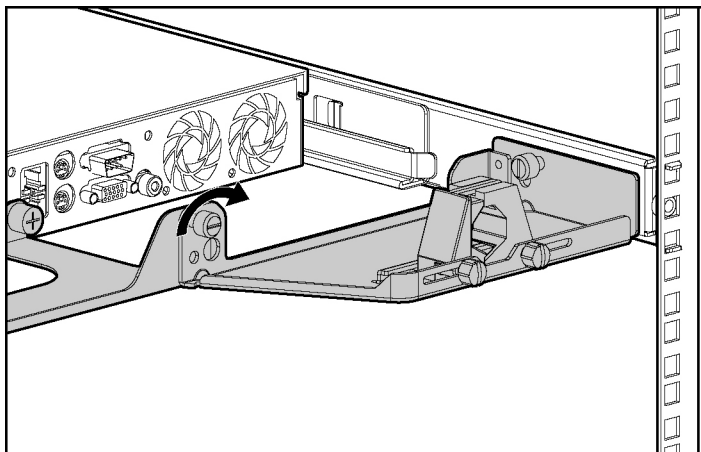

Figure 4-7: Securing the fixed cable tray to the server

After installing the server in the rack, begin the procedure for "Connecting the Peripheral Device Cables and the Power Cord."

Connecting the Peripheral Device Cables and the Power Cord

⚠ **WARNING: To reduce the risk of electrical shock or fire, do not plug telecommunications/telephone connectors into the NIC connectors.**

△ **CAUTION:** If the Remote Insight Lights-Out Edition II (RILOE II) is installed in the server, be sure that you attach the video cable to the video connector on the rear of the RILOE II board. The standard video connector on the server rear panel is not used when the RILOE II is installed. For more information, refer to the *Remote Insight Lights-Out Edition II User Guide*.

Use the following figure and table to identify connectors and the order for connecting them. Connect the power cord last.
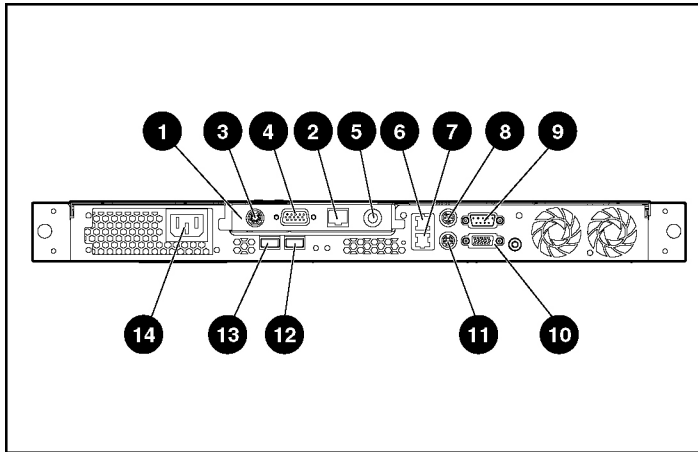
Figure 4-8: Rear panel connectors on the server

Table 4-1: Rear Panel Connectors and Connection Order

Location	Connector
1	Expansion slot (shown with optional Remote Insight Lights-Out Edition II (RILOE II) board installed)
2	RJ-45 connector (RILOE II)
3	Keyboard/mouse connector (RILOE II)
4	Video connector (RILOE II)
5	AC adapter connector (RILOE II)
6	RJ-45 Fast Ethernet connector for NIC 2
7	RJ-45 Fast Ethernet connector for NIC 1 (supports PXE)
8	Mouse connector
9	Serial connector
10	Video connector *
11	Keyboard connector

continued

Table 4-1: Rear Panel Connectors and Connection Order continued

Location	Connector
12	USB 1 connector
13	USB 2 connector
14	Power connector

* Not used when the Remote Insight Lights-Out Edition II is installed.

$\triangle$ **CAUTION:** Connect the power cord last or electrical damage to peripheral devices may occur.

Cabling the Remote Insight Lights-Out Edition II (Optional)

For more information on the Remote Insight Lights-Out Edition II (RILOE II), refer to the *Remote Insight Lights-Out Edition II User Guide* included with the option kit, or refer to

www.compaq.com/manage/remote-lightsout.html

1. Locate the external connectors on the rear panel of the server in the expansion bay. Refer to Figure 4-8 and Table 4-1.

2. Disconnect the video cable from the video connector on the rear of the server.

3. Connect the video cable to the external video connector on the Remote Insight Lights-Out Edition II.
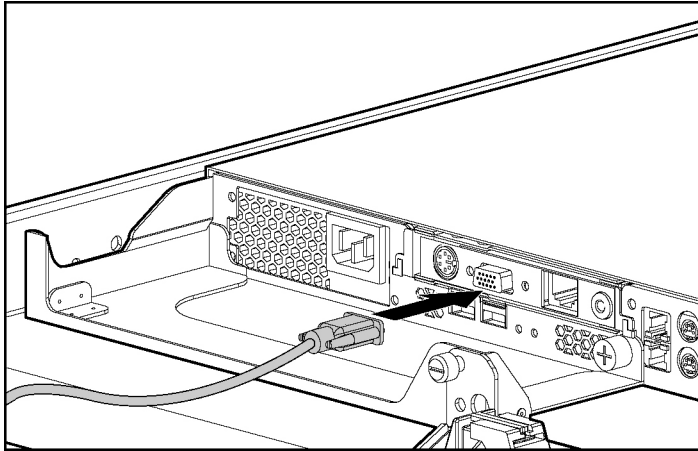
Figure 4-9: Connecting the video cable to the Remote Insight Lights-Out Edition II external video connector

NOTE: The server's high-density design may prevent some video cables from fully seating on the Remote Insight Lights-Out Edition II. However, the design does support video cables with a height that is less than or equal to 1.57 cm (0.62 inch).

4. Connect the LAN cable to the external RJ-45 connector on the Remote Insight Lights-Out Edition II.
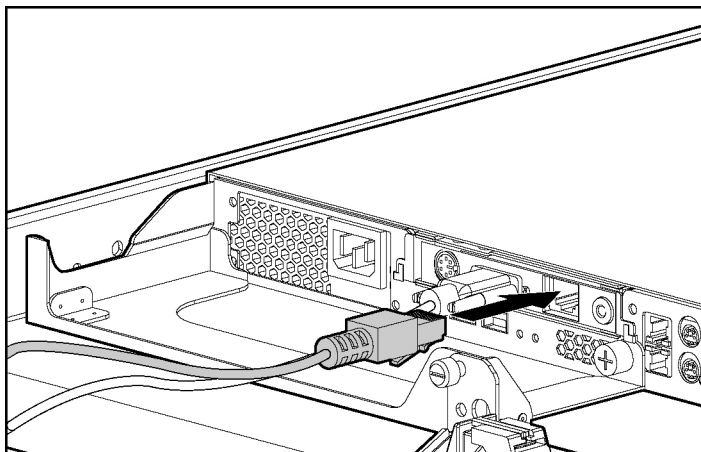
Figure 4-10: Connecting the LAN cable to the Remote Insight Lights-Out Edition II external RJ-45 connector

IMPORTANT: To allow LAN access to the Remote Insight Lights-Out Edition II, the LAN cable must be attached to the RJ-45 connector on the RILOE II. The standard RJ-45 connectors on the server rear panel do not provide network access to the RILOE II.

Securing the Cables in the Fixed Cable Tray

After attaching the fixed cable tray and cable support bracket and connecting the peripheral devices and power cord, secure all cabling.

To secure the cables in the fixed cable tray:

1. Loosen the clamp thumbscrews on both sides of the cable clamp (1) and open the cable clamp (2).
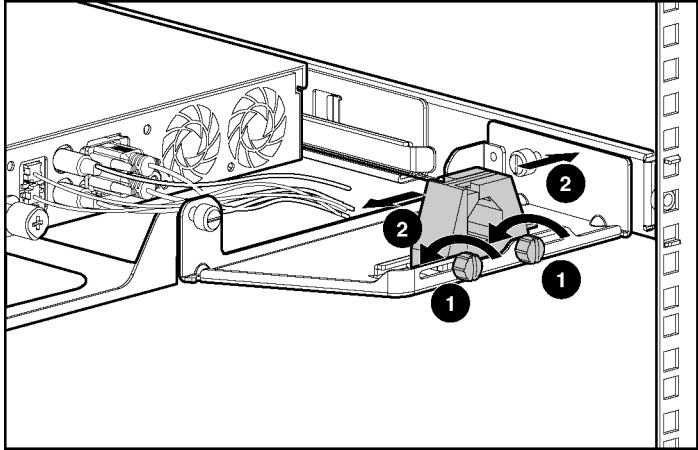
Figure 4-11: Opening the cable clamp (cables shortened for clarity)

2. Starting with the peripheral device cables on the left, route all of the cables and cords into the cable clamp.

3. Close the cable clamp (1) and tighten the clamp thumbscrews to hold the cable clamp in place (2).
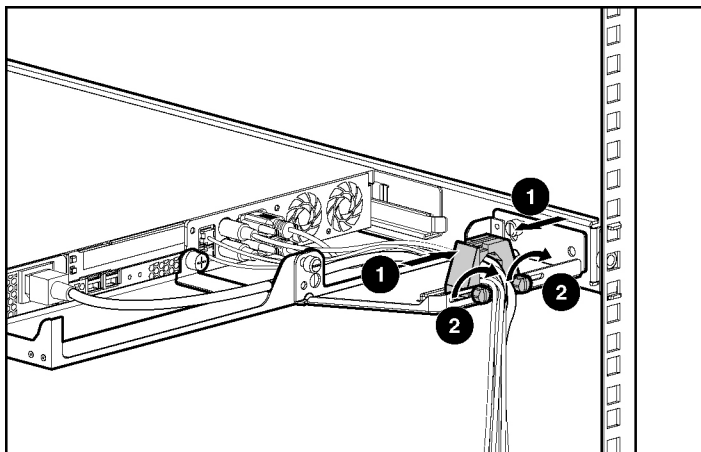
Figure 4-12: Closing the cable clamp on routed cables

4. Route the cables to the side of the rack. Refer to Figure 4-13 for an example.
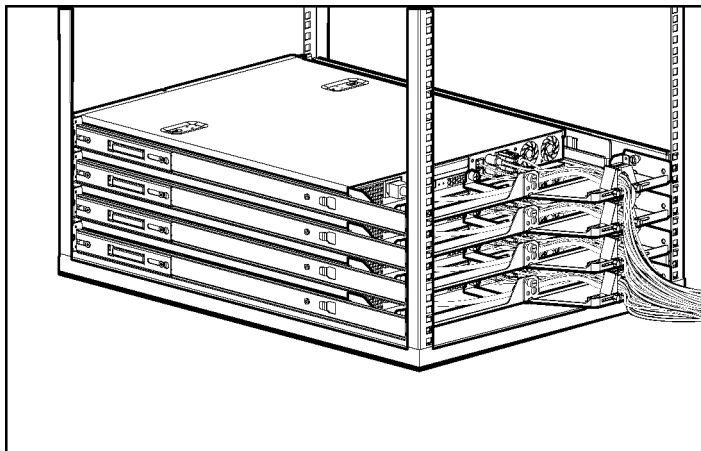
Figure 4-13: Multiple servers installed in a rack with properly routed cabling

Powering Up the Server

To power up the server:

1. Press the Power On/Off switch.

2. Confirm a successful power on sequence by ensuring that the Power On/Off LED is illuminated green or amber.

After the server has successfully powered up, begin the configuration process. Refer to Chapter 5, "Server Configuration and Utilities."

If the server does not power up successfully, or if it indicates a fault, refer to Appendix D, "Troubleshooting."

Installation Sequence

> $\triangle$ **CAUTION:** To install an operating system on the server, use the installation instructions in the following section. Otherwise, follow the instructions in the "Preconfigured Operating System" section later in this chapter.

Operating System Purchased Separately

If the operating system was purchased separately, install the operating system by following the instructions on the SmartStart and Support Software CD. Refer to the Server Setup and Management pack for instructions on using SmartStart software. The first time the server is configured, the SmartStart software automatically creates a necessary partition on the hard drive. This partition cannot be used for any other purpose and is not a traditional system partition.

When setting up the server for the first time:

IMPORTANT: To reduce the risk of damage to the server, complete the installation process by following the procedures provided later in this chapter. When installing other hardware options as part of the server installation, be sure to follow all procedures as defined in Chapter 3, "Installing Hardware Options."

1. Power up the server. Refer to "Powering Up the Server" earlier in this chapter.

IMPORTANT: The SmartStart and Support Software CD (recommended) or the RBSU that is embedded in the server ROM can be used to configure certain system features.

Step 2 applies only to users who choose to configure their servers with the SmartStart and Support Software CD.

IMPORTANT: The optional CD-ROM/diskette or DVD-ROM/diskette drive assemblies must be installed to use SmartStart software.

2. Place the SmartStart and Support Software CD in the CD-ROM/diskette or DVD-ROM/diskette drive and power up the server. Follow the onscreen instructions to complete the server initialization process. For SmartStart and Support Software CD initialization procedures, refer to the Server Setup and Management pack shipped with the server or refer to Chapter 5, "Server Configuration and Utilities."

3. Run the ROM-Based Setup Utility (RBSU) by pressing the **F9** key when prompted. Use RBSU to identify the type of operating system and set the date and time. For information on using the RBSU to configure other server features, refer to Chapter 5, "Server Configuration and Utilities."

4. Install the operating system.

5. Install Insight Manager to manage the server. For Management CD initialization procedures, refer to the Server Setup and Management pack shipped with the server.

    IMPORTANT: Insight Manager must be installed to benefit from Pre-Failure Warranties on processors, hard drives, and memory modules.

6. Install any application software needed.

7. Register the server. Refer to the "Registering the Server" section later in this chapter.

Preconfigured Operating System

⚠ **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.**

- **Disconnect power from the server by unplugging the power cord from either the electrical outlet or the server.**

- **Do not place anything on power cords or cables. Arrange them so that no one can accidentally step on or trip over them. Do not pull on a cord or cable. When unplugging the cord from the electrical outlet, grasp the cord by the plug.**

△ **CAUTION:** Use the SmartStart and Support Software CD as recovery software only. Powering up the server from the SmartStart and Support Software CD reconfigures the system and causes all data on the server to be lost.

If the server was ordered with the operating system factory-installed, everything required to install the operating system is already on the server. Refer to the steps provided in the *HP Factory-Installed Operating System Software User Guide* for more information on using the operating system.

To complete the installation process with a pre-configured operating system:

1. Power up the server. Refer to "Powering Up the Server" earlier in this chapter.

2. Follow the on-screen instructions to complete the factory-installed operating system initialization process. After initialization is complete, the server will automatically go through POST.

3. Install the HP Management Agents on the server. Refer to the HP Management CD for information about installing the HP Management Agents for the operating system installed on the server.

4. After the server configuration is complete, back up the server.

5. Install any application software.

6. Register the server. Refer to "Registering the Server" later in this chapter.

Registering the Server

For server registration information, refer to the Server Setup and Management pack that ships with the server, or register the server online at

www.hp.com

If configuring the server with SmartStart software, use the Server Profile Diskette to register after performing the configuration. Simply follow the instructions on the HP website and insert the Server Profile Diskette when prompted.

Routine Maintenance

For information concerning routine maintenance and safety precautions, refer to the Documentation CD included in the Reference Information pack shipped with the server.

Optional Installation Service

HP offers an optional installation service for installing rack products. The installation service can be customized to meet the specific requirements of the customer, or it can be ordered as a CarePaq. The installation service covers the entire hardware installation process, from unpacking the components to routing the cables and running a system test.

Hardware installation service is available in all countries where HP has a direct or indirect service presence. Service can be ordered from—and directly provided by—an HP authorized service reseller. In the United States, service can be requested by calling 1-800-652-6672. In the United States, HP makes all of the arrangements for complete rack system installation by qualified Guaranteed Service Providers. An order form with pricing information is available from PaqFax, the fax retrieval service, at 1-800-345-1518.

5

Server Configuration and Utilities

This chapter provides information about the utilities and support tools included with the ProLiant DL320 Generation 2 server.

ROM-Based Setup Utility

The ROM-Based Setup Utility (RBSU) performs a wide range of configuration activities, including:

- Configuring system devices and installed options

- Viewing system information

- Selecting the operating system

- Selecting the primary boot controller

For information on RBSU not found in this guide, refer to the *HP ROM-Based Setup Utility User Guide* found in the ProLiant Essentials Foundation pack.

Redundant ROM Support

The user can upgrade or configure the ROM safely due to the redundant ROM support feature. The server has a 2-MB ROM that acts as two separate 1-MB ROMs. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains the backup version.

Safety and Security Benefits

When the user flashes the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling the user to switch easily to the existing ROM version if the new ROM becomes corrupted for any reason. This feature protects the previous ROM version, even if a power failure occurs while flashing the ROM.

Access to Redundant ROM Settings

Use ROMPaq utilities to create a backup ROM image before upgrading the configuration or to restore saved ROM data.

To create a backup ROM image:

1. Access RBSU by pressing the **F9** key when prompted at startup.

2. Select **Redundant ROM** in the **Advanced Options** menu of RBSU.

3. Select one of the ROM banks as the system ROM.

4. Press the **Enter** key.

5. Press the **Esc** key to exit the current menu or press the **F10** key to exit RBSU.

6. Restart the server.

When the server boots, the system identifies whether the current ROM bank is corrupt. If a corrupt ROM is detected, the system boots from the backup ROM and alerts the user through POST that the ROM bank is corrupt.

Switching ROM images, in the event that the RBSU is inaccessible, can also be done by changing the switch settings on the system configuration switch. The server is first powered down and switches 1, 5 and 6 are set to ON. Power up the server, wait until the server stops beeping, and then power off. Set switches 1, 5 and 6 to OFF and then power on the server. Refer to Appendix E, "LEDs, Switches, and Jumpers," for additional information.

Disaster Recovery

If both the current and backup versions of the ROM are corrupt:

1. Create a new ROMPaq diskette by downloading the latest ROMPaq utility from www.hp.com.

IMPORTANT: If the ROM is corrupted by a ROMPaq interruption, the initial ROMPaq attempt may have affected the contents of the original diskette.

2. Power down the server.

3. Insert the ROMPaq diskette.

4. Power up the server.

   The server generates one long beep and two short beeps to indicate that disaster recovery mode is active. The keyboard, mouse, and monitor are inactive.

   The server analyzes the diskette, searching for the latest ROM image. If the diskette is not in place, the system continues to beep until a valid ROMPaq diskette is inserted.

   The ROMPaq diskette then flashes both system ROM images.

   At the successful completion of this process, a sequence of ascending audible beeps (tone) is generated. If the flash is not successful, a sequence of descending audible beeps is generated.

5. After successful completion of this process:

   a. Power down the server.

   b. Remove the ROMPaq diskette.

   c. Power up the server as usual.

If the ROMPaq upgrade procedure was unsuccessful, power down the server and repeat the above process.

ROMPaq

Using flash ROM in HP servers allows the firmware (BIOS) to be upgraded with system or option ROMPaq utilities. To upgrade the BIOS, insert a ROMPaq diskette into the diskette drive, power down the system, and then power up the system again.

The ROMPaq utility then checks the system and provides a choice (if more than one exists) of ROM revisions to which the system can be upgraded. This procedure is the same for both system and option ROMPaq utilities.

⚠️ **CAUTION:** Do not power down during a firmware upgrade. A loss of power during upgrade may corrupt the firmware and prevent the system from starting.

SmartStart Software

SmartStart software is a CD-based, single-server method for installing system software, thereby achieving a well-integrated server and ensuring maximum dependability and supportability. The SmartStart CD contains tools that diagnose problems with the server, configure the storage array, and update the system ROM.

SmartStart software enables the user to perform the following functions:

- Install major server operating systems using packaged product CDs.

- Install the latest optimized drivers.

- Create and copy standard server configuration scripts using the Scripting Toolkit and Configuration Replication Utility.

- Test server hardware using the new Enterprise Diagnostics LX32 Utility.

- Update the latest system or option ROM using the ROM Update Utility.

- Access software drivers through creation of diskettes or installation directly from the CD. With systems that have internet connection, the SmartStart autorun provides access to the complete list of ProLiant System Software on the website.

For more information about SmartStart software, refer to

www.compaq.com/smartstart

To install the SmartStart CD:

1. Press the **F9** key to run RBSU and configure the primary operating system.

2. Locate the SmartStart CD in the ProLiant Essentials Foundation Pack.

3. After powering up the server, press the CD-ROM drive eject button.

4. Insert the SmartStart CD into the CD-ROM drive with the labeled side up.

When the CD-ROM drive activity LED illuminates green, the SmartStart sequence begins.

Refer to the SmartStart documentation included with the server to install the operating system, create updated driver diskettes, and run upgrade utilities.

SmartStart Autorun Menu

On systems that run a Microsoft Windows operating system, the SmartStart Autorun Menu enables access to the latest system software directly from the operating system environment, simply by inserting the SmartStart CD into a configured system. The Autorun Menu enables the user to:

- Install the latest Support Packs.

- Create software diskettes for selected software.

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a set of MS-DOS-based utilities that enable the user to configure and deploy servers in a customized, predictable, and unattended manner. These utilities provide scripted server and array replication for mass server deployment and duplicate the configuration of a source server onto target systems with minimum user interaction.

The Configuration Replication Utility is a stand-alone MS-DOS utility that duplicates the settings of an operating RBSU-configured server by saving the server configuration to a scripted file. You can edit and modify settings in the scripted file at the subset level. For example, you can change ASR-2 settings without having to change settings for boot controller order.

To download the SmartStart Scripting Toolkit, refer to

www.compaq.com/manage/toolkit.html

Insight Manager

Insight Manager is the application for easily managing network devices. Insight Manager delivers intelligent monitoring and alerting, as well as visual control of the devices, and includes the following functions:

- Forwards server alerts and fault conditions

- Monitors fault conditions and server performance

- Controls server security and configuration

- Remotely controls server

- Initiates rapid recovery services

Documentation for Insight Manager is available on the HP Management CD. Insert the Management CD and accept the **License Agreement**. From the left sidebar, select **Insight Manager 7**, then select the **Documentation** link on the right frame. A list of Insight Manager 7 documentation is displayed.

IMPORTANT: Insight Manager must be installed and used to benefit from the Pre-Failure Warranty on processors, hard drives, and memory modules.

Survey Utility

Survey Utility is an online information-gathering agent for Microsoft Windows, Novell NetWare, and Linux operating systems that collects critical hardware and software information from various sources. If a significant change occurs between data-gathering intervals, the previous information is marked, and the data file is overwritten to reflect the latest configuration and changes. This file allows the user to keep a historical record of change events for server hardware and software.

Survey Utility automatically runs at startup and on specified time intervals. The user can modify the data-gathering interval by modifying the command-line parameters.

For more information on Survey Utility, including installation and application procedures, refer to the *Survey Utility Online Help User Guide* accessed through

www.compaq.com/support/files/server/us/

Perform a search for "Survey Utility," and then follow the appropriate link.

Enterprise Diagnostics LX32 Utility

The Enterprise Diagnostics LX32 Utility displays information about the server hardware and tests the system to be sure that it is operating properly. The Enterprise Diagnostics LX32 Utility can be accessed from the SmartStart CD or download from

www.compaq.com/support/files

Automatic Server Recovery

Automatic Server Recovery (ASR) is a feature of these servers that resets the system in the event of a catastrophic operating system error like a blue-screen, ABEND (abnormal end), or panic. A system failsafe timer, the ASR timer, is started when the System Management driver, also known as the health driver, is loaded. The timer is reset periodically during normal operation, but in the event of operating system failure, the timer expires and restarts the server. ASR increases server up time by restarting the server within a predetermined amount of time after the system stops responding. The Insight Manager console notifies the user in the event of an ASR restart. The user can disable ASR from the Insight Manager console.

IMPORTANT: The System Management driver must be installed for ASR to function.

Power-On Self-Test

Power-On Self-Test (POST) is a series of diagnostic tests that checks firmware and assemblies to ensure that the system is functioning properly. This utility runs automatically every time the server is powered up.

Refer to Appendix D, "Troubleshooting," for the normal power-up sequence and diagnosis of problems encountered during POST.

System Firmware Update

Smart Components for System Firmware Update enables Microsoft Windows NT 4.0 and Windows 2000 operating system administrators to efficiently upgrade and manage system and array controller ROMs.

This tool includes the following features:

- Works offline and online

- Integrates with other HP software maintenance, deployment, and operating system tools

- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

Auto-Configuration Process

The auto-configuration process automatically runs when the user boots the server for the first time. During the power-up sequence that occurs, the system ROM automatically configures the system with defaults without needing any intervention. By default, the auto-configuration process configures the system for the Microsoft Windows 2000 operating system. To change any default settings in the auto-configuration process, such as the settings for language, operating system, and primary boot controller, execute RBSU by pressing the **F9** key. After the settings are selected according to the users preference, exit RBSU and reboot the server. For more information on this process, refer to Chapter 3 of the *HP ROM-Based Setup Utility User Guide*.

Boot Options

After the auto-configuration process completes, or after the server reboots upon exit from RBSU, the Power-On Self-Test (POST) sequence runs, and then the boot option screen is displayed. This screen is visible for several seconds before the system attempts to boot from either a bootable CD or the hard drive. During this time, the menu on the screen allows the user to install an operating system, make changes to the server configuration in RBSU, or run the System Maintenance Menu. For detailed information about these options, refer to the *HP ROM-Based Setup Utility User Guide* or to the CD.

System Maintenance Menu

The System Maintenance Menu provides access to server diagnostics and RBSU. Embedded in the system ROM, the menu feature replaces the legacy system-partition functionality supported on some HP servers.

To access the System Maintenance Menu, press the **F10** key when prompted from the boot option screen. For more information on using the features of the System Maintenance Menu, refer to the *HP ROM-Based Setup Utility User Guide*.

Integrated Management Log

The Integrated Management Log (IML) records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with one-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within Insight Manager
- From within Survey Utility
- From within operating system-specific IML viewers
    — For Windows: Event Viewer or IML Viewer
    — For Linux: IML Viewer Application

For more information, refer to the *Servers Troubleshooting Guide* on the
Documentation CD, or the Management CD in the *ProLiant Essentials Foundation
Pack.*

6

RAID Configuration and Management

This chapter provides an overview of the Integrated ATA RAID Configuration Utility that comes standard with ATA models of the HP ProLiant DL320 Generation 2 server.

Introduction to RAID

Overview of RAID

Redundant array of independent drives (RAID) is an array of multiple independent hard drives that can be accessed simultaneously, improving I/O (input/output) performance. The RAID array is recognized by the host computer as a single storage unit or as multiple logical units. Data loss, because of a drive failure, can be prevented for RAID 1 and RAID 1+0 by reconstructing missing data from the remaining data drives.

RAID Terminology

> **IMPORTANT:** Only RAID levels 0 and 1 are supported by the Integrated ATA RAID Configuration Utility.

RAID 0 (Stripe)

RAID 0 is a RAID level that involves breaking up data into smaller blocks and then writing a block to each drive in the array (striping). RAID 0 does not provide any data redundancy, but does offer the best performance of any RAID level.

RAID 1 (Mirror)

RAID 1 is a RAID level that involves duplicating all data from one drive to a second drive (mirroring). RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity. A minimum of two hard drives are required to support RAID 1.

RAID 1+0

RAID 1+0 is not supported by the ProLiant DL320 Generation 2 server or the Integrated ATA RAID Configuration Utility. RAID 1+0 (also known as RAID 10) is a RAID level that provides both striping and mirroring capabilities. RAID 1+0 mirrors data from one drive to another and then stripes the data across a second set of drives. Four hard drives are required to support RAID 1+0 on the server.

RAID 5

RAID 5 is not supported by the ProLiant DL320 Generation 2 server or the Integrated ATA RAID Configuration Utility. It is a RAID level that stripes data and parity information across drives and requires a minimum of three hard drives.

Spare

The spare option is not supported by the ProLiant DL320 Generation 2 server or the Integrated ATA RAID Configuration Utility. This option in the utility assigns an extra, unused drive as a spare to be used in case of a drive failure. The spare drive will not be used during normal system operation, and provides no additional storage capacity. A pre-configured spare hard drive will be brought into service only in the case of a RAID 1 failure.

IMPORTANT: The spare option is applicable only in RAID 1 for the server. If a spare is not available, the failed drive must be replaced with a new drive so that the data on the failed drive can be rebuilt. The replacement drive capacity must be greater than or equal to the failed drive it replaces.

Integrated ATA RAID Configuration Utility

The Integrated ATA RAID Configuration Utility is a standard feature of ATA models of the server. This section details the features of the utility, including how to access and change utility options.

Configuration Utility Features

The features of the Integrated ATA RAID Configuration Utility include the following:

- Optimized drive access

- RAID support before operating system loads

- Automatic detection and configuration (default is RAID 0)

- Support for PIO modes 0-4, MDMA modes 0-2, and Ultra DMA modes 0-5 (0-5 for ATA/100)

- Support for RAID levels 0, 1, and 1+0

- Multiple drive rebuilding

- Special handling of spare drive and rebuilding

Using the Configuration Utility

After all hard drives have been installed and connected, press the **F8** key during startup to run the Integrated ATA RAID Configuration Utility and view the setup screen.

IMPORTANT: If the configuration utility setup (**F8**) is not run, the option ROM will automatically configure the drives to individual RAID 0 arrays.

The setup screen has three menu windows:

- Array Information
- Physical Drive Information
- Help Information

Array Information

IMPORTANT: Drives cannot be added or removed from an array that has already been configured without destroying the data present on the already configured array.

The **Array Information** window of the setup screen displays all the drive arrays configured. Use this window to create, delete, or edit the existing configurations. Press the up arrow and down arrow keys to navigate the properties, and then press the **Enter** key to edit your selection. Additional arrays can be created in this window. Refer to Chapter 2 of the *HP ProLiant DL320 Generation 2 Server Maintenance and Service Guide* for more information.

NOTE: To add additional arrays, follow the onscreen steps after an array configuration is selected. Refer to "Help Information" for more information about arrays.

Physical Drive Information

The **Physical Drive Information** window displays all the physical drives connected to the ATA/100 controller channels and their properties. Press the up arrow and down arrow keys to navigate this window. This window is not editable.

Help Information

> **IMPORTANT:** When running the Configuration Utility, RAID 0+1 may be displayed in place of RAID 1+0. RAID 0+1 and RAID 1+0 are used synonymously in this utility.

The **Help** window displays hints on available options and provides a list of keys that you can use to perform tasks, such as the following:

- **Switch Windows (Tab)**—switches the control back and forth between the **Array Information** and the **Physical Drive Information** windows.

- **Auto Configure RAID 0 (F1)**—automatically creates and configures a striped array based on the available physical drives installed.

- **Auto Configure RAID 1 (F2)**—automatically creates and configures a mirrored array based on the available physical drives installed. A minimum of two free hard drives must be available in the array.

- **Auto Configure RAID 1+0 (F3)**—automatically creates and configures a RAID 1+0 array based on the available physical drives installed. Four hard drives must be present in the array.

> **IMPORTANT:** All previous settings are lost when the **Auto Configure** option is run for RAID 0, RAID 1, and RAID 1+0 arrays.

- **Create Array (F4)**—creates a drive array. When this option is selected, a default array template is created. The array properties must be edited to complete the array creation. Use the arrow keys to select a property field, and then press the **Enter** key to edit that property. The array properties are as follows:

  — **Array Type**—selects the intended RAID mode including RAID 0, RAID 1, RAID 1+0, and Spare. The default for the **Array Type** option is RAID 0.

  — **Drive(s)**—selects the drives for the array. This option refers to the drive number listed in the **Physical Drives Information** box, not the number of drives in the array. Use the arrow keys, and then press the spacebar to select or deselect the drive or drives. Press the **Enter** key when done. There is no default for this setting.

  — **Stripe Size**—changes the stripe size. This field applies only to RAID 0 and RAID 1+0 arrays. The default stripe size is 64 KB.

IMPORTANT: RAID configurations do not support a stripe size less than 32 KB. The stripe size of an array that already has been configured **cannot** be changed.

— **Drive Size**—displays the size of the array and cannot be edited. If the array type is RAID 0, then the drive size is the total of all the drives selected. If the array type is RAID 1, drive size is shown by the smaller of the two drives making up the array.

— **Build Array**—is used to rebuild the array using a spare drive. When Build Array starts, it prompts the user to select the target drive, and then the rebuild starts. This option applies only to RAID 1 and RAID 1+0 arrays.

— **Initialize Array**—is used to clear the configuration information from drives attached to the Integrated ATA RAID controller.

- **Delete Array (F5)**—allows the user to delete a currently configured array.

- **Restore Old Configuration (F6)**—restores the configuration that was there before accessing the utility.

- **Edit Options (F7)**—edits the physical drive option status boxes located in the top right corner of the **Physical Drive Information** window. The options are as follows:

— **WC-OFF**—enables or disables write cache.

> ⚠ **CAUTION:** Enabling write cache may cause data loss or corruption during an unexpected loss of power.

— **DMA-ON**—enables or disables DMA (direct memory access) transfers, in which data is transferred directly from the memory to the hard drive without microprocessor intervention.

Pressing the **F7** key allows the user to enable or disable these options. Press the **F7** key, move the cursor to the desired box, and then press the spacebar to check off the option. When enabled, the option status boxes change from red to green.

- **Save and Exit (F10)**—saves the configuration and exits the utility.

To exit the utility without saving the configuration or any changes that have been made, press the **Esc** key. Respond appropriately to the subsequent message boxes requiring confirmation.

Integrated ATA RAID Management Utility

The Integrated ATA RAID Management Utility is a standard feature of ATA models of the server. This section details the features of the utility, including how to access and change utility options.

Management Utility Features

The features of the Integrated ATA Management Utility include:

- Visual representation of array status using the **Applications** tray icon (Microsoft OS only)

- Writing of array status to log file (Linux, Netware, and Microsoft OS)

- Writing of array status to the console (Netware OS)

- Automatic rebuild of pre-configured online spares following a RAID 1 failure (Linux, Netware, and Microsoft OS)

Using the Management Utility

Once installed and running, no user intervention is required for the use of the Integrated ATA RAID Management Utility. The utility runs automatically at boot time.

If the utility must be shut down for any reason (such as updating to a newer version), follow OS-specific instructions in this section:

Microsoft Operating Systems

- Right-click on the **Spy** tray icon (a small, round character with sunglasses) and select **Quit Spy**. The Integrated ATA RAID Management Utility will quit.

- To restart the utility, perform one of the following actions:

    — Log out of and back into Windows to restart the utility.

    — Reboot the unit.

    — Manually start the application.

Novell Operating Systems

- From the console, type `Unload Spy`. The system should respond with a message that the module has been unloaded.

- To start the utility again, simply type `Load Spy`. Once again, the system should respond with a message verifying this operation.

Linux Operating Systems

- From a prompt, type `Spy-Stop`.

- To restart the utility, type `Spy-Start`.

Troubleshooting the Integrated ATA RAID Configuration Utility

- Inconsistent naming may occur between the Power-On Self-Test (POST) and the Integrated ATA RAID Configuration Utility. Such is the case when a drive has failed in a RAID 1 or RAID 1+0 configuration. The POST message will list the array as running in a `Degraded` state and the Integrated ATA RAID Configuration Utility will list it as being in a `Rebuilding` state. If this inconsistency occurs, the array must be rebuilt.

- If drives are added to a configuration, the **Integrated ATA RAID Management Utility** tray icon (which is seen only under Microsoft operating systems) may indicate yellow or red, depending on the array condition. The color change indicates one of the following situations:

    — Errors are present on the array.

— Error data from an earlier application of the drive is present, and is mistakenly being presented as new errors. Right-click on the tray icon and select **Erase Error Log** from the menu. If these are new errors, they will be rediscovered by the server.

Drive Connection Tips

- If two drives are available (being utilized), connect one on each ATA/100 RAID channel. The performance of the array is enhanced when both channels are utilized.

- When attaching new drives to the array, be sure that any pre-existing configuration information has been cleared from the new drive. This may be accomplished by doing one of the following:

  — Running the SmartStart Erase Utility on the drive (running SmartStart with only the new drive connected)

  — Noting the position of the drive and editing any arrays (containing the newly added drive) presented in the Integrated ATA RAID Configuration Utility

- Use the same type of drives or drives with similar capability (in terms of speed and capacity).

- Do not use dissimilar drives on the same channel.

- Always use 80-conductor Ultra ATA cables.

- Do not connect any ATAPI devices (such as CD, ZIP, or LS120) to the ATA controller.

Configuration and Setup Tips

1. If the array configuration needs to be changed, back up the data first. When an array configuration changes, previous data in that array is lost.

   NOTE: If you do not select a RAID level for a newly added drive, then the drive will be configured as a stand-alone RAID 0.

2. If an unexpected message is received, such as `Drives Missing` or `Configuration Mismatch`, switch off the server and check all connections, ATA cables, and power cables.

3. If the `Configuration Mismatch` message is received after adding new drives, that is because the new drives had been used before and the configuration on the drives was not cleared. If this message is displayed, press the **F8** key to go to the setup and create the array configuration as needed.

A

Regulatory Compliance Notices

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, the HP ProLiant DL320 Generation 2 server is assigned a series number. The series number for this product is: Series ES1024. This server series number can be found on the product label, along with the required approval markings and information. When requesting certification information for this product, always refer to this series number. This series number should not be confused with the marketing name or model number for the ProLiant DL320 G2 server.

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (i.e., personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have a FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

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

- Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for Products Marked with the FCC Logo – United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this server, contact:

Hewlett-Packard Company
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

or call 1-800-652-6672. (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

Hewlett-Packard Company
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000

or call 281-514-3333.

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

CE

Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22) – Electromagnetic Interference

- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) – Electromagnetic Immunity

- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics

- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker

- EN 60950 (IEC 60950) – Product Safety

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文を
お読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づくクラスB情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

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るよう要求されることがあります。

BSMI Notice

警告使用者：

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

Laser Devices

All HP systems equipped with a laser device comply with safety standards, including
International Electrotechnical Commission (IEC) 825. With specific regard to the
laser, the equipment complies with laser product performance standards set by
government agencies as a Class 1 laser product. The product does not emit hazardous
light; the beam is totally enclosed during all modes of customer operation and
maintenance.

Laser Safety Warnings

⚠ **WARNING: To reduce the risk of exposure to hazardous radiation:**

- **Do not try to open the laser device enclosure. There are no user-serviceable components inside.**

- **Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.**

- **Allow only HP authorized service technicians to repair the laser device.**

Compliance with CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All HP systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the HP supplied laser device.

CLASS 1 LASER PRODUCT

This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in the server.

Laser Information

Laser Type	Semiconductor GaAIAs
Wave Length	780 nm +/- 35 nm
Divergence Angle	53.5 degrees +/- 0.5 degrees
Output Power	Less than 0.2 mW or 10,869 W·m-2 sr-1
Polarization	Circular 0.25
Numerical Aperture	0.45 inches +/- 0.04 inches

Battery Replacement Notice

This server is provided with an internal Lithium battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated.

For more information about battery replacement or proper disposal, contact an HP authorized reseller or your authorized service provider.

⚠️ **WARNING: This server contains an internal Lithium Manganese Dioxide, or a Vanadium Pentoxide, or an alkaline battery pack. There is 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 the battery.**

- **Do not expose to temperatures higher than 60°C.**

- **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**

- **Replace only with the HP spare parts designated for this product.**

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, please use the public collection system or return them to HP, an authorized HP Partner, or their agents.

Power Cords

The power cord set included in the server meets the requirements for use in the country where the server was purchased. If this server is to be used in another country, purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm² or 18 AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet). If you have questions about the type of power cord to use, contact an authorized service provider.

IMPORTANT: Route power cords so that they will not be walked on or pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

Mouse Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

B

Electrostatic Discharge

To prevent damaging the system, be aware of the precautions needed to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

Preventing Electrostatic Damage

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

- Place parts on a grounded surface before removing them from their containers.

- Avoid touching pins, leads, or circuitry.

- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megaohm ± 10 percent resistance in the ground cords. To provide proper grounding, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

If the suggested equipment for proper grounding is not available, have an authorized reseller install the part.

NOTE: For more information on static electricity or for assistance with product installation, contact an authorized reseller.

C

Server Error Messages

For a complete listing of error messages, refer to the *Servers Troubleshooting Guide*, also included on the documentation CD.

D

Troubleshooting

This appendix provides specific troubleshooting information for the HP ProLiant DL320 Generation 2 server. Use it to diagnose server startup and installation problems.

For information on LEDs, switch settings, and jumpers, refer to Appendix E, "LEDs, Switches, and Jumpers."

For information about general troubleshooting techniques, diagnostic tools, preventative maintenance, and a complete list of error messages, refer to the *Servers Troubleshooting Guide*, also included on the documentation CD.

When the Server Does Not Start

This section provides step-by-step instructions when encountering the most common problems during the initial Power-On Self-Test (POST). Every time the server boots, it must complete POST before it can load the operating system and start running software applications.

If the server completes POST and attempts to load the operating system, go to "Problems After Initial Startup" in this appendix.

> ⚠ **WARNING: There is a risk of personal injury from hazardous energy levels. The installation of options and the routine maintenance and service of this product must be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.**

When the server does not start:

1. Be sure that the server and monitor are plugged into a working outlet.

2. Be sure that the power source is working properly:

   — Confirm status using the Power On/Standby LED.

   — Refer to "System Board LEDs" in Appendix E for the location and status of the Power On/Standby LED.

   — Confirm that the Power On/Standby switch was pressed firmly.

   — Refer to the *Servers Troubleshooting Guide* for details on what else to evaluate.

3. If the system does not complete POST, or it does complete POST but does not load the operating system, refer to the *Servers Troubleshooting Guide*.

NOTE: If the server is rebooting repeatedly, ensure that the system is not restarting due to an Automatic Server Recovery (ASR) power up caused by another problem. Review Insight Manager for notification of this event. Refer to the *Servers Troubleshooting Guide* for more information.

4. Restart the server.

5. Be sure that a normal power up sequence has occurred to confirm that the system meets the minimal hardware requirements and is powered up under normal operation. The system has powered up successfully if:

   a. The front panel Power On/Standby LED illuminates green.

   b. The fans start up.

   c. The monitor displays messages regarding server initialization in the following sequence:

   Video initialization—The initialization screen is displayed.

   Processor initialization

   Memory test

   Memory initialization

   Diskette drive

   SCSI devices (if applicable)

   ATA devices (if applicable)

   Option ROM

   d. The operating system loads to complete the boot process.

If the problem persists, continue with the section, "Diagnosis Steps," in this appendix.

Diagnosis Steps

If the server does not power up, or powers up but does not complete POST, answer the questions in Table D-1 to determine appropriate actions based on the symptoms observed. According to the answers provided, another table in this appendix will be referenced, which will outline possible reasons for the problem, options available to assist in diagnosis, possible solutions, and list references to other sources of information.

Table D-1: Diagnosis Steps

Question	The Next Step
Question 1: Is the front panel Power-On/Standby LED on (illuminated solid green or flashing)?	If no, go to Table D-2, and then continue to Question 2 if the problem is not solved.
	If yes, continue to Question 4.
Question 2: Is the front panel Internal Health LED red?	If no, go to Table D-2, and then continue to Question 3 if the problem is not solved.
	If yes, continue to Question 4.
Question 3: Are any system board LEDs showing a failure or error condition? Refer to Appendix E, "LEDs, Switches, and Jumpers," for the location and status information of all system board LEDs.	If no, go to Question 4. If yes, then: 1. Reseat the applicable component and then restart the server. 2. If reseating does not fix the problem, replace the component with a known working component and then restart the server. 3. Contact an authorized service technician if steps 1 and 2 do not fix the problem.

continued

Table D-1: Diagnosis Steps *continued*

Question	The Next Step
Question 4: Is anything visible on the monitor?	If no, go to Table D-3.
	If yes, video is available for diagnosis. Determine the next action by observing POST progress and error messages. Refer to the *Servers Troubleshooting Guide* for a complete description of each POST error message.

NOTE: If the server attempts to load the operating system, go to "Problems After Initial Startup" in this appendix.

Table D-2: Front Panel Power On/Standby LED Is Not On

⚠	**WARNING: To reduce the risk of electric shock or damage to the equipment, before opening access panels to reseat components, power down the server, and then disconnect the power cord.**

Note: For LED locations and functions, refer to Appendix E, "LEDs, Switches, and Jumpers."

Possible Reasons	The Next Step
There is no AC power connection.	1. Be sure the power cables are fully connected.
The power button was not firmly pressed.	2. Press the power button.
The power button connector cable is not properly connected to the system board.	3. Be sure the power source is functioning. Refer to the *Servers Troubleshooting Guide* for further options.
A processor has failed or is not properly seated.	4. Reconnect the power button cable to the system board. Refer to Chapter 3, "Installing Hardware Options," for the location of the power button connector.
The power supply has failed or is not connected.	5. Power down the server. Reseat all expansion boards, DIMMs, processors, and PPMs. Reseat all cable connections. Refer to Chapter 3, "Installing Hardware Options," for complete instructions. Refer to the *Servers Troubleshooting Guide* for tips on proper procedures.
	6. Monitor the diagnostic LEDs on the system board for failure conditions.
	7. If these steps do not correct the problem, the most likely cause lies either in the power supply subsystem or a processor. Contact an authorized service provider for further technical support. Refer to the *Servers Troubleshooting Guide* for a list of authorized service providers.

Table D-3: Server Does Not Have Video

	WARNING: To reduce the risk of electric shock or damage to the equipment, before opening access panels to reseat components, power down the server, and then disconnect the power cord.

Note: For LED locations and functions, as well as switch setting information, refer to Appendix E, "LEDs, Switches, and Jumpers."

Possible Reasons	**The Next Step**
Video cable may not be properly connected. Switches may not be correctly set on the system board. If an optional video board was installed, the monitor cable may not be correctly connected. The monitor may be connected to the wrong video connector. Expansion boards or DIMMs may not be properly connected or seated.	1. Be sure that the monitor has power and that the monitor cable is securely connected. If more than one video adapter is installed, make sure that the monitor is connected to the correct video board. 2. Be sure that the monitor is functional by connecting it to a known working server. 3. Be sure that the switch settings on the system board are correctly set. 4. Power down the server. Reseat all expansion boards, DIMMs, processors, and PPMs. Reseat all cable connections. Refer to Chapter 3, "Installing Hardware Options," for bezel and side panel removal. 5. Restart the server.

continued

Table D-3: Server Does Not Have Video continued

Possible Reasons	The Next Step
	6. Listen for audible indicators, such as a series of beeps. A series of beeps indicates the presence of a POST error message.
	Refer to the *Servers Troubleshooting Guide* for a complete listing of possible POST error messages.
	7. Monitor the diagnostic LEDs on the system board for failure conditions.
	8. Refer to the *Servers Troubleshooting Guide* for more information on video problems.
	9. If these steps do not correct the problem, contact an authorized service provider for further technical support.

Problems After Initial Startup

After the server has passed POST, errors may still be encountered, such as an inability to load the operating system. Use Table D-4 to troubleshoot server installation problems that occur after the initial startup.

For updated information on supported operating systems, refer to Appendix F, "Server Specifications," or go to

www.hp.com

NOTE: If the server is rebooting repeatedly, be sure that the system is not restarting due to an Automatic Server Recovery (ASR) power up caused by another problem. Review Insight Manager for notification of this event. Refer to the *Servers Troubleshooting Guide* for more information.

Refer to the *Servers Troubleshooting Guide* for the following:

- Information that must be collected when diagnosing software problems and to provide when contacting support

- Instructions on how to upgrade the operating system and its drivers

- Information on available recovery options and advice on minimizing downtime

Table D-4: Problems After Initial Startup

Problem	Possible Cause	Possible Solution
The system cannot load SmartStart software.	Wrong version of SmartStart software is being installed.	1. Review the SmartStart release notes and user documentation.
		2. Refer to the HP website to validate the version of SmartStart software.
	The CD-ROM/diskette or DVD-ROM/diskette drive assembly is not set as a bootable device.	1. Press the **F9** key to run the ROM-Based Setup Utility (RBSU).
		2. Set defaults and exit the utility.
		3. Rerun RBSU to confirm the system configuration.
		Refer to Chapter 5, "Server Configuration and Utilities," or refer to the *HP ROM-Based Setup Utility User Guide*, for complete instructions on the use of RBSU.
	The CD-ROM/diskette or DVD-ROM/diskette drive assembly is either not installed, or is not properly connected.	1. Power down the server.
		2. Ensure that the CD-ROM/diskette or DVD-ROM/diskette drive assembly is installed.
		3. Remove and reseat the CD-ROM/diskette or DVD-ROM/diskette drive assembly.
		4. Reseat the cable between the backplane and the CD-ROM/diskette or DVD-ROM/diskette drive assembly to ensure proper connection.
		Refer to the *HP ProLiant DL320 Generation 2 Server Maintenance and Service Guide* for connection information.
		If the cable is not the problem, refer to the *Servers Troubleshooting Guide* for other options.

continued

Table D-4: Problems After Initial Startup *continued*

Problem	Possible Cause	Possible Solution
	The diskette in the CD-ROM/diskette or DVD-ROM/diskette drive assembly is preventing the system from loading.	Remove the diskette.
SmartStart software fails during installation.	An operating system has not been selected.	1. Press the **F9** key to run RBSU. 2. Select the primary operating system.
	Error occurs during installation.	Follow the error information provided. If it is necessary to reinstall, first run the System Erase Utility. Refer to the *Servers Troubleshooting Guide*.

<table>
<tr><td>⚠</td><td>CAUTION: The System Erase Utility causes the loss of all configuration information, as well as loss of existing data on all connected hard drives. Read "System Erase Utility" and the associated cautionary statements in the Servers Troubleshooting Guide before performing this operation.</td></tr>
</table>

Problem	Possible Cause	Possible Solution
Server cannot load operating system.	Required operating system step was missed.	Follow these steps: 1. Note at which phase the operating system failed. 2. Remove any loaded operating system components. 3. Refer to the operating system documentation. 4. Reinitiate installation procedures.
	Installation problem occurred.	Refer to the operating system documentation and to the SmartStart release notes.
	Primary hard drive controller installation is incorrect.	Run RBSU by pressing the **F9** key and correct this problem.

continued

Table D-4: Problems After Initial Startup *continued*

Problem	Possible Cause	Possible Solution
	Hard drive controller order is incorrect.	Run RBSU by pressing the **F9** key and correct this problem.
	Encountered problem after new hardware was added to the system.	Refer to the documentation provided with the hardware.
		Remove the new hardware.
	Problem was encountered with hardware added to a system with a factory-installed operating system.	The factory-installed operating system software installation must be completed **before** adding new hardware to the system.
		Be sure that all instructions provided in the *HP Factory-Installed Operating System Software Installation Guide* are being followed.
		Remove the new hardware and complete the software installation. Then, reinstall the new hardware.

Note: Refer to Chapter 5, "Server Configuration and Utilities," or refer to the *HP ROM-Based Setup Utility User Guide*, for complete instructions on the use of RBSU.

Other Troubleshooting Resources

Table D-5: ProLiant DL320 Generation 2 Server Troubleshooting Resources

Resource	Description
Servers Troubleshooting Guide	This resource contains troubleshooting information that is beyond the scope of this document. It includes general hardware and software troubleshooting information for all HP ProLiant servers, a complete list of error messages along with an explanation of probable cause, and a list of appropriate measures. This guide ships with the server.
HP ProLiant DL320 Generation 2 Server Maintenance and Service Guide	This resource provides a complete list of all replacement parts available, along with step-by-step instructions on installation and replacement. Find this guide at www.compaq.com/support Follow the link for maintenance and service guides, and download the guide provided for the server.

Information on warranties and service and support upgrades (CarePaq services) can be found by visiting

www.hp.com

E

LEDs, Switches, and Jumpers

Status Indicators

The ProLiant DL320 Generation 2 server contains the following sets of LED indicators, which indicate the status of hardware components and settings:

- Front panel LED indicators
- Rear panel LED indicators
- System board LEDs

Use the following sections to determine the location and status of LEDs on the server.

Front Panel LED Indicators

The set of seven LEDs on the front of the server indicates server status. The following figure and table identify and describe the location and function of the LEDs.
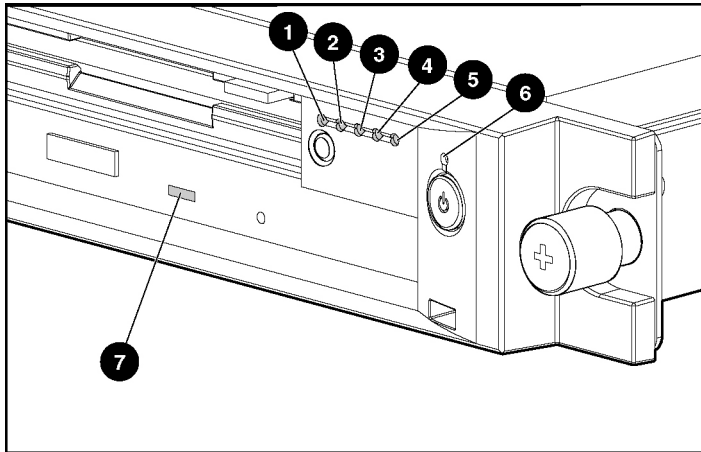
Figure E-1: Identifying the front panel LED indicators

Table E-1: Front Panel LED Indicators

Location	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
3	NIC 1 link/activity	On = Link
		Off = No Link
		Blinking = Activity
4	System health	Green = Good
		Amber = Degraded
		Red = Critical Error

continued

Table E-1: Front Panel LED Indicators *continued*

Location	LED Description	Status
5	Hard drive activity	On = Activity
		Off = No Activity
6	Power On/Off	Green = Power On
		Amber = Standby mode
		Off = Power Off
7	CD-ROM/diskette or DVD-ROM/diskette drive activity	On = Activity
		Off = No Activity

Rear Panel LED Indicators

The server rear panel contains three LEDs: one for the rear unit identification LED switch and two for the RJ-45 connectors. Use the following figure and table to identify each LED.
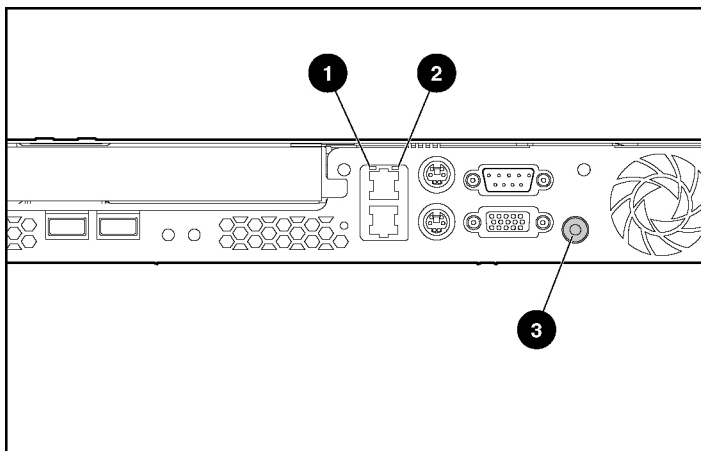
Figure E-2: Identifying the rear panel LED indicators

Table E-2: Rear Panel LED Indicators

Location	LED	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

continued

Table E-2: Rear Panel LED Indicators *continued*

Location	LED	Status
3	Rear unit identification LED switch	On = Local Management
		Blinking = Remote Management
		Off = Deactivated

System Board LEDs

The system board contains various LEDs which display current conditions of the server. These are identified in the illustration below and in Table E-3.
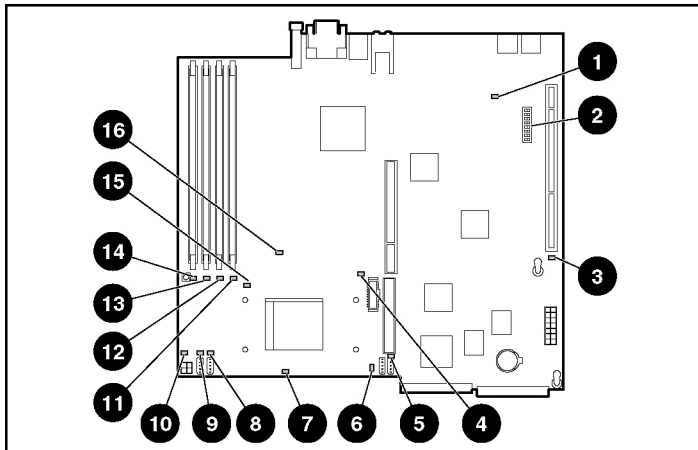
Figure E-3: Locating the system board LEDs and switches

Table E-3: System board LEDs and Switches

Item	Description
1	Power supply OK
2	System configuration switch (SW1)
3	Auxiliary power supply OK
4	CPU error
5	Fan 1 failure
6	Fan 2 failure
7	CPU temperature critical
8	Fan 3 failure
9	Fan 4 failure
10	CPU power cable unplugged
11	DIMM 1 failure
12	DIMM 2 failure
13	DIMM 3 failure
14	DIMM 4 failure
15	System temperature alert
16	VRM failure

Power On/Off and Unit Identification Switches
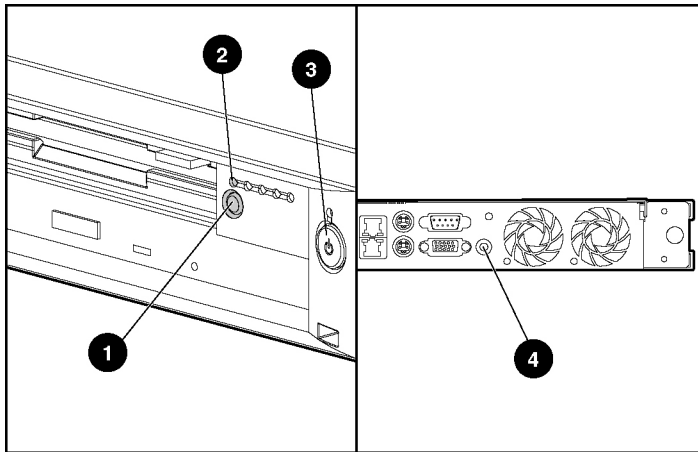
Figure E-4: Unit Identification and Power On/Off switches (front and rear views)

Table E-4: Power On/Off and Unit Identification Switches

Item	Description
1	Unit Identification switch – front view
2	Unit Identification switch LED
3	Power On/Off switch
4	Unit Identification switch – rear view

Switches

The system board contains a switchbank that may need to be modified to set configuration or to trigger special functions. These switches can cause problems if they are not correctly set.

When adding or removing a component or changing a security feature, the server must be reconfigured to recognize these changes. If the system configuration is incorrect, the server may not work properly, and you may receive error messages on the screen.

IMPORTANT: Reserved switches are provided for use by authorized service providers only and should not be changed from the indicated default settings.

Refer to Figure E-3 and Table E-3 for location on the system board of the System Configuration Switch.

The following subsections provide reference information about setting the system board switches and jumpers, which is part of the reconfiguration process, along with running the ROM-Based Setup Utility (RBSU).

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 the proper system configuration switch settings. The following table shows the shipping configuration of SW1.

Table E-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.			

Clearing and Resetting System Password Settings

It may be necessary at some time to clear and reset the system password.

IMPORTANT: This method of clearing and resetting system passwords is only necessary if the current password is not known.

Otherwise, when prompted, the password can be entered followed by a forward slash (/). This operation removes the current password and allows one of the following to be performed:

- Enter the ROM-Based Setup Utility (RBSU) and set the password to a new value.

- Leave the password value blank to disable the password feature.

When the system switch position 5 is set to the On position, the system is prepared to clear the system password.

1. Power down the server.

2. Set the switch at position 5 to the On position.

3. Restart the server, and wait for confirmation.

4. Power down the server.

5. Set the switch at position 5 to the default Off position.

6. Restart the server. The password is cleared.

Clearing and Resetting System Configuration Settings

It may be necessary at some time to clear and reset system configuration settings. When the system switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

IMPORTANT: Clearing CMOS and/or (NVRAM) deletes the configuration information. Refer to Chapter 5 for complete instructions on configuring the server.

To clear and reset the system configuration settings, follow the procedures outlined in "Clearing and Resetting System Password Settings" section earlier in this chapter, except for replacing switch position 6 for 5 in the process. After completing the steps, press the **F9** key to run the ROM-Based Setup Utility (RBSU) and reset all system configuration settings.

NOTE: For complete instructions on how to use RBSU, refer to Chapter 5.

Setting the NIC Operating Mode

The NIC operating modes do not have to be set because the controllers automatically differentiate between the 10-Mbit, 100-Mbit and 1-GB environments.

F

Server Specifications

Operating and Performance Specifications

Table F-1: Operating and Performance Specifications

Dimensions/Feature		
Height	4.24 cm	(1.67 in)
Depth	55.6 cm	(21.9 in)
Width	48.3 cm	(19 in)
Weight (maximum)	11.15 kg	(24.58 lb)
Input 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	—
BTUs per hour	1048	—

continued

Table F-1: Operating and Performance Specifications *continued*

Feature		
Power supply output		
Rated steady-state power	180 W	—
Maximum peak power	200 W	—
Temperature range		
Operating (See note)	10°C to 35°C	(50°F to 95°F)
Shipping (See note)	-40°C to 70°C	(-40°F to 158°F)
Relative humidity (noncondensing)		
Operating (See note)	10% to 90%	—
Non-operating (See note)	5% to 95%	—
Maximum wet bulb temperature	28°C	(82.4°F)

NOTE: Operating temperature has an altitude derating of 1°C per 304.8 M (1,000 ft). No direct sunlight. Storage maximum humidity of 95% is based on a maximum temperature of 45°C. Altitude minimum for storage is 70 KPa.

G

System Battery

The HP ProLiant DL320 Generation 2 server has one memory device that requires a battery for retaining stored information.

When your server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock. With normal use, battery life is usually about 5 to 10 years. Replace used batteries with HP 540-milliampere-hour lithium, 3 V replacement batteries (P/N 179322-001).

System Battery Replacement

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

- **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.**

- **Disconnect power from the server or other product by unplugging the power cord from either the electrical outlet or the server or other product.**

To install a new battery:

1. Access internal server components. Refer to "Accessing Internal Server Components" in Chapter 3, "Installing Hardware Options."

2. If an expansion board is installed, remove the PCI riser board assembly. Refer to "Removing the PCI Riser Board Assembly" in Chapter 3, "Installing Hardware Options."

3. Locate the battery holder on the system board. Refer to Figure 3-8 and Table 3-1 in Chapter 3, "Installing Hardware Options."

4. Remove the existing battery.
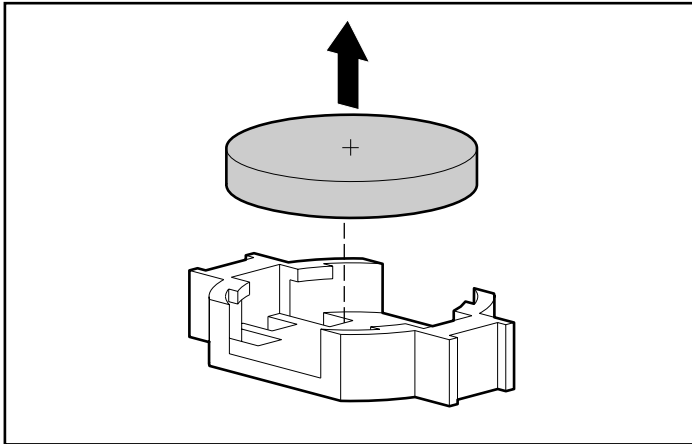
Figure G-1: Removing the system battery

5. Install the new battery.

6. If you removed the PCI riser board assembly in step 3, reinstall it. Refer to "Installing an Expansion Board" in Chapter 3, "Installing Hardware Options."

7. Reverse the procedures performed in the "Accessing Internal Server Components" section in Chapter 3, "Installing Hardware Options."

8. Run the ROM-Based Setup Utility to reconfigure the system with the new battery. See Chapter 5, "Server Configuration and Utilities."

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