

HP ProLiant ML330 Generation 3 Server Maintenance and Service Guide



April 2003 (First Edition)
Part Number 322375-001

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About This Guide

This maintenance and service guide can be used for reference when servicing the HP ProLiant ML330 Generation 3 server.



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

Audience Assumptions

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

Technician Notes



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



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



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

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



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



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

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

Where to Go for Additional Help

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

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

Telephone Numbers

For the name of the nearest HP authorized reseller:

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

For HP technical support:

- In the United States and Canada, call 1-800-652-6672.
- Outside the United States and Canada, refer to the HP website (www.hp.com).

Illustrated Parts Catalog

Mechanical Components

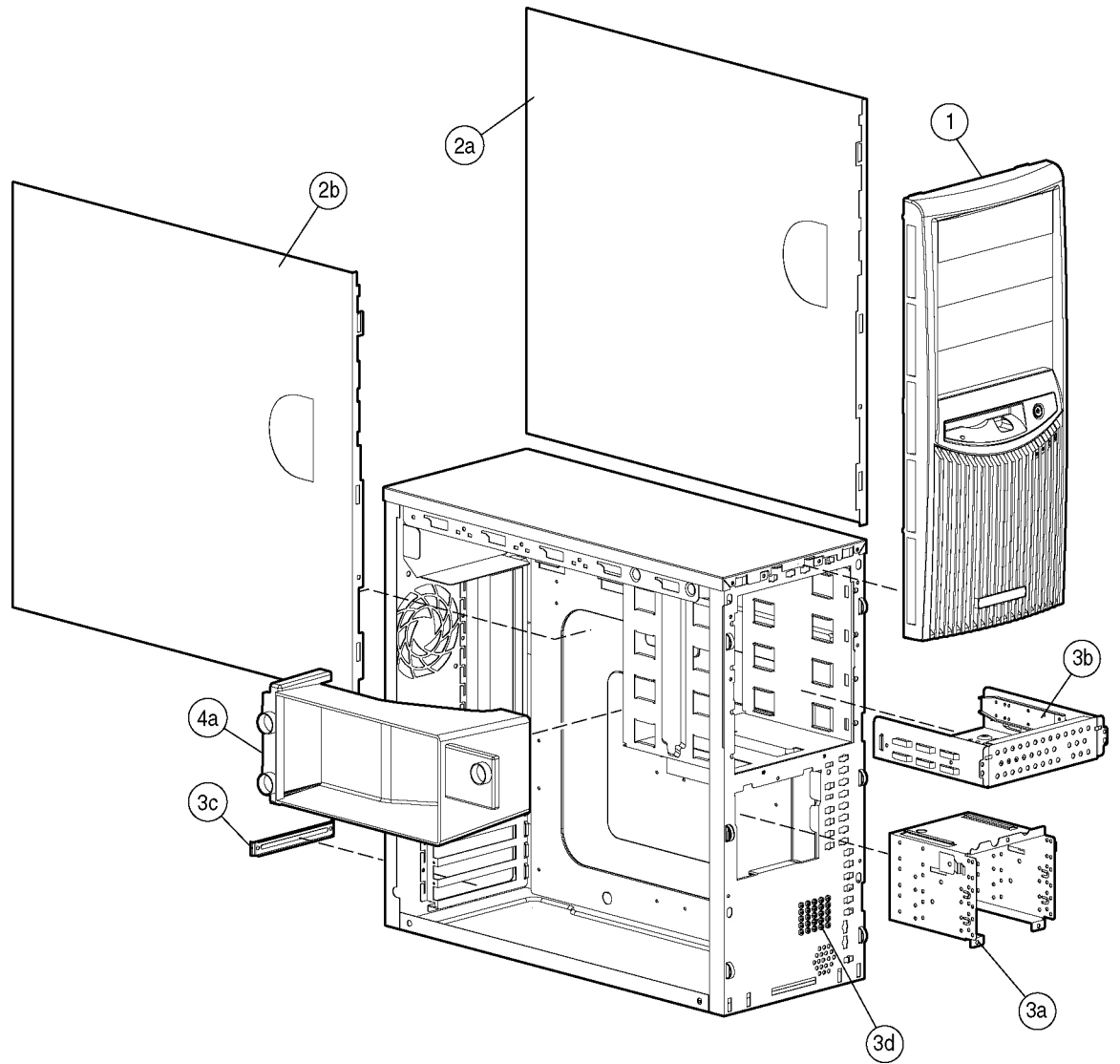


Table 1-1: Mechanical Components

Item	Description	Spare Part Number
Chassis		
1	Front bezel	324713-001
2	Access panel	307549-001
	a) Hood panel (right)	—
	b) Access panel (left)	—
Miscellaneous		
3	Hardware kit	325036-001
	a) Hard drive compartment	—
	b) Media bay drive tray	—
	c) Expansion board knockout	—
	d) Hard drive screws	—
	e) Processor retention brackets*	—
4	Miscellaneous plastics kit	176617-001
	a) Air baffle	—
	b) Expansion slot retainer*	—
	c) Rubber bumpers*	—
	d) Removable media bezel blank*	—
	e) Cable clips*	—
	f) Miscellaneous clamps*	—
	g) LED shield*	—

*Not shown

System Components

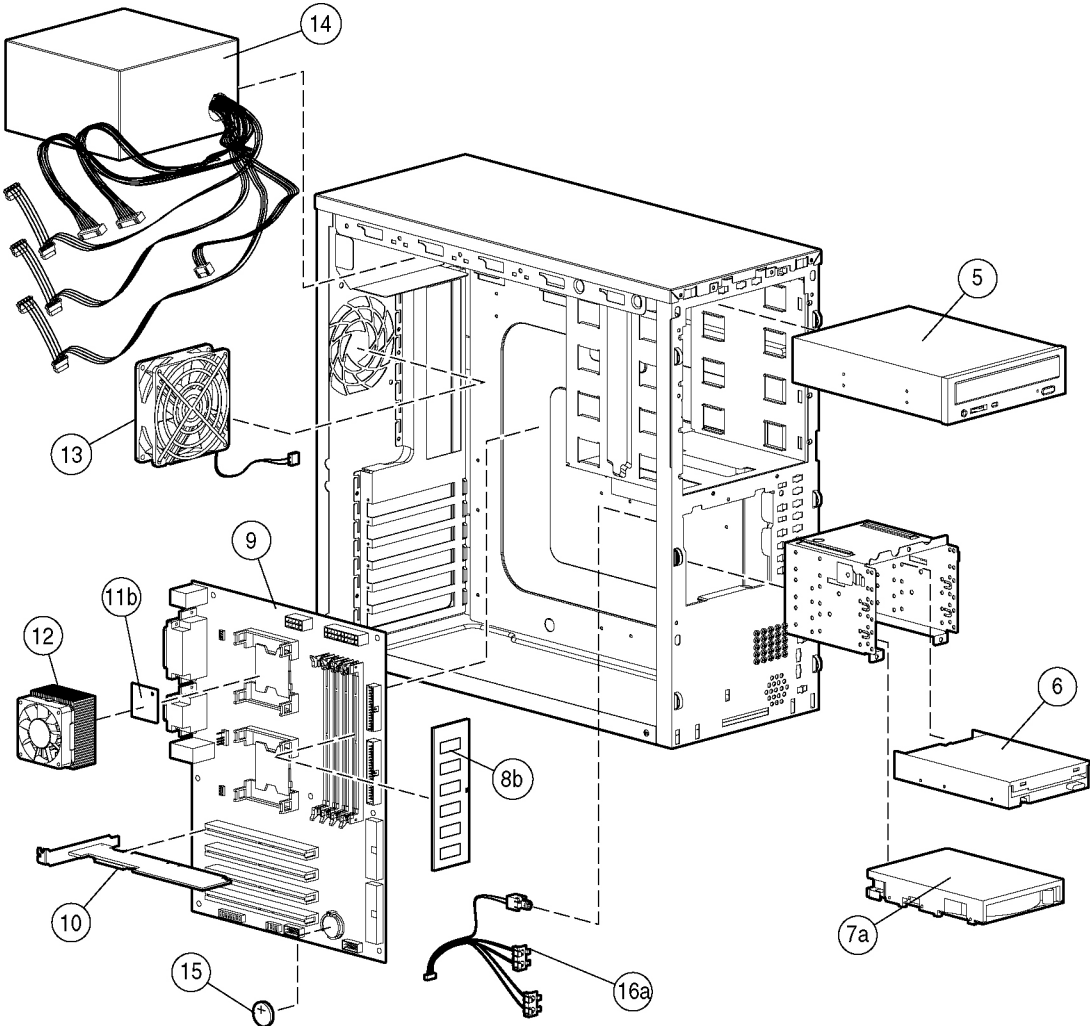


Table 1-2: System Components

Item	Description	Spare Part Number
Mass Storage Devices		
5	IDE CD-ROM drive, 48X	288894-001
6	Diskette drive	233409-001
7	Hard drive	
	a) 36-GB Wide Ultra3 hard drive, 10K RPM (SCSI model)	177986-001
	b) 40-GB ATA hard drive (ATA model)*	232008-001
	c) 18-GB Wide Ultra3 hard drive, 10K RPM (SCSI model)*	152191-001
	d) 80-GB ATA hard drive (ATA model)*	287685-001
	e) 160-GB ATA hard drive (ATA model)*	326510-001
Boards		
8	PC2100 ECC Registered DDR SDRAM DIMM	
	a) 128-MB*	301691-001
	b) 256-MB	300699-001
	c) 512-MB*	300700-001
	d) 1-GB*	300701-001
9	System board, 533-MHz front side bus	324709-001
10	Integrated Single Channel Ultra3 SCSI adapter	324710-001
11	Intel Xeon processor	
	a) 2.4-GHz*	325034-001
	b) 2.8-GHz	324708-001
Fans and Power		
12	Heatsink/fan assembly	325035-001
13	System fan	324711-001
14	Power supply, 300 W, CE Mark-compliant	324714-001
15	CR2032 lithium battery	234556-001
16	Power cable kit	287181-001
	a) Power button/LED assembly	—
	b) Power shield cable*	—
	c) Power extension cable*	—

*Not shown

continued

Table 1-2: System Components *continued*

Item	Description	Spare Part Number
Miscellaneous		
17	Enhanced keyboard*	244000-001
	a) European keyboard—UK*	244000-031
	b) European keyboard—GR*	244000-041
	c) European keyboard—FR*	244000-051
	d) Spacesaver keyboard—JP*	244000-291
18	Signal cable kit*	253826-001
	a) ATA ribbon cable assembly	—
	b) Diskette drive cable assembly	—
	c) CD cable assembly	—
19	Ultra3 SCSI cable*	289229-001
20	Rack enabling kit*	302569-001
21	Country kit*	308250-001
22	Return kit*	176621-001
*Not shown		

Removal and Replacement Procedures

To service the server, you might need the following:

- Torx T-15 screwdriver
- Flat-blade screwdriver
- Phillips screwdriver
- Diagnostics software from the SmartStart CD

Safety Considerations

Before performing service procedures, review all the safety information.

Electrostatic Discharge Information

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

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

Rack Warnings and Cautions



WARNING: Because the rack allows stacking of computer components on a vertical rather than horizontal plane, be sure that precautions have been taken to provide for rack stability and safety. It is important to follow these precautions providing for rack stability and safety, and to protect both personnel and property. Heed all cautions and warnings throughout the installation instructions provided with the device.



WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational safety requirements and guidelines for heavy equipment handling.
 - Obtain adequate assistance to lift and stabilize the product during installation or removal.
 - Always load the heaviest item first, and load the rack from the bottom up. This makes the rack bottom-heavy and helps prevent the rack from becoming unstable.
 - Extend the leveling jacks to the floor.
 - Rest the full weight of the rack on the leveling jacks.
 - Attach the stabilizing feet to the rack if it is a single-rack installation.
 - Couple the racks together in multiple-rack installations.
 - Fully extend the bottom stabilizers on the equipment. Be sure that the equipment is properly supported/braced when installing options and boards.
 - Be sure that the rack is adequately stabilized before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended for any reason.
 - Do not attempt to move a fully loaded equipment rack. Remove equipment from the rack before moving the rack.
 - At least two people are needed to safely unload the rack from the pallet. An empty 42U rack weighs 115 kg (253 lb), is over 2.1m (7 ft) tall, and may become unstable when being moved on its casters. Do not stand in front of the rack as it rolls down the ramp from the pallet; handle it from the sides. Stabilize the device by keeping the unit on the rails.
-

Server Warnings and Cautions

Before installing a system, be sure that you understand the following warnings and cautions.



WARNING: To reduce the risk of personal injury or damage to the equipment, observe all warnings and cautions throughout this chapter.



WARNING: Do not exceed the level of repair specified in the procedures in the product documentation. All troubleshooting and repair procedures are detailed to allow only subassembly or module-level repair. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.



WARNING: Be sure that the AC power supply branch circuit that provides power to the rack is not overloaded. Not overloading AC power to the rack power supply circuit reduces the risk of personal injury, fire, or damage to the equipment. The total rack load should not exceed 80 percent of the branch circuit rating. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.



WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power devices should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.



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.
 - Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the system.
 - Do not use conductive tools that could bridge live parts.
 - Remove all watches, rings, or loose jewelry when working in hot-plug areas of an energized device.
-



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



CAUTION: Protect the device 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.

System Power Down



WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the system. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.



CAUTION: Failure to follow these directions could result in damage to equipment or loss of data.

IMPORTANT: If installing a hot-plug device, it is not necessary to power down the system.

To power down the server:

1. Back up the server data and record configuration information.
2. Shut down the operating system as directed in the operating system instructions.
3. Press the Power On/Standby button to place the server in standby mode. When the server acquires standby mode, the system power LED goes from green to amber.
4. After the system power LED is amber, disconnect the power cord.
5. Disconnect any other external equipment from the server.

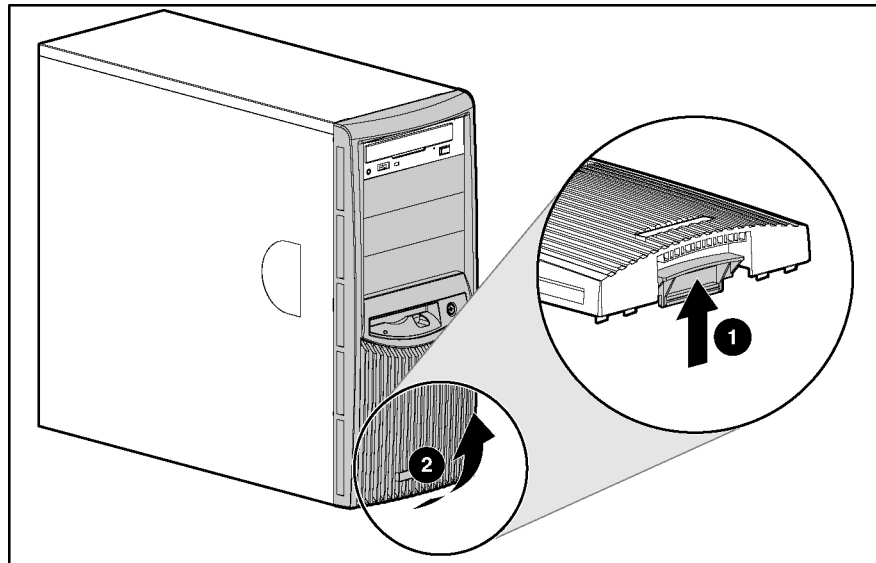
Front Bezel



CAUTION: To prevent equipment damage or data loss, be sure that the server is powered down, all cables are disconnected from the back of the server, and the power cord is disconnected from the grounded (earthed) AC outlet before removing the front bezel.

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Pull up on the bezel locking latch until it disengages.
3. Rotate the bezel upward and slide it away from the chassis. A small amount of force may be necessary to detach the bezel.



To replace the component, reverse the removal procedure.

IMPORTANT: When replacing the front bezel, be sure to place the top hinge points in the chassis before rotating the front bezel downward to its original position.

Bezel Blanks

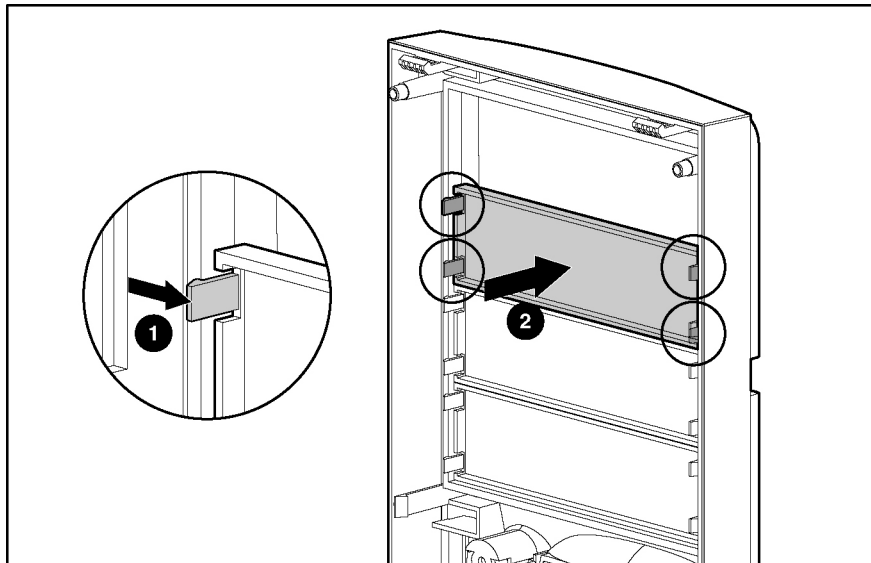


WARNING: To reduce the risk of personal injury and to prevent damage to the equipment, before removing the front bezel, be sure that the server is powered down, all cables are disconnected from the back of the server, and the power cord is disconnected from the grounded AC outlet.

NOTE: It is not necessary to remove a bezel blank when installing a hard drive into a removable media bay.

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the bezel blank:
 - a. On the back of the front bezel, press the tabs on each end of the bezel blank toward each other.
 - b. Push the bezel blank through the front bezel.



To replace the component, reverse the removal procedure.

Access Panel



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

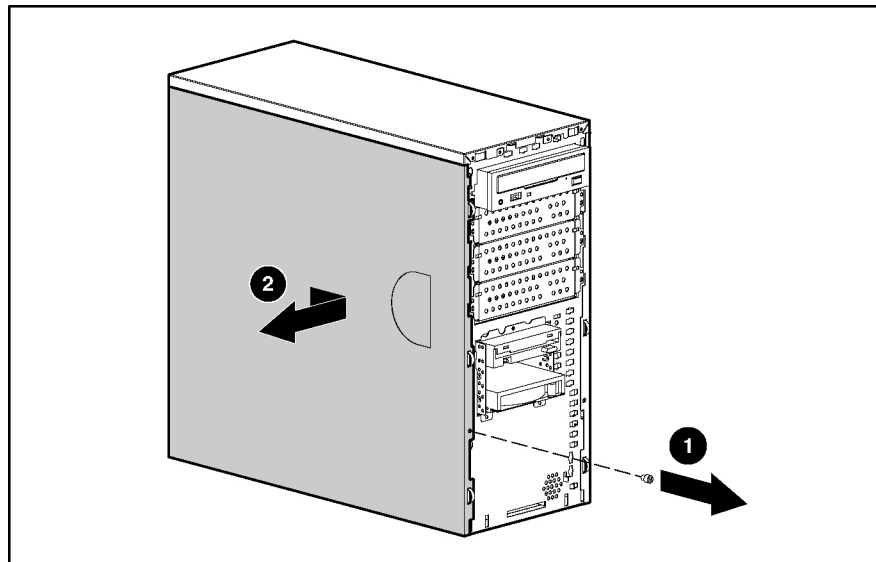


CAUTION: Do not operate the server for long periods without the access panel. Operating the server without the access panel results in improper airflow and improper cooling that can lead to thermal damage.

NOTE: The interior of the access panel contains labels with information about the server system board.

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel:
 - a. Remove the thumbscrew from the front left side of the chassis.
 - b. Slide the access panel forward.
 - c. Pull from the top of the access panel to remove it from the chassis.

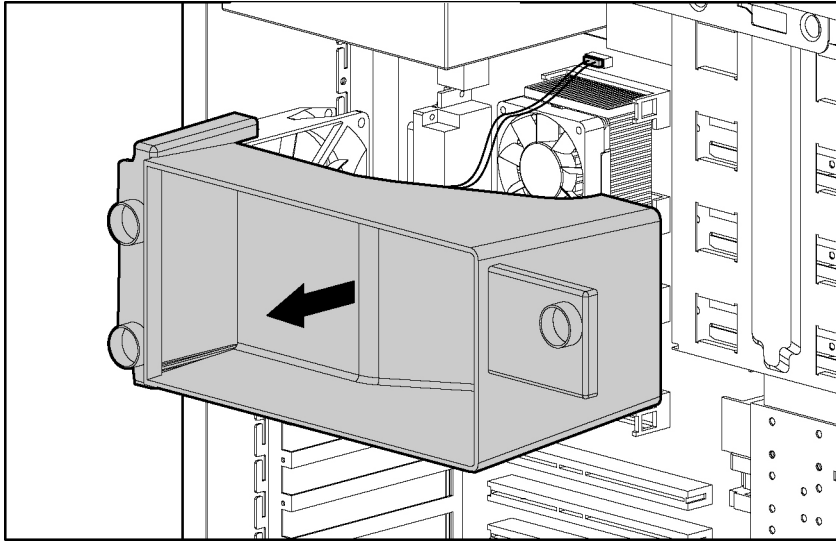


To replace the component, reverse the removal procedure.

Air Baffle

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle.

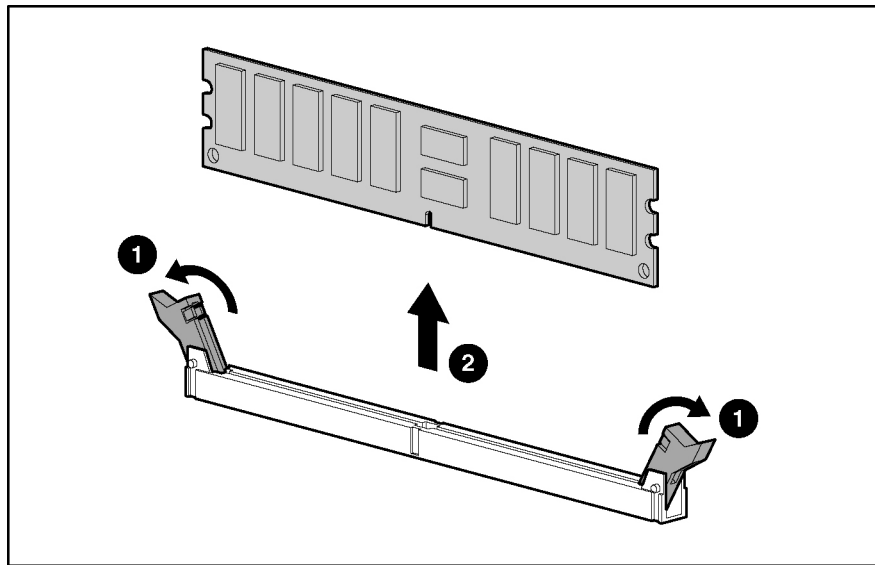


To replace the component, reverse the removal procedure.

DIMMs

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle. Refer to “Air Baffle” in this chapter.
5. Remove the DIMM:
 - a. Press outward on both latches of the memory module socket at the same time to release the DIMM and push it partially out of the socket.
 - b. Lift the memory module from the socket.



CAUTION: When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.



CAUTION: Do not mix ECC and non-ECC SDRAM DIMMs. If different types of memory modules are mixed, the server does not properly function.

IMPORTANT: DIMMs must be industry-standard, ECC Registered PC2100 DDR SDRAM DIMMs and support CAS Latency 2.5 (CL=2.5).

NOTE: HP recommends that the DIMMs be installed sequentially in slots 1, 2, 3, and then 4.

To replace the component, reverse the removal procedure.

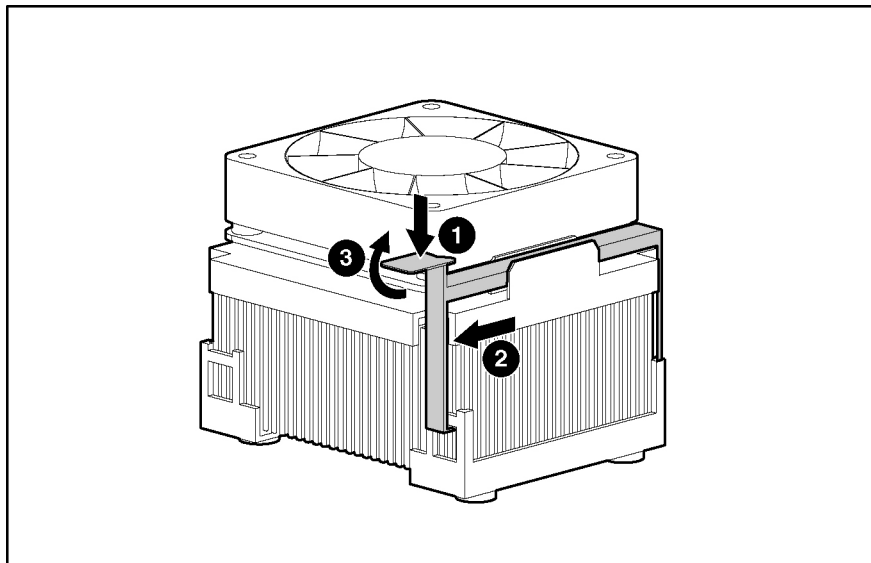
Processor and Heatsink/Fan Assembly



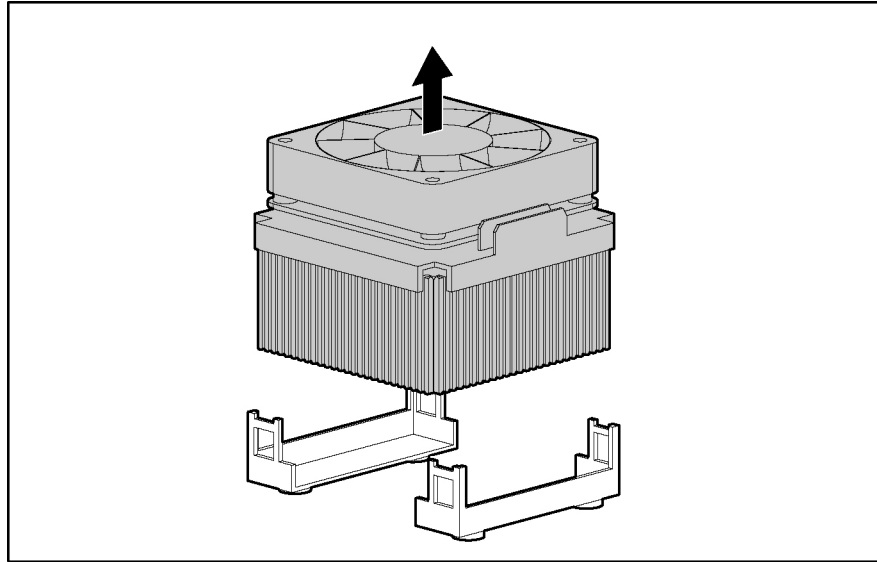
CAUTION: To reduce the risk of personal injury from hot surfaces, allow the internal server components to cool before touching them.

To remove the component:

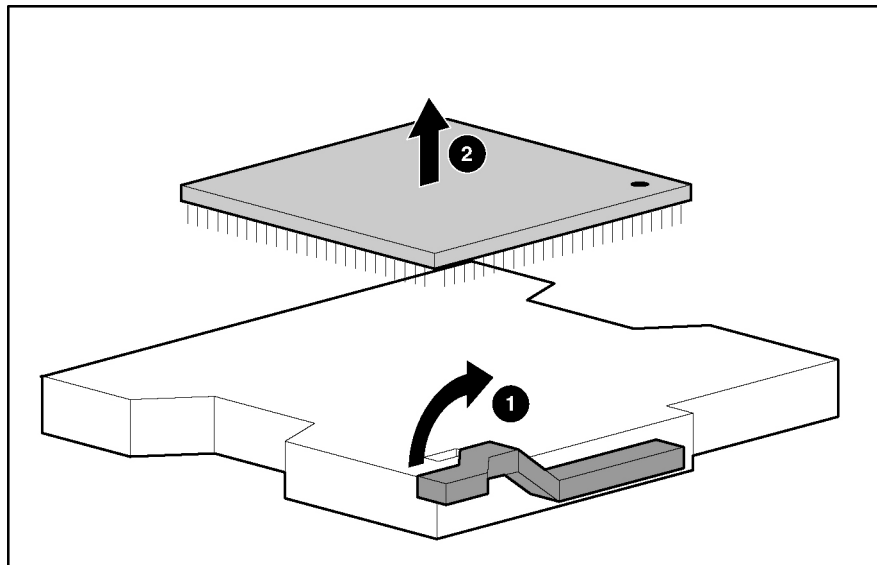
1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle. Refer to “Air Baffle” in this chapter.
5. Lay the server on the right side, so the open side faces up.
6. Disconnect the processor fan cable from the system board. For system board connectors, refer to Chapter 4, “Component Identification.”
7. Open the processor retaining clips.



8. Remove the heatsink/fan assembly.



9. Open the processor socket locking lever and remove the processor.

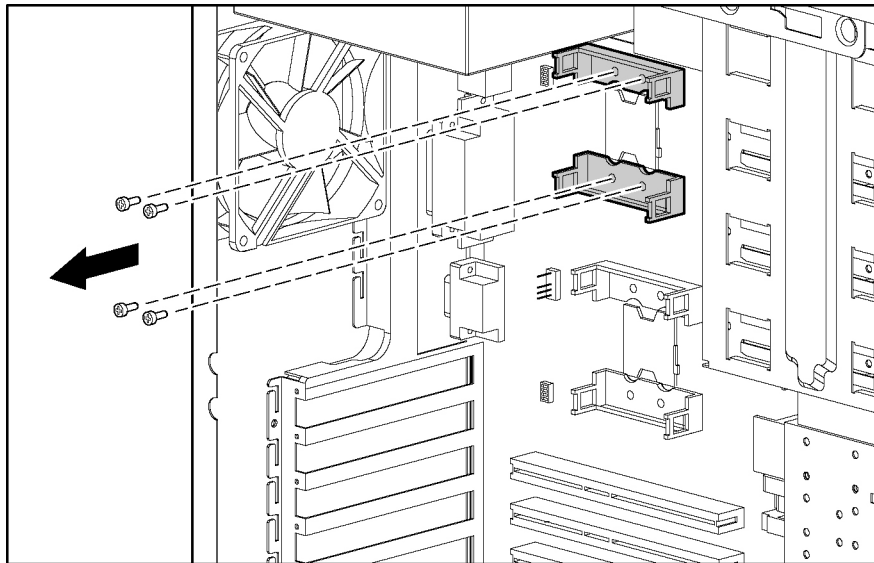


To replace the component, reverse the removal procedure.

Processor Retention Brackets

To remove the components:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle. Refer to “Air Baffle” in this chapter.
5. Remove the processor and heatsink/fan assembly. Refer to “Processor and Heatsink/Fan Assembly” in this chapter.
6. Remove the processor retention brackets:
 - a. Remove the screws securing the bracket to the system board.
 - b. Lift the bracket off the system board.

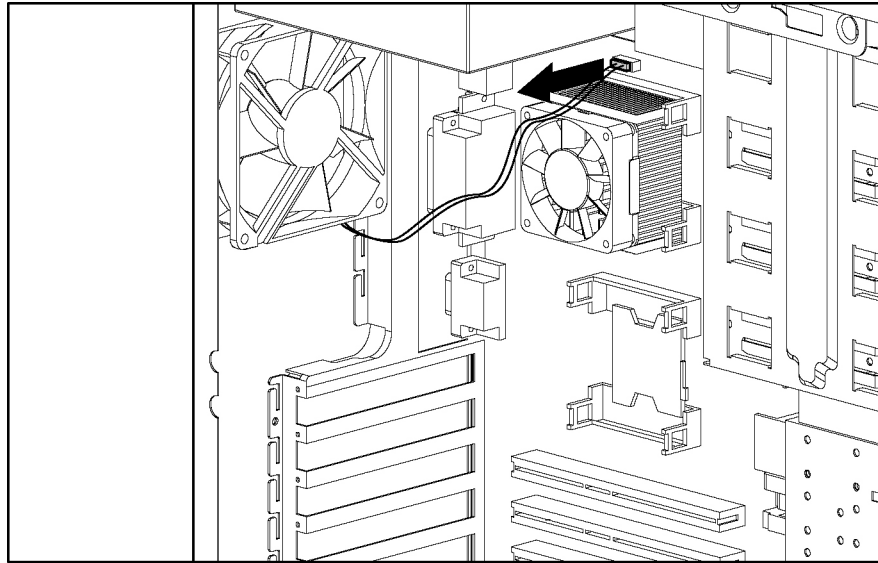


To replace the component, reverse the removal procedure.

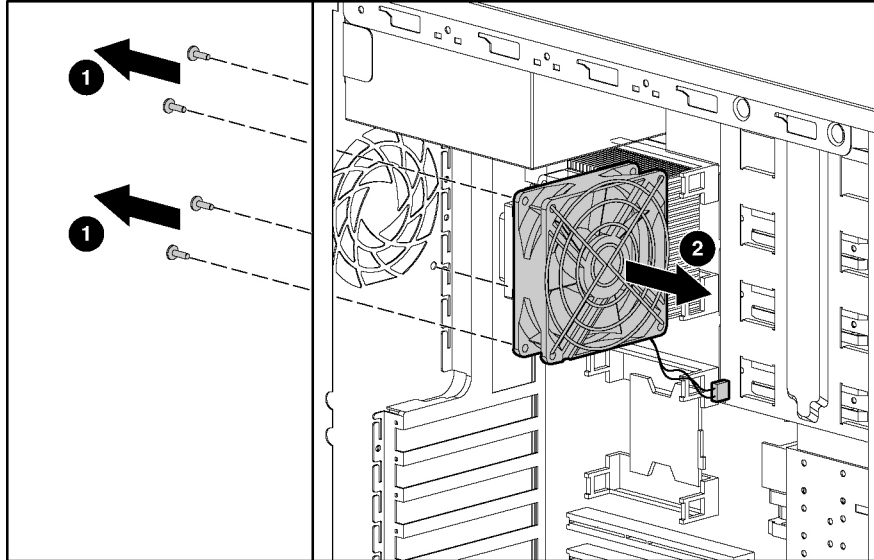
System Fan

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle. Refer to “Air Baffle” in this chapter.
5. Disconnect the fan power cable from the system board fan connector.



6. Remove the system fan:
 - a. Use a Torx T-15 screwdriver to remove the four mounting screws from the rear of the server.
 - b. Pull the fan out and away from the chassis.



To replace the component, reverse the removal procedure.

Power Supply



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

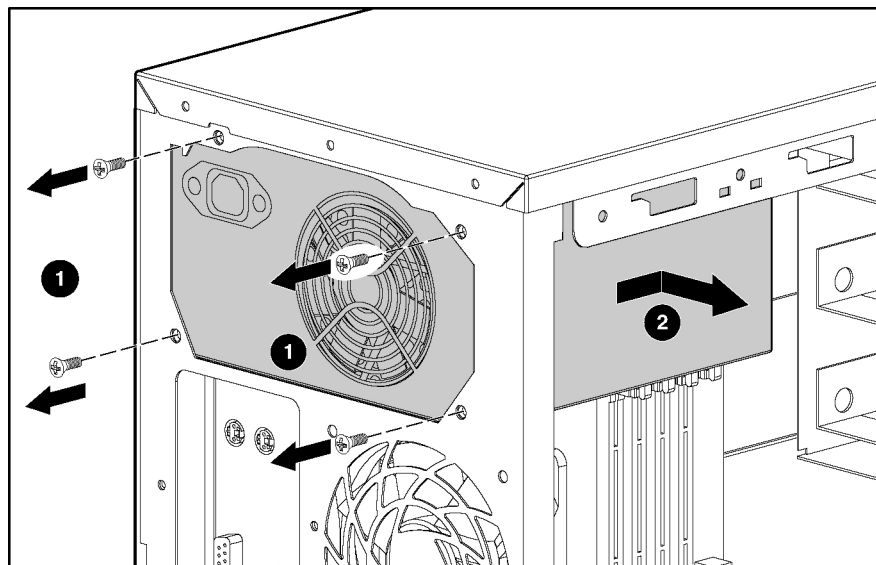
- Unplug the power cord before removing the power supply from the server.
- Install the power supply before connecting the power cord to the power supply.



CAUTION: When sliding the power supply out of the chassis, use one hand to support the weight of the power supply.

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle, as needed to access power supply connectors. Refer to “Air Baffle” in this chapter.
5. Disconnect all power cables from the devices and system board.
6. Remove the power supply:
 - a. Remove the four screws securing the power supply to the rear of the chassis.
 - b. Slide the power supply forward.
 - c. Lift the power supply from the chassis.



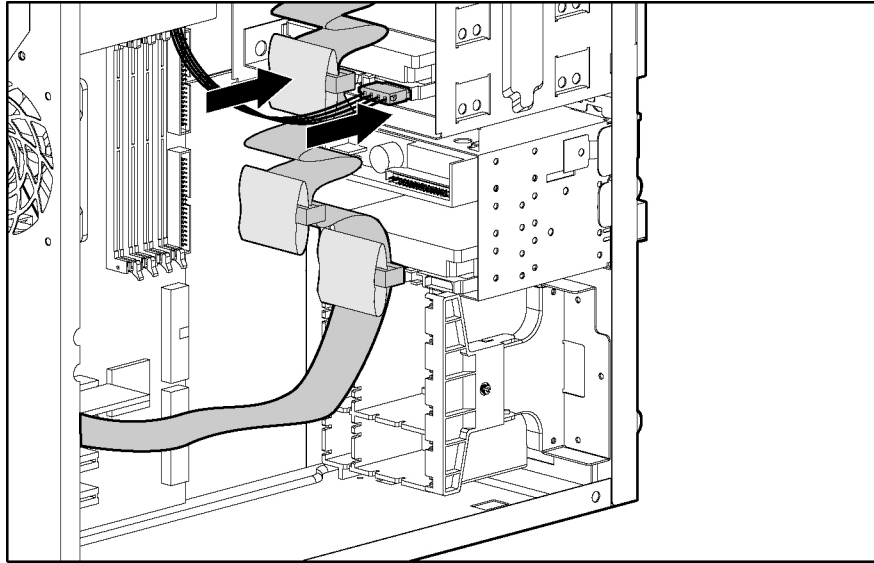
To replace the component, reverse the removal procedure.

Media Devices

Cable Routing Diagrams

SCSI Device Cabling

NOTE: Air baffle removed for clarity.



ATA Device Cabling

NOTE: Air baffle removed for clarity.

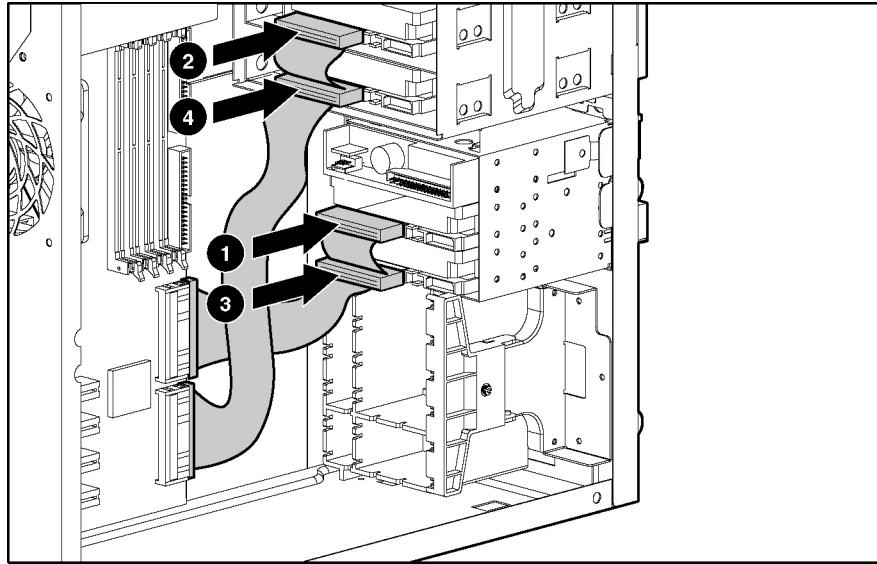


Table 2-1: ATA Cabling Routing

Item	Channel/Cable	Cable Connector	Drive Location
1	ATA/100 RAID primary controller	Device 0	Hard drive bay 2
2	ATA/100 RAID secondary controller	Device 0	Media bay 3
3	ATA/100 RAID primary controller	Device 1	Hard drive bay 3
4	ATA/100 RAID secondary controller	Device 1	Media bay 4

ATAPI Tape Drive Cabling

NOTE: Air baffle removed for clarity.

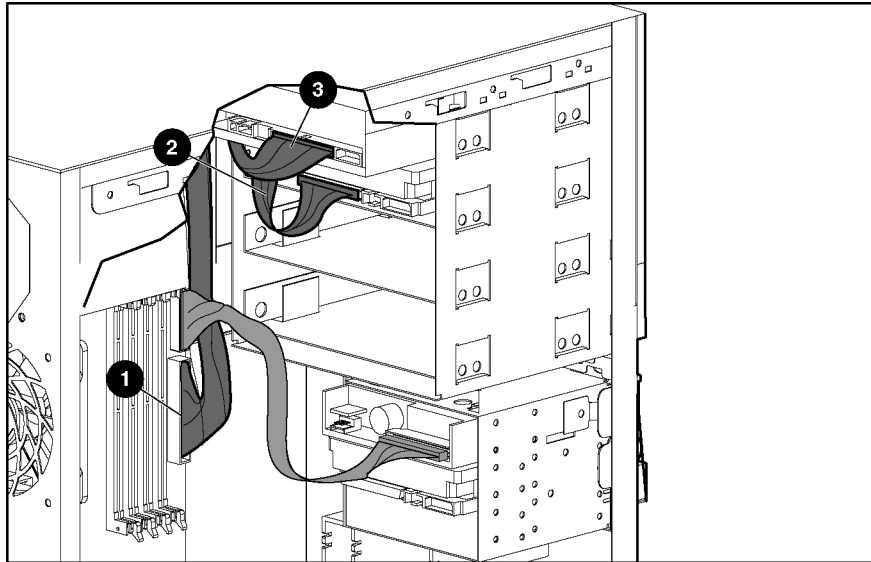


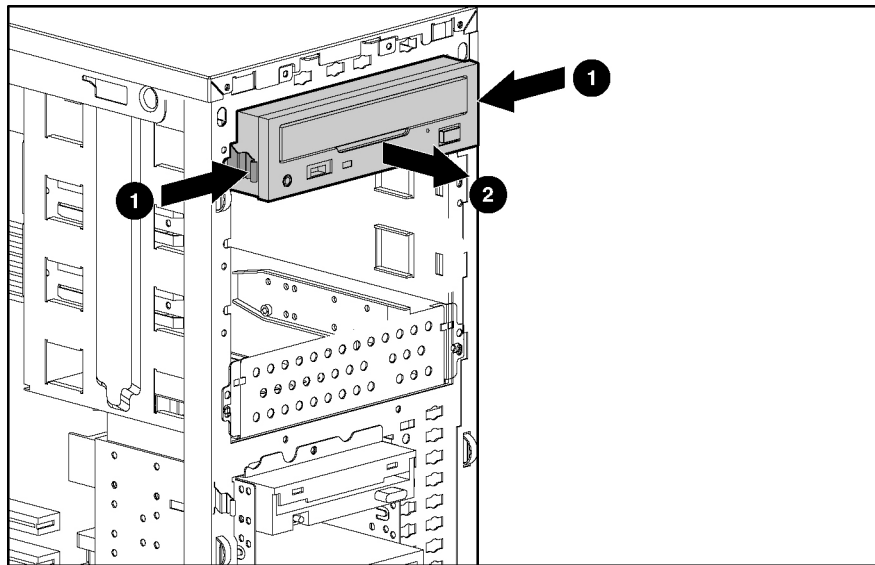
Table 2-2: ATAPI Tape Drive Cable Routing

Item	Connector
1	Integrated IDE channel
2	Device 1
3	Device 0

CD-ROM Drive

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the CD-ROM drive:
 - a. Disconnect the cables from the rear of the drive. Refer to “Cable Routing Diagrams” in this chapter.
 - b. Press the release latches.
 - c. Slide the drive out of the bay.



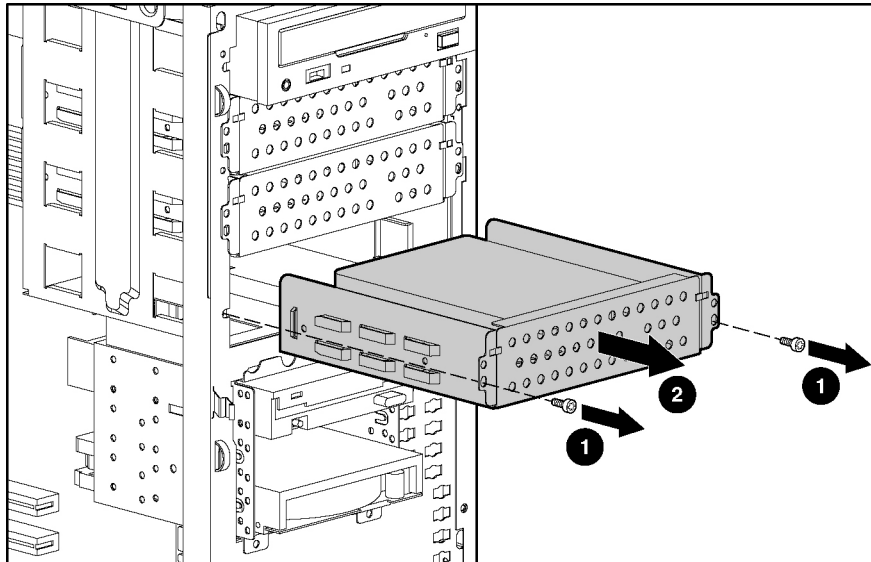
To replace the component, reverse the removal procedure.

Media Bay Drive Tray

NOTE: The drive trays in the removable media bays can be used to mount internal 3.5-inch devices. The rails mounted inside the drive trays can be removed and used to mount other devices in the removable media bays.

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the drive tray:
 - a. Remove the screws that secure the drive tray on each side.
 - b. Gently slide the drive tray out of the chassis.

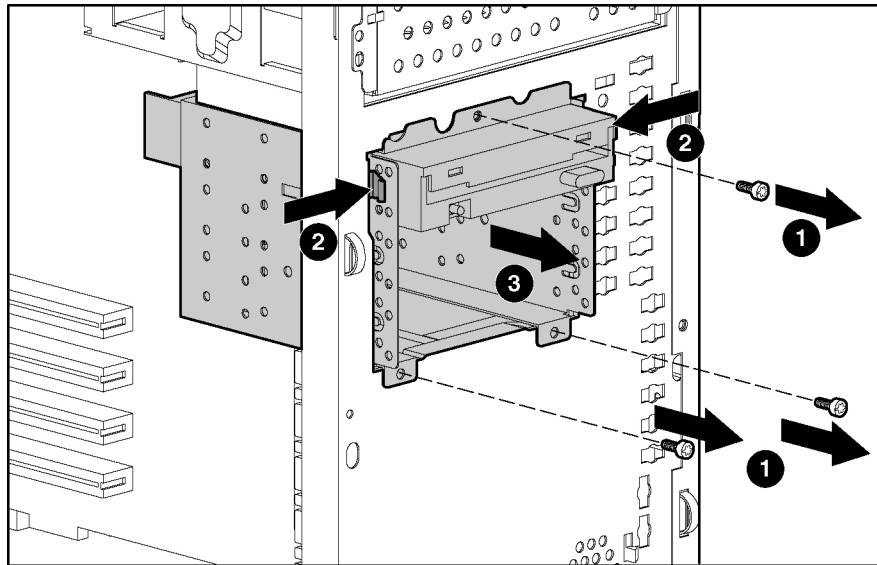


To replace the component, reverse the removal procedure.

Hard Drive Compartment

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Disconnect any cabling attached to the drives in the compartment. Refer to “Cable Routing Diagrams” in this chapter.
5. Remove the drive compartment:
 - a. Remove the three shipping screws.
 - b. Press the tabs on each side of the drive compartment.
 - c. Pull the drive compartment out of the chassis.

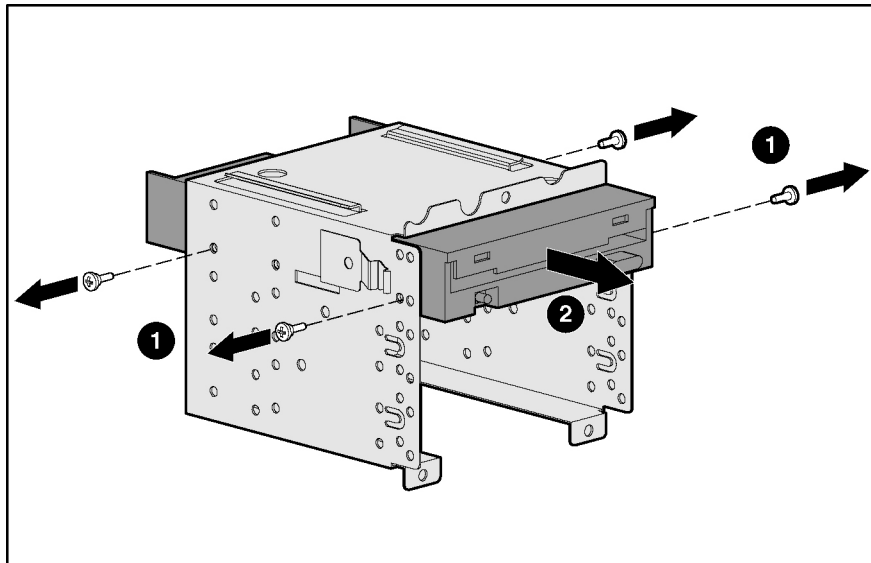


To replace the component, reverse the removal procedure.

Diskette Drive

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the hard drive compartment. Refer to “Hard Drive Compartment” in this chapter.
5. Remove the diskette drive:
 - a. Disconnect the cables from the rear of the drive. Refer to “Cable Routing Diagrams” in this chapter.
 - b. Remove the four screws that secure the drive to the compartment.
 - c. Slide the drive out of the bay.

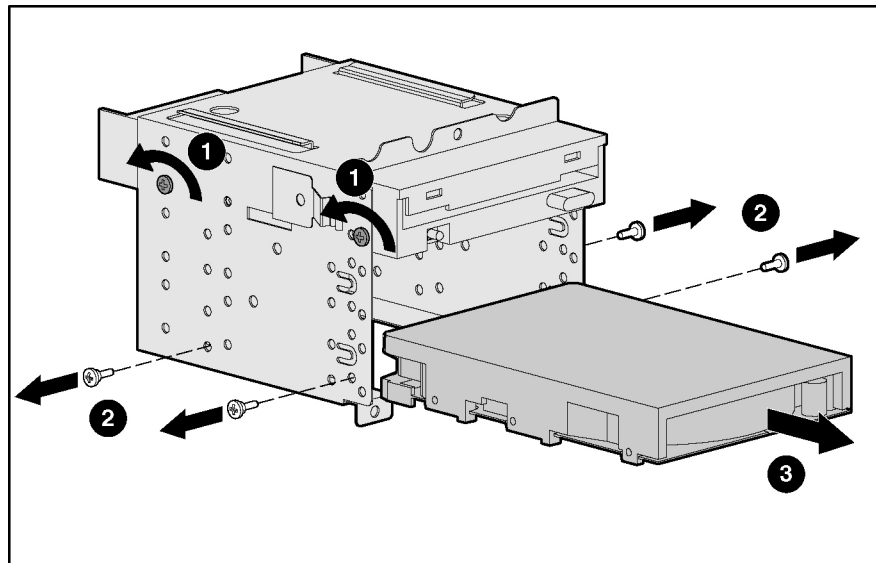


To replace the component, reverse the removal procedure.

Hard Drives

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Disconnect any cabling attached to the drives in the compartment. Refer to “Cable Routing Diagrams” in this chapter.
5. Remove the hard drive compartment. Refer to “Hard Drive Compartment” in this chapter.
6. Remove the hard drive:
 - a. Using a Phillips screwdriver, loosen the screws that secure the diskette drive.
 - b. Remove the two screws on each side of the hard drive to be removed.
 - c. Gently pull the hard drive out of the drive bay.



To replace the component, reverse the removal procedure.

ATA Drive Failure Scenarios

IMPORTANT: This section applies only to ATA models of the server.

When a drive fails:

- Insight Manager notifies you of the drive failure.
- If applicable to the operating system, the RAID status icon changes from green to red to indicate that a problem exists. The icon is represented as a round figure wearing sunglasses and is located in the tray bar at the lower right of the screen.
- Some operating systems also write to the console and/or a log file.

IMPORTANT: Some operating systems do not display the RAID status icon or the icon may display differently.

The following sections provide instructions for rebuilding an array when a drive fails.

RAID 0 Configurations

A drive failure in a RAID 0 configuration causes data loss across the entire array. To recover from a drive failure, the array must be rebuilt from scratch. To rebuild the array:

1. Determine the failed drive by viewing the information provided at Power-On Self Test (POST) and in the Integrated ATA RAID Configuration Utility by pressing the **F8** key.
2. Replace the failed drive. Refer to “Hard Drives” in this chapter.
3. Reboot the server and configure the array using the menu options in the Integrated ATA RAID Configuration Utility by pressing the **F8** key.

Refer to “Integrated ATA RAID Configuration Utility” in this chapter for information on the utility menu options.

RAID 1 Configurations

NOTE: This configuration is the only one where a spare pool configuration has any value. A spare provides a means by which a failed drive in a RAID 1 configuration can be rebuilt online.

In a RAID 1 configuration, use the following scenarios depending on whether an online spare is configured.

When an online spare is configured, the auto-rebuild process occurs without user intervention, removing the failed drive from the array and adding the spare to the array.

To reconfigure the online spare:

1. Replace the failed drive. Refer to “Hard Drives” in this chapter.
2. Run the Integrated ATA RAID Configuration Utility by pressing the **F8** key.
3. Configure the drive as a spare.

When an online spare is not configured, you must rebuild the array.

To rebuild the array:

1. Replace the failed drive. Refer to “Hard Drives” in this chapter.
2. Reboot the server.
3. Use one of the following methods to rebuild the array:
 - Run the Integrated ATA RAID Configuration Utility by pressing the **F8** key, and then run **Rebuild**.
 - Let the auto-rebuild take place when the operating system is up and running.

Refer to “Integrated ATA RAID Configuration Utility” in this chapter for information on the utility menu options.

RAID 1+0 Configurations

NOTE: RAID 1+0, RAID 0+1, and RAID 10 are used synonymously. Four ATA hard drives are required to support a RAID 1+0 configuration.

In a RAID 1+0 situation, multiple drive failures can be handled as long as both elements of a mirror have not failed.

To rebuild the array:

1. Replace the failed drive. Refer to “Hard Drives” in this chapter.
2. Reboot the server.
3. Use one of the following methods to rebuild the array:
 - Run the Integrated ATA RAID Configuration Utility by pressing the **F8** key, and then run **Rebuild**.
 - Let the auto-rebuild take place when the operating system is up and running.

Refer to “Integrated ATA RAID Configuration Utility” in this chapter for information on the utility menu options.

Integrated ATA RAID Configuration Utility

The setup screen of the Integrated ATA RAID Configuration Utility has three menu windows:

- Array Information
- Physical Drive Information
- Help Information

Array Information

The **Array Information** window of the setup screen displays all configured drive arrays. Use this section to create, delete, or edit the existing configurations. The window displays the drive arrays as a node in a tree, like Microsoft® Windows® Explorer. Open the node to display the properties of the array. Press the up arrow and down arrow keys to navigate the properties, and then press the **Enter** key to edit your selection.



CAUTION: Adding or removing drives from a configured array results in data loss.

Physical Drive Information

The **Physical Drive Information** window displays all the physical drives connected to the ATA/100 controller channels and the drive properties. Press the up arrow and down arrow keys to navigate this section. You cannot edit information in this window.

Help

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

- **Switch Windows** (the **Tab** key)—toggles control back and forth between the **Array Information** and the **Physical Drive Information** windows.
- **Auto Configure RAID 0** (the **F1** key)—automatically creates and configures a striped array based on the available physical drives installed.
- **Auto Configure RAID 1** (the **F2** key)—automatically creates and configures a mirrored array based on the available physical drives installed. You must have a minimum of two free hard drives in the array.
- **Auto Configure RAID 0+1** (the **F3** key)—automatically creates and configures a RAID 0+1 array based on the available physical drives installed. You must have four hard drives in the array.

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

- **Create Array** (the **F4** key)—creates a drive array. When this option is selected, a default array template is created. You must edit the array properties to complete the array creation. Use the arrow keys to highlight 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 0+1, and Spare. The default for the **Array Type** option is RAID 0.
 - **Drive(s)**—selects the drives for the array. This term refers to the drive number listed in the **Physical Drives Information** box, not the number of drives attached. Use the arrow keys, and then press the spacebar to select or deselect the drive or drives. Press the **Enter** key when done. No default exists for this setting.

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

IMPORTANT: RAID configurations do not support a stripe size less than 32 KB. You cannot change the stripe size of an array that has been configured already.

- **Drive Size**—displays the size of the array and cannot be edited. If the array type is stripe, then the drive size is the total of all the drives selected. When mirrored, the drive size is shown by an individual drive.
- **Build Array**—rebuilds the array using a spare drive. When **Build Array** starts, the utility prompts the user to select the target drive before rebuilding the array. This option applies only to RAID 1 and RAID 0+1 arrays.
- **Initialize Array**—clears the configuration information from drives attached to the integrated ATA controller.
- **Delete Array** (the **F5** key)—deletes a currently configured array.
- **Restore Old Configuration** (the **F6** key)—restores the configuration that existed before you entered the utility.
- **Edit Options** (the **F7** key)—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 Direct Memory Access (DMA) transfers, in which data is transferred directly from the memory to the hard drive without microprocessor intervention.

Pressing the **F7** key enables or disables these options. Press the **F7** key, move the cursor to the desired box, and then press the spacebar to select the option. When enabled, the option status boxes change from red to green.

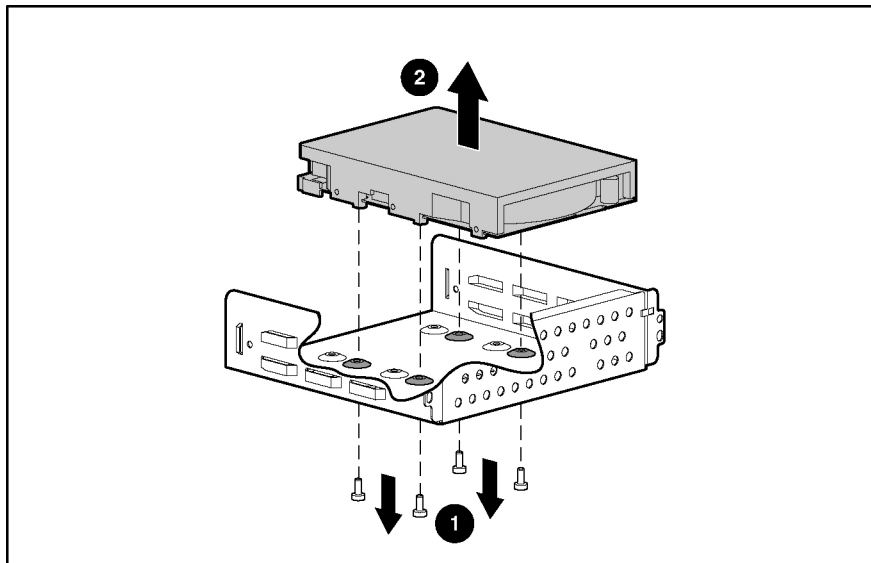
- **Save and Exit** (the **F10** key)—saves the configuration and exits the utility.

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

Removable Media Bay Devices

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle, as needed to access cabling. Refer to “Air Baffle” in this chapter.
5. Disconnect any cabling attached to the drives in the compartment. Refer to “Cable Routing Diagrams” in this chapter.
6. Remove the media bay drive tray. Refer to “Media Bay Drive Tray” in this chapter.
7. Remove the device from the tray:
 - a. Remove the screws from the bottom of the device.
 - b. Lift the device from the tray.



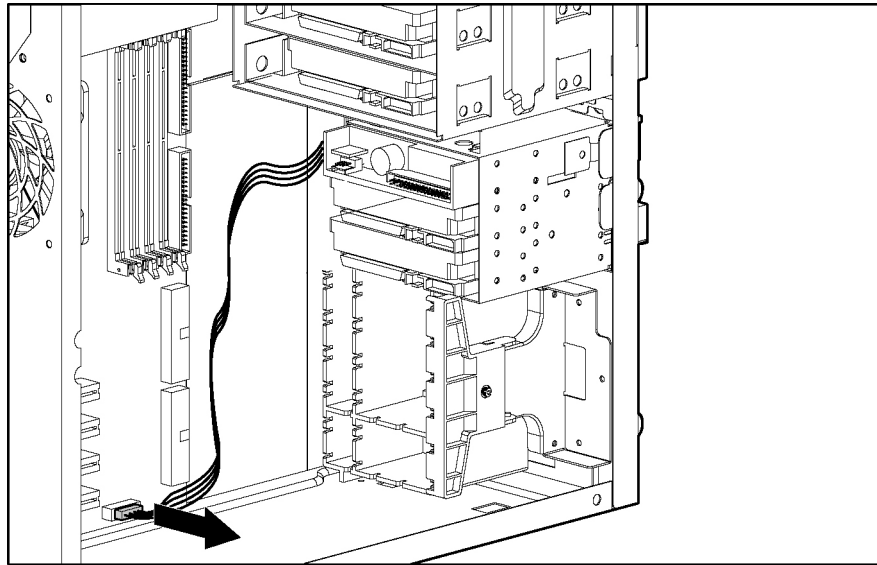
To replace the component, reverse the removal procedure.

Power Button/LED Assembly

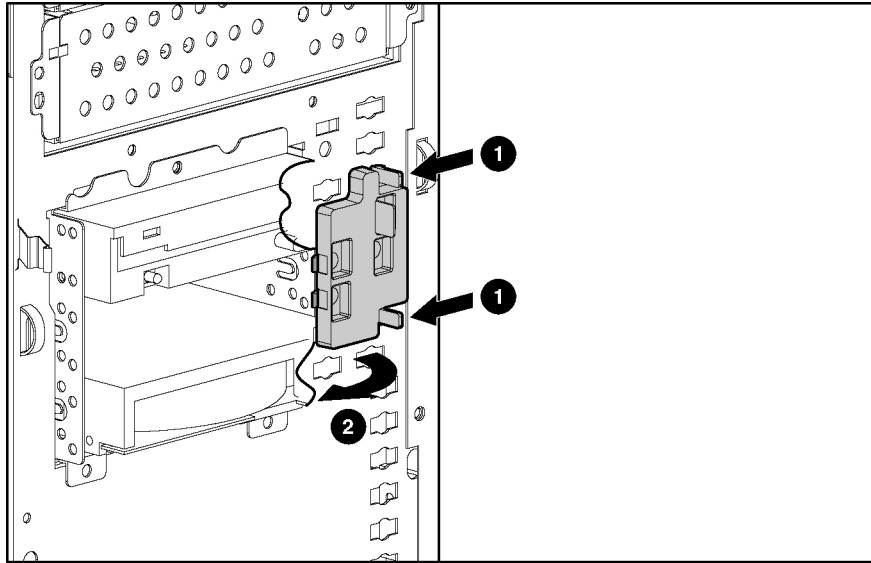
To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Disconnect the power button cable from the system board.

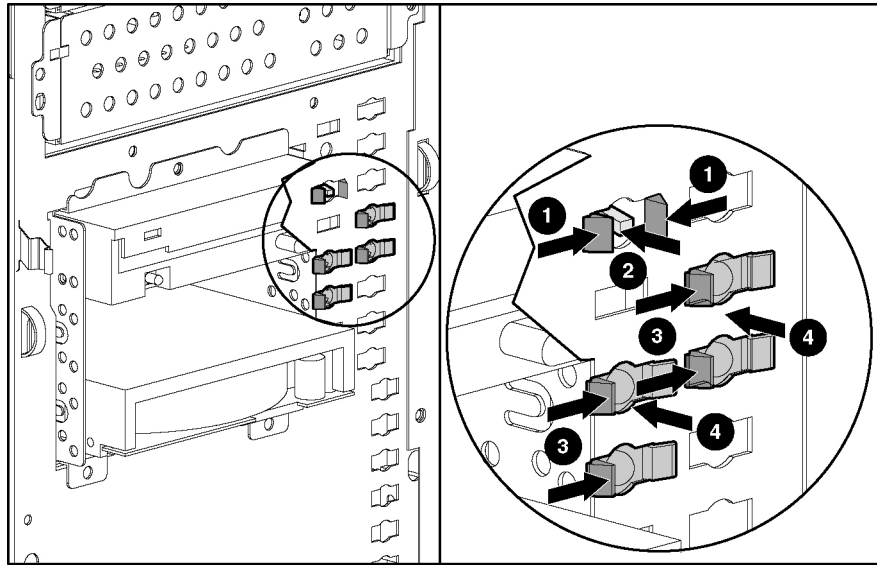
NOTE: Air baffle removed for clarity.



5. Remove the LED shield:
 - a. Press the locking levers.
 - b. Pull the shield away from the chassis.



6. Disengage the power button:
 - a. From the front of the chassis, squeeze the sides of the power button to disengage the two retainer clips from the chassis.
 - b. Gently remove the power button from the chassis.
7. Disengage the LEDs:
 - a. Squeeze the sides of the LED to disengage the two retainer clips from the chassis.
 - b. Gently remove the LED from the chassis.
 - c. Repeat for the other LEDs.

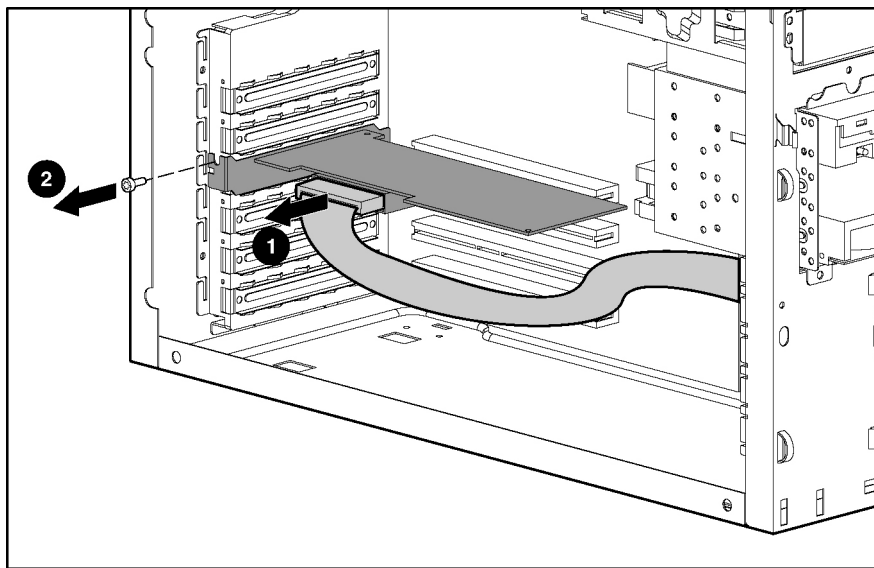


To replace the component, reverse the removal procedure.

SCSI Controller

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the SCSI controller:
 - a. Disconnect the SCSI cable attached to the SCSI controller.
 - b. Remove the screw that secures the SCSI controller to the slot.
 - c. Slide the SCSI controller out of the slot.



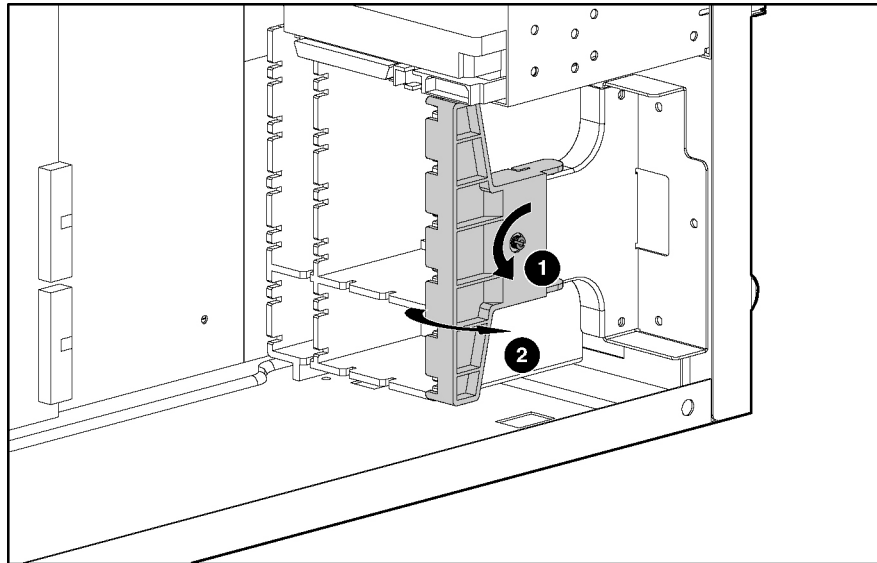
IMPORTANT: Always install the SCSI controller in slot 1.

To replace the component, reverse the removal procedure.

Expansion Slot Retainer

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Disconnect any cabling attached to the drives in the compartment. Refer to “Cable Routing Diagrams” in this chapter.
5. Remove the expansion slot retainer:
 - a. Loosen the screw.
 - b. Pivoting the retainer back towards the front of the chassis.



To replace the component, reverse the removal procedure.

Battery

If the 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. Always use a battery from the approved spare parts list in Chapter 1, “Illustrated Parts Catalog.”



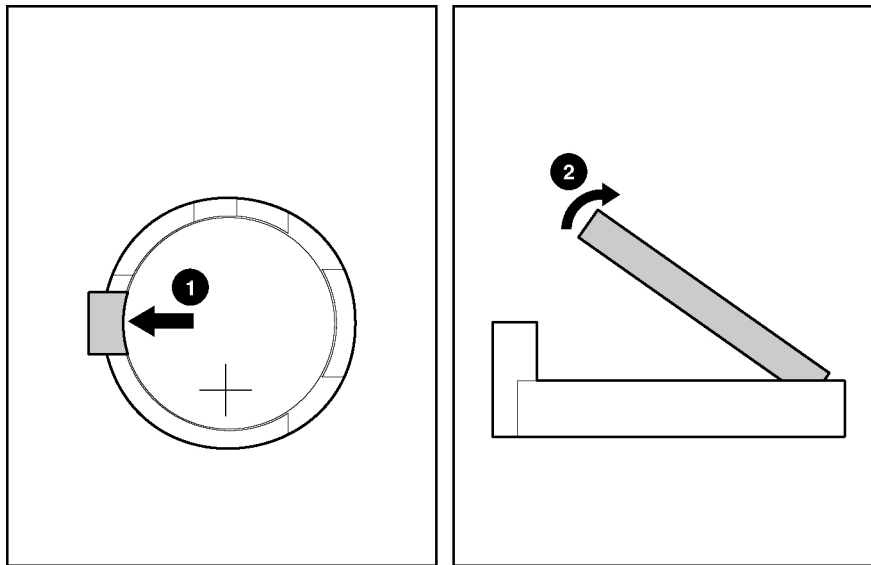
WARNING: The system board contains a lithium battery. A risk of fire and chemical burn exists if the battery is improperly handled. Do not disassemble, crush, puncture, or short external contacts, dispose of in water or fire, or expose the battery to temperatures higher than 60°C (140°F).

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Locate the battery on the system board. Refer to Chapter 4, “Component Identification.”

NOTE: If you have expansion boards installed, it may be necessary to remove them to gain access to the battery.

5. Remove the battery:
 - a. Press outward on the latch at the top of the battery holder to release the battery.
 - b. Lift the battery away from the holder.



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

To replace the component, reverse the removal procedure.

IMPORTANT: Positive (+) polarity must be positioned up.

IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU. Refer to the setup and installation guide.

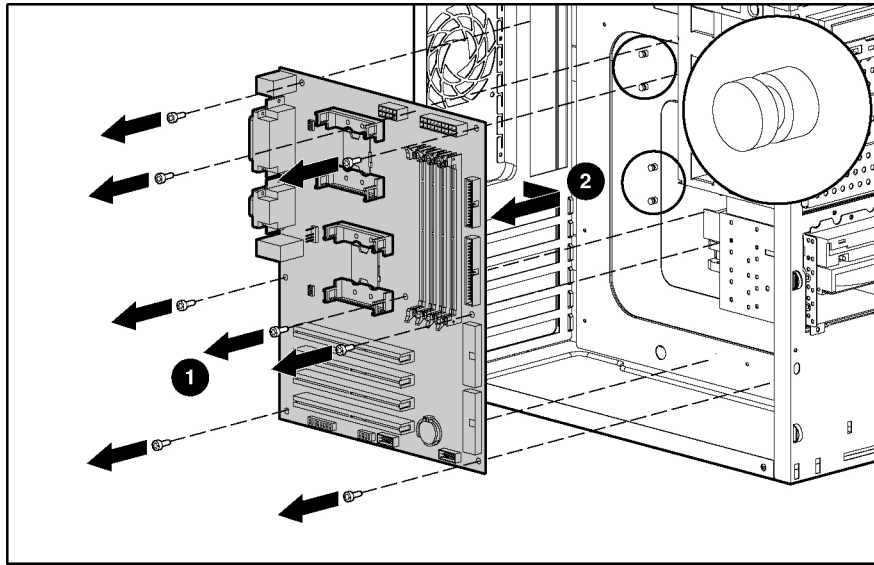
System Board

To remove the component:

1. Power down the server. Refer to “System Power Down” in this chapter.
2. Remove the front bezel. Refer to “Front Bezel” in this chapter.
3. Remove the access panel. Refer to “Access Panel” in this chapter.
4. Remove the air baffle. Refer to “Air Baffle” in this chapter.
5. Remove all DIMMs. Refer to “DIMMs” in this chapter.
6. Remove all processors. Refer to “Processor and Heatsink/Fan Assembly” in this chapter.
7. Remove the SCSI controller (SCSI models). Refer to “SCSI Controller” in this chapter.
8. Remove all expansion boards.
9. Disconnect all cables from the system board.

10. Remove the system board:

- a. Remove the seven screws securing the system board to the chassis.
- b. Slide the system board toward the front of the server to clear the four alignment standoffs.
- c. Gently pull the system board out of the chassis.



To replace the component, reverse the removal procedure.

Automatic Server Recovery-2

ASR-2 is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (abnormal end), or panic. A system fail-safe timer, the ASR-2 timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR-2 increases server availability by restarting the server within a specified time after a system hang or shutdown. At the same time, the Insight Manager 7 console notifies you by sending a message to a designated pager number that ASR-2 has restarted the system. You can disable ASR-2 from the Insight Manager 7 console or through RBSU.

Insight Manager 7

Insight Manager 7 is a Web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a Web browser. Insight Manager 7 provides device management capabilities that consolidate and integrate management data from HP and third-party devices.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

Integrated ATA RAID Configuration Utility (ATA models only)

Supports and configures RAID arrays. The features include:

- Optimized drive access
- RAID support before operating system loads
- Automatic detection and configuration
- Ability to handle configuration changes
- 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 error log, spare drive, and rebuilding

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. ROM will automatically configure drives to RAID 0 if you do not run the **F8** utility.

To turn off the Integrated ATA RAID Management:

- In Microsoft operating systems, right-click on the tray icon and select **Quit Spy**.
- In Novell operating systems, enter `Unload Spy` at the console.
- In Linux operating systems, enter `Spy-Stop` at the prompt.

Turning off this utility turns off the ability for online spares to be rebuilt if a drive failure occurs. You need to power up the server and rebuild the spare in the RAID Configuration Utility by pressing the **F8** key.

To turn on the Integrated ATA RAID Configuration Utility:

- In Microsoft operating systems, power up the server or log off the server and then log back on.
- In Novell operating systems, enter `Load Spy` at the console.
- In Linux operating systems, enter `Spy-Start` at the prompt.

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML time stamps each event with 1-minute granularity.

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

- From within Insight Manager 7
- From within Survey Utility
- From within operating system-specific IML viewers
 - For NetWare: IML Viewer
 - For Windows: Event Viewer or IML Viewer
 - For Linux: IML Viewer Application
- From within Enterprise Diagnostics LX32 Utility

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

Management Agents

The server is equipped with the latest Management Agents, allowing easy manageability of the server through Insight Manager 7 software, and third-party SNMP management platforms. Management agents monitor key subsystems that are instrumental in making health, configuration, and performance data available to the agent software. The agents act upon that data by initiating alarms in the event of faults. The agents also provide updated management information, such as network interface or subsystem performance statistics, to the management systems.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or refer to the HP website (www.hp.com/servers/manage).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility provides support for the following functions:

- Configuring one or more logical drives using physical drives on one or more SCSI buses
- Viewing the current logical drive configuration
- Deleting a logical drive configuration

If you do not use the utility, ORCA will default to the standard configuration.

For more information about array controller configuration, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

Power-On Self-Test

POST is a series of diagnostic tests that checks firmware and assemblies to ensure that the server is functioning properly. This utility runs automatically every time the server is powered up.

For the normal power-up sequence and diagnosis of problems encountered during POST, refer to the setup and installation guide.

ROM-Based Setup Utility

RBSU performs a wide range of configuration activities, including the following:

- Configuring server devices and installed options
- Viewing server information
- Selecting the operating system
- Selecting the primary boot controller

To make selections within RBSU, use the following keys:

- Access RBSU by pressing the **F9** key when prompted during startup.
- Use the arrow keys navigate through the menu system.
- Make selections by pressing the **Enter** key.
- Cancel selections by pressing the **Esc** key.
- Save selections and changes by pressing the **F10** key.

For information on RBSU not found in this guide, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

ROMPaq

Flash ROM enables you to upgrade the firmware (BIOS) with system or option ROMPaq utilities. To upgrade the BIOS, insert a ROMPaq diskette into the diskette drive and boot the system.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available ROM revisions. 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 server from starting.

For more information about the ROMPaq utility, refer to the HP website (www.hp.com/servers/manage).

SmartStart Software

The SmartStart CD is used to load the server software, thereby achieving a well-integrated server and ensuring maximum dependability and supportability. The SmartStart CD contains diagnostic utilities and ROMPaq tools.

SmartStart software enables you to:

- Install selected server operating systems using packaged product CDs.
- Install the latest optimized drivers.
- Test server hardware using the new Enterprise Diagnostics LX32 Utility.
- Update the latest system or option ROM using the ROM Update Utility.
- Install software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to the complete list of ProLiant System Software on the website.

To install the SmartStart software:

1. Press the **F9** key to run RBSU and configure the primary operating system.
2. Locate the SmartStart CD in the HP ProLiant Essentials Foundation Pack.
3. After you power 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. Handle the CD by its edges, not by the flat surfaces of the disc.
5. When the busy indicator turns 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.

For more information about SmartStart software, refer to the HP website (www.hp.com/servers/smartstart).

SmartStart Autorun Menu

The SmartStart Autorun Menu enables you to access the latest system software directly from the operating system environment, simply by inserting the SmartStart CD into a configured system. The Autorun Menu enables you to install the latest HP ProLiant Support Packs.

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a set of Microsoft MS-DOS®-based utilities that enables you 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.

For more information, and to download the SmartStart Scripting Toolkit, refer to the HP website (www.hp.com/servers/sstoolkit).

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. To access the Enterprise Diagnostics LX32 Utility, refer to the SmartStart CD or refer to the HP website (www.hp.com/servers/manage).

For more information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

Survey Utility

Survey Utility gathers critical hardware and software information on servers running Microsoft Windows NT®, Novell NetWare, SCO OpenServer, or SCO UnixWare operating systems.

IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, refer to the HP FTP site (<ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf>).

If a significant change occurs between data-gathering intervals, the Survey Utility marks the previous information and overwrites the Survey text files to reflect the latest changes in the configuration.

To install the Survey Utility, use the Management CD in the HP ProLiant Essentials Foundation Pack or refer to the HP website (www.hp.com/servers/manage).

System Online ROM Flash Utility

The Online ROM Flash Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Microsoft Windows NT, Windows 2000, Windows Server 2003, Novell NetWare, and Linux operating systems

IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, refer to the HP FTP site (<ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf>).

- Integrates with other 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

To download the tool and for more information, refer to the HP website (www.compaq.com/support/files/server/us/webdoc/rom/RemoteROMUser-001.pdf).

Additional Information

For detailed information about each of these diagnostic tools, refer to the *Servers Troubleshooting Guide* on the Documentation CD. For the most recent version of the guide, refer to the HP website (www.hp.com).

Component Identification

Front Panel Components

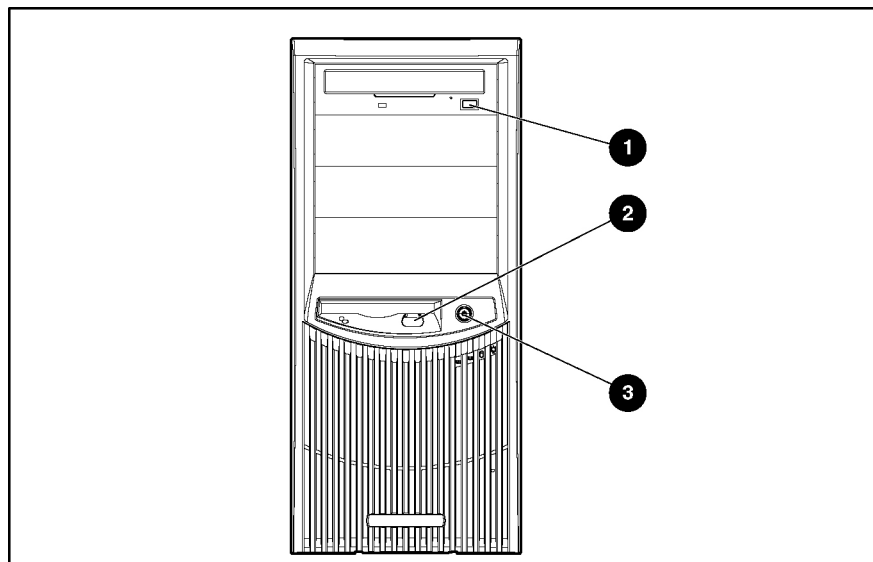


Table 4-1: Front Panel Components

Item	Description
1	CD-ROM drive eject button
2	Diskette drive eject button
3	Power On/Standby button

IMPORTANT: The Power On/Standby button does not remove all power from the system. The Standby mode removes power from most of the electronics and the drives, but portions of the power supply and some internal circuitry remain active. To remove power completely, refer to “System Power Down” in Chapter 2, “Removal and Replacement Procedures.”

Front Panel LEDs

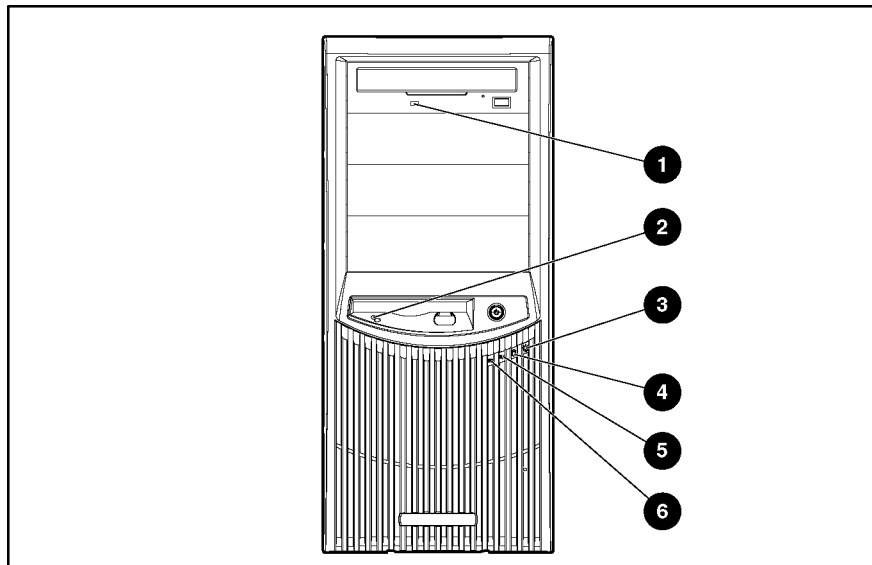


Table 4-2: Front Panel LEDs

Item	LED Description	Status
1	CD-ROM drive activity	On = Drive activity exists.
2	Diskette drive activity	Off = No drive activity exists.
3	System power	Green = Server is on. Amber = Server is in standby mode. Off = Server is off; power cord is disconnected.
4	Hard drive activity	Green or flashing green = Hard drive activity exists. Off = No hard drive activity exists.
5	NIC link/activity	Green = Network link exists. Flashing green = Network activity exists. Off = No network link exists or server in standby.
6	Internal health	Green = Server is powered up and server health is good. Amber = Server health is degraded; a pre-failure warning exists. Red = Server health is critical; attention is required. Off = Server is off; power cord is disconnected.

Media Components

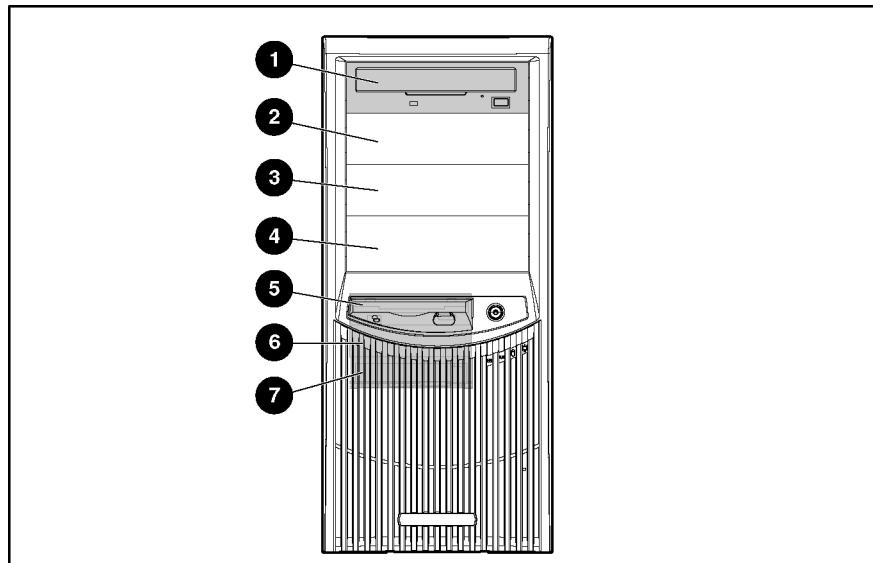


Table 4-3: Media Components

Item	Description	Location	Dimensions
1	IDE CD-ROM drive	Media bay 1	13.34 × 4.06 cm
2	Available removable media bay	Media bay 2	(5.25 × 1.60 in)
3	Available removable media bay	Media bay 3	
4	Available removable media bay	Media bay 4	
5	Diskette drive	Hard drive bay 1	8.90 × 2.54 cm
6	Hard drive bay	Hard drive bay 2	(3.5 × 1.0 in)
7	Hard drive bay	Hard drive bay 3	

Rear Panel Components

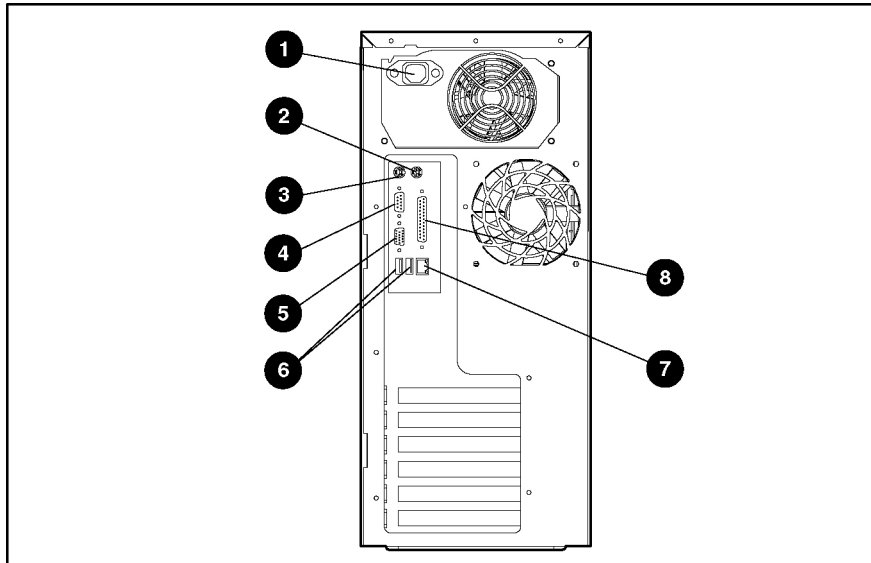


Table 4-4: Rear Panel Components

Item	Description
1	Power connector
2	Mouse connector
3	Keyboard connector
4	Serial connector
5	Video connector
6	USB connectors
7	RJ-45 connector
8	Parallel connector

Rear Panel LEDs

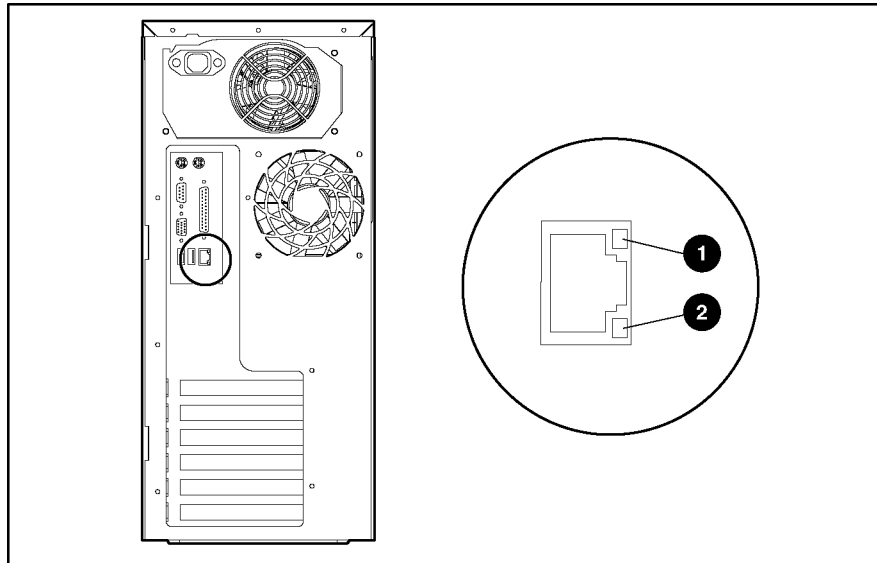


Table 4-5: Rear Panel LEDs

Item	LED Description	Status
1	Network activity	Flashing green = Network activity exists. Off = No network activity exists.
2	Network link	Green = Network link exists. Off = No network link exists.

System Board Components

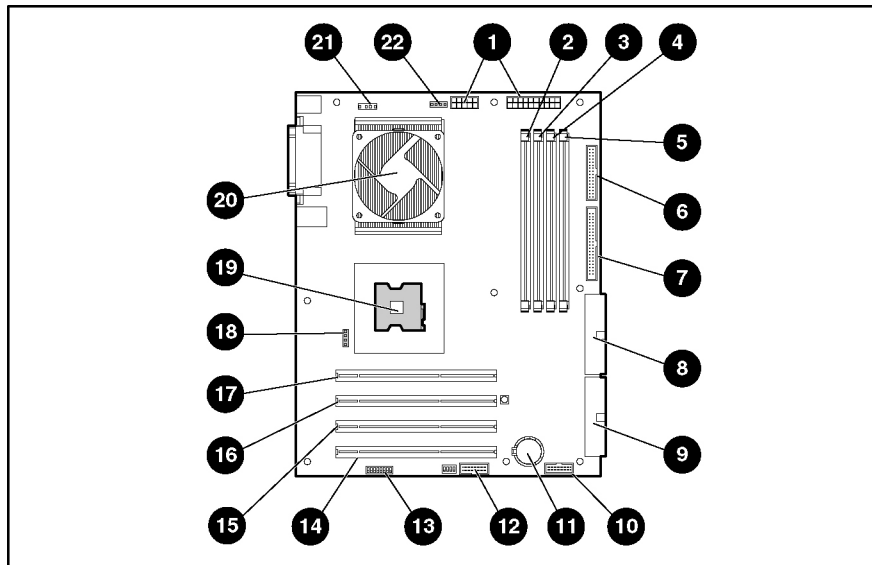


Table 4-6: System Board Components

Item	Description	Item	Description
1	Power supply connectors	12	Remote Insight connector (30-pin)
2	DIMM slot 4	13	System configuration switch
3	DIMM slot 3	14	Expansion slot 4
4	DIMM slot 2	15	Expansion slot 3
5	DIMM slot 1	16	Expansion slot 2
6	Diskette drive connector	17	Expansion slot 1
7	IDE connector (ATAPI devices)	18	Processor fan connector 2
8	ATA/100 RAID primary connector	19	Processor socket 2
9	ATA/100 RAID secondary connector	20	Processor socket 1 (populated)
10	Power button assembly connector	21	System fan connector
11	System battery	22	Processor fan connector 1

Note: In SCSI model servers, the SCSI controller populates expansion slot 1.

System Configuration Switch



CAUTION: Clearing nonvolatile RAM (NVRAM) deletes the system configuration. For instructions on configuring the server, refer to the setup and installation guide.

Table 4-7: System Configuration Switch Settings

Position	Default	Description	Status
1	Off	Reserved	—
2	Off	Lock configuration	Off = Configuration can be changed On = Configuration is locked
3	Off	Tower/rack configuration	Off = Tower configuration On = Rack configuration
4	Off	Diskette boot	Off = Server uses RBSU diskette boot selection On = User can override RBSU diskette boot selection and boot from diskette
5	Off	Password override	Off = Password protection is active On = User can override password
6	Off	Clear CMOS and NVRAM	Off = No function On = Server configuration is erased at power-up
7	Off	Reserved	—
8	Off	Reserved	—

Note: Switch positions 1, 7, and 8 are reserved for authorized service providers only.

System ID Switch

The system ID switch is reserved for use by authorized service providers only. Do not change the indicated default settings.

Jumper Settings

SCSI Device Jumper Settings

No two SCSI devices connected to the same SCSI controller can have the same SCSI ID. If another SCSI device is connected to the controller, check its SCSI ID before beginning the installation procedure for the additional device. Jumpers located on each device set the SCSI ID. For more information, refer to the SCSI device option documentation.

IDE Device Jumper Settings

When installing any IDE devices (ATA hard drives, ATAPI CD-ROM drives, or ATAPI tape drives), be sure that the jumper on the device is set to Cable Select (CS). This setting allows the cable to automatically assign the device ID of an IDE drive attached to the cable. For information on installing and cabling IDE devices, refer to the setup and installation guide.

System Board LEDs

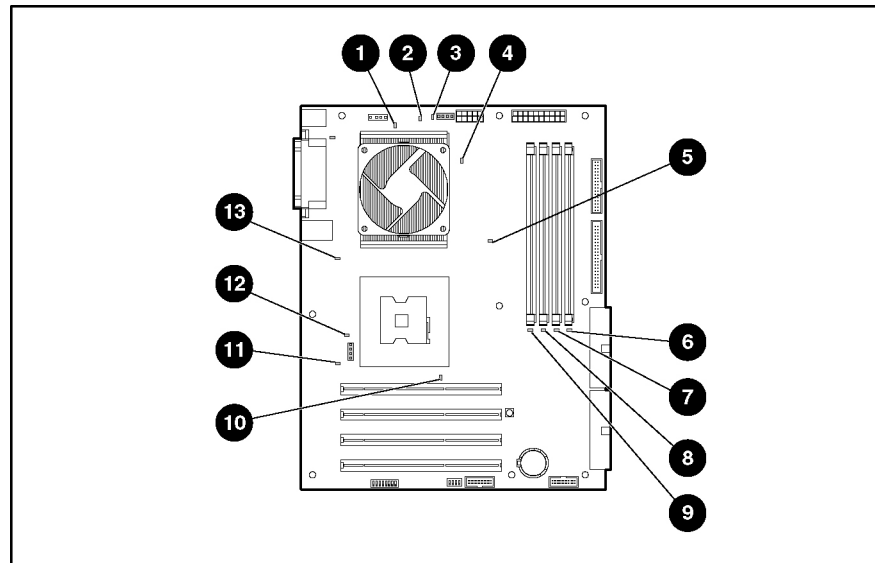


Table 4-8: System Board LEDs

Item	LED Description	Status
1	System fan failure	Amber = The system fan has failed or is not installed. Off = The system fan is functioning.
2	Processor 1 failure	Amber = Processor 1 has failed or is not installed. Off = Processor 1 is functioning.
3	Processor fan 1 failure	Amber = Processor fan 1 has failed or is not installed. Off = Processor fan 1 is functioning.
4	Processor power connector not installed	Amber = Power connector is not installed. Off = Power connector is installed.
5	Integrated PPM failure	Amber = The PPM has failed. Off = The PPM is functioning.
6	DIMM 1 failure	Amber = The DIMM is failed.
7	DIMM 2 failure	Off = The DIMM is functioning.
8	DIMM 3 failure	
9	DIMM 4 failure	
10	Processor 2 failure	Amber = Processor 2 has failed or is missing. Off = Processor 2 is functioning.
11	System overtemperature	Amber = The temperature threshold has been exceeded. Off = The temperature is normal.

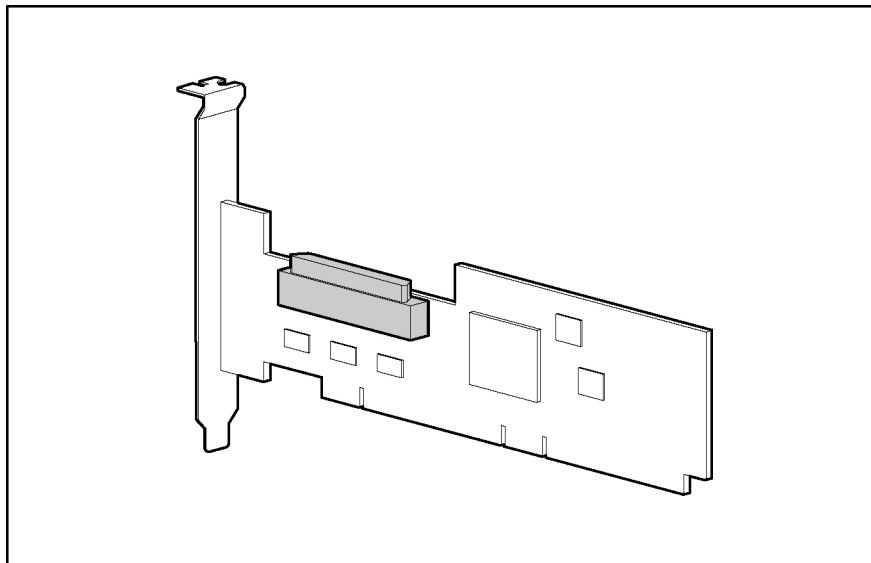
continued

Table 4-8: System Board LEDs *continued*

Item	LED Description	Status
12	Processor fan 2 failure	Amber = Processor fan 2 has failed or is not installed. Off = Processor fan 2 is functioning.
13	AC power	Green = The power supply is attached to AC power. Off = The AC power cord is not connected to the power supply, the power supply connector is not attached to the system board, or the power supply has failed.

SCSI Controller Components

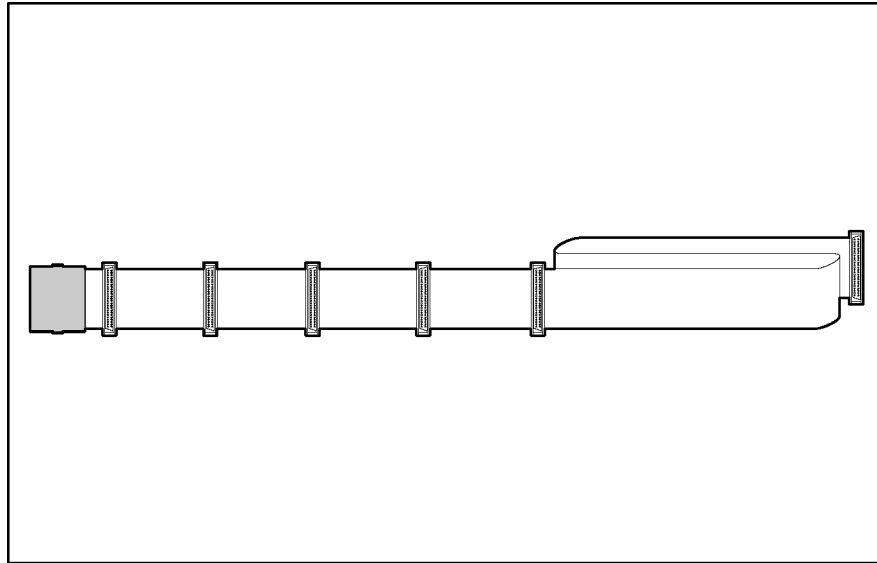
The SCSI controller has a single SCSI connector to support the internal SCSI bus.



SCSI Cable Components

Before performing SCSI cabling procedures, identify the SCSI cable components.

The SCSI cable supports up to five SCSI devices and comes with a terminator on the end. One cable is included with SCSI models of the server.



ATA Cable Components

Before performing ATA cabling procedures, identify the ATA cable components.

The type of ATA cable that ships with the server supports up to two ATA devices. Two cables are included with ATA models of the server.

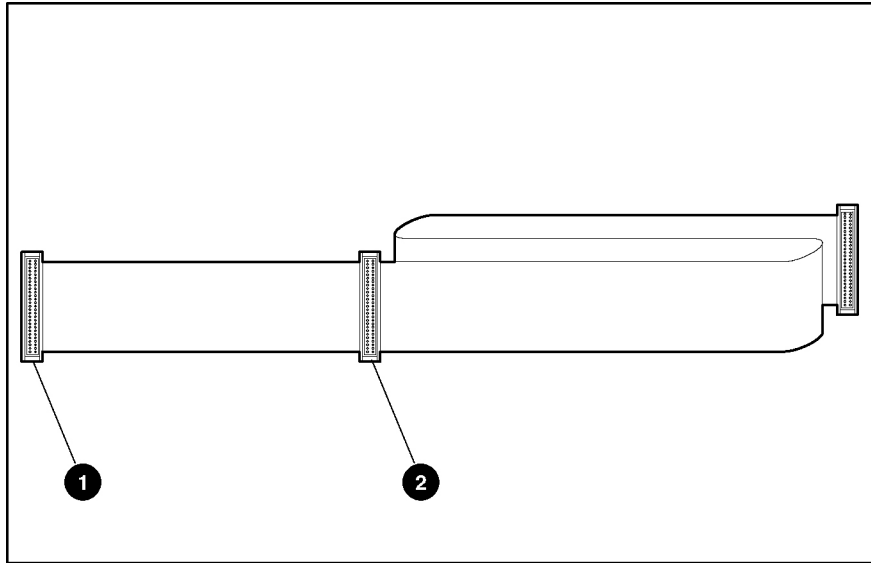


Table 4-9: ATA Cable Components

Item	Description
1	Device 0 (primary)
2	Device 1 (secondary)

Specifications

Server Unit

Table 5-1: Server Unit Specifications

Specification	Value
Dimensions	
Height	42.7 cm (16.8 in)
Width	19.1 cm (7.5 in)
Depth	48.5 cm (19.1 in)
Approximate weight (depending on options)	18.18 kg (40 lb)
Input specifications	
Rated input voltage	100 VAC to 199 VAC (U.S.)
	200 VAC to 240 VAC (International)
Rated input frequency	50 Hz to 60 Hz
Rated input current	6 A (100 VAC to 199 VAC)
	3 A (200 VAC to 240 VAC)
Input power (rated)	462 W
Output specifications	
Rated steady-state power	300 W
Maximum peak power	400 W
BTUs for tower model	935 BTU/hr (based on 274 W input)
Acoustic noise	
Idle (hard drives spinning)	5.5 NPEL (Bels)/45 AVERAGE SPL (dba)
Operating (random seeks to hard drives)	6.0 NPEL (Bels)/45 AVERAGE SPL (dba)

Environmental Specifications

Table 5-2: Environmental Specifications

Specification	Value
Temperature range*	
Operating	50°F to 95°F (10°C to 35°C)
Shipping	-40°F to 158°F (-40°C to 70°C)
Maximum wet bulb temperature	82.4°F (28°C)
Relative humidity (noncondensing)	
Operating	10% to 90%
Non-operating	5% to 95%
* All temperature ratings shown are for sea level. The specification uses an altitude derating of 1°C per 300 m to 3,000 m (1.8°F per 1,000 ft to 10,000 ft).	

DIMMs

Table 5-3: DIMM Specifications

Specification	Value
Size	128 MB, 256 MB, and 512 MB, and 1 GB
Speed	DDR 266 MHz
Type	ECC Registered PC2100 DDR SDRAM DIMMs

Diskette Drive

Table 5-4: 1.44-MB Diskette Drive Specifications

Specification	Value
Size	8.89 cm (3.5 in)
LEDs (front panel)	Green
Read/write capacity per diskette (high/low density)	1.44 MB/720 KB
Drives supported	1
Drive height	Third, 1 inch
Drive rotation	300 rpm
Transfer rate bits/sec (high/low)	500 Kbps/250 Kbps
Bytes/sector	512
Sectors per track (high/low)	18/9
Tracks per side (high/low)	80/80
Access times	
Track-to-track (high/low)	3 ms/6 ms
Average (high/low)	94 ms/169 ms
Settling time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

IDE CD-ROM Drive

Table 5-5: IDE CD-ROM Specifications

Specification	Value
Applicable disk	CD-ROM (modes 1 and 2); mixed mode (audio and data combined); CD-DA; Photo CD (single- and multiple-session), CD-XA (mode 2, forms 1 and 2); CDI ready; CD-WO
Capacity	650 MB
Rotational speed	5,200 rpm
Block size	2,328 bytes (CD-XA)
	2,340 bytes, 2,336 bytes, 1,024 bytes (mode 2)
	2,048 bytes, 1,024 bytes (mode 1)
	2,352 bytes (CD-DA)

continued

Table 5-5: IDE CD-ROM Specifications *continued*

Specification	Value
Dimensions	
Height	42.9 mm (1.69 in)
Width	208.0 mm (8.2 in)
Depth	150.1 mm (5.91 in)
Weight	0.950 kg (2.09 lb)
Data transfer rate	
Sustained	150 KBps (single), 1,500 to 4,800 KBps (10X to 32X)
Burst	150 KBps to 4,800 KBps
Interface	IDE (ATAPI)
Access times (typical)	
Full stroke	<150 ms
Random	<100 ms
Diameter	12 cm, 8 cm (4.7 in, 3.15 in)
Center hole	15 mm (0.6 in)
Thickness	1.2 mm (0.05 in)
Track pitch	1.6 μ m
Cache/buffer	128 KB
Startup time	<7 seconds
Stop time	<4 seconds
Laser parameters	
Type	Semiconductor Laser GaAlAs
Wave length	780 \pm 25 nm
Divergence angle	53.5° \pm 1.5°
Output power	0.14 mW
Operating conditions	
Temperature	5°C to 45°C (41°F to 113°F)
Humidity	5% to 90% (10% to 80%)

ATA Hard Drives

Table 5-6: ATA Hard Drive Specifications

Specification	40 GB 7.2K rpm	80 GB 7.2K rpm	160 GB 7.2K rpm
Capacity	40,020.0 MB	80,020.0 MB	160,040.0 MB
Height	26.1 mm (1.028 in)	26.1 mm (1.028 in)	26.1 mm (1.028 in)
Width	101.6 mm (4 in)	101.6 mm (4 in)	101.6 mm (4 in)
Interface	Ultra ATA/100	Ultra ATA/100	Ultra ATA/100
Transfer rate synchronous (max)	100 MBps	100 MBps	100 MBps
Seek time (typical, including setting)			
Single track	1.2 ms	3.0 ms	3.0 ms
Average	<9.00 ms	<9.00 ms	<9.00 ms
Full stroke	<30.0 ms	<30.0 ms	<30.0 ms
Rotational speed	7,200 rpm	7,200 rpm	7,200 rpm
Physical configuration			
Logical blocks	78,165,360	156,301,488	312,581,808
Bytes/sector	512	512	512
Operating temperature			
Celsius	5° to 55°	5° to 55°	5° to 55°
Fahrenheit	41° to 131°	41° to 131°	41° to 131°

Wide Ultra3 SCSI Hard Drives

Table 5-7: Wide Ultra3 SCSI Hard Drive Specifications

Specification	18.2 GB 10 K rpm	36.4 GB 10 K rpm
Capacity	18,209.3 MB	36,419.2 MB
Height	25.4 mm (1 in)	25.4 mm (1 in)
Width	101.6 mm (4.0 in)	101.6 mm (4.0 in)
Interface	Wide Ultra3 SCSI	Wide Ultra3 SCSI
Transfer rate synchronous (max)	160 MBps	160 MBps
Seek time (typical, including setting)		
Single track	0.7 ms	0.7 ms
Average	5.4 ms	5.4 ms
Full stroke	11.0 ms	11.0 ms
Rotational speed	10,000 rpm	10,000 rpm
Physical configuration		
Bytes/sector	512	512
Logical blocks	35,565,080	71,132,000
Operating temperature		
Celsius	10° to 35°	10° to 35°
Fahrenheit	50° to 95°	50° to 95°

NC7760 PCI Gigabit Server Adapter (Integrated/Embedded)

Table 5-8: NC7760 PCI Gigabit Server Adapter (Integrated/Embedded) Specifications

Specification	Value
Network interface	1000Base-T/100Base-TX/10Base-T
Compatibility	IEEE 802.3am, 802.3u, 802.3
Data transfer method	32-bit, 33-MHz PCI bus master
Network transfer rate	10/100/1000 MBps
Connector	RJ-45
Compliance	PCI 2.2
OS support	For specific OS support, refer to www.hp.com/products/servers/platforms
Management support	Wake-on-LAN (WOL), Pre-Boot eXecution Environment (PXE)

Integrated Single Channel Ultra3 SCSI Adapter

Table 5-9: Integrated Single Channel Ultra3 SCSI Adapter Specifications

Specification	Value
SCSI protocol	Wide Ultra3 SCSI, Wide Ultra2 SCSI, Wide Ultra SCSI-3, Fast-Wide SCSI-2, and Fast SCSI-2
Electrical protocol	Low Voltage Differential (LVD)
Drives supported	Up to 14 SCSI devices per channel
Data transfer method	64-bit/33-MHz PCI bus master
Maximum host bus transfer rate	267 MBps per channel
Maximum SCSI transfer rate	160 MBps per channel
Storage capacity	Up to 1019.2 GB

Integrated Dual Channel Ultra ATA/100 Adapter with Integrated ATA RAID 0, 1, and 1+0 (ATA Models)

Table 5-10: Integrated Dual Channel Ultra ATA/100 Adapter Specifications

Specification	Value
Protocol	UDMA Mode (0-5) PIO Mode (0-4)
Drives supported	Up to 4 ATA (2 devices per channel)
Data transfer method	32-bit/33-MHz PCI bus-master
Maximum transfer rate per PCI Bus (peak)	133 MBps per channel
ATA 100 Cable	80-conductor cable
ATA channel transfer rate	100 MBps per channel
ATA connectors	Two 40-pin connectors (primary and secondary)

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