HP ProLiant ML370 Generation 4 Server Maintenance and Service Guide

March 2006 (Eighth Edition)
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Audience assumptions

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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Illustrated parts catalog

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Customer self repair

What is customer self repair?

HP's customer self-repair program offers you the fastest service under either warranty or contract. It enables HP to ship replacement parts directly to you so that you can replace them. Using this program, you can replace parts at your own convenience.

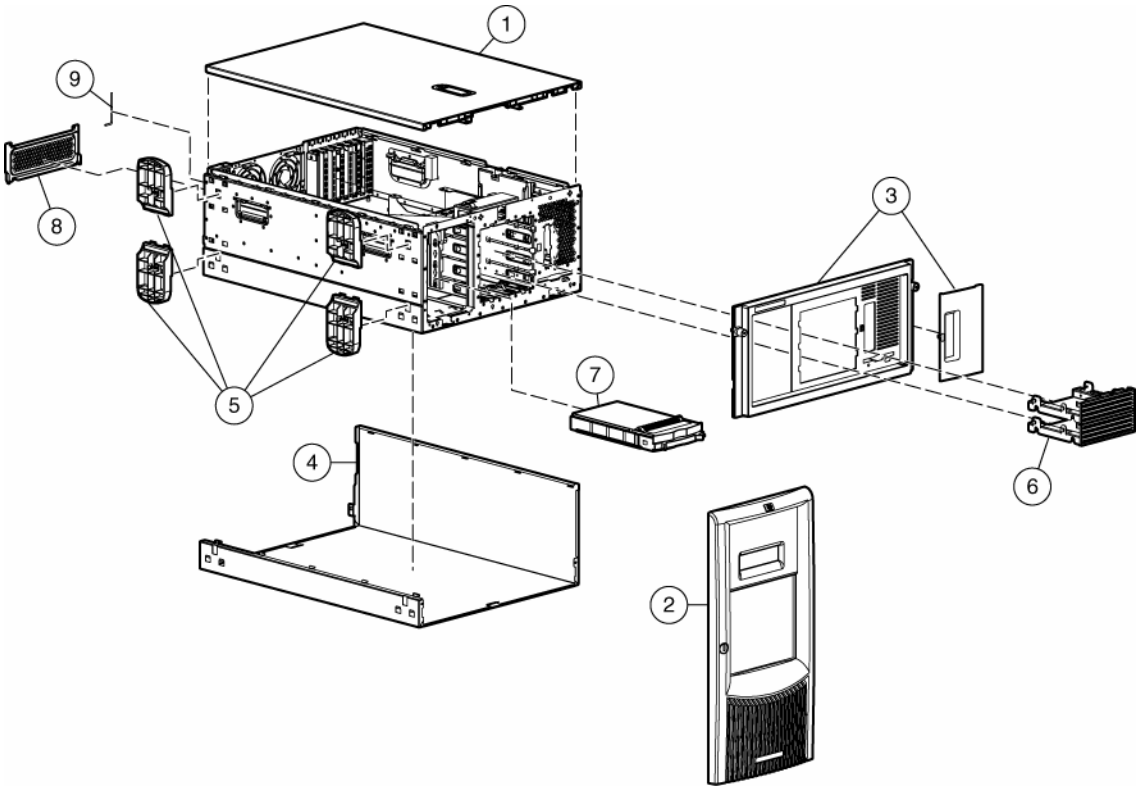
A convenient, easy-to-use program:

- An HP support specialist will diagnose and assess whether a replacement part is required to address a system problem. The specialist will also determine whether you can replace the part.
- Replacement parts are express-shipped. Most in-stock parts are shipped the very same day you contact HP. You may be required to send the defective part back to HP, unless otherwise instructed.
- Available for most HP products currently under warranty or contract. For information on the warranty service, refer to the HP website (http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html).

For more information about HP's customer self-repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Customer replaceable parts are identified in the following tables.

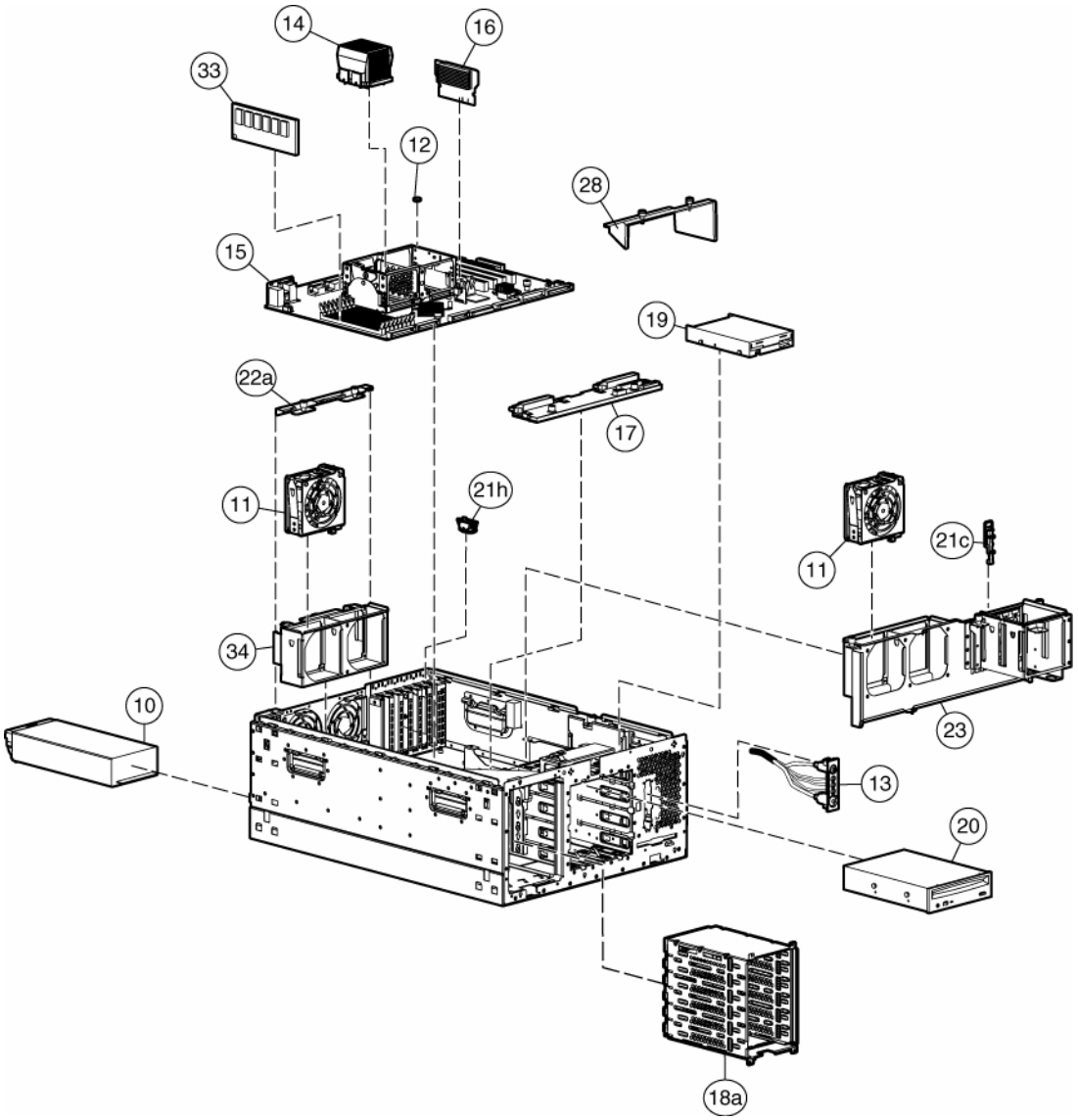
Mechanical components



Item	Description	Original spare part number	Modified spare part number	Customer self repair (on page 6)
1	Access panel (top cover)	359233-001	—	Yes
2	Front bezel (tower model only)	359234-001	—	Yes
3	Rack bezel (rack model only)	359235-001	—	Yes
4	Hood cover (tower model only)	359236-001	—	Yes
5	Feet (tower model only) (part of kit 365962-001)	—	—	Yes
6	Removable media blanks	359715-001	—	Yes
7	Hard drive blank	—	—	—
	a) SCSI	122759-001	—	Yes
	b) SAS*	392613-001	—	Yes
8	Power supply blank	359716-001	—	Yes
9	T-15 Torx screwdriver	290557-001	—	Yes

*Not shown

System components



Item	Description	Original spare part number	Modified spare part number	Customer self repair (on page 6)
	System components			
10	Power supply, 800 W	347883-001‡ See requirement	406867-001	Yes
11	Fan, 92 mm	231213-001	—	Yes
12	3.3-V lithium battery	153099-001	—	Yes
13	Power button/switch with cable	359714-001	—	Yes
14	Processor with heatsink	—	—	—
	a) Intel® Xeon™ 3.0-GHz 1-MB L2 cache* †	378006-001	—	Yes
	b) Intel® Xeon™ 3.2-GHz 1-MB L2 cache* †	374233-001	—	Yes

Item	Description	Original spare part number	Modified spare part number	Customer self repair (on page 6)
	c) Intel® Xeon™ 3.4-GHz 1-MB L2 cache †	364757-001	—	Yes
	d) Intel® Xeon™ 3.6-GHz 1-MB L2 cache* †	364758-001	—	Yes
	e) Intel® Xeon™ 2.8-GHz 2-MB L2 cache* †	399132-001	—	Yes
	f) Intel® Xeon™ 3.0-GHz 2-MB L2 cache* †	379427-001	—	Yes
	g) Intel® Xeon™ 3.2-GHz 2-MB L2 cache* †	379428-001	—	Yes
	h) Intel® Xeon™ 3.4-GHz 2-MB L2 cache* †	379429-001	—	Yes
	i) Intel® Xeon™ 3.6-GHz 2-MB L2 cache* †	379430-001	—	Yes
	j) Intel® Xeon™ 3.8-GHz 2-MB L2 cache* †	399133-001	—	Yes
	k) Intel® Xeon™ dual-core, 1066-Mhz FSB, 4-MB cache for use with dual-core system I/O board 012974-001 only	403934-001	—	Yes
	Boards			
15	a) System board with processor cage (for use with Intel® Xeon™ single-core processors)	347882-001	—	Yes
	b) System board, dual-core processor support, with processor cage & battery (for use with Intel® Xeon™ dual-core processors)	408300-001‡ See requirement	408300-001	Yes
16	PPM	347884-001	—	Yes
17	Power supply backplane	347886-001‡ See requirement	412735-001	Yes
18	Drive backplane	—	—	—
	a) SCSI backplane Simplex with 6 x 1-in drive cage	359719-001	—	Yes
	b) SCSI backplane Duplex board with drive cage*	371722-001	—	Yes
	c) SAS backplane Duplex board with drive cage*	392607-001‡ See requirement	412736-001	Yes
	Mass storage devices			
19	Diskette drive, 3-mode, 1.44 MB	233409-001‡ See requirement	399397-001	Yes
20	CD-ROM drive, IDE, 48x	288894-001‡ See requirement	397931-001	Yes
	Miscellaneous			
21	Plastics kit	365962-001	—	—
	a) Foot (refer to item number 5)*	—	—	Yes

Item	Description	Original spare part number	Modified spare part number	Customer self repair (on page 6)
	b) Receptacle, door snap, stone*	—	—	Yes
	c) Retainer, card guide, PCI	—	—	Yes
	d) Fastener, 0.15-in plastic standoff*	—	—	Yes
	e) Fastener, 0.202-in plastic standoff*	—	—	Yes
	f) Clip, cable, adhesive, 1.77 in*	—	—	Yes
	g) Clip, retainer, 0.125-in diameter*	—	—	Yes
	h) Assembly, PCI latch and base	—	—	Yes
	i) Cable clip*	—	—	Yes
	j) Standoff bumper*	—	—	Yes
22	Hardware kit	365963-001	—	—
	a) Bracket, rear, removable	—	—	Yes
	b) Bracket, diskette tray*	—	—	Yes
	c) Bracket, diskette retainer*	—	—	Yes
	d) Cover, slot, PCI expansion*	—	—	Yes
	e) Bracket, blank, option board, PCI latch*	—	—	Yes
	f) 2-56 pan head screw*	—	—	Yes
	g) Hi-top screw*	—	—	Yes
23	Wall, center	359238-001	—	Yes
24	Rack-mounting kit*	359239-001	—	Yes
25	Cable management arm*	367831-001	—	Yes
26	Country kit*	359712-001	—	Yes
27	Return kit	—	—	—
	a) Tower*, packing box and cushions	359713-001	—	Yes
	b) Rack*, packing box and cushions	371561-001	—	Yes
28	Processor air baffle	359240-001	—	Yes
	Cables			
29	Miscellaneous data cable kit*	365964-001	—	—
	a) IDE hard drive/CD-ROM drive data cable*	—	—	Yes
	b) Diskette drive cable*	—	—	Yes
	c) Point-to-point SCSI cable*	—	—	Yes
	d) USB cable assembly*	—	—	Yes
30	Miscellaneous power cable kit (SCSI)*	365967-001	—	—
	a) Diskette and CD-ROM drive power cable (SCSI)*	—	—	Yes
	b) Power supply cable, 24 pin*	—	—	Yes

Item	Description	Original spare part number	Modified spare part number	Customer self repair (on page 6)
	c) Fan cage cable*	—	—	Yes
31	Miscellaneous power cable kit (SAS)*	392608-001	—	—
	a) Diskette and CD-ROM drive power cable (SAS)*	—	—	Yes
32	SAS option cable*	389952-001	—	Yes
	Memory			
33	a) 512-MB PC2-3200R DIMM	359241-001‡ See requirement	413384-001	Yes
	b) 1-GB PC2-3200R DIMM*	359242-001‡ See requirement	413385-001	Yes
	c) 2-GB PC2-3200R DIMM*	359243-001‡ See requirement	413386-001	Yes
	d) 4-GB PC2-3200R DIMM	379984-001‡ See requirement	413388-001	Yes
	Options			
34	Rear fan cage	230984-001	—	Yes
35	Two-bay, hot-plug SCSI hard drive cage*	253761-001	—	Yes
36	Keyboard*	311059-001‡ See requirement	382925-001	Yes
37	Mouse*	311060-001‡ See requirement	390937-001	Yes
38	AC power cord*	187335-001	—	Yes
39	SCSI Ultra320 universal hot-plug hard drive*	—	—	—
	a) 72.8-GB, 10,000 rpm	289042-001‡ See requirement	404709-001	Yes
	b) 146.8-GB, 10,000 rpm	289044-001‡ See requirement	404708-001	Yes
	c) 300-GB, 10,000 rpm	351126-001‡ See requirement	404701-001	Yes
	e) 36.4-GB, 15,000 rpm	289241001‡ See requirement	404714-001	Yes
	f) 72.8-GB, 15,000 rpm	289243-001‡ See requirement	404713-001	Yes
	g) 146-GB, 15,000 rpm	347779-001‡ See requirement	404712-001	Yes
40	SAS SFF hard drive*	—	—	—
	a) 36-GB, 10,000 rpm	376596-001	—	Yes
	b) 72-GB, 10,000 rpm	376597-001	—	Yes
	c) 60-GB, 5,000 rpm SFF SATA	382264-001	—	Yes
41	HP Smart Array P600 Controller	370855-001	—	Yes

* Not shown
†Do not mix single-core and dual-core processors, or processors with different cache sizes or speeds.
‡**REQUIREMENT:**
For Customers in the EU only.
The use of the Original Spare part is regulated by RoHS legislation§.
If your unit contains a part that is labelled with the Modified Spare number, the Modified Spare must be ordered as the replacement part in the EU.
If your unit contains a part that is labelled with the Original Spare number, please order the Original Spare as the replacement part in the EU. In this case either the Original Spare or the Modified Spare may be shipped which will not affect performance or functionality of the unit.
§*Directive 2002/95/EC restricts the use of lead, mercury, cadmium, hexavalent chromium, PBBs and PBDEs in electronic products.*

Removal and replacement procedures

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Required tools

You need the following items for some procedures:

- T-15 Torx screwdriver (included with the server)
- Diagnostics Utility (included on the SmartStart CD-ROM)

Safety considerations

Before performing service procedures, review all the safety information.

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need 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.

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.

Symbols on equipment

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

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

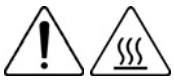
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

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.

25-41 kg

55-90 lbs

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

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.

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.

Rack warnings

⚠ **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.**

⚠ **WARNING: To reduce the risk of personal injury or equipment damage when unloading a rack:**

- **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 being 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.**

⚠ **WARNING: To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack 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.**

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

Preparation procedures

To access some components and perform certain service procedures, you must perform one or more of the following procedures:

- Extend the server from the rack ("Extending the server from the rack" on page 16).

  If you are performing service procedures in an HP, Compaq branded, telco, or third-party rack cabinet, you can use the locking feature of the rack rails to support the server and gain access to internal components.

  For more information about telco rack solutions, refer to the RackSolutions.com website (http://www.racksolutions.com/hp).
- Power down the server (on page 16).

If you must remove a server from a rack or a non-hot-plug component from a server, power down the server.

- Remove the server from the rack ("Removing the server from the rack" on page 17).

  If the rack environment, cabling configuration, or the server location in the rack creates awkward conditions, remove the server from the rack.

Power down the server

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. 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.

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

1. Shut down the OS as directed by the OS documentation.
2. Press the Power On/Standby button to place the server in standby mode. When the server enters standby power mode, the system power LED changes to amber.
3. Disconnect the power cords.

The system is now without power.

Extending the server from the rack

1. Loosen the thumbscrews that secure the server faceplate to the front of the rack.

IMPORTANT: If the server is installed in a telco rack, remove the server from the rack to access internal components.

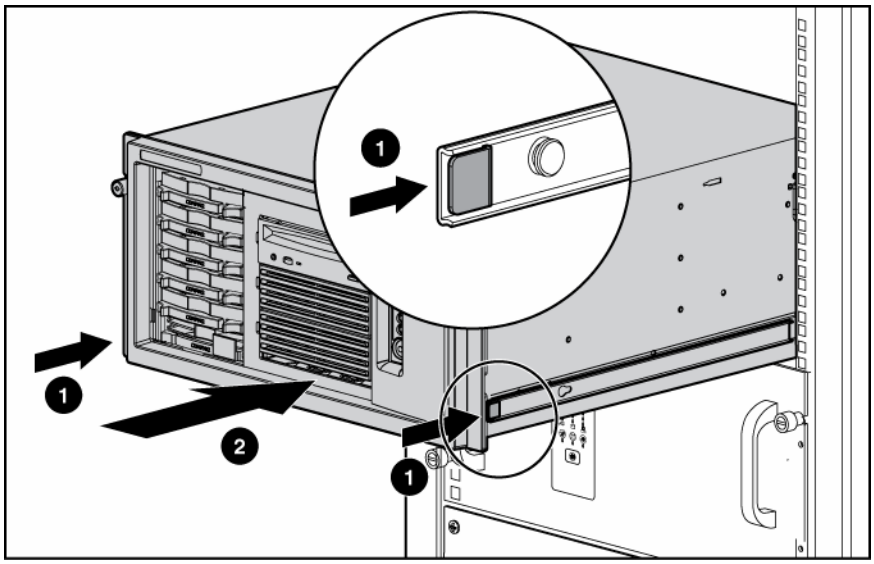
2. Extend the server on the rack rails until the server rail-release latches engage.

WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

3. After performing the installation or maintenance procedure, slide the server back into the rack:

a. Press the server rail-release latches and slide the server fully into rack.



b. Secure the server by tightening the thumbscrews.

Removing the server from the rack

To remove the server from an HP, telco, or third-party rack:

1. Power down the server (on page 16).
2. Loosen the front panel thumbscrews that secure the server faceplate to the front of the rack.
3. Disconnect the cabling and remove the server from the rack. Reverse the server installation steps in the documentation that ships with the rack-mounting option.
4. Place the server on a sturdy, level surface.

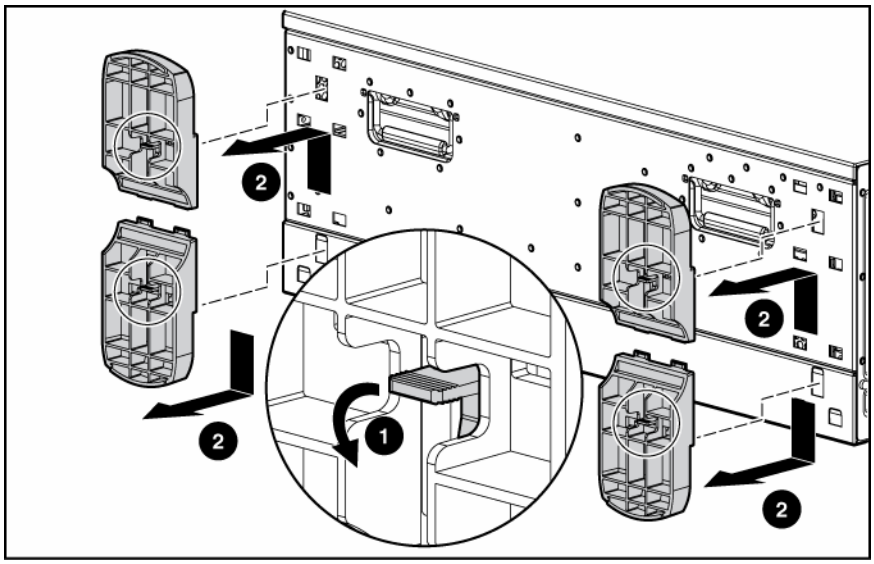
Feet

NOTE: This procedure applies to tower servers only.

To remove the component:

1. Place the server on its side.

2. Remove the feet.

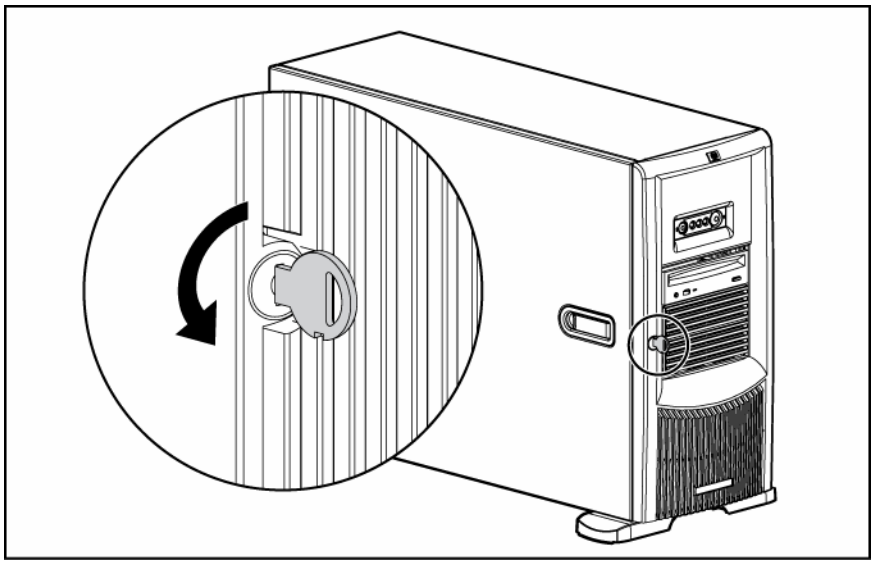


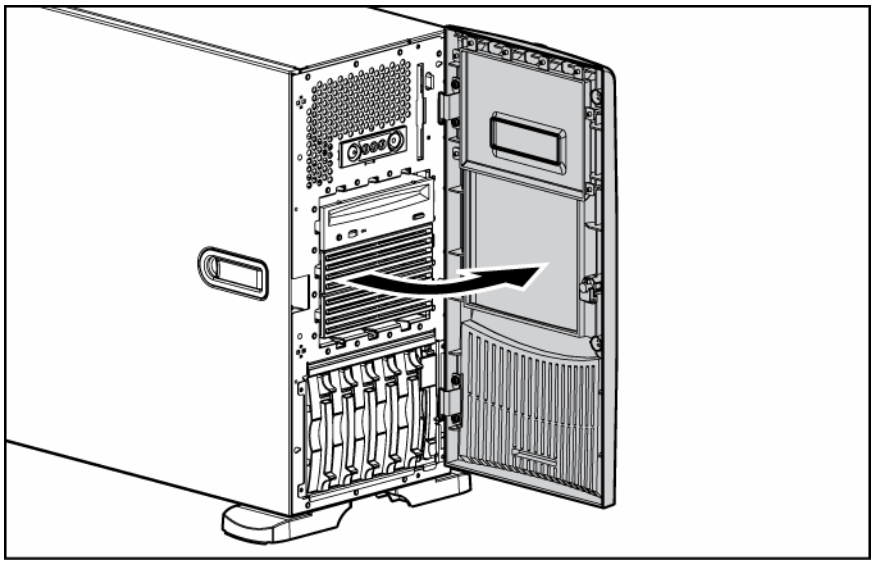
To replace the component, slide it back onto the locking slot. Be sure that the foot snaps securely into the holder. Repeat with the remaining feet, as necessary.

Front bezel

Tower servers have a removable front bezel that must be unlocked and opened before accessing the hard drive cage, diskette drive, and before removing the access panel.

To unlock the front bezel, use the key provided with the server to unlock the bezel with a counterclockwise turn.



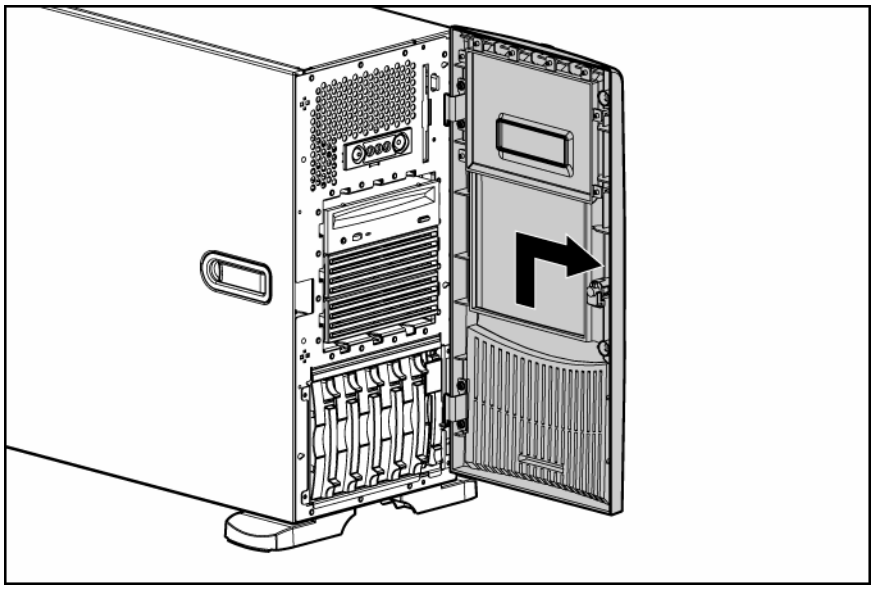


To remove the component:

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).

IMPORTANT: You must unlock the front bezel before removing the access panel.

2. Lift up the front bezel and remove it from the chassis.



To replace the component, reverse the removal procedure.

Access panel

⚠ **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:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
3. Open the front bezel ("Front bezel" on page 19).
4. Using a Torx T-15 screwdriver, unlock the access panel locking latch.
5. Lift up on the hood latch handle and remove the access panel.

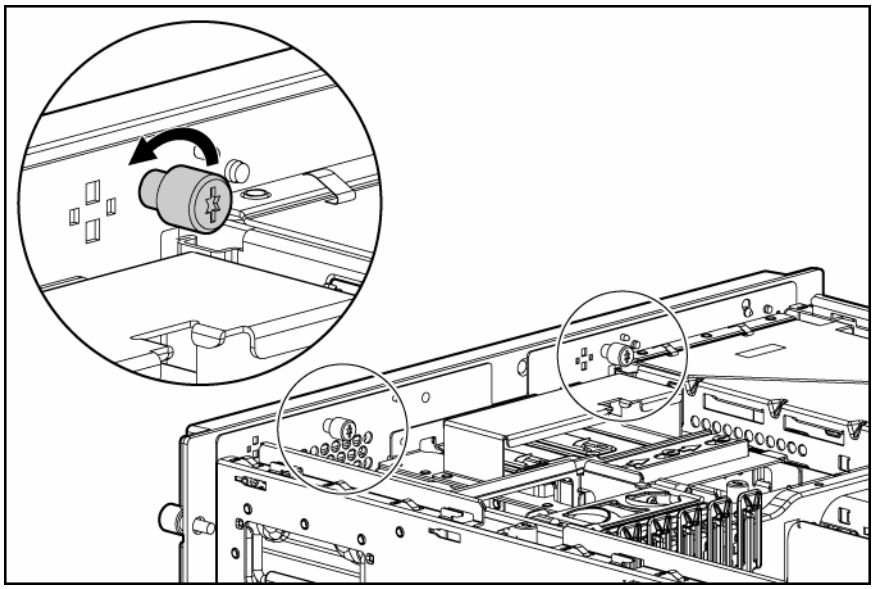
After installing hardware options, replace the access panel. Be sure that the panel is securely locked into place before powering up the server.

Rack bezel

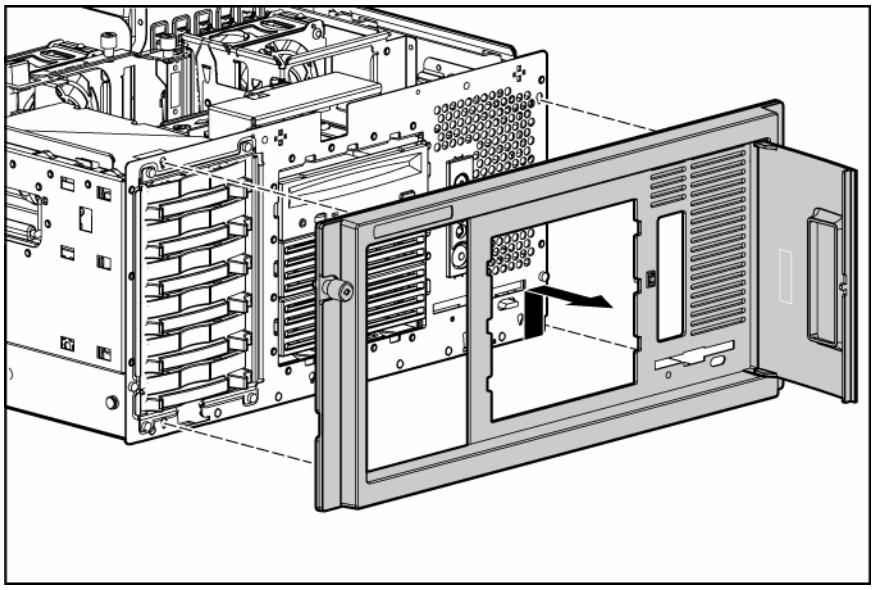
To remove the component:

1. Remove the access panel ("Access panel" on page 20).
2. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).

3. Loosen the two thumbscrews that secure the rack bezel to the chassis.



4. Remove the rack bezel.



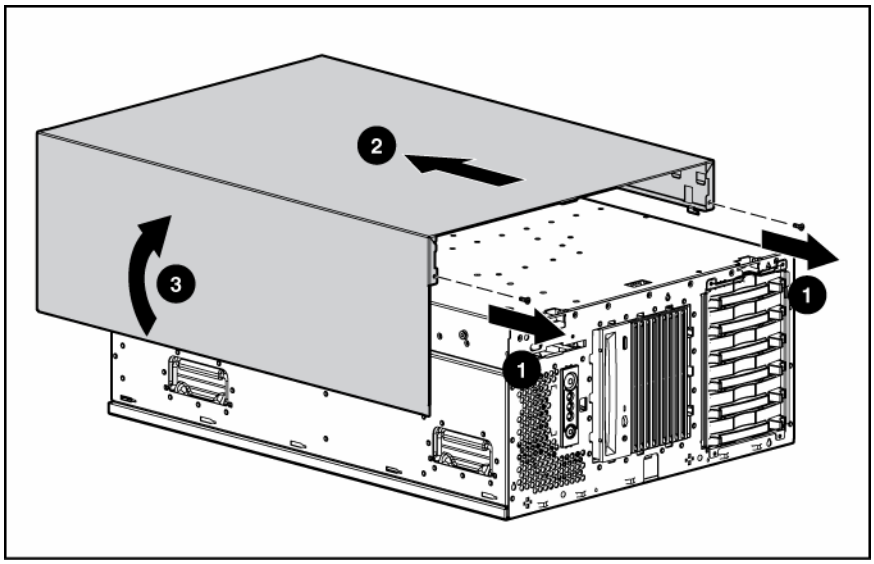
To replace the component, reverse the removal procedure.

Tower hood cover

To remove the component:

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
2. Remove the rack bezel (rack servers only) ("Rack bezel" on page 20).
3. Use the Torx T-15 tool to remove the two front panel screws.

4. Remove the tower hood cover.



To replace the component, reverse the removal procedure.

Rack rails

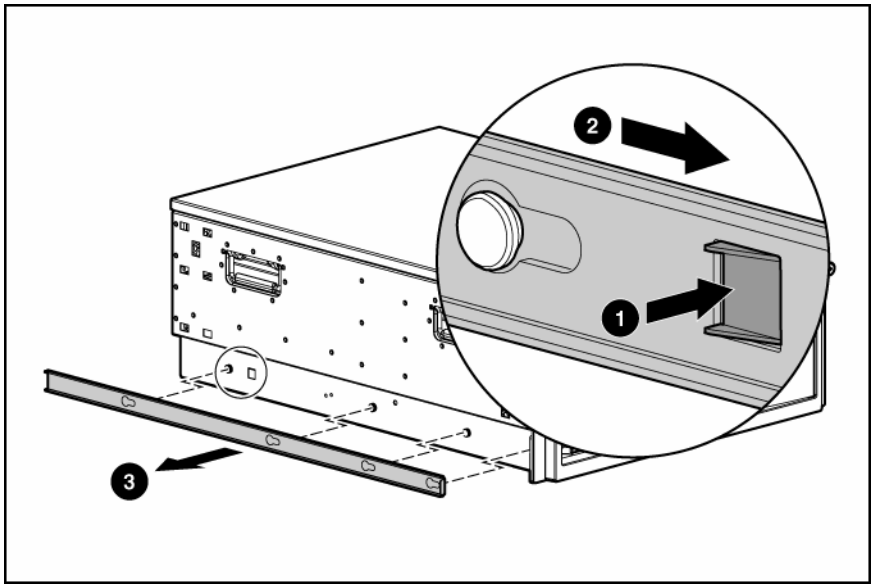
NOTE: This procedure applies to rack servers only.

To remove the component:

1. Use the Torx T-15 screwdriver to push in the release key.

NOTE: The T-15 Torx screwdriver is clipped to the rear panel of the server.

2. Press the rail against the side of the chassis and slide it to the front of the server to release the rails.
3. Align the four keyholes above the four spools on the side of the chassis and remove the rail.



4. Repeat steps 1 through 3 to remove the other rail.

To replace the component, reverse the removal procedure.

Power supply blank

WARNING: To reduce the risk of electric shock, do not disassemble the power supply or attempt to repair it. Replace it only with the specified spare part.

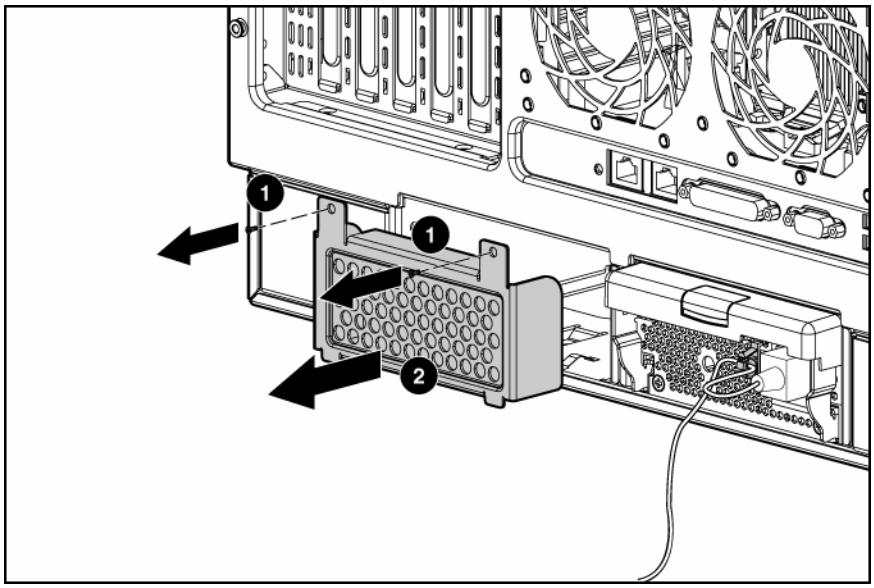
CAUTION: Do not attempt to remove and replace a power supply as a hot-plug procedure unless both bays are populated with power supplies.

To remove the component:

1. Remove the two screws with the T-15 Torx screwdriver.

NOTE: The T-15 Torx screwdriver is clipped to the rear panel of the server.

2. Remove the power supply blank.



To replace the component, reverse the removal procedure.

Hot-plug power supply

WARNING: To reduce the risk of electric shock, do not disassemble the power supply or attempt to repair it. Replace it only with the specified spare part.

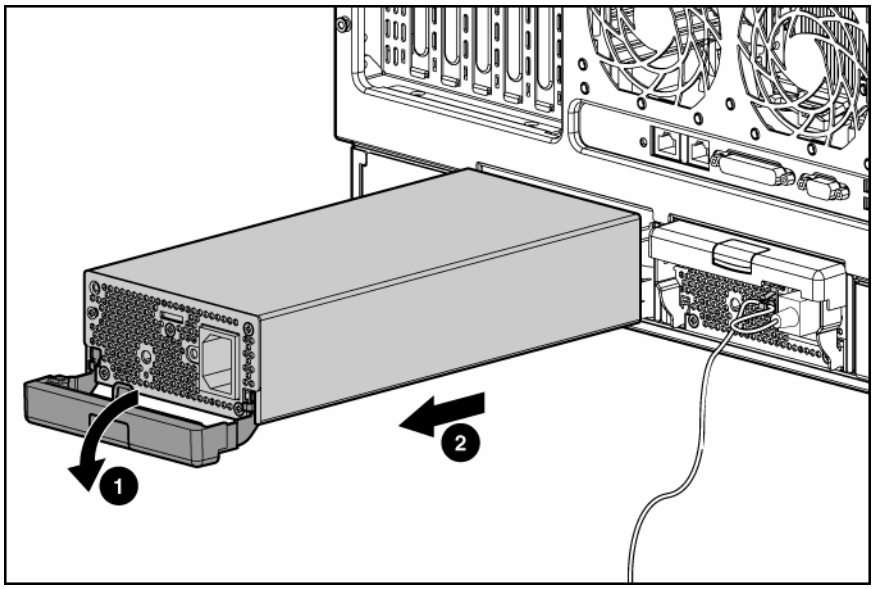
CAUTION: Do not attempt to remove and replace a power supply as a hot-plug procedure unless both bays are populated with power supplies.

To remove the component:

1. Remove the power cord from the unit to be removed.
2. Use the Torx T-15 screwdriver to remove the shipping screw securing the handle.

NOTE: The T-15 Torx screwdriver is clipped to the rear panel of the server.

3. Remove the power supply.



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

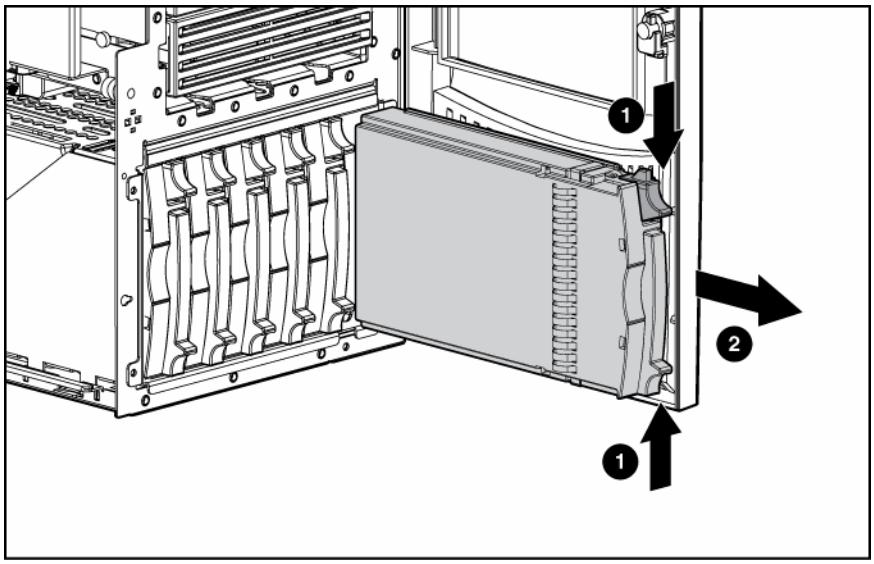
To replace the component, reverse the removal procedure.

Hard drive blank (SCSI)

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
2. Remove the blank.

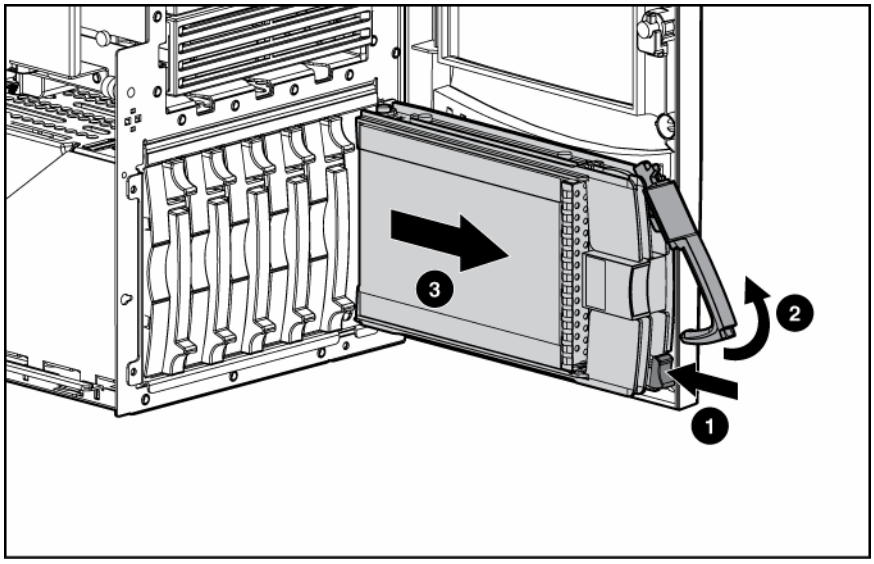


To replace the component, reverse the removal procedure.

Hard drives (SCSI)

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
2. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-plug SCSI hard drive LEDs" on page 72, "SATA or SAS hard drive LEDs" on page 73).
3. Back up all server data on the hard drive.
4. Remove the hard drive.

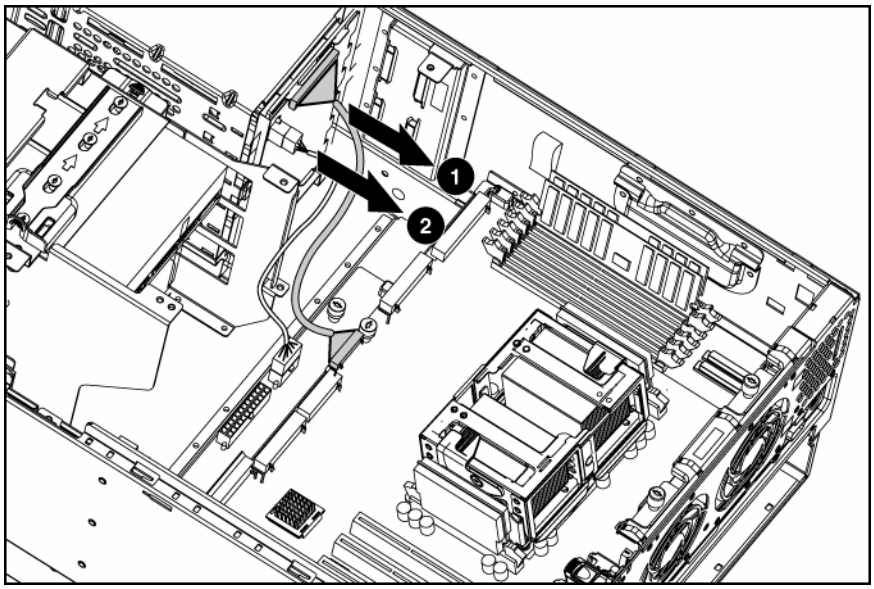


To replace the component, reverse the removal procedure.

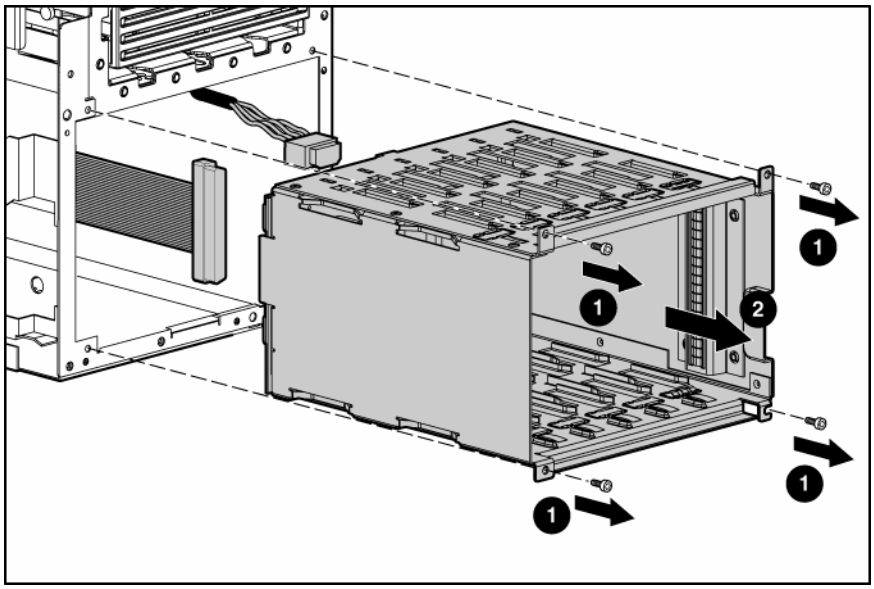
Hard drive cage (SCSI)

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Remove the rack bezel (rack servers only) ("Rack bezel" on page 20).
4. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
5. Remove the access panel ("Access panel" on page 20).
6. Remove all hard drive blanks ("Hard drive blank (SCSI)" on page 24).
7. Remove all hot-plug SCSI hard drives ("Hard drives (SCSI)" on page 25).
8. If using the duplex SCSI board option, remove the duplex SCSI board (on page 45).
9. Disconnect the point-to-point SCSI cable from the SCSI hard drive backplane.

10. Disconnect the power cable from the SCSI hard drive backplane.



11. Remove the four (4) screws that secure the hard drive cage into the chassis.
12. Remove the hard drive cage.



To replace the component, reverse the removal procedure.

△ **CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

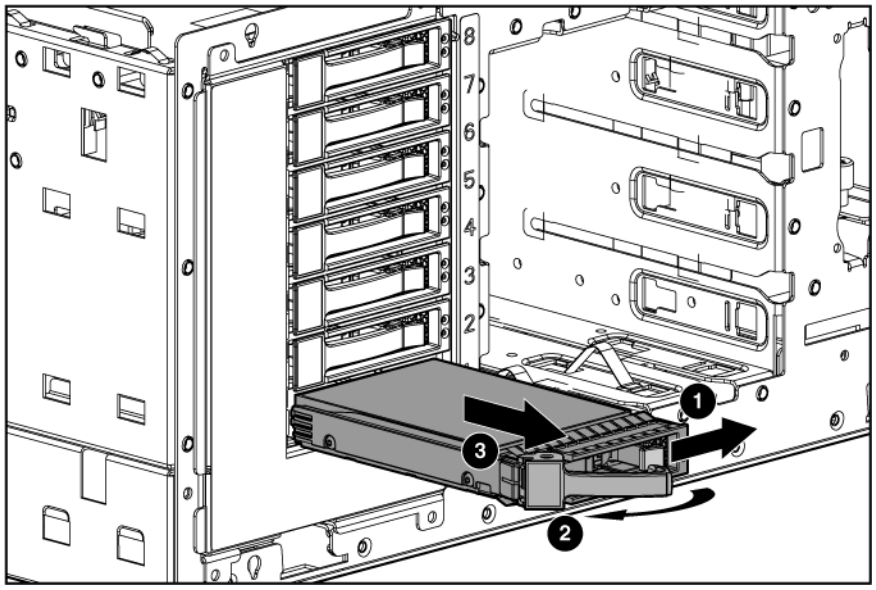
Hard drive blank (SAS)

△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).

2. Remove the blank.

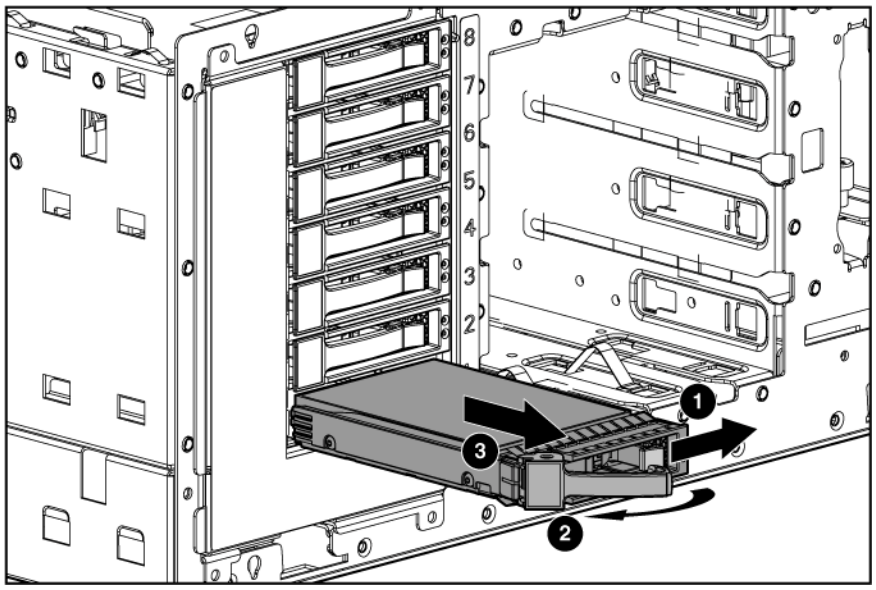


To replace the component, reverse the removal procedure.

Hard drives (SAS)

△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
2. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-plug SCSI hard drive LEDs" on page 72, "SATA or SAS hard drive LEDs" on page 73).
3. Back up all server data on the hard drive.
4. Remove the hard drive.

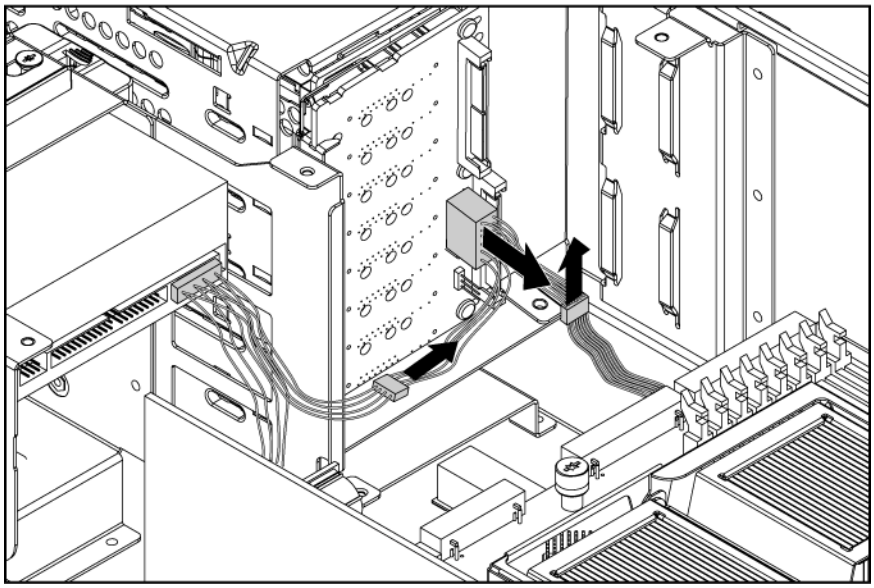


To replace the component, reverse the removal procedure.

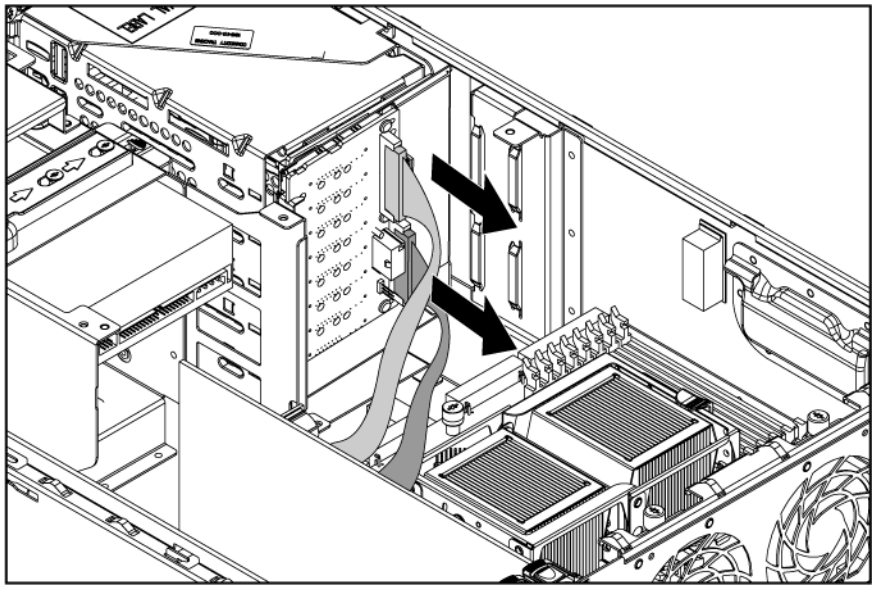
Hard drive cage (SAS)

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Remove the rack bezel (rack servers only) ("Rack bezel" on page 20).
4. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
5. Remove the access panel ("Access panel" on page 20).
6. Disconnect the power cable from the SAS backplane.

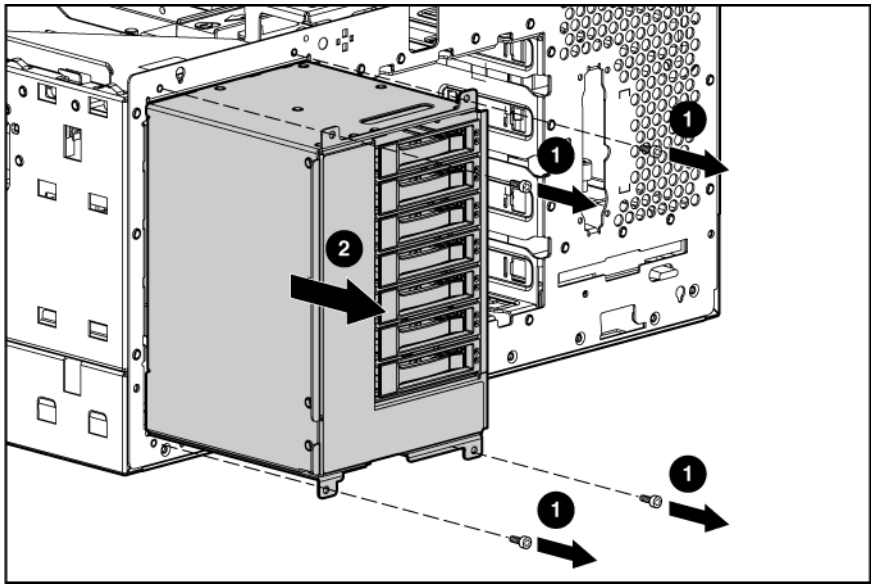
NOTE: The center wall is removed for illustration purposes only.



7. Disconnect the SAS-SATA cables from the SAS backplane.



8. Unscrew and remove the four screws that secure the drive cage to the chassis and remove the SAS cage.



To replace the component, reverse the removal procedure.

System fans

The server supports redundant hot-plug fans to provide proper airflow to the system if a primary fan fails.

In the standard configuration, three fans cool the server: fans 1, 3, and 5.

For the redundant configuration, fans 2, 4, and 6 are added to back up the primary fans. This configuration allows the server to continue operation in non-redundant mode, if a fan failure occurs.

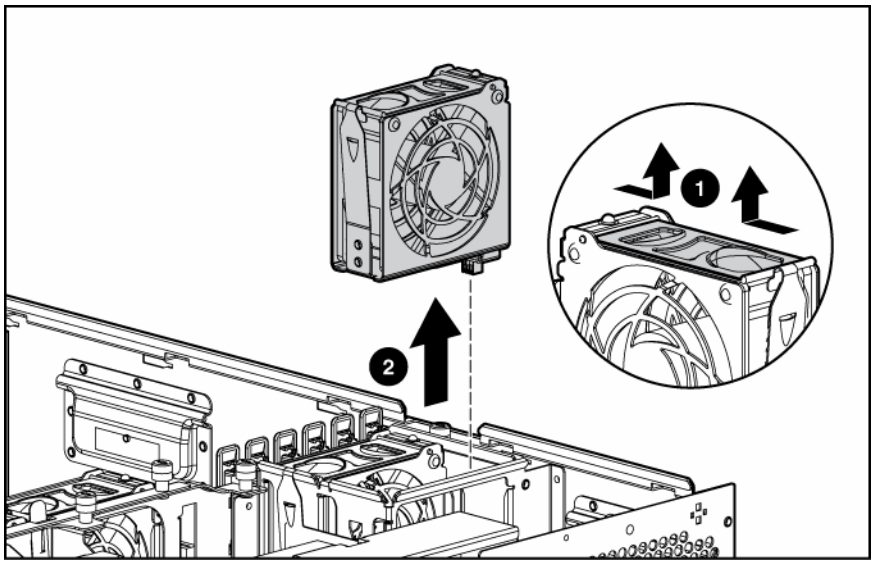
For fan locations, refer to "Identifying hot-plug fans ("Identifying redundant hot-plug fans" on page 73)."

All fans are identical. This procedure can be used for any of the six fan positions.

To remove the component:

1. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
2. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
3. Remove the access panel ("Access panel" on page 20).

4. Remove the fan.



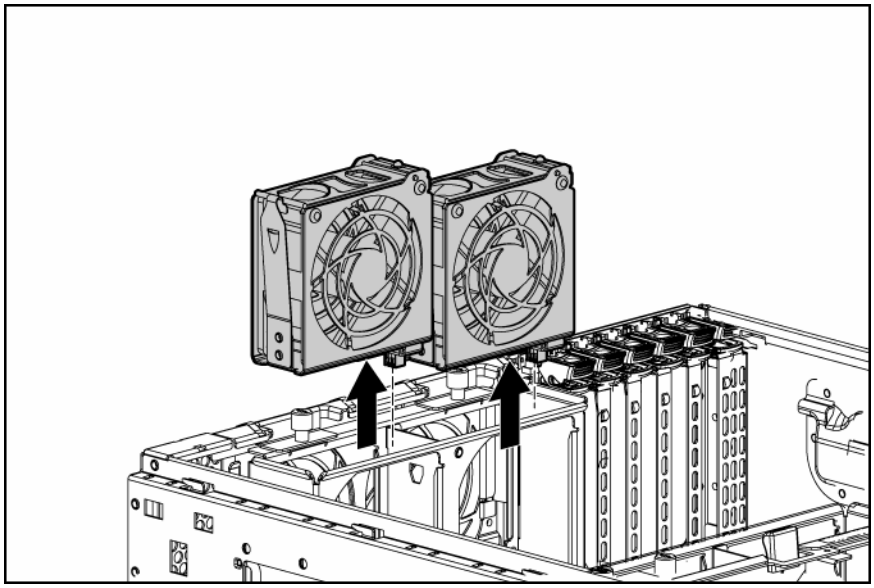
To replace the component, reverse the removal procedure.

Redundant hot-plug fan cage

For full redundancy, always install all three fans included in the redundant hot-plug fan option kit.

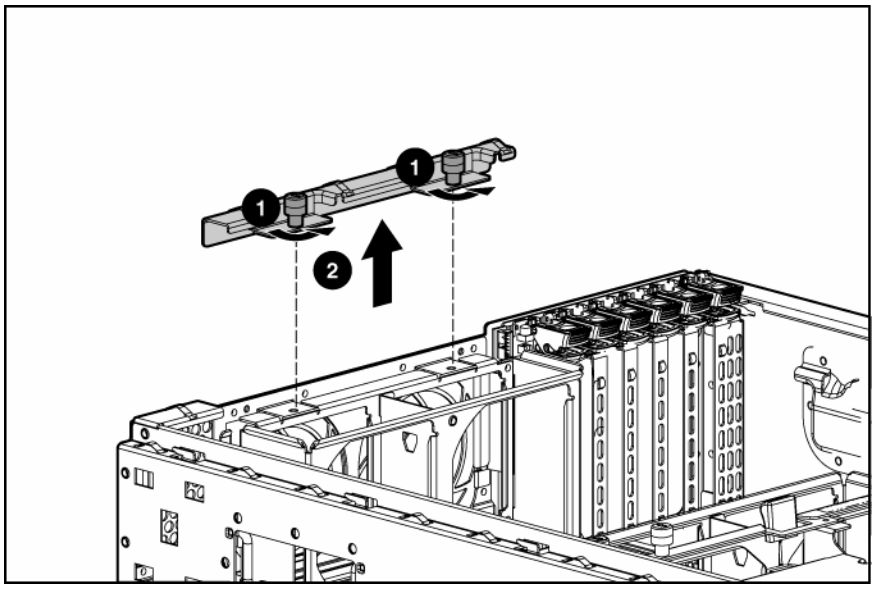
To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove the fans from the redundant fan cage.

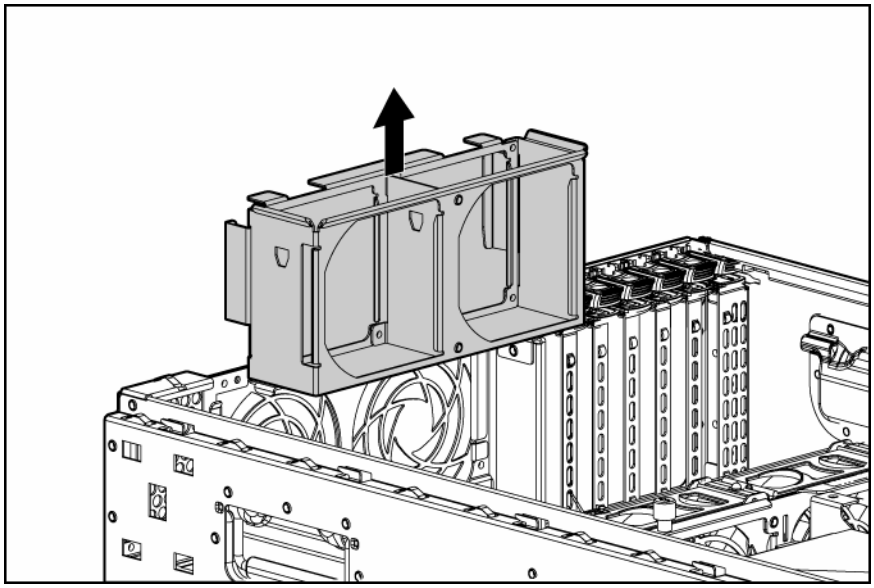


6. Remove the redundant fan cage retaining bracket from the chassis.

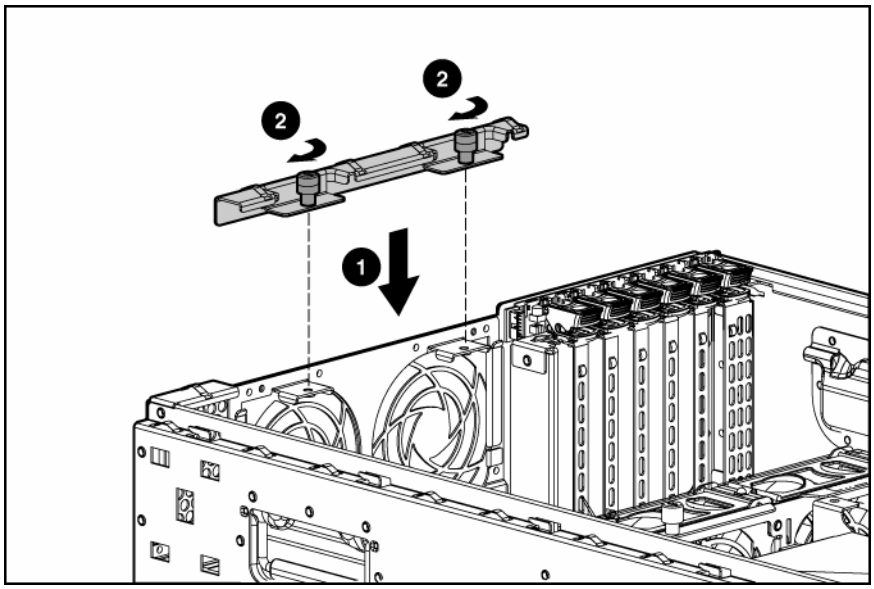
IMPORTANT: Do not discard the fan cage retaining bracket. The bracket is required for proper fan operation.



7. Slide the redundant fan cage out of the chassis.



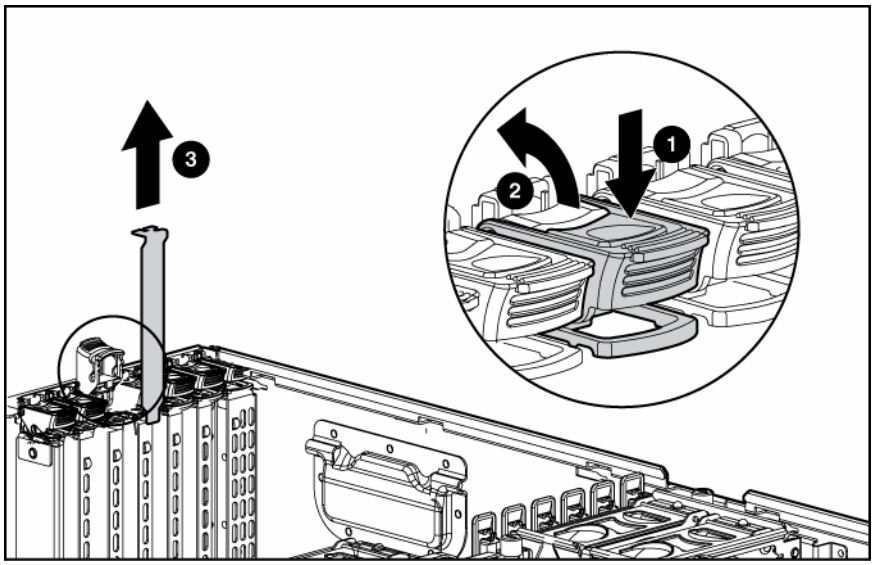
8. Reinstall the redundant fan cage retaining bracket.



To replace the component, reverse the removal procedure.

Expansion slot cover

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Unlatch the slot release lever.
6. Remove the expansion slot cover.



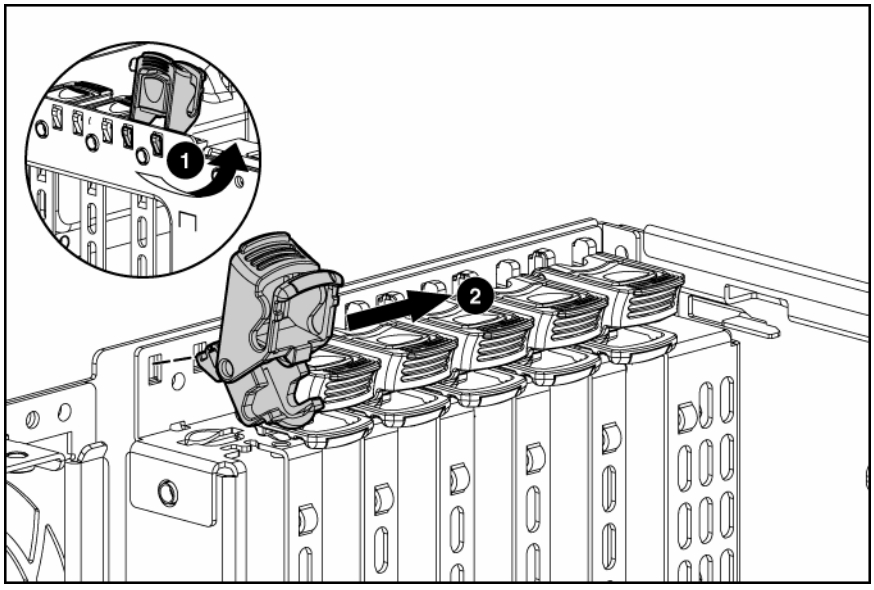
△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

Slot release lever

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Unlatch the slot release lever.
6. Remove the expansion slot cover.
7. Remove any expansion board installed in the assembly ("Expansion board" on page 33).
8. From behind the chassis, push up on the lever locking tab.
9. Pull the release lever forward to disengage the rear tabs from the server wall.



10. Remove the slot release lever from the chassis.

To replace the component, reverse the removal procedure.

IMPORTANT: Be sure that the lever locking tab is locked into place. If the lever is not locked, it will not retain the expansion boards properly.

Expansion board

The server supports PCI-X and PCI Express expansion boards.

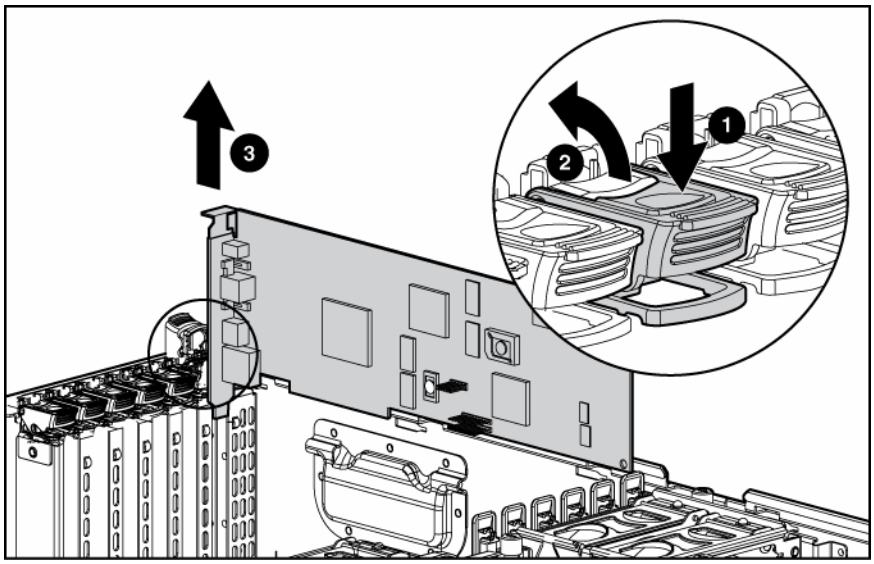
Slot	Expansion card type	Connector	Capable speed
1	PCI-X	64-bit, 3.3-volt	100-MHz
2	PCI-X	64-bit, 3.3-volt	100-MHz
3	PCI-X	64-bit, 3.3-volt	100-MHz
4	PCI-X	64-bit, 3.3-volt	100-MHz
5	PCI Express *	x8	x4
6	PCI Express *	x8	x4

* x8 PCI Express cards are supported, but will run at x4 speeds.

CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the expansion boards.

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Unlatch the slot release lever.
6. Disconnect any cables attached to the expansion board.
7. Release the retaining clip.
8. Press the slot release lever and swing the slot release lever upward.



9. Lift the expansion board out of the server.

CAUTION: Make a note of board locations. Be sure to install replacements in the same slots.

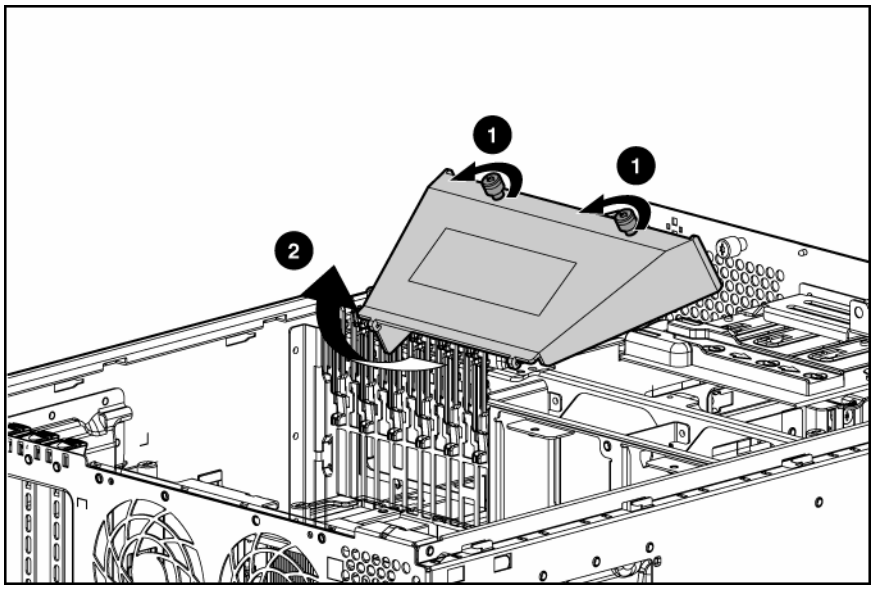
To replace the component, reverse the removal procedure.

Processor air baffle

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Loosen the two thumbscrews that secure the air baffle to the center wall.

6. Lift the air baffle up and out of the server.

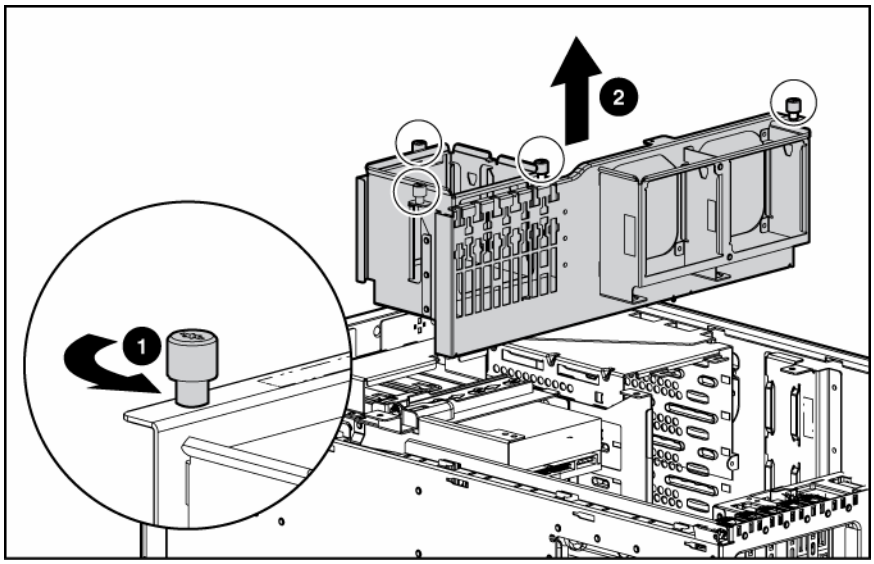


To replace the component, reverse the removal procedure.

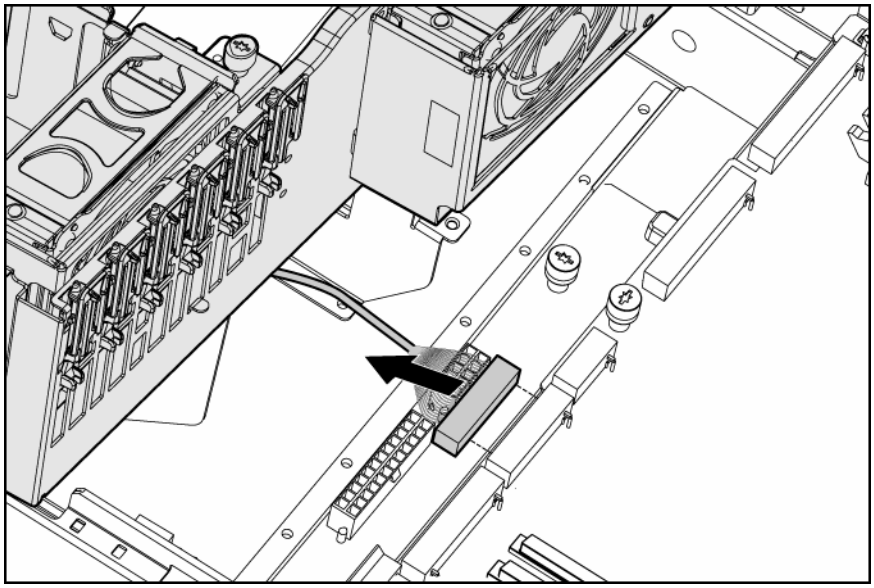
Center wall

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove all expansion boards ("Expansion board" on page 33).
6. Loosen the four thumbscrews that secure the center wall to the chassis.
7. Lift the wall up enough to reach the fan cable.



8. Disconnect the fan cable from the system board.



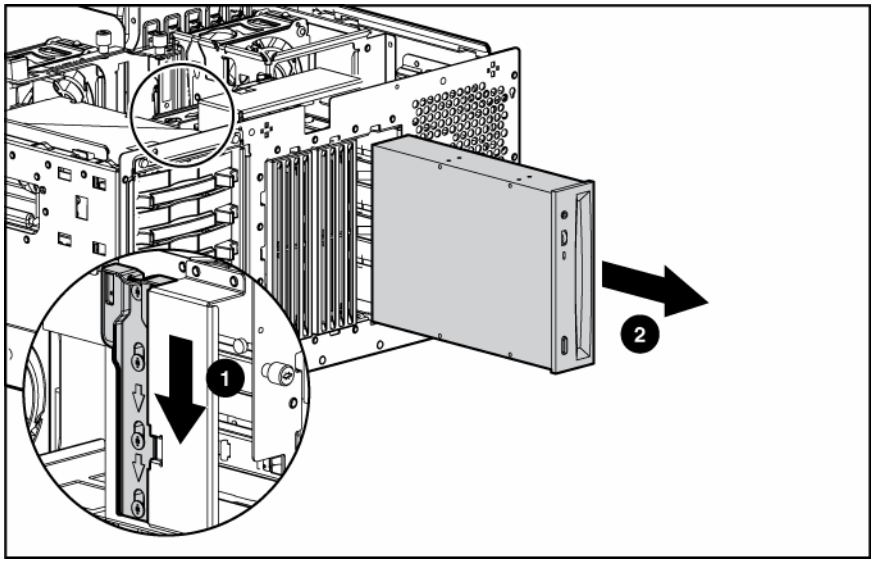
9. Lift the center wall away from the chassis.

To replace the component, reverse the removal procedure.

CD-ROM drive

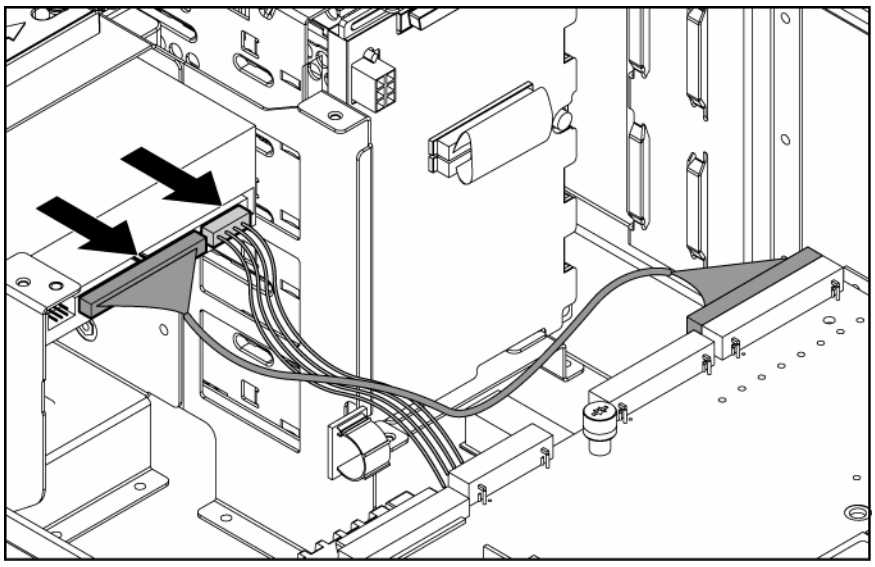
To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Slide the media latch to release the drives while pushing the CD-ROM drive from the inside of the chassis slightly out of the bay.
   - In tower configurations, use the media latch on the side of the removable media cage.
   - In rack configurations, use the media latch on the top of the removable media cage.



△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

6. Disconnect the IDE cable from the CD-ROM drive.
7. Disconnect the power cable from the CD-ROM drive.



8. Remove the CD-ROM drive from the chassis.

To replace the component, reverse the removal procedure.

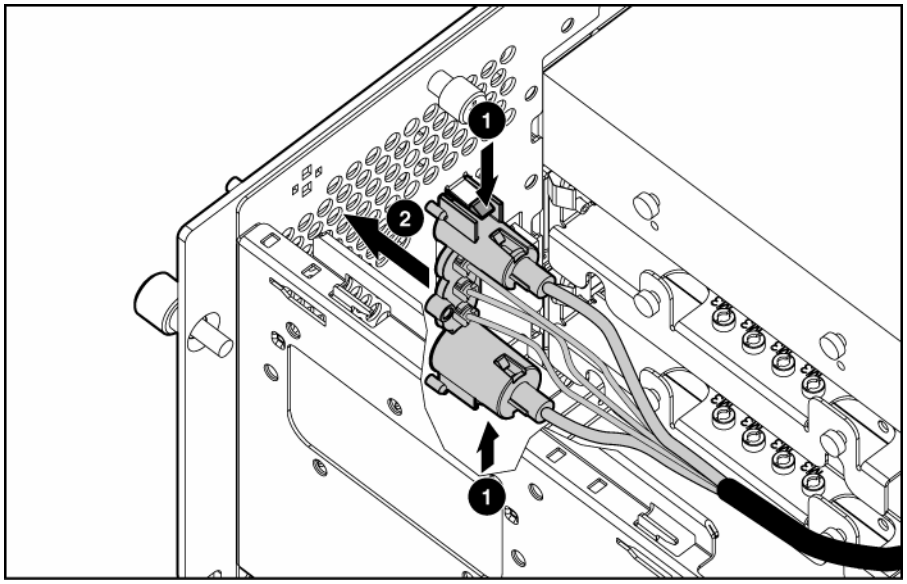
△ **CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

Power button/LED assembly

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove all expansion boards ("Expansion board" on page 33).
6. Remove the center wall ("Center wall" on page 35).
7. Disconnect the power button/LED assembly cable from the system board and power supply backplane.

8. Squeeze the two tabs securing the assembly from the inside, and slide the power button/LED assembly through the front of the server.



9. Remove the assembly from the chassis.

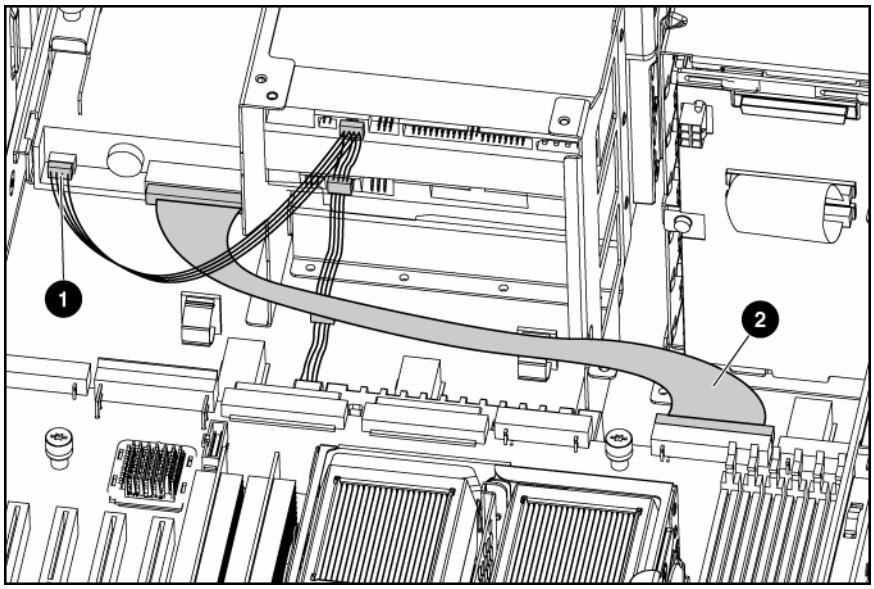
To replace the component, reverse the removal procedure.

Diskette drive

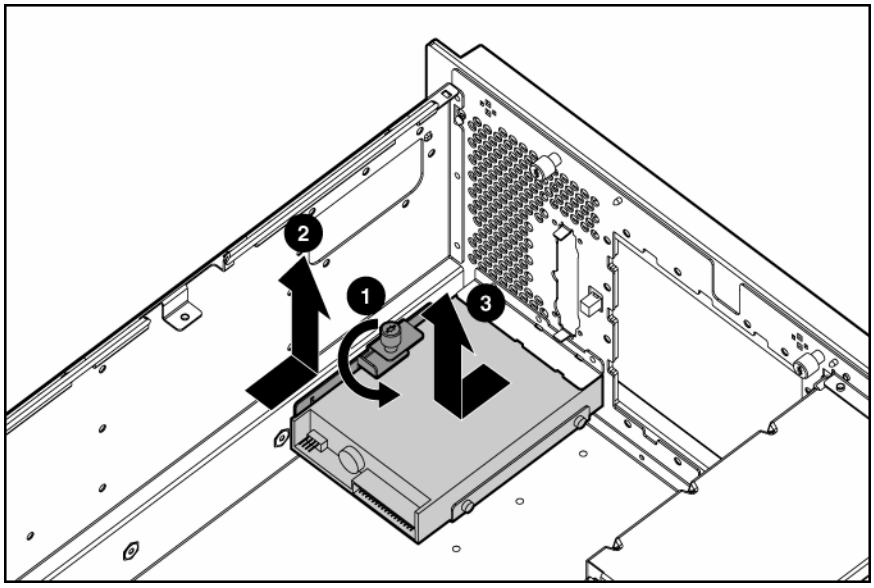
To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove all expansion boards ("Expansion board" on page 33).
6. Remove the center wall ("Center wall" on page 35).
7. Remove the power button/LED assembly ("Power button/LED assembly" on page 37).

8. Disconnect the diskette drive cable and power cable from the diskette drive.



9. Loosen the thumbscrews that secure the retaining bracket to the diskette chassis.
10. Pull the diskette retaining bracket forward to disengage the tabs and lift the bracket from the chassis.
11. Pull the diskette drive backward about 1 cm (0.4 in) and lift it up to clear the base.



12. Remove the diskette drive from the chassis.

To replace the component, reverse the removal procedure.

Processor assembly

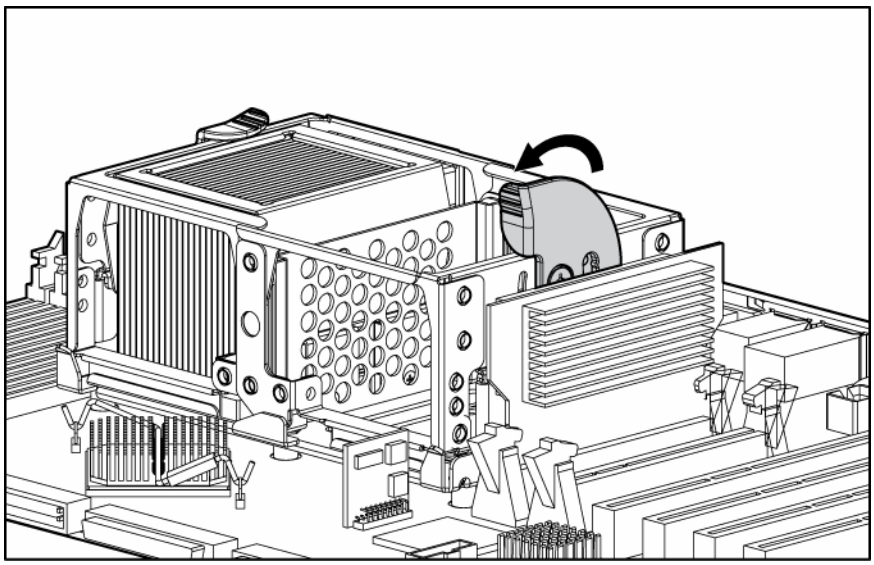
△ **CAUTION:** Be sure that you have the current version of the system ROM. Failure to flash the ROM with the correct version before installing or replacing the processor causes system failure. For the most current version of the ROM, go to the HP website (http://www.hp.com/support).

△ **CAUTION:** The processor, heatsink, and retaining clip comprise a single assembly. Separating the processor from the heatsink causes thermal instability and damage to the server.

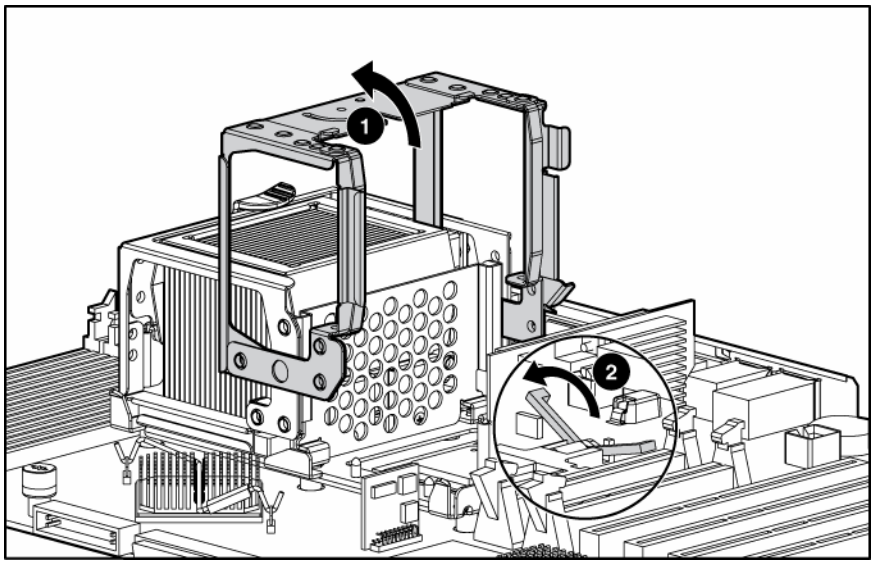
CAUTION: Do not mix the 2-MB L2 Cache processors with the 1-MB L2 Cache processors.

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove the processor air baffle ("Processor air baffle" on page 34).
6. Open the processor cage.
7. Lift the processor retaining bracket lever to release the processor retaining bracket.



8. Lift the processor retaining bracket.
9. Release the processor locking lever.

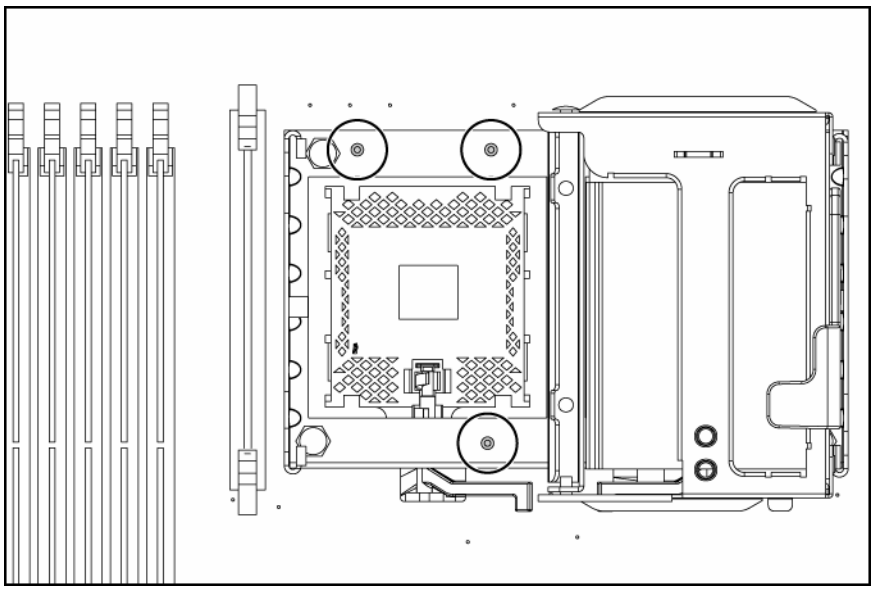


10. Remove the processor/heatsink assembly.

To replace the component:

1. Open the processor retaining bracket.
2. Install the processor/heatsink assembly into the available processor socket:

a. Determine the correct processor orientation by observing the three guide pins on the processor retaining bracket and the three corresponding guide holes on the processor/heatsink assembly.

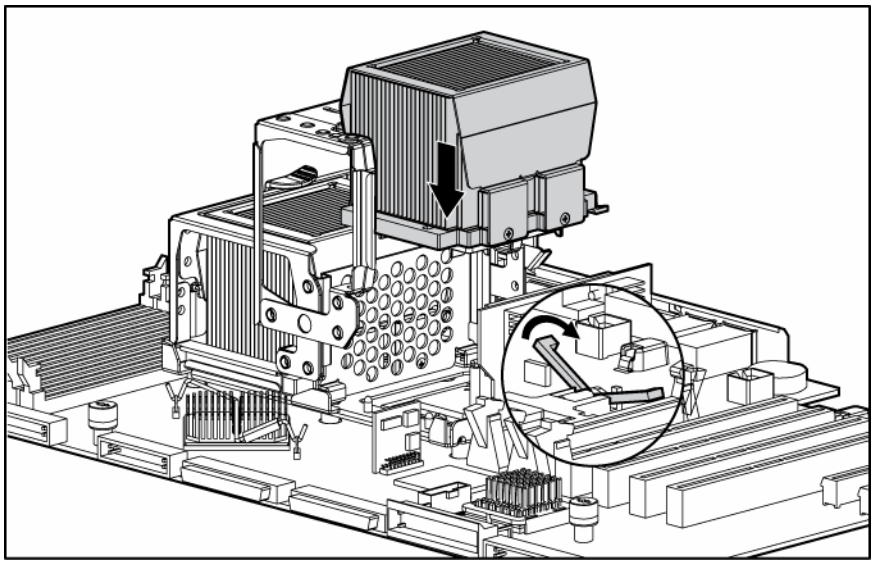


b. Be sure the processor locking lever is open.

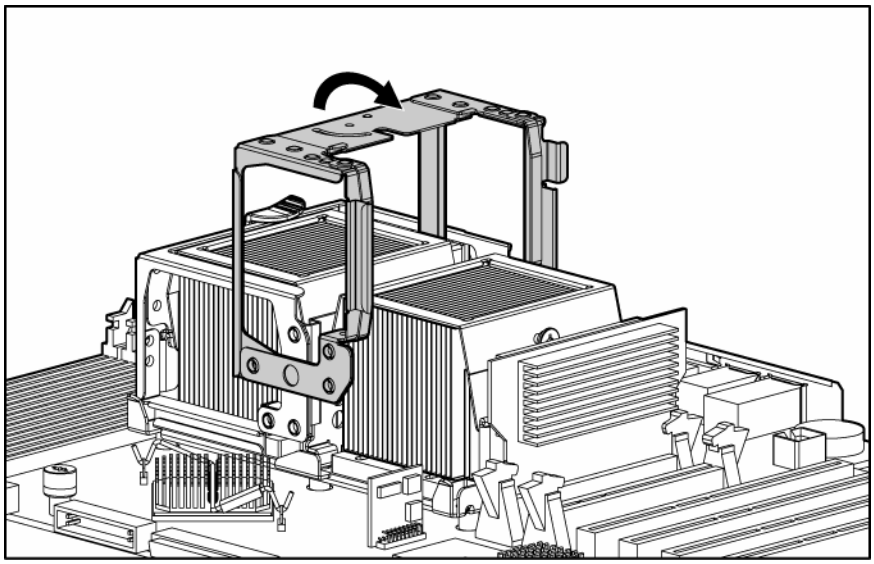
c. Insert the processor/heatsink assembly into the processor socket.

d. Close the processor locking lever.

IMPORTANT: If the processor locking lever is not secured, the processor retaining bracket will not close properly.



3. Lower the processor retaining bracket into position over the processor.



4. Press the processor retaining bracket lever down to secure the processor retaining bracket.

CAUTION: To prevent possible server malfunction or damage to the equipment, be sure to completely close the processor locking lever.

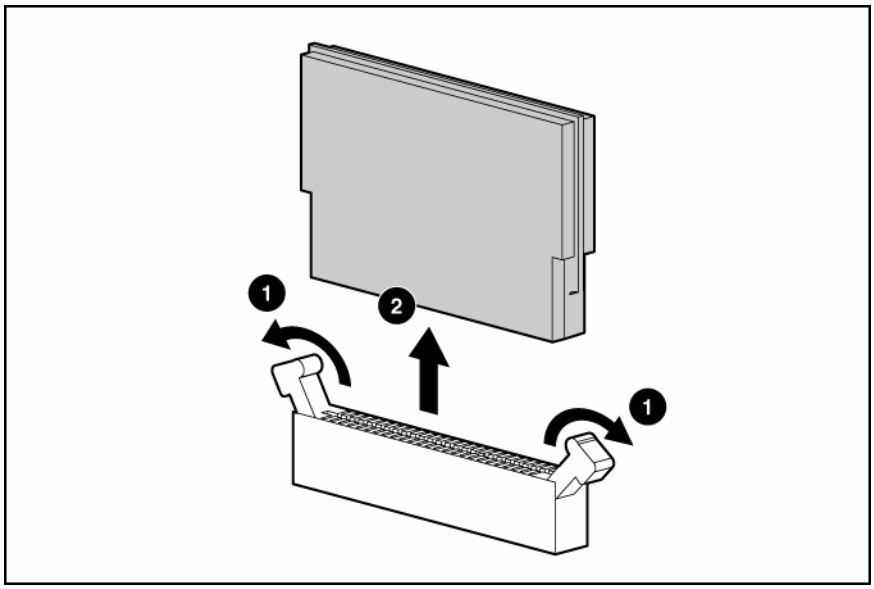
NOTE: When replacing a failed processor, run the RBSU after replacing the new processor to mark the failed processor as repaired. Refer to the *HP ProLiant ML370 Generation 4 Server Reference and Troubleshooting Guide* or the *HP ROM-Based Setup Utility User Guide* for more detailed information on RBSU.

Processor power module (PPM)

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove the processor air baffle ("Processor air baffle" on page 34).

6. Remove the PPM.



NOTE: The appearance of compatible PPMs may vary.

CAUTION: Only install a PPM if the processor is installed. Both the PPM and the processor must be installed together, otherwise the system does not boot.

IMPORTANT: PPMs do not seat if turned the wrong way.

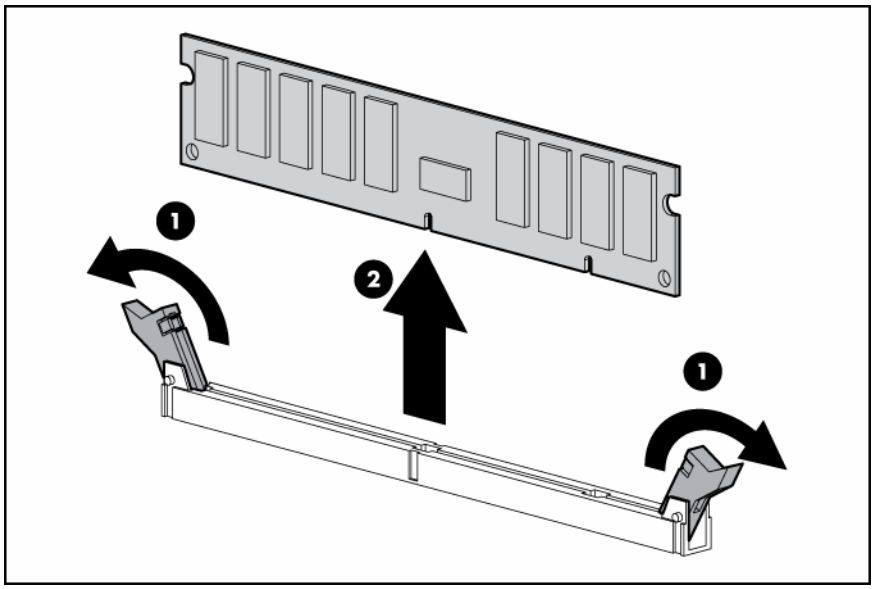
To replace the component, reverse the removal procedure.

DIMM

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove the processor air baffle ("Processor air baffle" on page 34).

6. Remove the DIMM.



IMPORTANT: DIMMs do not seat fully if turned the wrong way.

For DIMM configuration information, refer to the *HP ProLiant ML370 Generation 4 Server Reference and Troubleshooting Guide*.

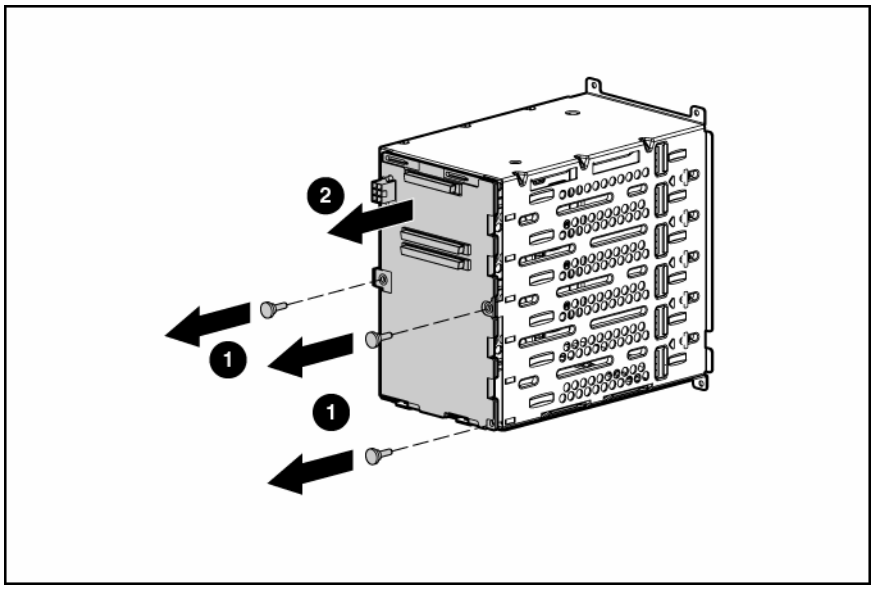
To replace the component, reverse the removal procedure.

SCSI backplane

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Remove the rack bezel (rack servers only) ("Rack bezel" on page 20).
4. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
5. Remove the access panel ("Access panel" on page 20).
6. Remove the hard drive cage ("Hard drive cage (SCSI)" on page 25).

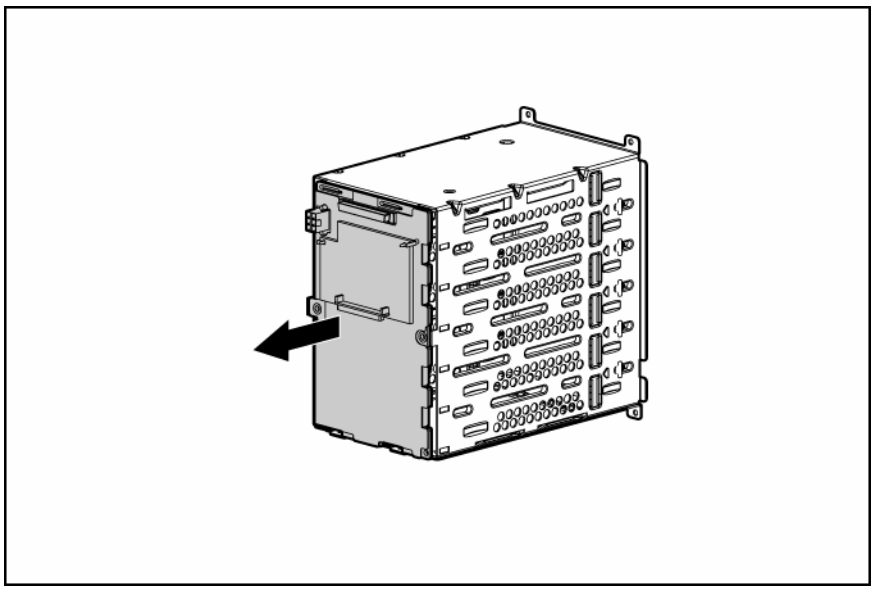
7. Remove the SCSI backplane.



To replace the component, reverse the removal procedure.

Duplex SCSI board

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Remove the rack bezel (rack servers only) ("Rack bezel" on page 20).
4. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
5. Remove the access panel ("Access panel" on page 20).
6. Remove the hard drive cage ("Hard drive cage (SCSI)" on page 25).
7. Remove the duplex SCSI board from the SCSI backplane.



If replacing the SCSI backplane and drive cage, refer to SCSI backplane.

To replace the component, reverse the removal procedure.

VHDCI or HD68 SCSI cable option

The VHDCI or HD68 SCSI Cable connects the server to external SCSI-based storage or backup devices. The cabling option kit must be used for internal ports to be used externally.

IMPORTANT: To install the external SCSI option, an internal SCSI port must be dedicated for external use only.

In addition to the VHDCI or HD68 SCSI cable, you will also need:

- T-15 Torx screwdriver
- Flathead screwdriver

NOTE: A PCI blank included with the optional Internal-to-External SCSI Kit enables the optional HD68 SCSI cable to connect through a PCI-X or PCI Express expansion slot. Refer to the Internal-to-External SCSI Kit installation instructions for details.

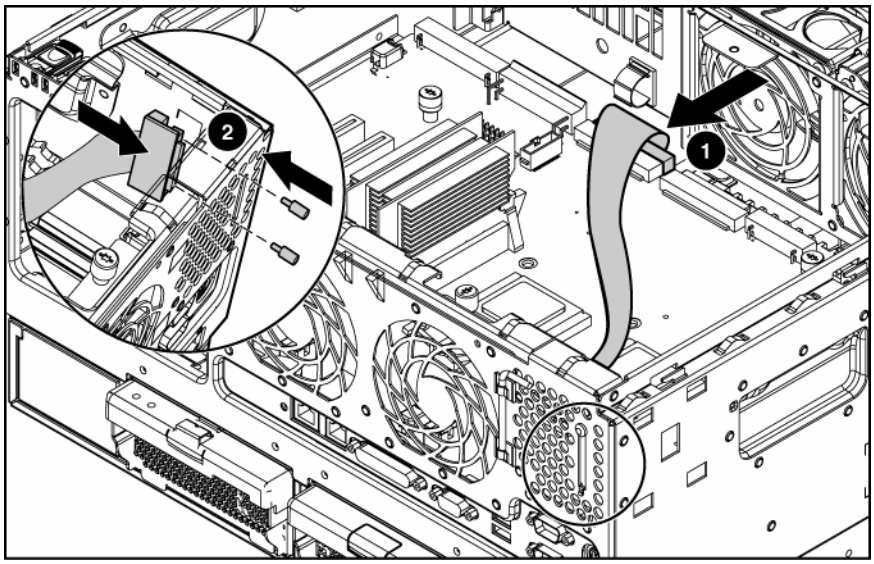
To prepare the server before installing or removing options:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).

WARNING: To reduce the risk of electric shock or damage to the equipment, disconnect power from the server by unplugging all power cords from the electrical outlets.

CAUTION: Failure to correctly power down the server could result in damage to equipment or loss of information.

5. Using a T-15 Torx screwdriver, remove a SCSI knockout located on the rear of the chassis and retain the screw.
6. Remove any brackets on the VHDCI cable, if necessary.
7. Connect the preassembled cable bracket assembly through the external SCSI knockout on the rear of the chassis, and secure the cable using the screw retained in step 5.
8. Connect the other end of the VHDCI SCSI cable to an available SCSI port or a PCI card.



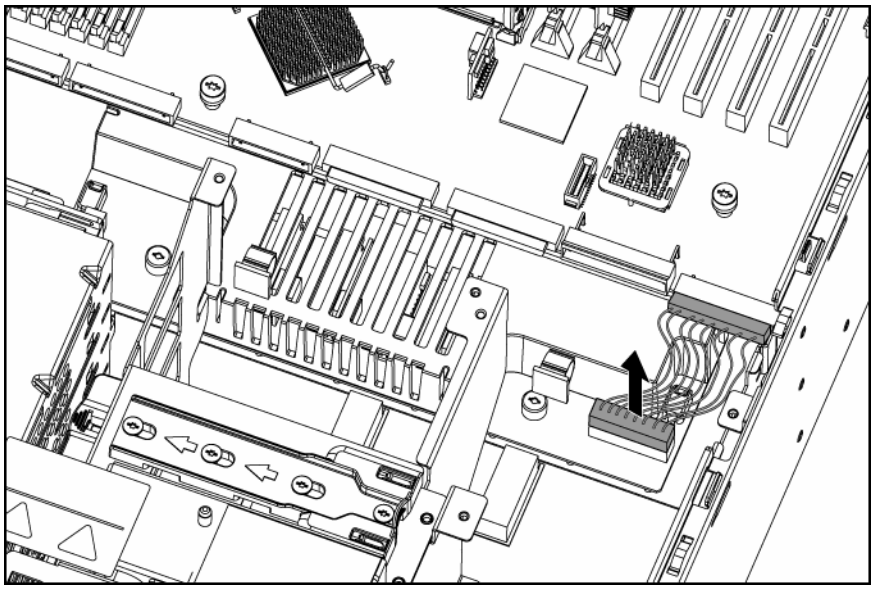
NOTE: Refer to the documentation that shipped with the external storage device for more information.

To replace the component, reverse the removal procedure.

Power supply backplane

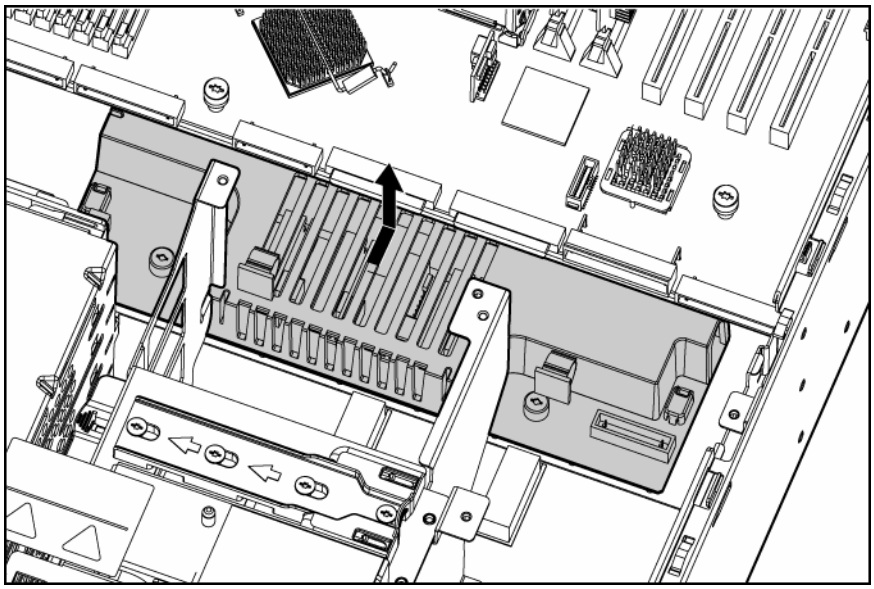
To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Remove all hot-plug power supplies ("Hot-plug power supply" on page 23).
4. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
5. Remove the access panel ("Access panel" on page 20).
6. Remove all expansion boards ("Expansion board" on page 33).
7. Remove the center wall ("Center wall" on page 35).
8. Disconnect the signal cable from the power supply backplane.



9. Disconnect all cables from the system board, as necessary, in order to access the power supply backplane.

10. Remove the power supply backplane.



To replace the component, reverse the removal procedure.

IMPORTANT: Be sure to align the two retaining guides on the chassis with the holes on the power supply backplane when replacing it.

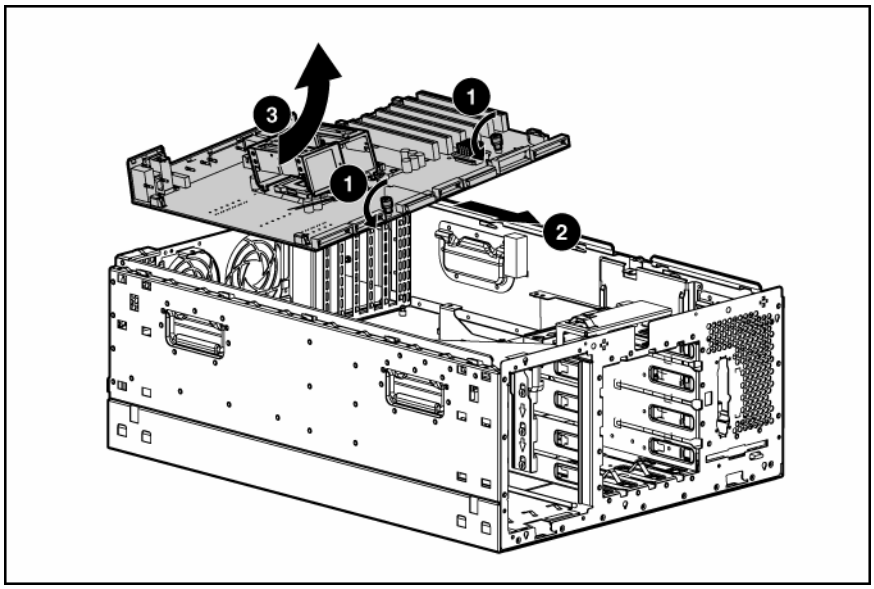
System board

IMPORTANT: If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("Re-entering the server serial number and product ID" on page 50).

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).
5. Remove the redundant fan cage (if installed) ("Redundant hot-plug fan cage" on page 30).
6. Remove all expansion boards ("Expansion board" on page 33).
7. Remove the center wall ("Center wall" on page 35).
8. Disconnect all cables.
9. Loosen the two thumbscrews securing the system board to the chassis.
10. Slide the system board toward the front of the chassis to release it from the six retaining guides.

11. Lift the system board out of the chassis and tilt it to one side to clear the cable guide.



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. Under normal use, battery life is 5 to 10 years.

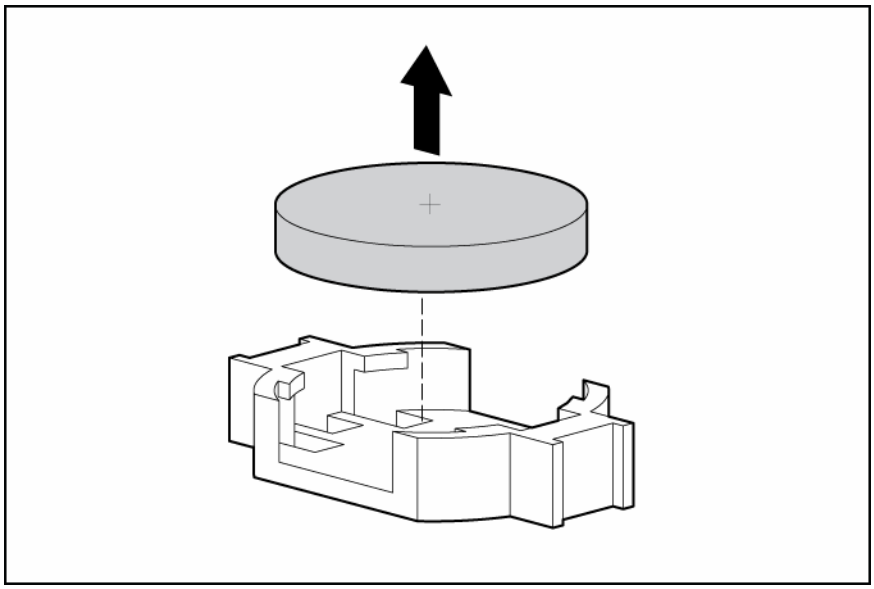
⚠ **WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:**

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

To remove the component:

1. Power down the server (on page 16).
2. Unlock and open the front bezel ("Front bezel" on page 19) (tower servers only).
3. Extend or remove the server from the rack ("Extending the server from the rack" on page 16).
4. Remove the access panel ("Access panel" on page 20).

5. Remove the battery.



To replace the component, reverse the removal procedure.

Run RBSU to configure the system after replacing the battery. Refer to the *HP ROM-Based Setup Utility User Guide* for more detailed information.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **System Options** menu.
3. Select **Serial Number**. The following warning is displayed:

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

4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**.
7. Enter the product ID and press the **Enter** key.
8. Press the **Esc** key to close the menu.
9. Press the **Esc** key to exit RBSU.
10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

Server cabling

In this section

Cabling overview 51
Hot-plug SCSI cabling 51
SAS cabling 55
CD-ROM drive cabling 57
Diskette drive cabling 57
External storage cabling 58
Storage device cabling guidelines 58
RILOE II cabling 58

Cabling overview

This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

For information on cabling peripheral components, refer to the white paper on high-density deployment at the HP website (http://www.hp.com/products/servers/platforms).

CAUTION: When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

Hot-plug SCSI cabling

Integrated simplex SCSI cabling (on page 51)

Integrated duplex SCSI cabling (on page 52)

Integrated SCSI cabling with optional internal two-bay hot-plug SCSI drive cage (on page 53)

Array controller simplex SCSI cabling (on page 54)

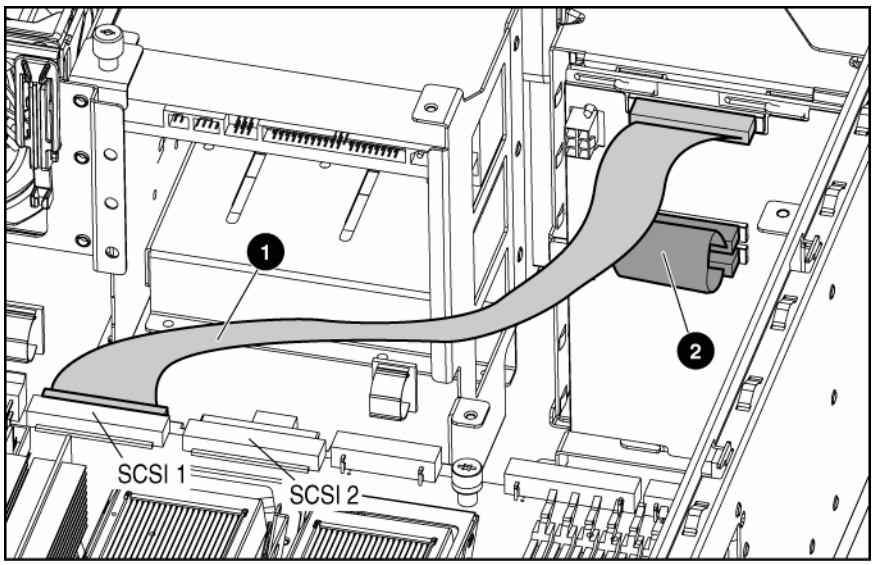
Array controller duplex SCSI cabling (on page 54)

Array controller duplex SCSI cabling with optional internal two-bay hot-plug SCSI drive cage (on page 55)

Integrated simplex SCSI cabling

In the integrated simplex cabling configuration, which is the standard shipping configuration, the integrated SCSI controller controls up to six hard drives through one SCSI port.

NOTE: The cables shown ship standard with the server.

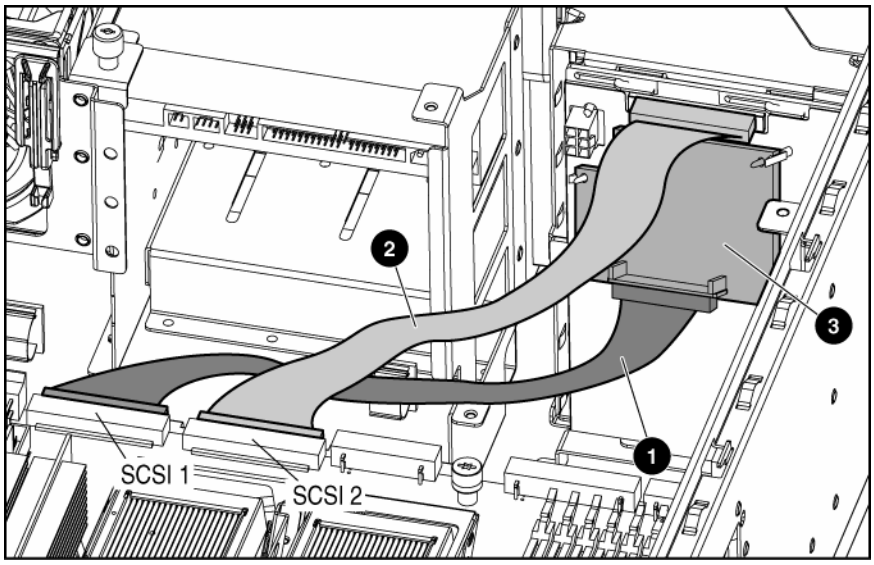


Item	Component description	SCSI IDs managed
1	SCSI cable (SCSI 1)	0, 1, 2, 3, 4, 5
2	simplex SCSI cable	N/A

IMPORTANT: After changing any SCSI configuration, be sure the proper boot controller order is set in RBSU.

Integrated duplex SCSI cabling

In the optional integrated duplex cabling configuration, the integrated controller controls up to six hard drives through two SCSI ports: one with up to two drives, and the other with up to four drives.



NOTE: The Duplex SCSI Backplane Option Kit is required for duplex cabling configurations. The kit contains a duplex SCSI cable and a duplex SCSI board.

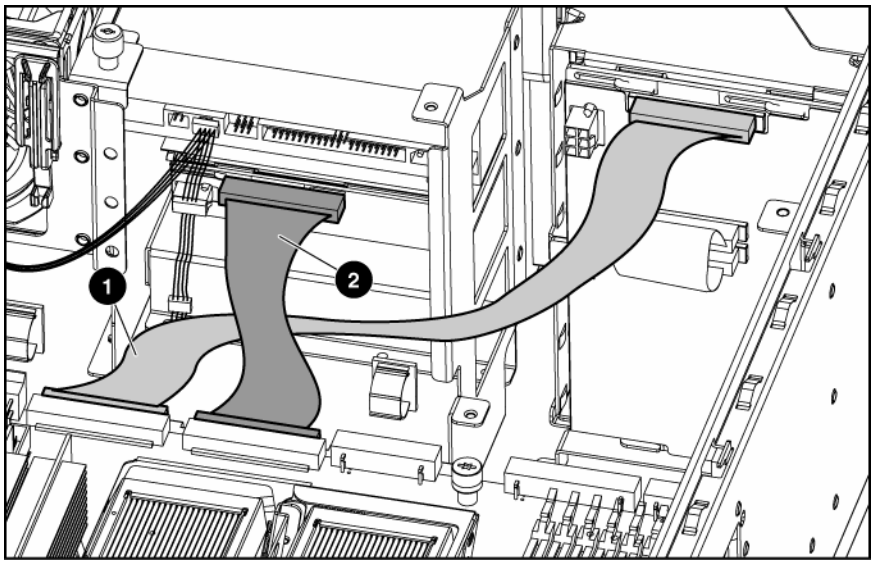
Item	Component description	SCSI IDs managed
1	SCSI cable (SCSI 1)	0, 1, 2, 3

Item	Component description	SCSI IDs managed
2	SCSI cable (SCSI 2) *	4, 5
3	Duplex SCSI board	N/A

* One SCSI cable is provided with the server.

Integrated SCSI cabling with optional internal two-bay hot-plug SCSI drive cage

When cabling an optional internal two-bay hot-plug SCSI drive cage with the integrated drive cage, the embedded integrated SCSI controller controls up to two hard drives on one SCSI bus and up to six hard drives on the second SCSI bus.

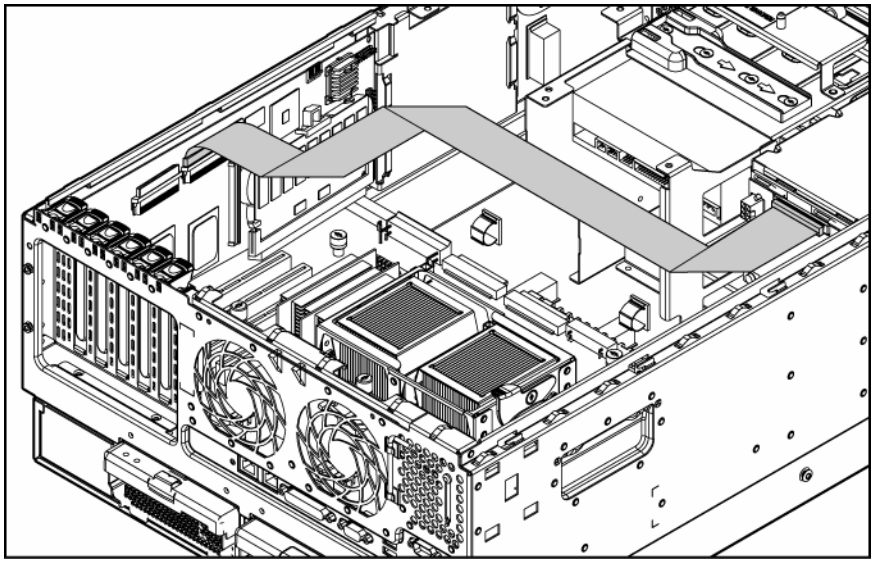


Item	Component description	SCSI IDs managed
1	SCSI cable **	0, 1, 2, 3, 4, 5
2	SCSI cable *	0, 1

* One SCSI cable is provided with the server.
** One SCSI cable is provided with the internal two-bay hot-plug SCSI drive cage.

Array controller simplex SCSI cabling

In the array controller simplex SCSI cabling configuration, an optional PCI array controller controls up to six hard drives through one SCSI bus.



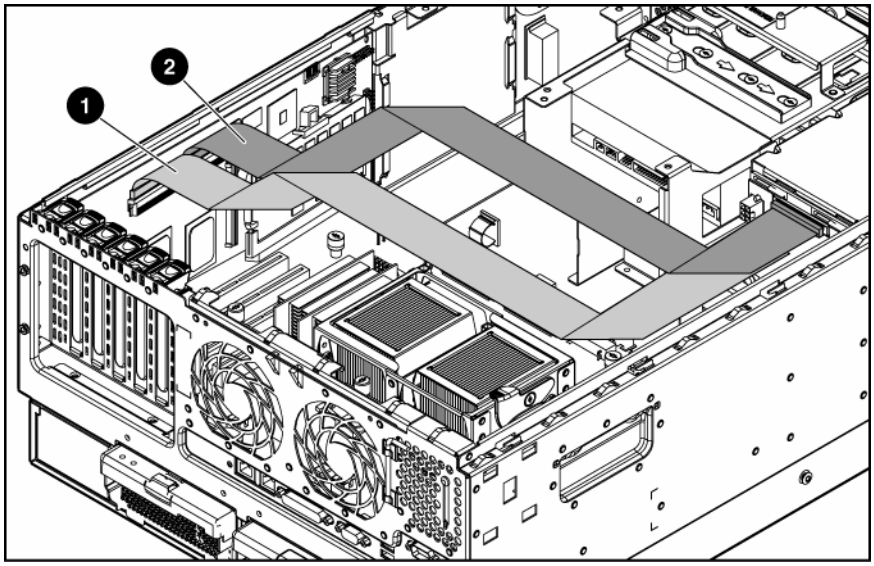
Component description	SCSI IDs managed
SCSI cable *	0, 1, 2, 3, 4, 5

* One SCSI cable is provided with the server.

Array controller duplex SCSI cabling

NOTE: The Duplex SCSI Backplane Option Kit is required for duplex cabling configurations. The kit contains a duplex SCSI cable and a duplex SCSI board.

In the array controller duplex SCSI cabling configuration, the optional PCI array controller controls up to four hard drives on one SCSI bus and two hard drives on the other SCSI bus.



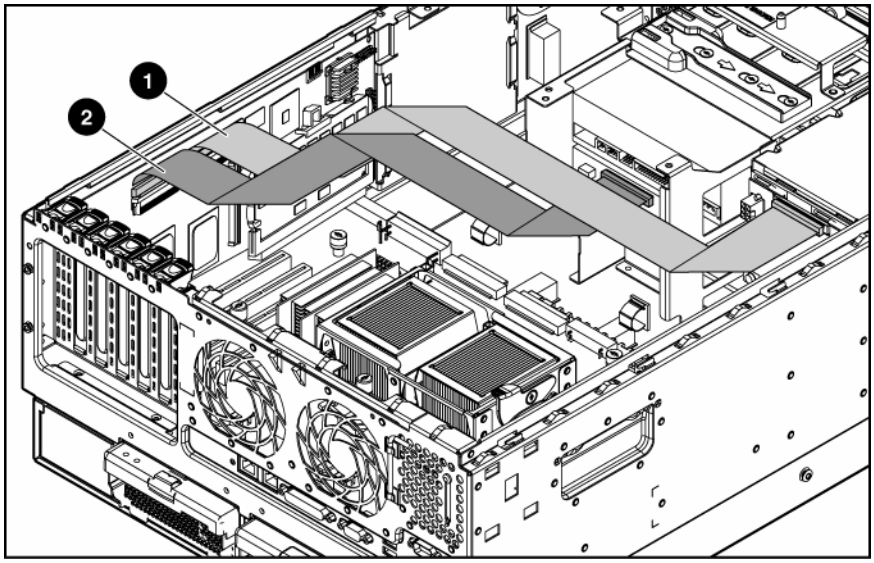
Item	Component description	SCSI IDs managed
1	SCSI cable	0, 1, 2, 3

Item	Component description	SCSI IDs managed
2	SCSI cable *	4, 5

* One SCSI cable is provided with the server.

Array controller duplex SCSI cabling with optional internal two-bay hot-plug SCSI drive cage

When cabling an optional internal two-bay hot-plug SCSI drive cage with the integrated drive cage, the optional PCI array controller controls up to two hard drives on one SCSI bus and up to six hard drives on the other SCSI bus.



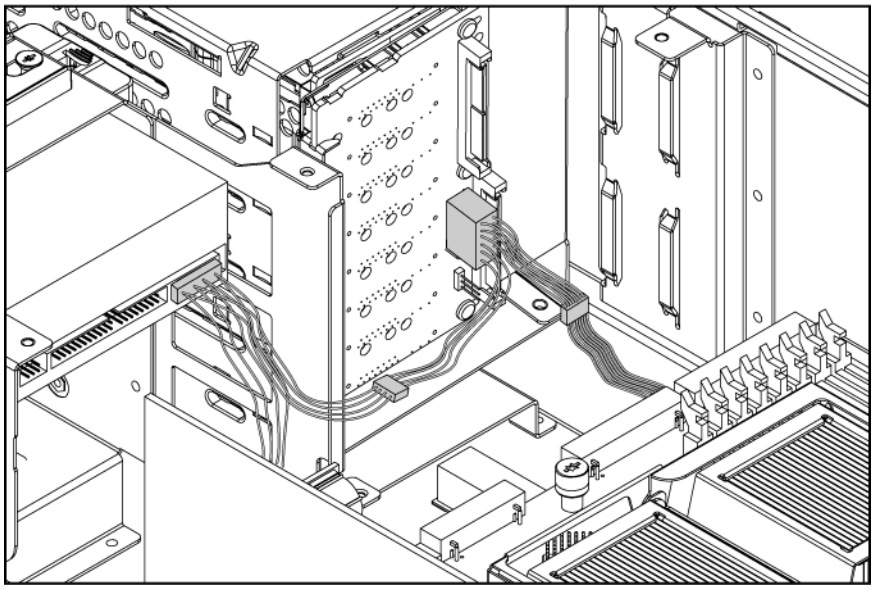
Item	Component description	SCSI IDs managed
1	SCSI cable *	0, 1, 2, 3, 4, 5
2	SCSI cable **	0, 1

* One SCSI cable is provided with the server.
** One SCSI cable is provided with the internal two-bay hot-plug SCSI drive cage.

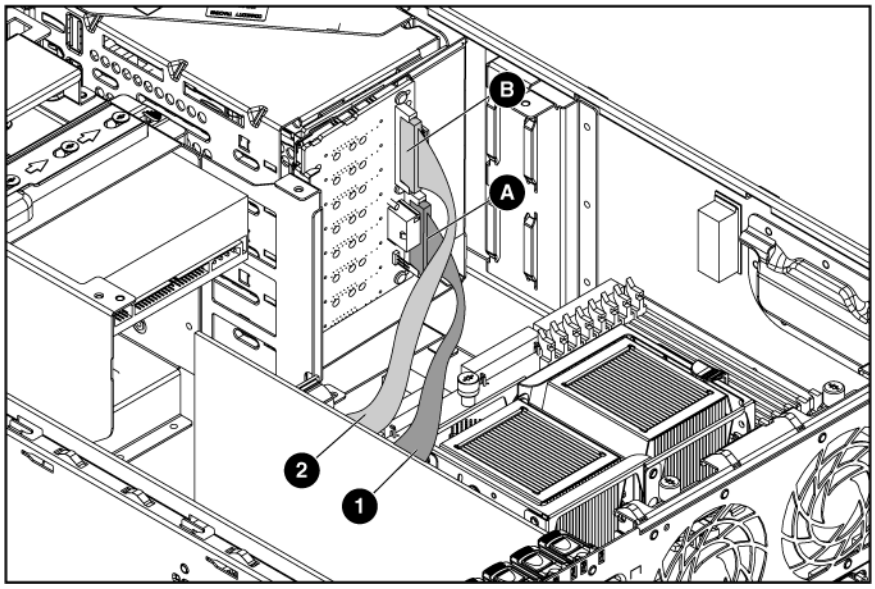
SAS cabling

NOTE: The center wall is removed for illustration purposes only.

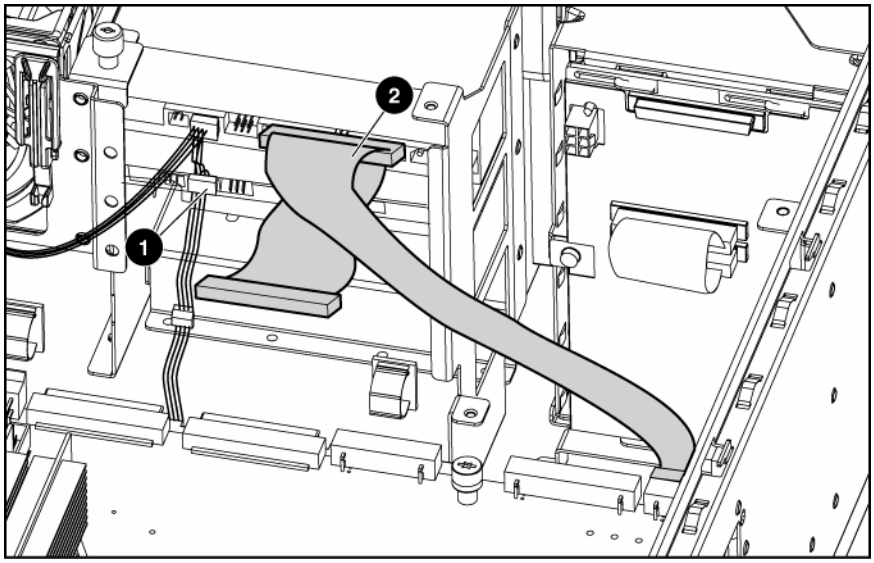
- Power cables



- Data cables

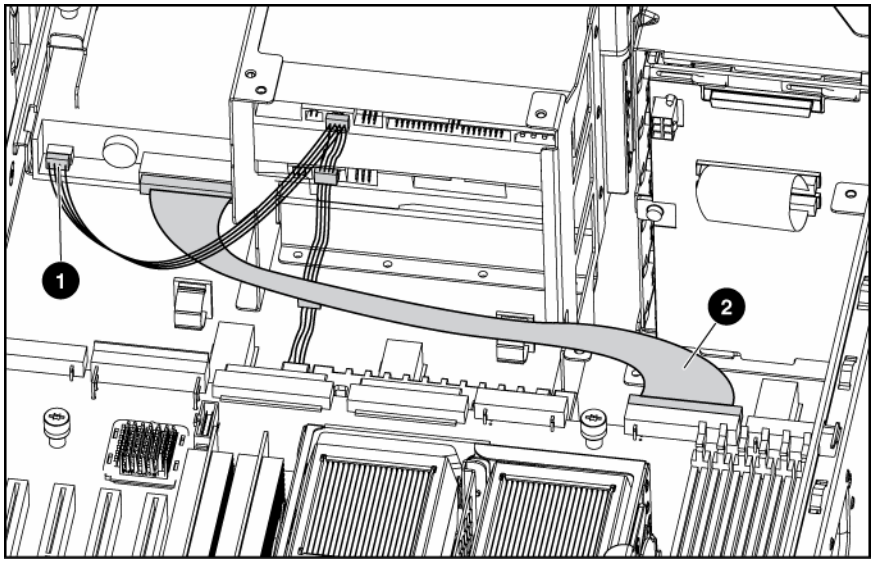


CD-ROM drive cabling



Item	Cable description
1	CD-ROM drive power cable
2	CD-ROM drive data cable

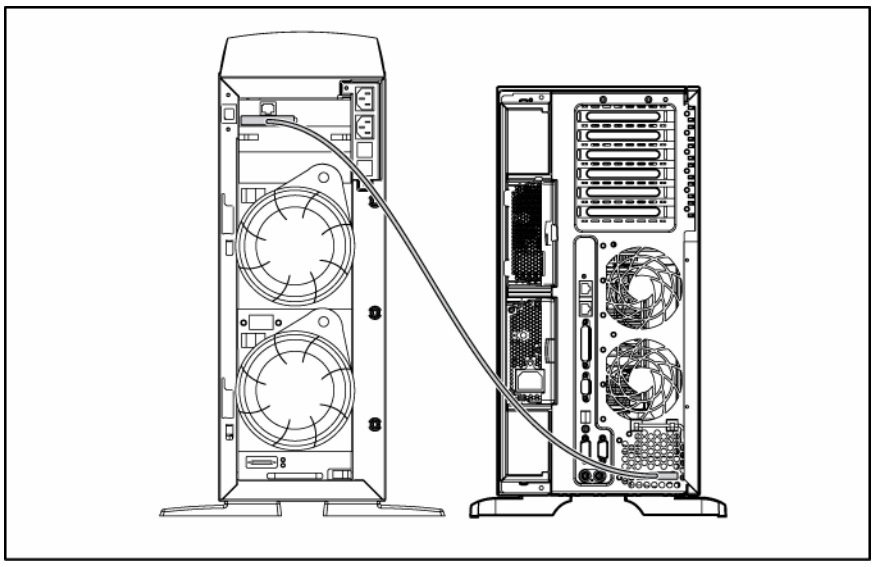
Diskette drive cabling



Item	Cable description
1	Diskette drive power cable
2	Diskette drive data cable

External storage cabling

With the optional cable kit, the server supports external storage devices through the Auxiliary VHDCI SCSI connector ("VHDCI or HD68 SCSI cable option" on page 46) on the rear panel of the server.



For more information on external cabling, refer to the HP website (http://www.hp.com/products/servers/platforms).

Storage device cabling guidelines

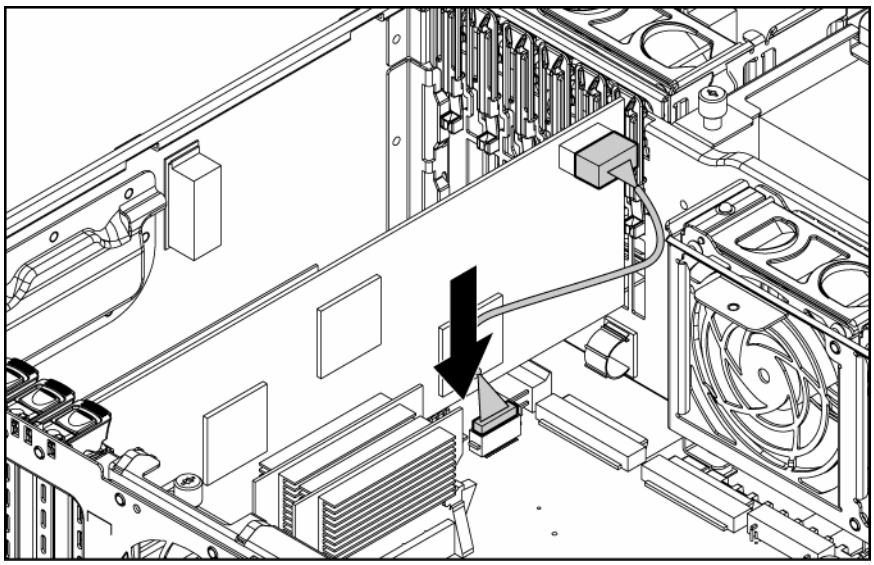
CAUTION: To prevent damage to the equipment, be sure that the server is powered down, all cables are disconnected from the back of the server, and the power cord is disconnected from the grounded (earthed) AC outlet before installing devices.

CAUTION: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

RILOE II cabling

The 30-pin Remote Insight cable ships with the RILOE II cable kit.

IMPORTANT: Install the RILOE II board into slot 1 for ease of cabling.



Diagnostic tools

In this section

Automatic Server Recovery 60
HP Systems Insight Manager 60
Integrated Management Log 60
Lights Out Manager technology 61
Option ROM Configuration for Arrays 61
ProLiant Essentials Rapid Deployment Pack 61
HP ROM-Based Setup Utility 62
ROMPaq utility 62
System Online ROM flash component utility 62
SmartStart software 62

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR 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 increases server availability by restarting the server within a specified time after a system hang or shutdown. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the HP SIM console or through RBSU.

HP Systems Insight Manager

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

IMPORTANT: You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SCSI hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (http://www.hp.com/go/hpsim).

Integrated Management Log

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

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

- From within HP SIM ("HP Systems Insight Manager" on page 60)

- From within Survey Utility
- From within operating system-specific IML viewers
  - For NetWare: IML Viewer
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within the RILOE user interface
- From within HP Insight Diagnostics (on page 63)

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

Lights Out Manager technology

The RILOE subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The RILOE subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes RILOE independent of the host server and its operating system. The RILOE subsystem provides remote access to any authorized network client, sends alerts, and provides other server management functions.

Using RILOE, you can:

- Remotely power up, power down, or reboot the host server.
- Send alerts from RILOE regardless of the state of the host server.
- Access advanced troubleshooting features through the RILOE interface.
- Diagnose RILOE using HP SIM through a web browser and SNMP alerting.

For more information about RILOE features, refer to the RILOE documentation on the Documentation CD or on the HP website (http://www.hp.com/servers/lights-out).

Option ROM Configuration for Arrays

NOTE: ORCA is supported with the use of an optional HP Array Controller.

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 regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

ProLiant Essentials Rapid Deployment Pack

The RDP is an integrated HP and Altiris solution that automates the process of deploying and provisioning server software. Refer to the RDP website (http://www.hp.com/servers/rdp).

HP ROM-Based Setup Utility

RBSU, an embedded configuration utility, performs a wide range of configuration activities that may include:

- Configuring system devices and installed options
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/servers/smartstart).

ROMPaq utility

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.

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

System Online ROM flash component utility

The Online ROM Flash Component 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 website (http://www.hp.com/go/supportos).

- 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 (http://h18000.www1.hp.com/support/files/index.html).

SmartStart software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Configuring hardware using embedded configuration utilities, such as RBSU and ORCA

- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation
- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page 63)
- Installing software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility, Array Diagnostic Utility, and Erase Utility

SmartStart is included in the HP ProLiant Essentials Foundation Pack. For more information about SmartStart software, refer to the HP ProLiant Essentials Foundation Pack or the HP website (http://www.hp.com/servers/smartstart).

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The SmartStart Scripting Toolkit is designed to support ProLiant BL, ML, and DL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these new tools to build an automated server deployment process.

Using SmartStart technology, the Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each server deployed, making it possible to scale server deployments to high volumes in a rapid manner.

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

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, launch the SmartStart CD.

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft® Windows® and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, refer to the HP website (http://www.hp.com/servers/diags).

Server component identification

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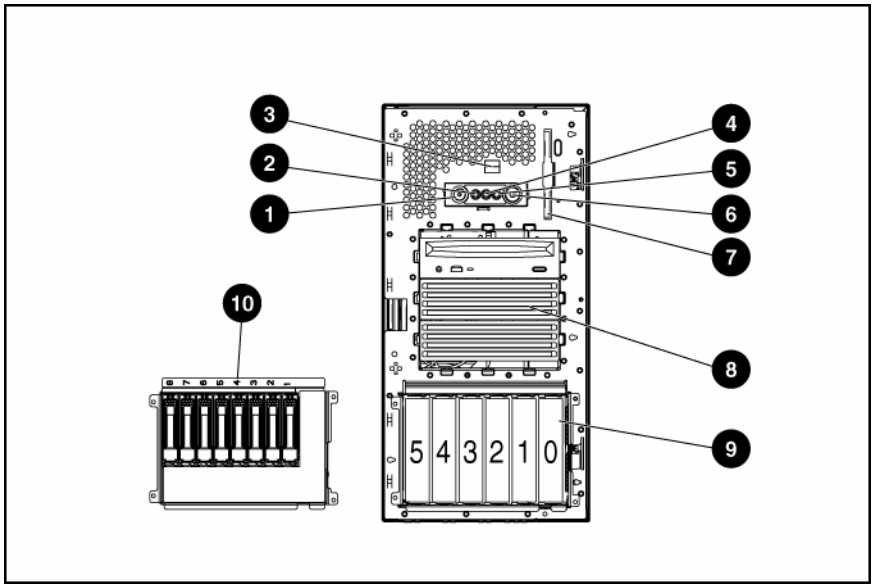
Front panel components

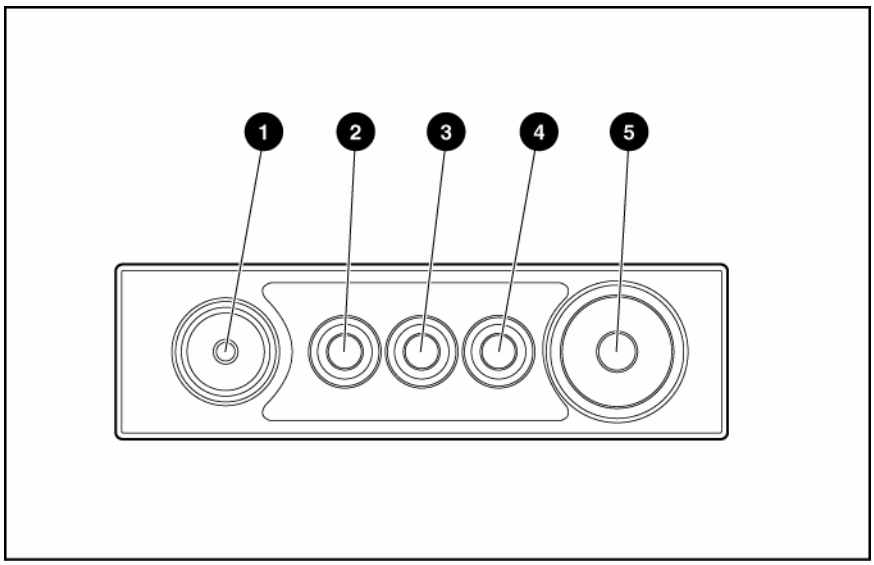


Item	Description
1	UID switch and LED
2	Internal system health LED
3	Front panel USB port
4	External system health LED
5	NIC link/activity LED
6	Power on/Standby button/LED assembly
7	Diskette drive*

Item	Description
8	Removable media bays
9	Hot-plug SCSI hard drive bays (SCSI IDs 0 through 5)
10	Optional SAS-SATA hard drive bays (1 through 8)

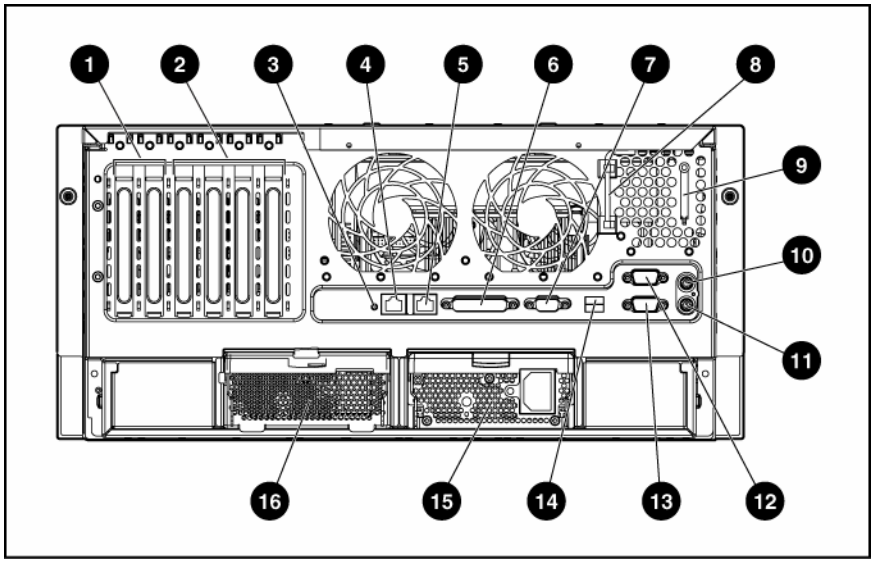
* Open the media door on the rack server to access the diskette drive.

Front panel LEDs and buttons



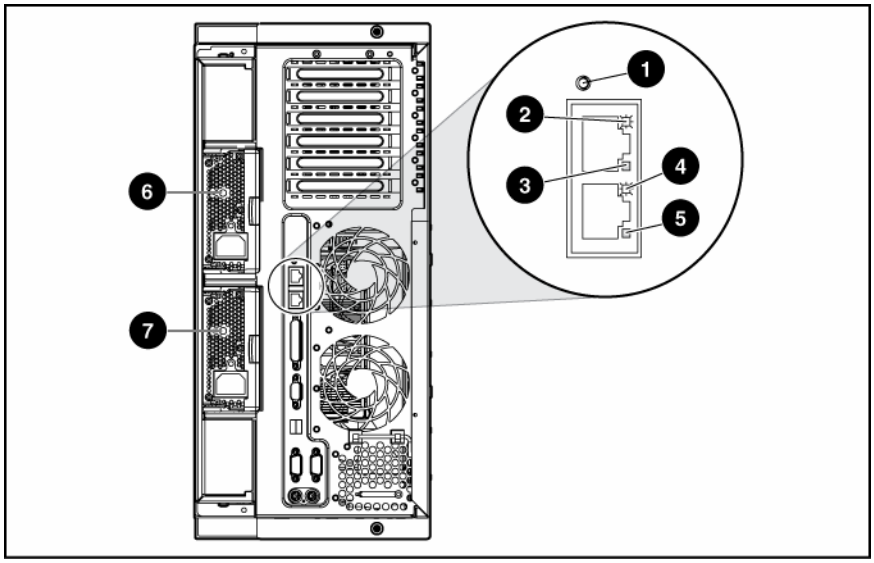
Item	Description	Status
1	UID switch and LED	Blue = Activated Flashing blue = System being managed remotely Off = Deactivated
2	Internal system health LED	Green = Normal (system on) Amber = System health is degraded Red = System health is critical Off = Normal (system off)
3	External system health (power supply) LED	Green = Normal (system on) Amber = Redundant power supply failure Red = Power supply failure. No operational power supplies. Off = Normal (system off)
4	NIC link/activity LED (embedded NIC only)	Green = Linked to network Flashing green = Linked with activity on the network Off = No network connection
5	Power on/Standby button and LED	Amber = System has AC power and is in standby mode Green = System has AC power and is turned on Off = System has no AC power

Rear panel components



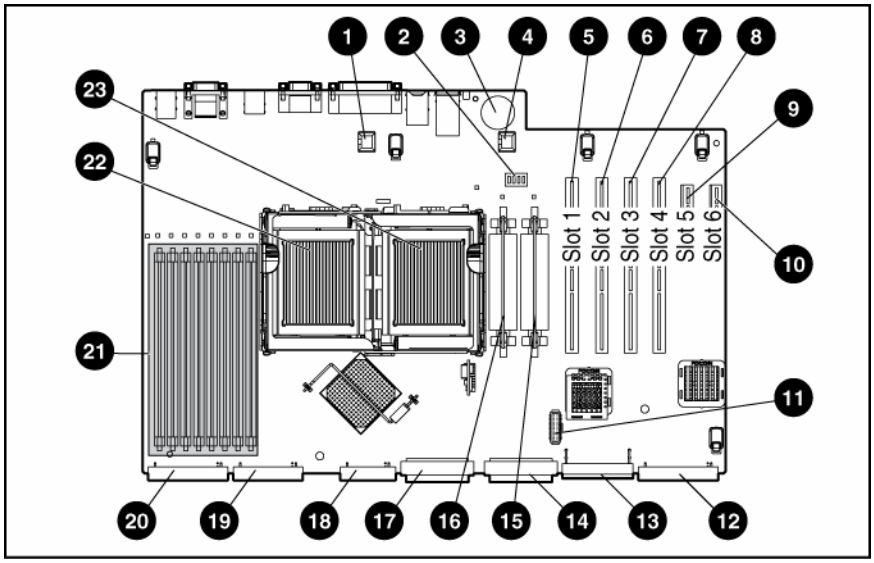
Item	Description	Item	Description
1	x4 PCI Express expansion slots	9	Auxiliary VHDCI SCSI blank
2	100-MHz PCI-X expansion slots	10	Mouse connector
3	Unit ID LED	11	Keyboard connector
4	Ethernet 10/100/1000 port	12	Serial connector B
5	iLO management port	13	Serial connector A
6	Parallel connector	14	USB connectors
7	Video connector	15	Primary hot-plug power supply
8	T-15 Torx screwdriver	16	Redundant hot-plug power supply

Rear panel LEDs and buttons



Item	Description	LED color	Status
1	Unit ID LED	Blue	On = Activated Flashing = System remotely managed Off = Deactivated
2	NIC activity LED (Integrated NC7781)	Green	On or flashing = Linked to network Off = Not linked to network
3	NIC link LED (Integrated NC7781)	Green	On = Network activity Off = No network activity
4	iLO NIC activity LED	Green	On or flashing = Network activity Off = No network activity
5	iLO NIC Link LED	Green	On = Linked to network Off = Not linked to network
6	Power supply LED (redundant)	Green	On = Power turned on and power supply functioning properly Off = One or more of the following conditions exists: • AC power unavailable • Power supply failed • Power supply in standby mode • Power supply exceeded current limit
7	Power supply LED (primary)	Green	On = Power turned on and power supply functioning properly Off = One or more of the following conditions exists: • AC power unavailable • Power supply failed • Power supply in standby mode • Power supply exceeded current limit

System board components



Item	Description	Item	Description
1	Redundant fan 2 connector	13	Power supply connector
2	System maintenance switch	14	SCSI port 1
3	System battery	15	PPM socket 2
4	Redundant fan 4 connector	16	PPM socket 1 (populated)
5	64-bit/100-MHz PCI-X slot, bus 3	17	SCSI port 2
6	64-bit/100-MHz PCI-X slot, bus 3	18	Fan cable connector
7	64-bit/100-MHz PCI-X slot, bus 7	19	Diskette drive connector
8	64-bit/100-MHz PCI-X slot, bus 7	20	IDE connector
9	PCI Express x4 slot, bus 11 *	21	DIMM slots
10	PCI Express x4 slot, bus 14 *	22	Processor 1
11	RILOE II connector (install adapter into slot 1) **	23	Processor 2
12	Power supply signal connector		

* x8 PCI Express cards are supported, but will run at x4 speeds.
** The server comes with iLO remote management capability embedded on the system board. The 30-pin remote management connector for the RILOE II board is provided if the server environment requires an upgrade for improved Remote Console performance.

System maintenance switch

The system maintenance switch (SW1) is a six-position switch that is used for system configuration. The default position for all six positions is Off.

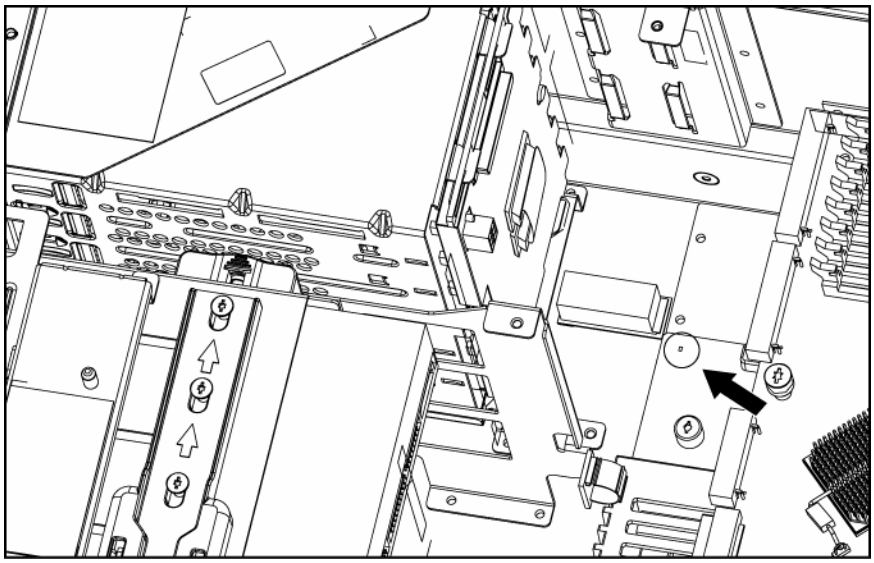
Position	Description	Function
S1	iLO security	Off = iLO security is enabled On = iLO security is disabled
S2	Configuration lock	Off = System configuration can be changed On = System configuration is locked
S3	Reserved	Reserved
S4	Reserved	Reserved
S5	Password protection override	Off = No function On = Clears power-on password and administrator password
S6	Invalidate configuration	Off = Normal On = ROM treats system configuration as invalid

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

△ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

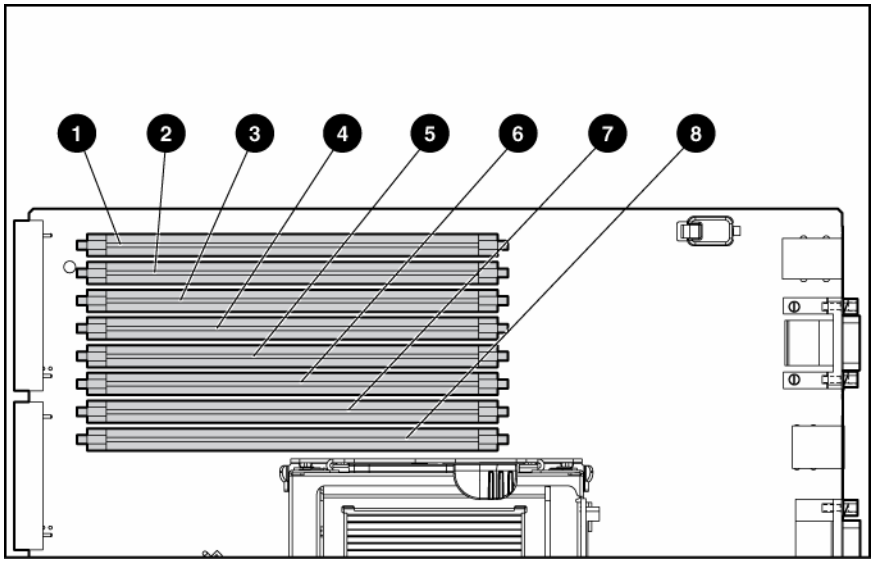
Power supply backplane LED

If the power supply backplane LED is illuminated, then the power supply backplane must be replaced.



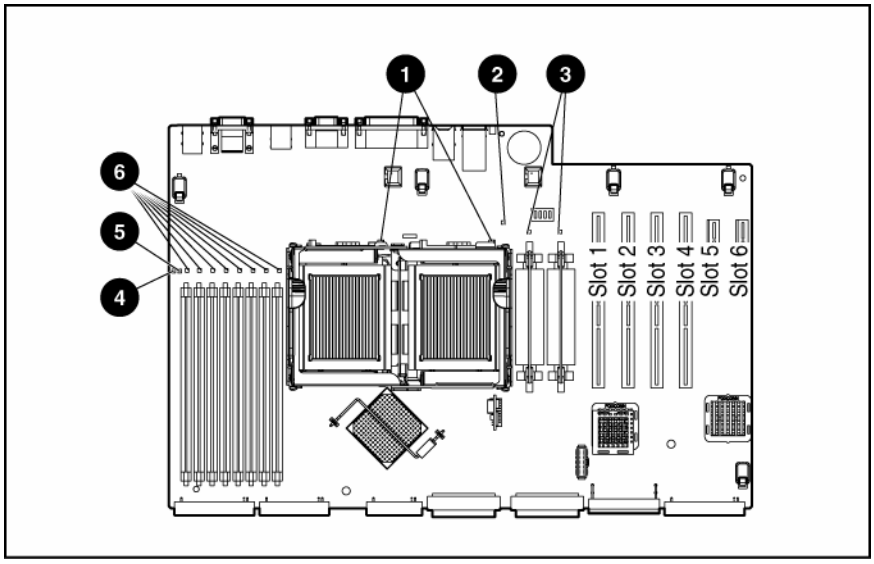
DIMM slots

DIMM slots are numbered sequentially (1 through 8) and the paired banks are identified by the letters A, B, C, and D.



Item	Description
1	DIMM slot 1A
2	DIMM slot 2A
3	DIMM slot 3B
4	DIMM slot 4B
5	DIMM slot 5C
6	DIMM slot 6C
7	DIMM slot 7D
8	DIMM slot 8D

System board LEDs



Item	LED description	Status
1	Processor error	Off = Normal Amber = Processor failed or missing
2	System temperature alert	Off = Normal Amber = System temperature has exceeded OS cautionary level
3	PPM error	Off = Normal Amber = PPM failed or missing
4	Memory mode LED	Off = Normal Green = System is in online spare memory mode
5	Online spare memory failover LED	Off = Normal Amber = Online spare memory is in use due to memory failover
6	Memory status	Off = Normal Amber = Memory failed or configuration problem

System LEDs and internal health LED combinations

When the internal health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated system LEDs and the internal health LED indicate system status.

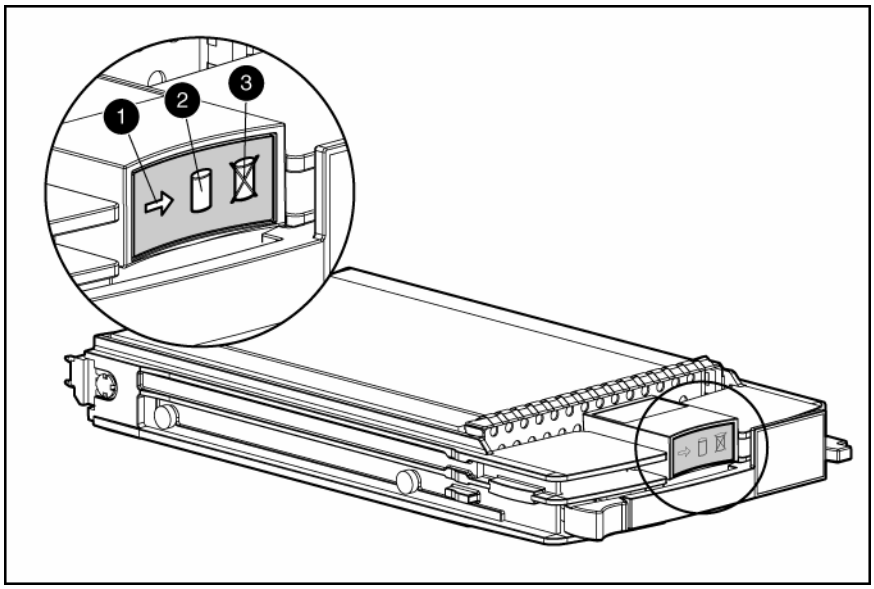
NOTE: The system management driver must be installed for the internal system health LED to provide pre-failure and warranty conditions.

The front panel health LEDs indicate only the current hardware status. In some situations, HP SIM may report server status differently than the health LEDs because the software tracks more system attributes.

System LED and color	Internal health LED color	Status
Processor failure, socket *X* (amber)	Red	One or more of the following conditions may exist: • Processor in socket *X* has failed. • Processor *X* is not installed in the socket. • ROM detected a failed processor during POST.
	Amber	Processor in socket *X* is in a pre-failure condition.
PPM failure, slot *X* (amber)	Red	• PPM in slot *X* has failed. • PPM is not installed in slot *X*, but the corresponding processor is installed.
DIMM failure, slot *X* (amber)	Red	• DIMM in slot *X* has failed. • DIMM has experienced a multi-bit error.
	Amber	• DIMM in slot *X* has reached single-bit correctable error threshold. • DIMM in slot *X* is in a pre-failure condition.
DIMM bank error (all slots in one bank, amber)	Red	The bank is not populated entirely or DIMMs do not all match within the bank.

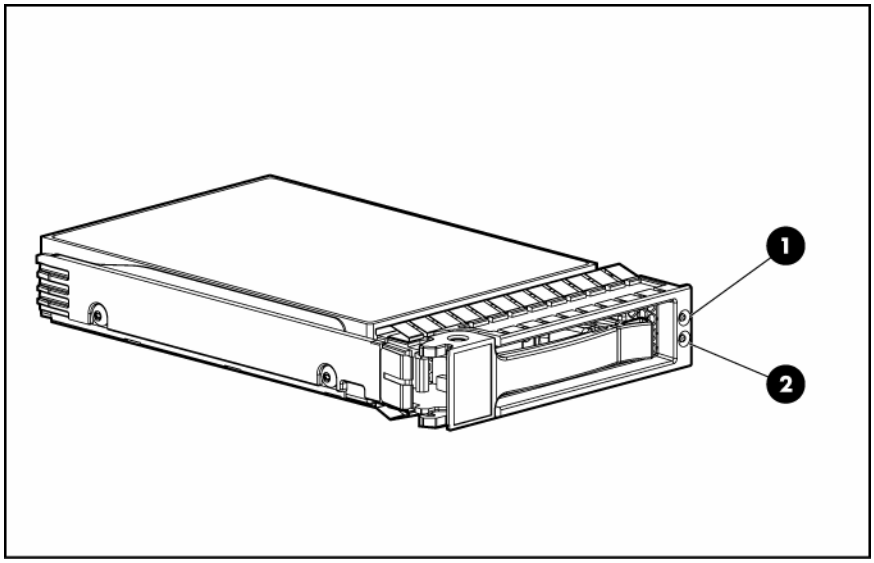
System LED and color	Internal health LED color	Status
DIMM failure (all slots, amber)	Red	• No valid or usable memory is installed in the system. • The banks are not populated in the correct order.
System temperature alert (amber)	Red	System temperature has exceeded OS cautionary level or critical hardware level.
Fan (amber)	Red	A required fan has failed.
	Amber	A redundant fan has failed.
Power supply backplane failure (amber)	Red	The power supply backplane has failed.

Hot-plug SCSI hard drive LEDs



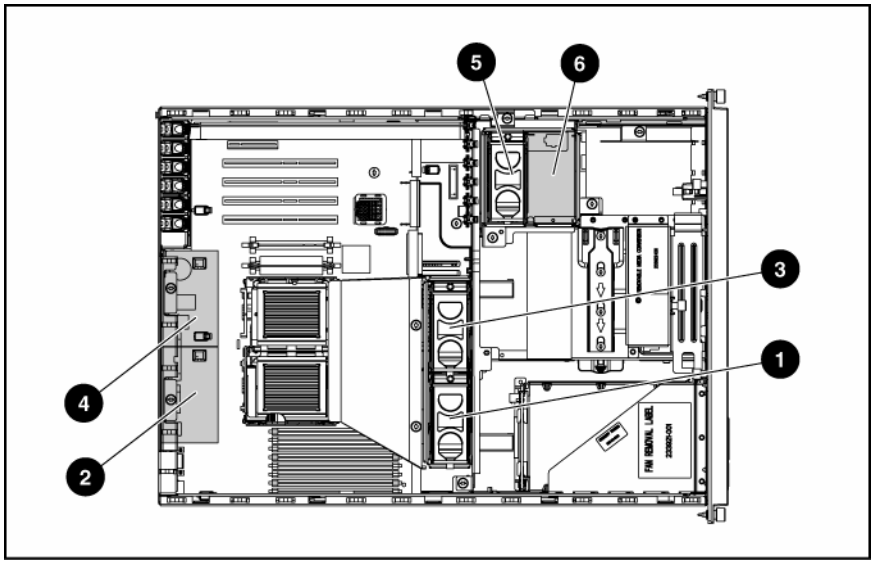
Item	LED description	Status
1	Activity status	On = Drive activity Flashing = High activity on the drive or drive is being configured as part of an array. Off = No drive activity
2	Online status	On = Drive is part of an array and is currently working. Flashing = Drive is actively online. Off = Drive is offline.
3	Fault status	On = Drive failure Flashing = Fault-process activity Off = No fault-process activity

SATA or SAS hard drive LEDs



Item	LED description	Status
1	Fault/UID status	Amber = Drive failure Flashing amber = Fault-process activity Blue = Unit identification is active Off = No fault-process activity
2	Online/Activity status	Green = Drive activity Flashing green = High activity on the drive or drive is being configured as part of an array Off = No drive activity

Identifying redundant hot-plug fans

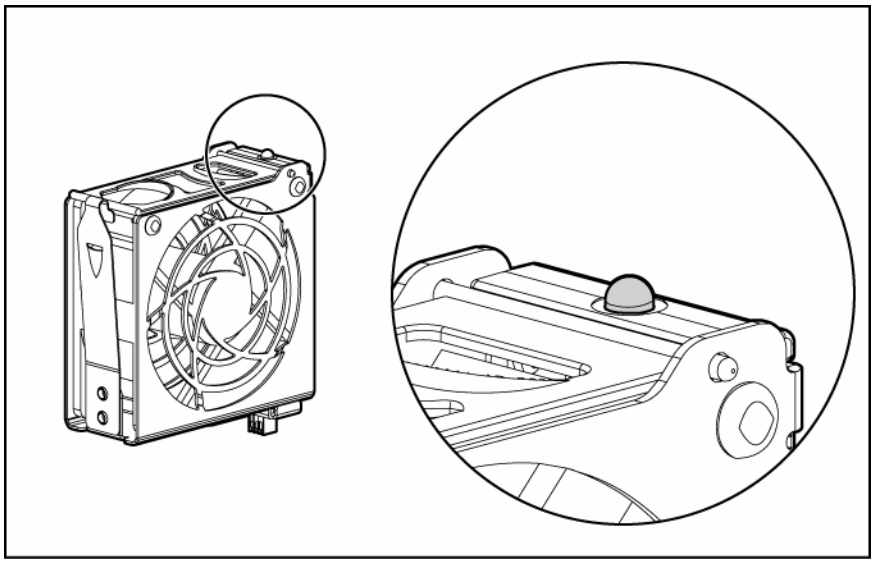


NOTE: Fan locations are located in the chassis.

Item	Description	Configuration
1	Fan 1	Primary
2	Fan 2	Redundant
3	Fan 3	Primary
4	Fan 4	Redundant
5	Fan 5	Primary
6	Fan 6	Redundant

Fan failures are indicated by amber LEDs located on each hot-plug fan and by the front panel internal health LED. When a fan failure occurs, the internal health LED illuminates red in non-redundant mode and amber in redundant mode.

Hot-plug fan LEDs



Status
Green = Operating normally
Amber = Failed
Off = No power

Specifications

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SAS and SATA hard drive specifications 78

Server specifications

Dimensions	**Specifications**
Height	21.92 cm (8.63 in)
Depth	65.41 cm (25.75 in)
Width	44.45 cm (17.50 in)
Weight (maximum)	40.8 kg (90 lb)
Weight (no drives installed)	24.9 kg (55 lb)
Input Requirements	**Specifications**
Rated input voltage	100 VAC to 240 VAC *
Rated input frequency	47 Hz to 63 Hz
Rated input current	10 A (100 V) to 5 A (200 V)
Rated input power	1000 W
BTUs per hour	2730
Power Supply Output	**Specifications**
Rated steady-state power	400 W
Maximum peak power	775 W

* 100 to 127 VAC is required for 10 A; 200 to 240 VAC is required for 5 A.

Environmental specifications

Specification	**Value**
Temperature range*	—
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)

Specification	Value
Relative humidity (noncondensing)**	—
Operating	10% to 90%
Non-operating	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.
** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, refer to the HP Enterprise Configurator website (http://h30099.www3.hp.com/configurator/).

DDR2 SDRAM DIMM specifications

CAUTION: Be sure to install DIMMs in the proper configuration. Refer to the Documentation CD.

Item	Description
Size	512 MB, 1 GB, 2 GB
Width	72 bits
Upgrade requirement *	Any combination of like-paired DDR2 DIMMs that provide a minimum of 512 MB

*Use only 512-MB, 1-GB, or 2-GB, 72-bit wide, 1.8-V, PC2-3200 Registered ECC DDR2. Use HP DDR2 only.

1.44-MB diskette drive specifications

Specification	Value
Dimensions	
Height	12.7 mm (0.5 in)
Width	96 mm (3.8 in)
Depth	130 mm (5.1 in)
LEDs (front panel)	Green = On
Read/write capacity per diskette	
High density	1.44 MB
Low density	720 KB
Drives supported	1
Drive height	One-third height
Drive rotation	300 rpm
Transfer rate	
High	500 Kb/s
Low	250 Kb/s
Bytes/sector	512

Specification	Value
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)	169 ms/94 ms
Setting time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

CD-ROM drive specifications

Specification	Value
Disk formats	CD-ROM (modes 1 and 2); mixed mode (audio and data combined); CD-DA; Photo CD (single/multiple-session), CD-XA ready; CDi ready
Capacity	550 MB (mode 1, 12 cm)
	640 MB (mode 2, 12 cm)
Block size	2368, 2352 bytes (mode 0)
	2352, 2340, 2336, 2048 bytes (mode 1)
	2352, 2340, 2336, 2048 bytes (mode 2)
Dimensions	
Height	12.7 mm (0.50 in)
Depth	132.08 mm (5.20 in)
Width	132.08 mm (5.20 in)
Weight	0.34 kg (0.75 lb)
Data transfer rate	
Sustained	150 KB/s (sustained 1X), 1500/3600 KB/s (10X to 24X)
Burst	16.6 MB/s
Access times (typical)	
Full stroke	300 ms
Random	140 ms
Diameter	12 cm, 8 cm (4.70 in, 3.15 in)
Thickness	1.2 mm (0.05 in)
Track pitch	1.6 μm (6.3×10^{-7} in)
Cache/buffer	128 KB
Startup time	< 10 s
Stop time	< 5 s (single); < 30 s (multisession)
Laser parameters	
Type	Semiconductor laser GaAs
Wave length	700 ± 25 nm

Specification	Value
Divergence angle	53.5° ± 1.5°
Output power	0.14 mW
Operating conditions	
Temperature	5°C to 45°C (41°F to 118°F)
Humidity	5% to 90%

Ultra320 SCSI hard drive specifications

Item	36.4-GB Ultra320 SCSI drive	72.8-GB Ultra320 SCSI drive	72.8-GB Ultra320 SCSI drive	146.8-GB Ultra320 SCSI drive
Capacity	36,419.6 MB	72,837.2 MB	72,837.2 MB	146,815.74 MB
Height	1.0 in (One-third height)	1.0 in (One-third height)	1.0 in (One-third height)	One-third, 1.0 in
Width	4.0 in	4.0 in	4.0 in	4.0 in
Interface	Ultra320 SCSI	Ultra320 SCSI	Ultra320 SCSI	Ultra320SCSI
Transfer rate	320 MB/sec	320 MB/sec	320 MB/sec	320 MB/sec
Rotational speed	15,000 rpm	10,000 rpm	15,000 rpm	10,000 rpm
Bytes per sector	512	512	512	512
Logical blocks	71,132,000	142,264,000	142,264,000	286,749,488
Operating temperature	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)

SAS and SATA hard drive specifications

Item	36-GB SAS drive	72-GB SAS drive	60-GB SATA drive
Capacity	36,420 MB	73,408 MB	60,022 MB
Height	15 mm	15 mm	9 mm
Interface	SAS	SAS	Serial ATA
Transfer rate	3 GB/sec	3 GB/sec	1.5 GB/sec
Rotational speed	10,000 rpm	10,000 rpm	5,400 rpm
Bytes per sector	512	512	512
Logical blocks	71,132,960	143,374,737	117,231,408
Operating temperature	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)

Acronyms and abbreviations

ABEND

abnormal end

ASR

Automatic Server Recovery

BIOS

Basic Input/Output System

DDR

double data rate

DIMM

dual inline memory module

ECC

error checking and correcting

HD68

high density 68

IDE

integrated device electronics

iLO

Integrated Lights-Out

IML

Integrated Management Log

LED

light-emitting diode

NIC

network interface controller

NMI

non-maskable interrupt

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCI Express

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

PPM

processor power module

RAID

redundant array of inexpensive (or independent) disks

RBSU

ROM-Based Setup Utility

RDP

Remote Desktop Protocol

RILOE II

Remote Insight Lights-Out Edition II

ROM

read-only memory

SAS

serial attached SCSI

SATA

serial ATA

SCSI

small computer system interface

SDRAM

synchronous dynamic RAM

SIM

Systems Insight Manager

SNMP

Simple Network Management Protocol

UID

unit identification

USB

universal serial bus

VHDCI

very high density cable interconnect

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