HP ProLiant ML150 Generation 2 Server Maintenance and Service Guide

June 2005 (Third Edition)
Part Number 368148-003

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Contents

Index

1

Illustrated Parts Catalog

This chapter provides the illustrated parts breakdown and spare parts lists for the HP ProLiant ML150 Generation 2 (G2) server. Refer to Table 1-1 for the names of referenced spare parts.

Exploded View

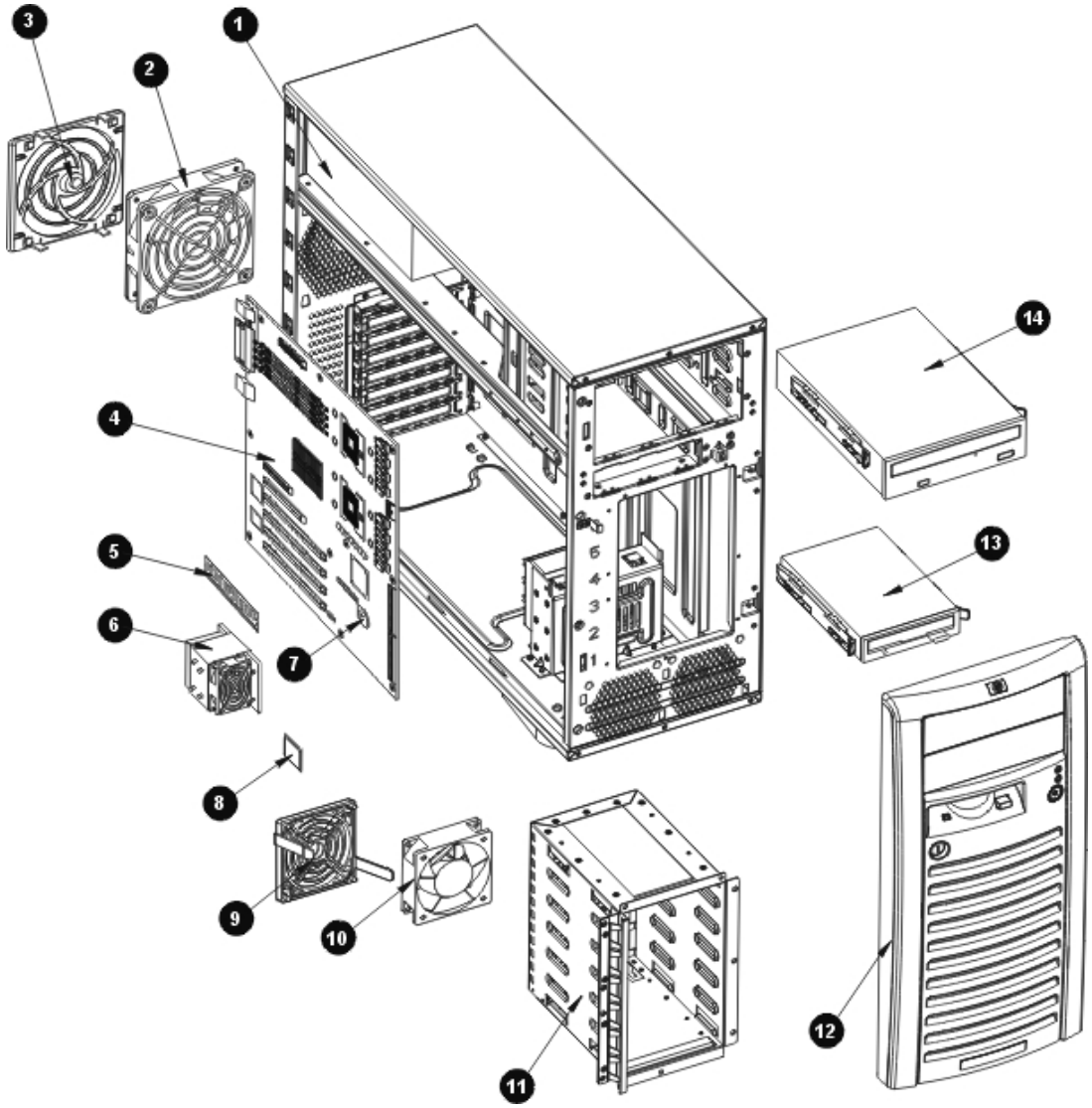

Figure 1-1: Exploded view

Table 1-1: Spare Parts List

Item	Description	Spare Part Number
1	Power supply	372783-001
2	Rear system fan	372787-001
3	Rear system fan holder	374895-001
4	System board	373275-001

continued

Table 1-1: Spare Parts List *continued*

Item	Description	Spare Part Number
5	Memory	
	a) 512-MB PC2700 DDR ECC Registered DIMM★	370780-001
	b) 1-GB PC2700 DDR ECC Registered DIMM★	367167-001
	c) 2-GB PC2700 DDR ECC Registered DIMM★	367553-001
6	Heatsink	373584-001
7	3V Lithium battery for system board	234556-001
8	Processor	
	a) Intel® Xeon 2.8-GHz/800-MHz	373580-001
	b) Intel® Xeon 3.0-GHz/800-MHz★	373581-001
	c) Intel® Xeon 3.2-GHz/800-MHz★	373582-001
	d) Intel® Xeon 3.4-GHz/800-MHz★	373583-001
	e) Intel® Xeon 3.6-GHz/800-MHz★	374156-001
9	Front system fan holder	373305-001
10	Front system fan	373183-001
11	SCSI hot-plug hard drive cage	373277-001
12	Bezel door	373457-001
13	Diskette drive	233409-001
14	IDE CD-ROM drive	288894-001
15	IDE Combo drive★	337272-001
16	SCSI card★	373239-001
17	SCSI hot-plug back plane★	373238-001
18	SCSI hot-plug hard drive cable★	384448-001
19	SCSI hot-plug hard drive carrier★	373465-001
20	SCSI non-hot-plug hard drive cable★	384449-001
21	SCSI hot-plug hard drive★	
	a) 36-GB 15K hard drive	377680-001
	b) 72-GB 10K hard drive	377681-001
	c) 146-GB 10K hard drive	377682-001
22	SCSI non-hot-plug hard drive cage★	373456-001
23	SCSI non-hot-plug hard drive – 36GB 15K★	372659-001

continued

Table 1-1: Spare Parts List *continued*

Item	Description	Spare Part Number
24	SATA card★	373013-001
25	SATA LED cable★	377227-001
26	SATA hot-plug back plane★	373012-001
27	SATA hot-plug hard drive cable★	
	a) Green cable	384450-001
	b) Yellow cable	384451-001
	c) White cable	384452-001
	d) Blue cable	384453-001
28	SATA hot-plug hard drive carrier★	373211-001
29	SATA hot-plug hard drive cage★	373210-001
30	SATA hot-plug hard drive –80GB 7.2K ★	353042-001
31	HP ProLiant ML150 G2 Lights-Out 100 remote management card★	372860-001
32	10/100/1000-T PCI card	353446-001
33	Diskette drive cable★	373276-001
34	CD-ROM drive cable★	373278-001
35	Power LED cable★	373382-001
36	Processor common enabling kit (CEK) ★	373705-001
37	Power switch★	373941-001
38	Insulator for SCSI hot-plug model★	374375-001
39	EMI shield for the SCSI non-hot-plug model★	374374-001
40	Rail kit★	373383-001
41	Hardware kit★	373015-001
42	Return kit★	373464-001

★Not shown

2

Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for the HP ProLiant ML150 G2 server.

To service the server, a T-15 Torx screwdriver may be needed.

Electrostatic Discharge Information

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

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

Symbols on Equipment

These symbols may be located on equipment in areas where hazardous conditions may exist.

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

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

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

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

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

This symbol on an RJ-45 receptacle indicates a network interface connection.

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

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

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

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

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

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

Weight in kg
Weight in lb

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

Preparation Procedures

WARNING: Only authorized technicians trained by HP should attempt to repair this equipment. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure. Refer to "Electrostatic Discharge Information" earlier in this chapter for more information.

Before removing any serviceable parts, determine whether the part is hot-pluggable or non-hot-pluggable.

Non-Hot-Pluggable Device

If the device is non-hot-pluggable, the server must be powered down. Non-hot-pluggable devices in the server include the processor, all boards, memory modules, fans, PCI option cards and drive cages.

Powering Down the Server

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

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

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

CAUTION: The server must always be operated with system unit covers on. Proper cooling is not achieved when the system unit covers are removed.

To power down the server:

1. Shut down the operating system in an orderly manner as directed in the operating system instructions.
2. If the server is on, press the power button to power down the server.

   If you are unable to shut down the server normally, press and hold the power button for more than four seconds to power down the server.
3. Be sure that the power indicator on the front panel is off and that the fan noise has stopped.
4. Disconnect the AC power cord from the AC outlet, and then from the server.
5. Disconnect all external peripheral devices from the server.

Bezel Door

To remove the bezel door:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. If the bezel lock is locked, unlock the bezel door using the included key.

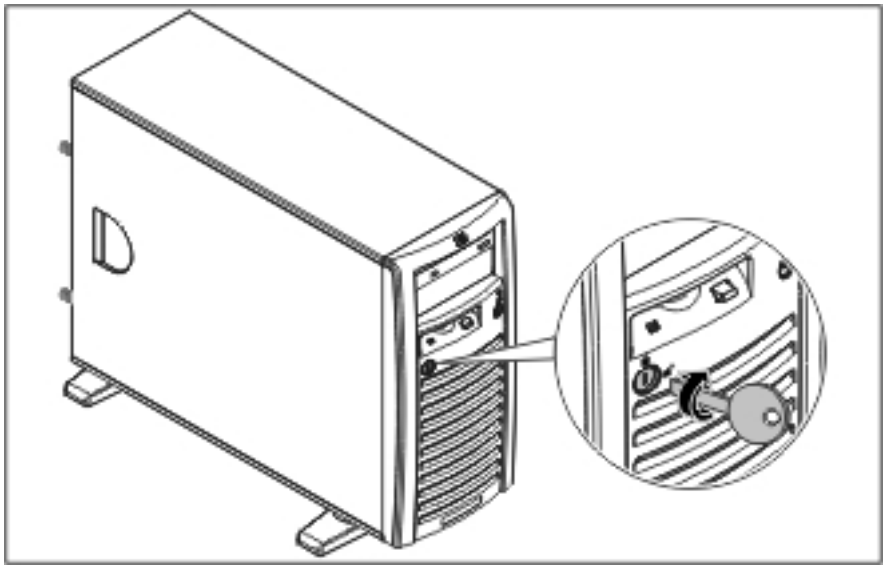

Figure 2-1: Unlocking the bezel door

3. Open the bezel door fully to the right (1).
4. Lift the bezel door and then pull it away from the chassis (2).

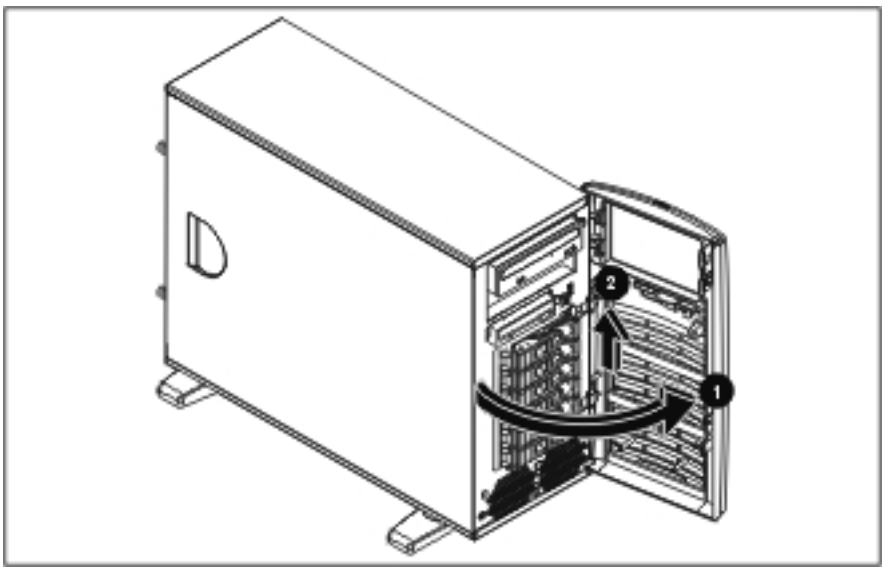

Figure 2-2: Removing the bezel door

To replace the bezel door, reverse steps 3 through 4.

NOTE: There is an EMI shield attached to the back of the bezel door for the SCSI non-hot-plug model. To remove the EMI shield, remove the four screws securing the shield to the bezel door.

Access Panel

To remove the access panel:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Loosen the two thumbscrews located on the right of the rear of the chassis (1).
3. Slide the access panel back about 1.5 cm (0.5 inch) (2).
4. Detach the top edge of the access panel from the chassis about 30 degrees, and then pull up to remove the access panel (3).

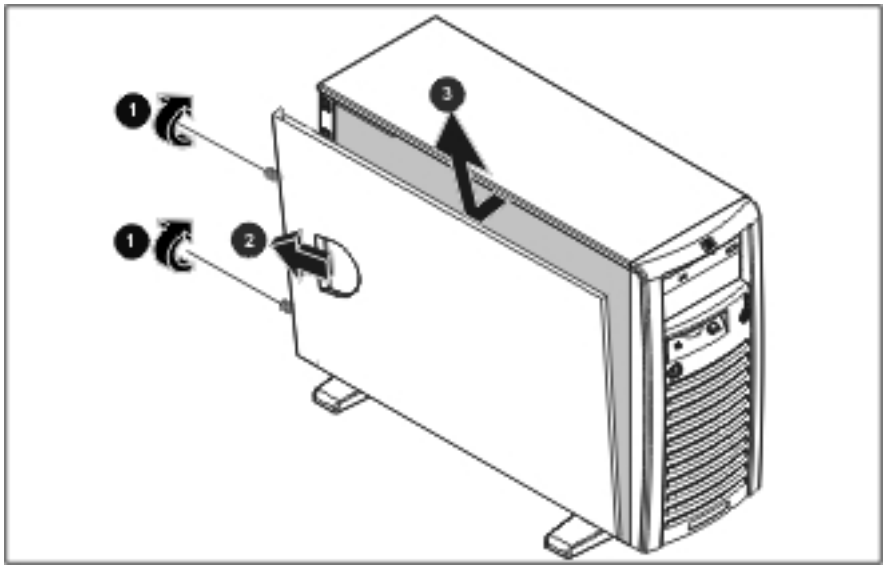

Figure 2-3: Removing the access panel

To replace the access panel, reverse steps 2 through 4.

Cable Routing Diagrams

Figure 2-4 through Figure 2-8 show the cable routing for the server.

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

IDE CD-ROM Drive Signal Cable

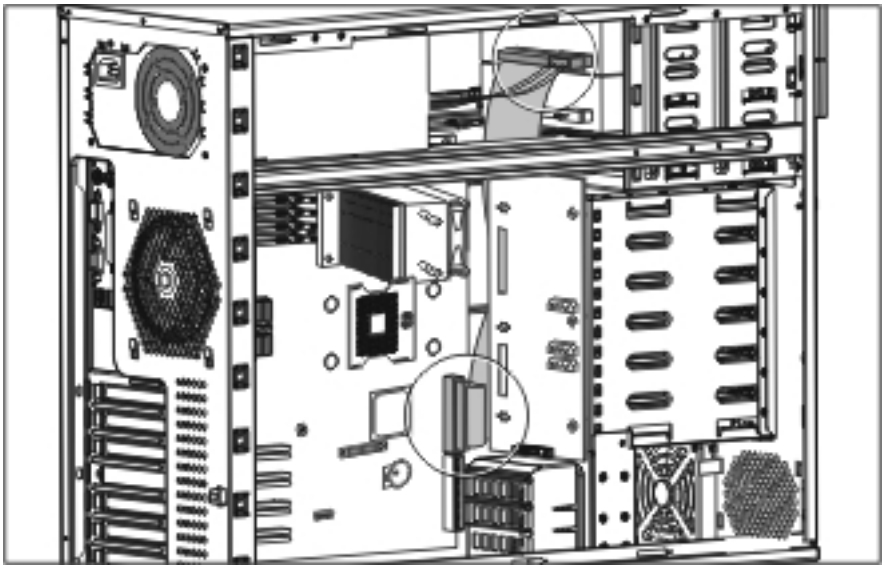

Figure 2-4: IDE CD-ROM drive signal cable routing

Diskette Drive Signal Cable

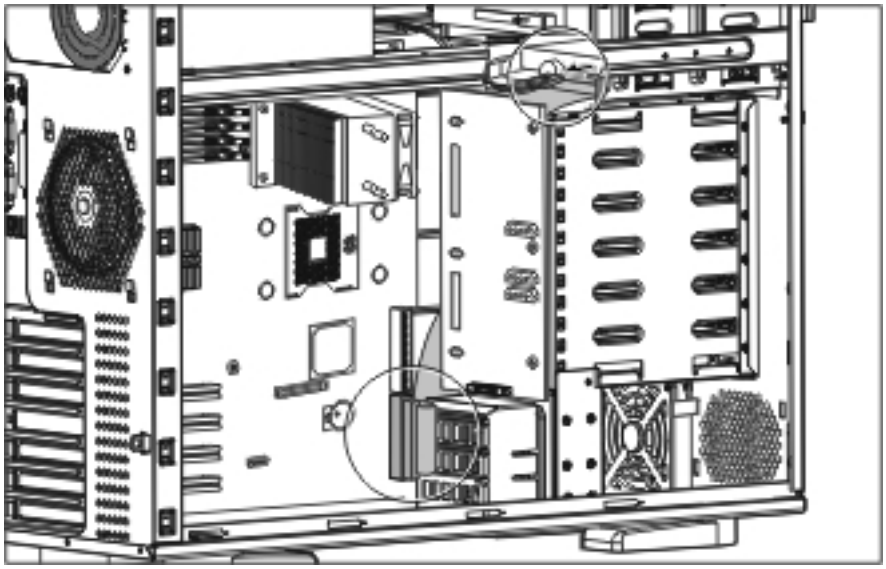

Figure 2-5: Diskette drive signal cable routing

SCSI Hot-Plug Hard Drive Cable

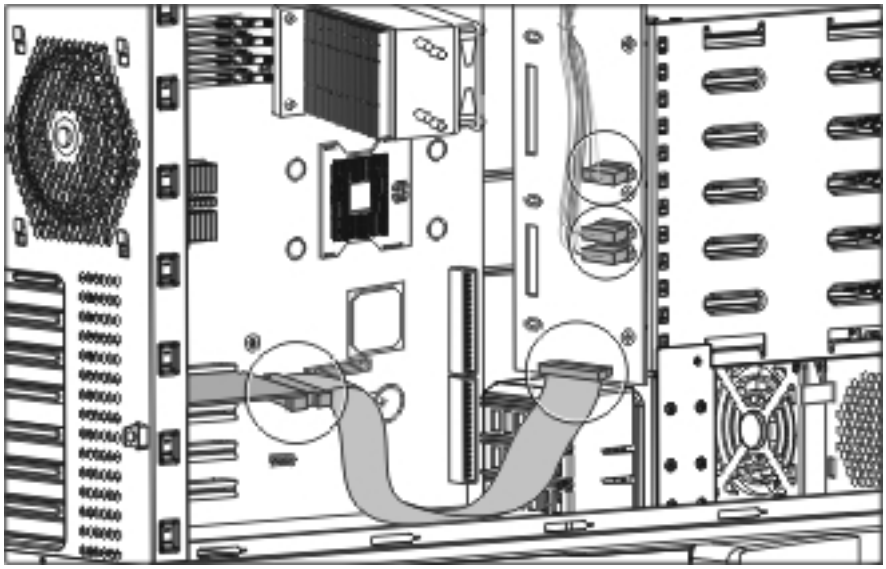

Figure 2-6: SCSI hot-plug hard drive cable routing

SCSI Non-Hot-Plug Hard Drive Cable

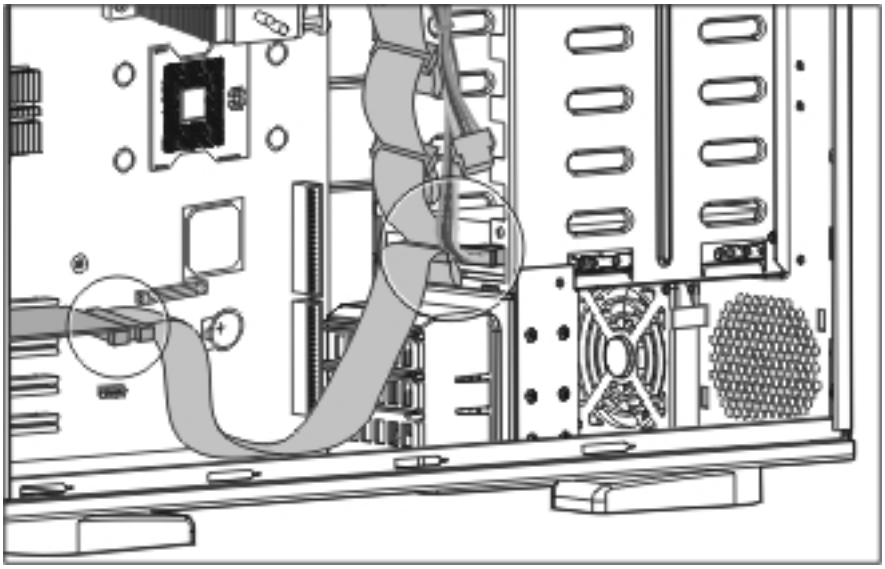

Figure 2-7: SCSI non-hot-plug hard drive cable routing

SATA Hot-Plug Hard Drive Cable

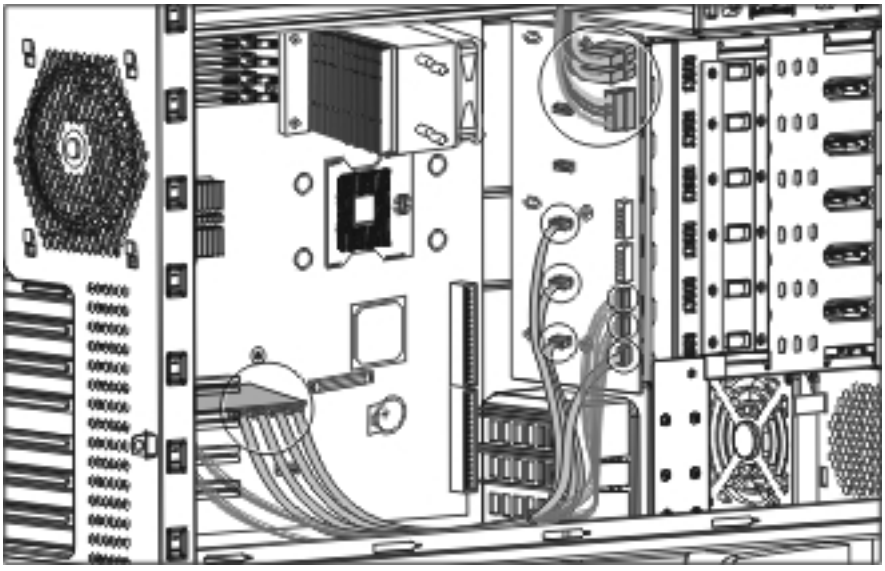

Figure 2-8: SATA hot-plug hard drive cable routing

NOTE: When connecting the SATA data cables, be sure to connect them in the following order:

- The connectors on the SATA card from left to right: white, yellow, green, blue.
- The connectors on the SATA back plane from top to bottom: white, yellow, green; blue on the bottom right corner.

NOTE: There are two SATA LED cables which are tied together using a cable tie. When connecting the SATA LED cables, be sure to connect them in the following way:

- The two cables should connect to the J14 (hard drive activity indictor) and J15 (hard drive status indicator) connectors on the SATA card.
- The cable with one end to the J14 connector on the SATA card should connect to the J505 connector on the SATA back plane.
- The cable with one end to the J15 connector on the SATA card should connect to the J507 connector on the SATA back plane.

NOTE: You can upgrade by purchasing an HP 6-Port SATA RAID Controller option kit.

When installing the 6-Port SATA RAID Controller, plug the I2C cable into the 3-pin connector labeled J516 on the SATA back plane. Insert the cable by aligning pin 1 on the cable with pin 1 of connector J516. For detailed information on how to install the card, refer to the *6-Port SATA RAID controller User Guide*.

System Fan Modules

To remove the rear system fan module:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Open the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
4. Disconnect the rear system fan cable (1) from the system board.

NOTE: Front system fan cable connection shown for clarity (2).

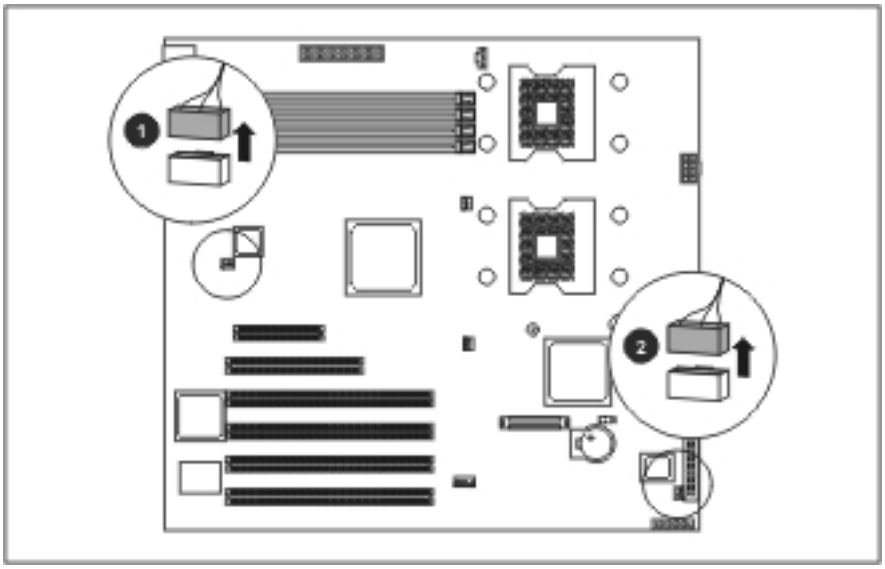

Figure 2-9: Disconnecting the fan cables from the system board

5. Press the stopper in the center of the fan module on the rear of the chassis to release the fan module from the rear panel (1).
6. Pull down the fan module slightly to remove it from the rear panel (2).
7. Carefully lift the fan module out and away from the chassis (3).

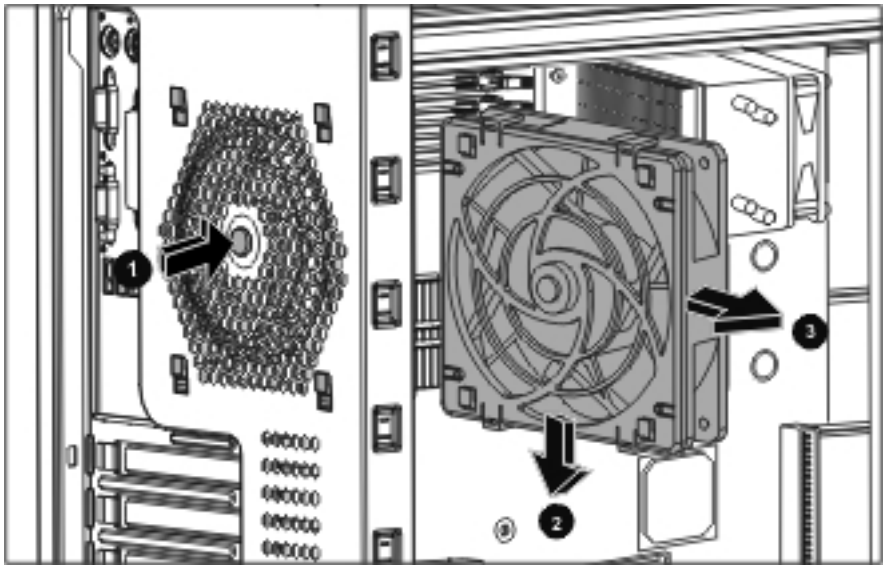

Figure 2-10: Removing the rear system fan module

8. To separate the fan and fan holder (the blue plastic part), pull the four latches of the fan holder (two at the top and two at the bottom) away from the fan.

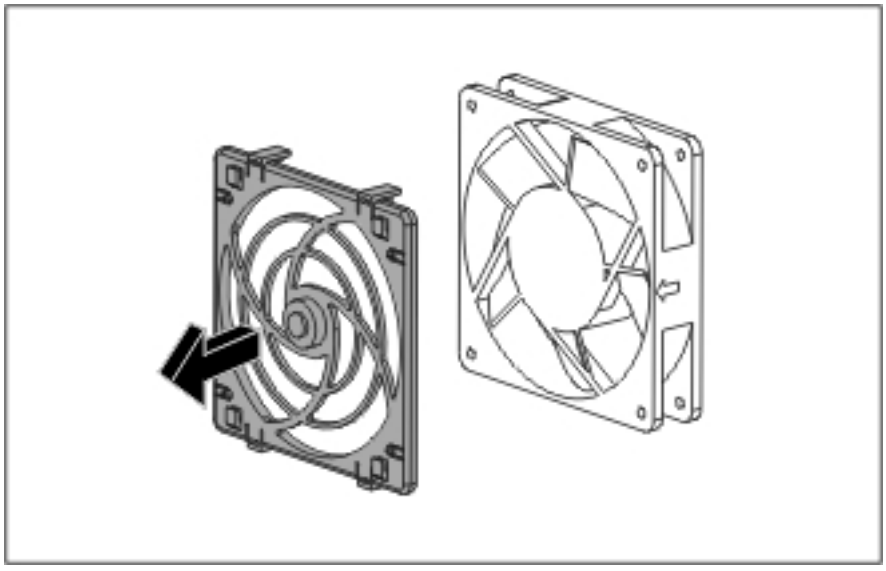

Figure 2-11: Removing the rear system fan holder

To replace the rear system fan module, reverse steps 2 through 8.

To remove the front system fan module:

1. Disconnect the front system fan cable from the system board. Refer to Figure 2-9.
2. Press the two tabs of the fan holder together towards the center of the fan module (1) to release the fan module from the front panel.
3. Carefully lift the fan module out and away from the chassis (2).

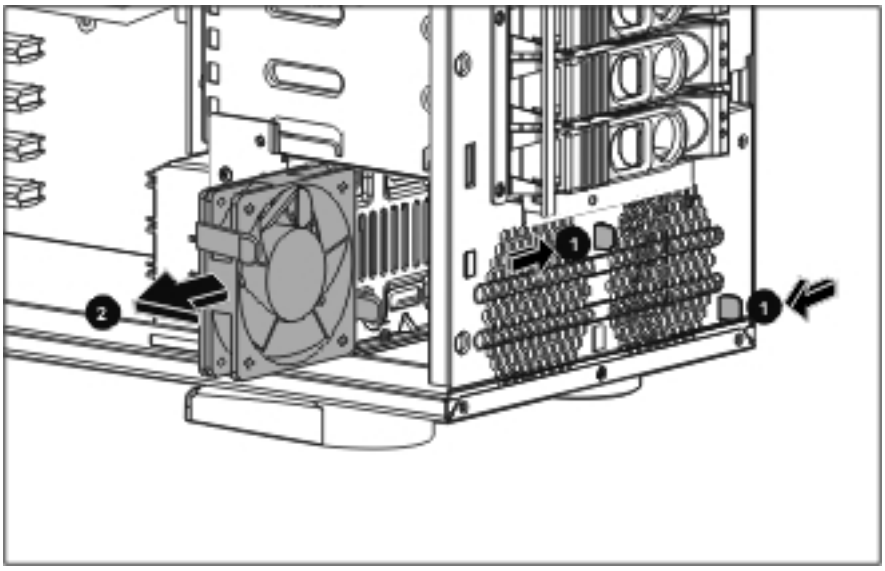

Figure 2-12: Removing the front system fan module

4. When the fan module is removed from the chassis, it is easy to separate the fan and fan holder (the blue plastic part).

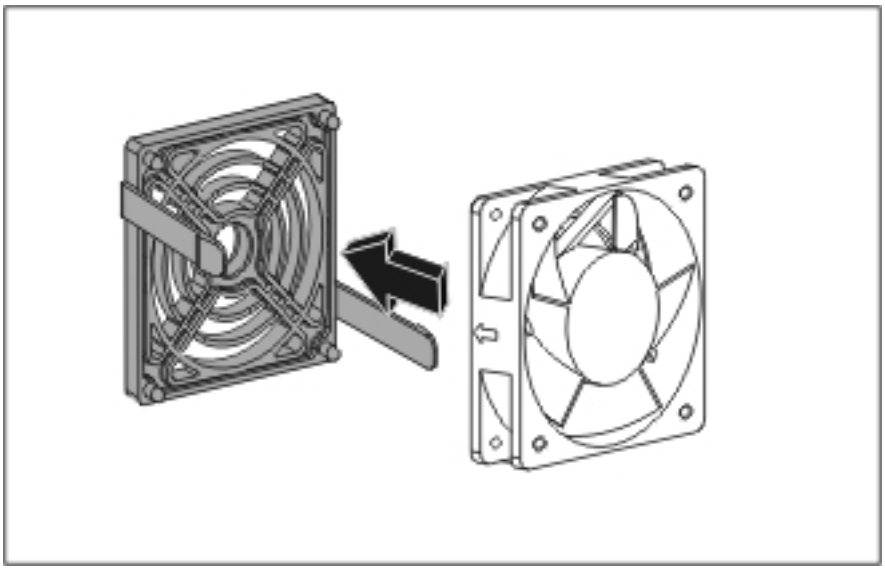

Figure 2-13: Removing the front system fan holder

To replace the front system fan module, reverse steps 1 through 4.

When installing the fan module, a click sound indicates that the fan module is secured to the front panel.

Drive Bay Configuration

The server supports a maximum of nine drive bays (three are for removable media devices; six are for hot-plug hard drives). The removable media device bays contain a 3.5-inch 1.44-MB diskette drive; a 5.25-inch IDE optical device; and an empty drive bay.

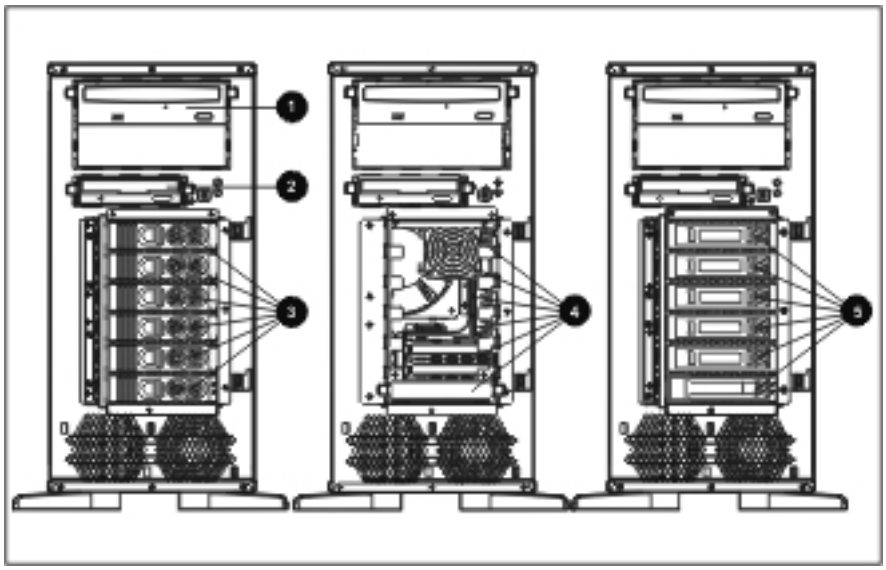

Figure 2-14: Server drive bay configuration

Table 2-1: Drive Bay Configuration

Item	Description
1	Optical drive
2	1.44-MB diskette drive
3	SCSI hot-plug hard drive bays
4	SCSI non-hot-plug hard drive bays
5	SATA hot-plug hard drive bays

Boot Priority

The server's boot order should be considered when selecting a boot device. This is especially important if you are installing a board that requires a higher priority in the boot order. The board's boot priority is set by its slot location in the boot order.

By default, the server searches for boot devices in the following order:

1. **Legacy Floppy Drives** (for the flexible diskette drive or virtual floppy)
2. **USB FDD:** (for the external USB floppy diskette drive)
3. **IDE 0:** (for the IDE CD-ROM drive)
4. **USB HDD:** (for the external USB hard disk drive or flash disk)
5. **USB CDROM:** (for the external USB CD-ROM drive)
6. **SCSI/SATA:** (for the SCSI or SATA hard disk drive)
7. **PXE:** (for the embedded LAN)
8. (reserved for additional boot devices)

NOTE: The boot order can be changed using the server's BIOS Setup Utility.

Flexible Diskette Drive

To remove the flexible diskette drive:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Open the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Press the two release tabs of the rails inward and slide the drive out far enough to expose the connectors.
4. Disconnect the power and signal cable connectors.
5. Hold the drive by its sides and gently slide the drive out of the drive bay.

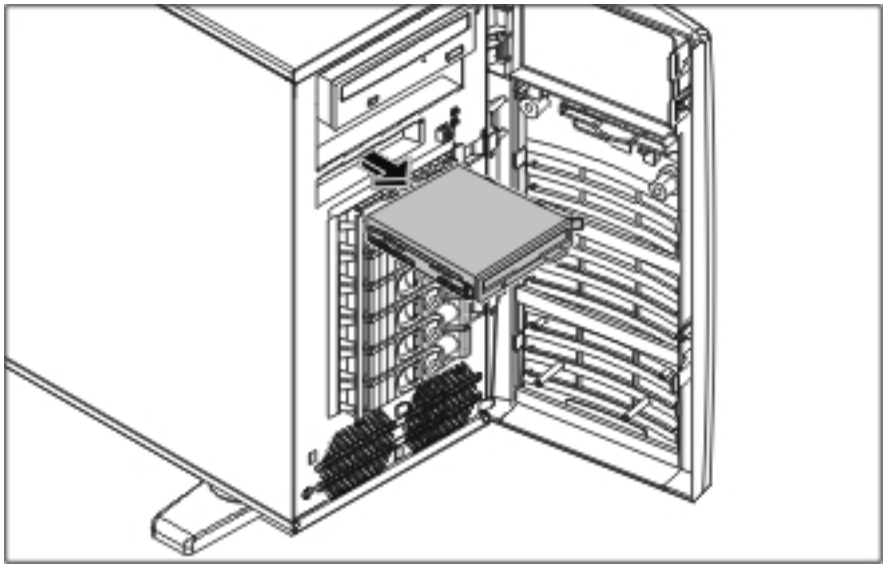

Figure 2-15: Removing the flexible diskette drive

6. Remove the rails from the drive.

   Remove the two screws securing each rail on the side of the drive.

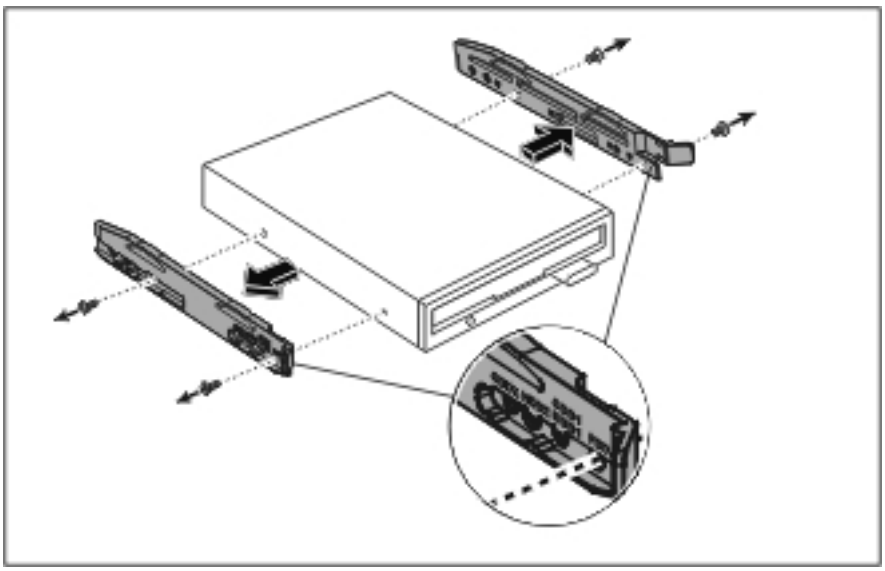

Figure 2-16: Removing the rails from the flexible diskette drive

To replace the flexible diskette drive, reverse steps 2 through 6.

When attaching the rails to the sides of the flexible diskette drive, be sure that the screws are secured in the correct holes on the rails.

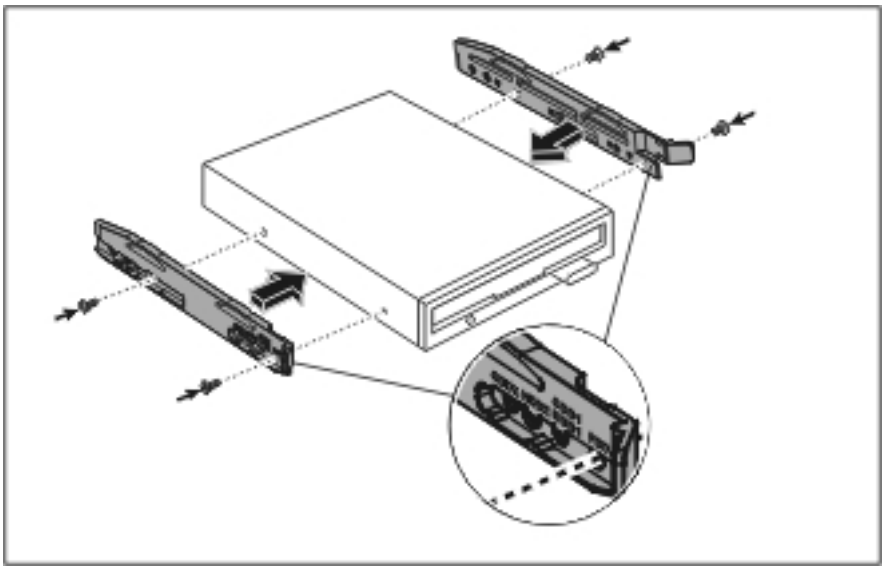

Figure 2-17: Attaching the rails to the flexible diskette drive

CD-ROM Drive

To remove the CD-ROM drive:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Open the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Press the two release tabs of the rails inward and slide the drive out far enough to expose the connectors.
4. Disconnect the power and signal cable connectors.
5. Hold the drive by its sides and gently slide the drive out of the drive bay.

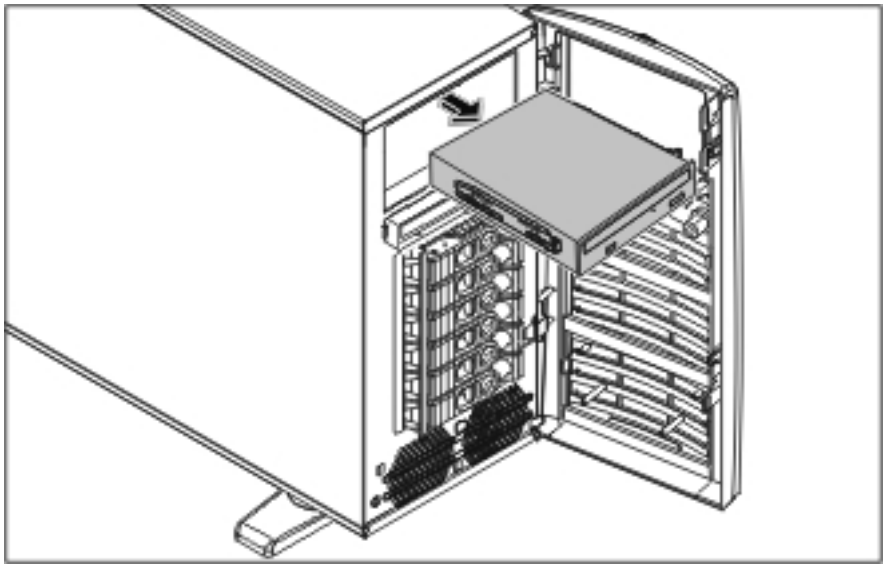

Figure 2-18: Removing the CD-ROM drive

6. Remove the rails from the drive.

   Remove the two screws securing each rail on the side of the drive.

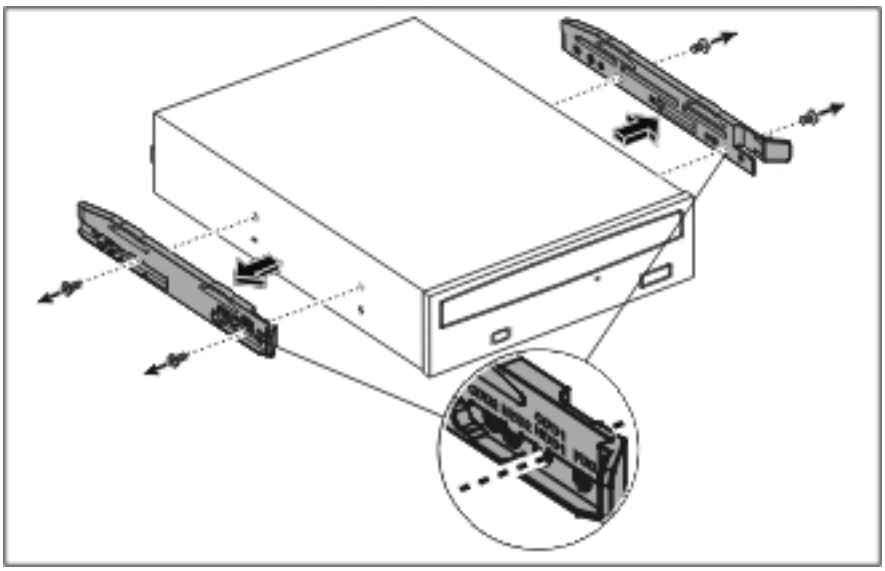

Figure 2-19: Removing the rails from the CD-ROM drive

To replace the CD-ROM drive, reverse steps 2 through 6.

When attaching the rails to the sides of the CD-ROM drive, be sure that the screws are secured in the correct holes on the rails.

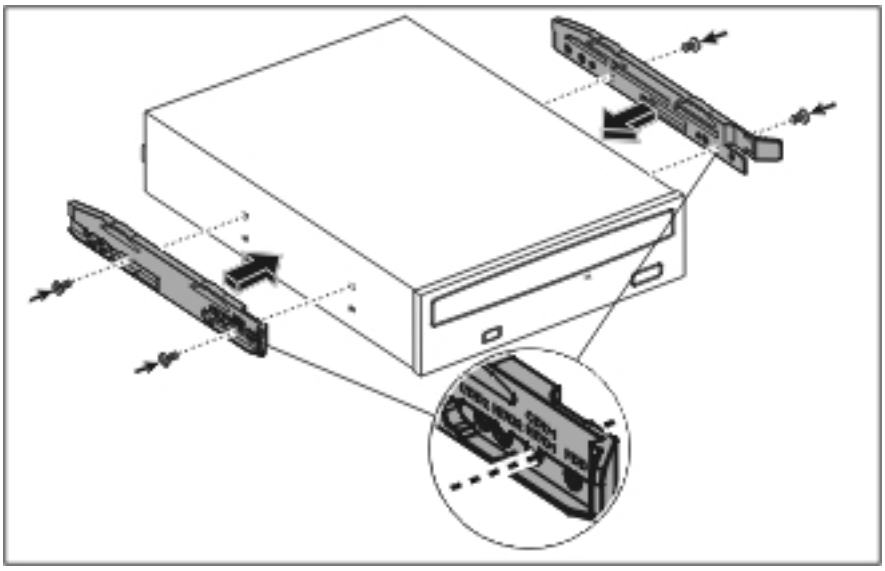

Figure 2-20: Attaching the rails to the CD-ROM drive

SCSI Hot-Plug Hard Drive Blank Carrier

NOTE: The server does not need to be powered off to complete this operation.

To remove the SCSI hot-plug hard drive blank carrier:

1. Open the bezel door. Refer to “Bezel Door” earlier in this chapter.
2. Locate the desired hard drive blank carrier. Hold the handle and slide the blank carrier out of the drive bay.

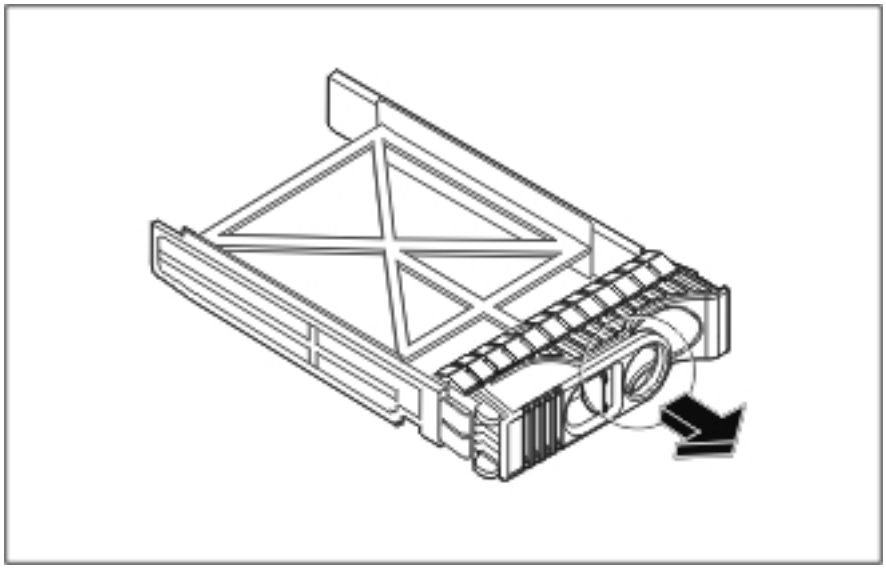

Figure 2-21: Removing the SCSI hot-plug hard drive blank carrier

To replace the SCSI hot-plug hard drive blank carrier, reverse steps 1 through 2.

SCSI Hot-Plug Hard Drive

NOTE: The server does not need to be powered off to complete this operation.

To remove the SCSI hot-plug hard drive:

1. Open the bezel door. Refer to "Bezel Door" earlier in this chapter.
2. Push in the locking latch of the desired hard drive carrier (1) and then pull the ejector handle towards you (2).
3. Gently pull the hard drive carrier straight out to disengage the connection from the back plane and then out of the drive bay (3).

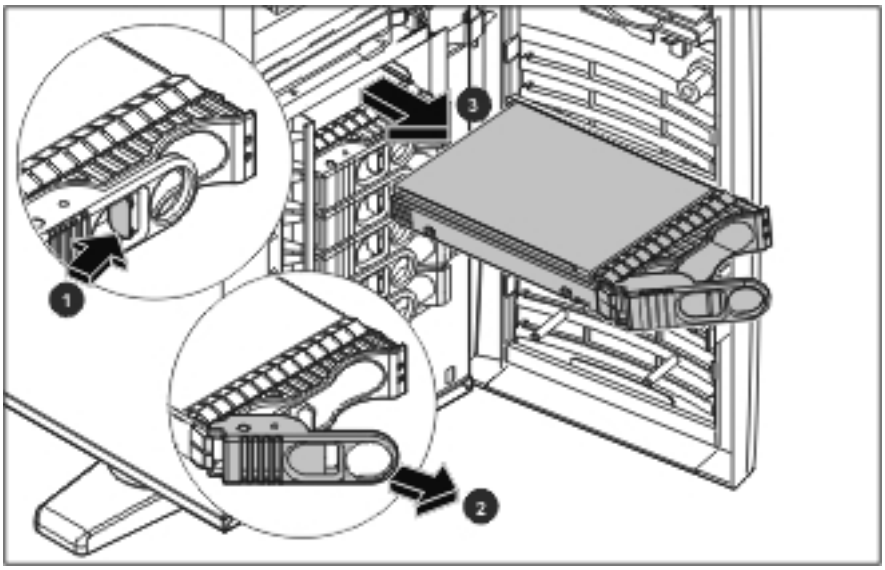

Figure 2-22: Removing the SCSI hot-plug hard drive carrier

CAUTION: You must remove the drive slowly about an inch to disconnect from the back plane, and wait 30 seconds for the drive to stop spinning to ensure the drive heads are parked prior to removal. Be sure you follow these instructions carefully to prevent handling damage, such as head slaps or head actuator unlocking.

4. Use your hand to support the bottom of the hard drive carrier while you slowly pull the carrier straight out. Do not allow the carrier to fall.

5. Separate the hard drive and the carrier.
   a. Remove the two screws on each side of the carrier.
   b. Lift the hard drive out of the carrier.

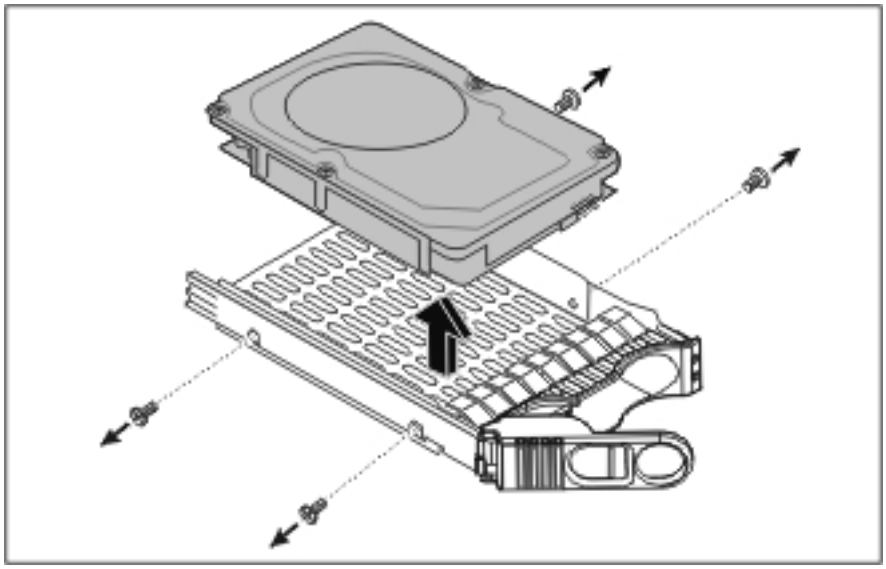

Figure 2-23: Separating the hard drive and carrier

6. Place the hard drive in an electrostatic protected container.

   Do not stack drives.

To replace the SCSI hot-plug hard drive:

1. Assemble the hard drive and the carrier.
   a. Place the hard drive inside the carrier.
   b. Replace the two screws to each side of the carrier.
2. Slide the hard drive into the drive bay until you feel resistance, and then press firmly until the hard drive is fully seated into the connector on the back plane.
3. Verify the hooks behind the pivot end of the handle engage the hole in the edge of the hard drive cage.
4. Press the ejector handle in until you feel the latch click into place.

   Closing the ejector handle engages the hard drive with the electrical connector in the hot-plug hard drive cage and seats the hard drive.

SCSI Hot-Plug Hard Drive Cage

To remove the SCSI hot-plug hard drive cage:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Remove the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
4. Disconnect the power cables from the back plane connected to the SCSI hot-plug hard drive cage, and the SCSI cable from the back plane connected to the SCSI hot-plug hard drive cage and expansion board. Refer to “SCSI Hot-Plug Hard Drive Cable” earlier in this chapter.
5. Remove all blank carriers and hard drives. Refer to “SCSI Hot-Plug Hard Drive Blank Carrier” and “SCSI Hot-Plug Hard Drive” earlier in this chapter.
6. Remove the three screws securing the back plane.
7. Pull the back plane slightly towards the exposed side of the server (1).
8. Remove the back plane from the hard drive cage and take it away from the chassis (2).

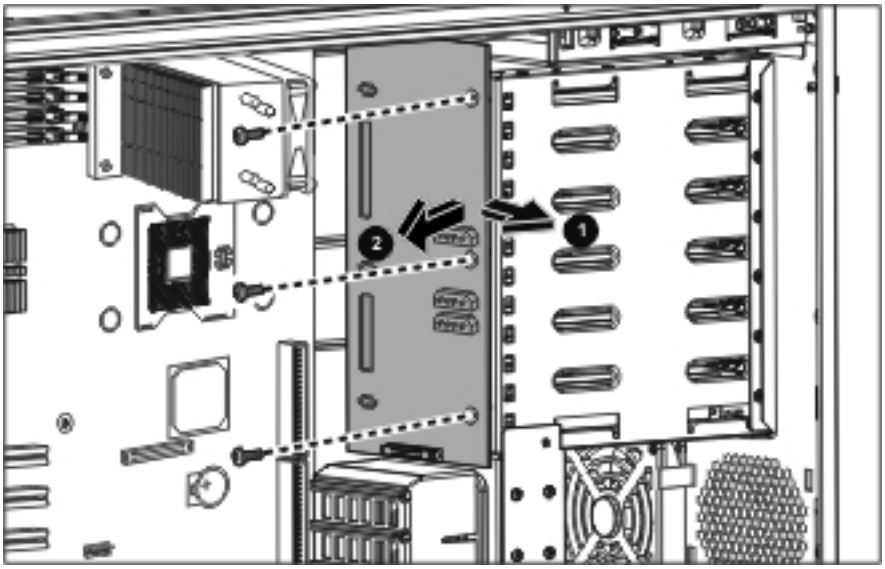

Figure 2-24: Removing the SCSI back plane

9. Remove the screw on the side (1) and 10 screws on the front (2) securing the hard drive cage to the chassis with a T-15 Torx screwdriver.
10. Pull the hard drive cage out from the chassis (3).

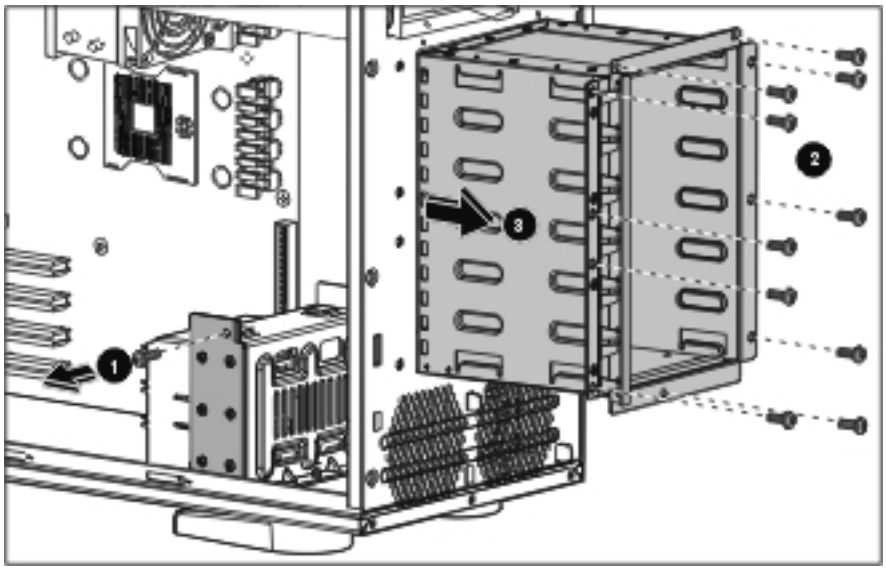

Figure 2-25: Removing the SCSI hot-plug hard drive cage

To replace the SCSI hot-plug hard drive cage, reverse steps 2 through 10.

When installing the hard drive cage in the chassis, be sure that the hard drive cage is seated properly on the supporter.

SCSI Non-Hot-Plug Hard Drive

To remove the SCSI non-hot-plug hard drive:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Open the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
4. Disconnect the SCSI hard drive cable and the 4-pin hard drive power connector from the hard drive to be removed. Refer to “SCSI Non-Hot-Plug Hard Drive Cable” earlier in this chapter.
5. Using both hands, hold the release tabs of the hard drive rails and press inward while pulling the hard drive out towards you.
6. Use your hand to support the bottom of the hard drive, while you slowly pull the hard drive straight out. Do not allow the hard drive to fall.

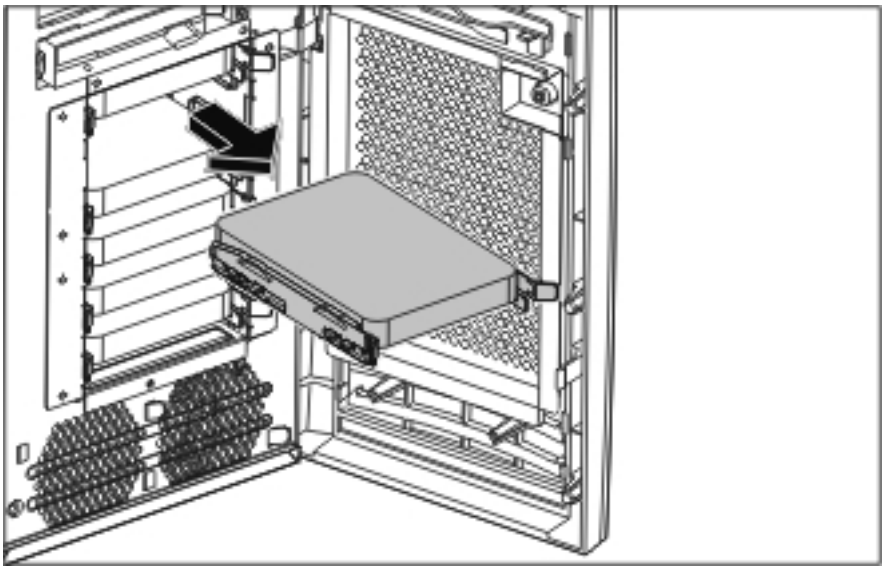

Figure 2-26: Removing the SCSI non-hot-plug hard drive

7. Remove the rails from the hard drive.

   Remove the two screws securing each rail on the side of the hard drive.

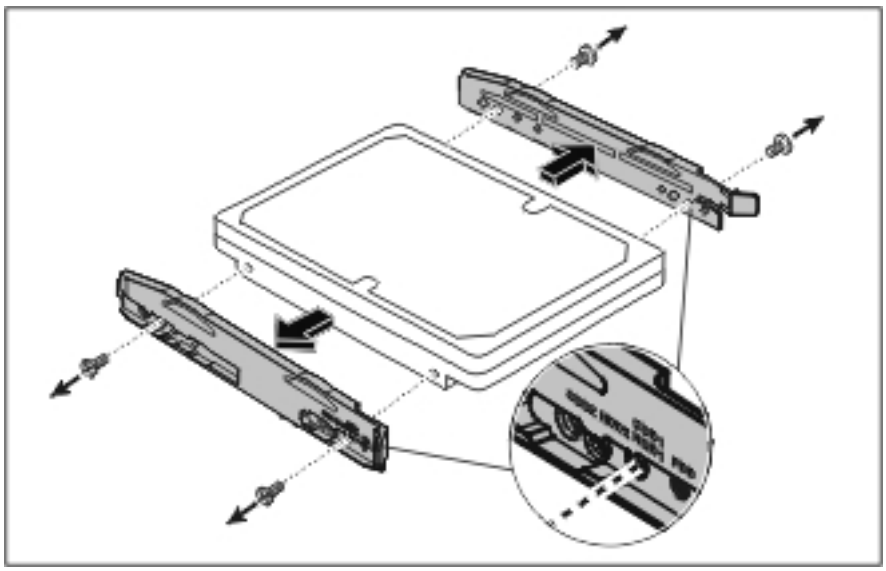

Figure 2-27: Removing the rails from the non-hot-plug hard drive

8. Place the hard drive in an electrostatic protected container.

   Do not stack drives.

To replace the SCSI non-hot-plug hard drive, reverse steps 2 through 8.

When attaching the rails to the sides of the hard drive, be sure that the screws are secured in the correct holes on the rails.

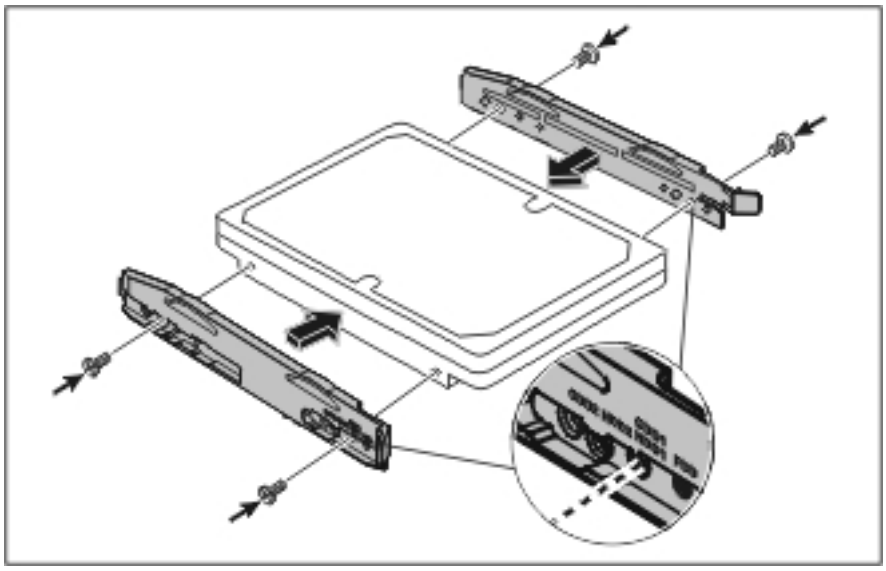

Figure 2-28: Attaching the rails to the hard drive

Verify that the hard drive is flush with the other hard drives. If the hard drive is not flush, it is not seated properly in the drive bay.

SCSI Non-Hot-Plug Hard Drive Cage

To remove the SCSI non-hot-plug hard drive cage:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Remove the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
4. Remove all hard drives. Refer to “SCSI Non-Hot-Plug Hard Drive” earlier in this chapter.
5. Remove the screw on the side (1) and 10 screws on the front (2) securing the SCSI non-hot-plug hard drive cage to the chassis with a T-15 Torx screwdriver.
6. Pull the hard drive cage out from the chassis (3).

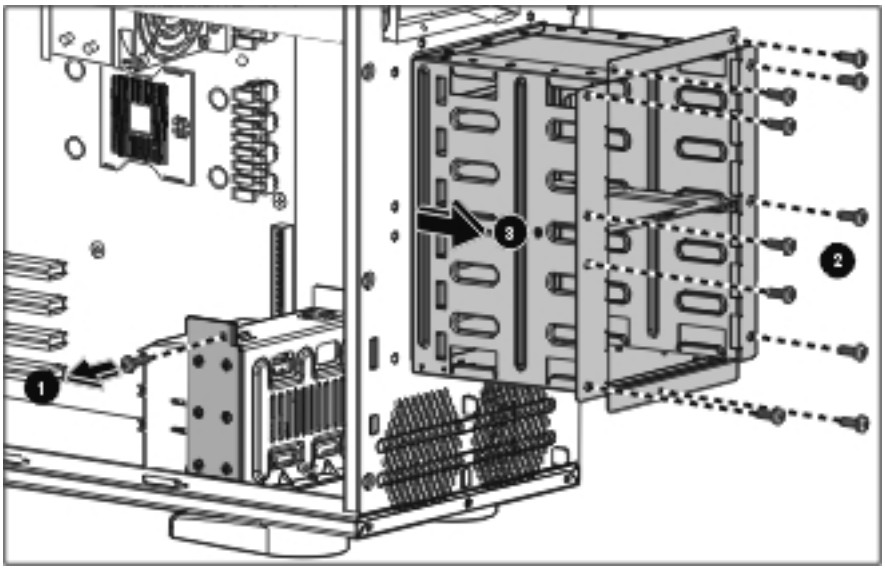

Figure 2-29: Removing the SCSI non-hot-plug hard drive cage

To replace the SCSI non-hot-plug hard drive cage, reverse steps 2 through 6.

When installing the hard drive cage in the chassis, be sure that the hard drive cage is seated properly on the supporter.

SATA Hot-Plug Hard Drive Blank Carrier

NOTE: The server does not need to be powered off to complete this operation.

To remove the SATA hot-plug hard drive blank carrier:

1. Open the bezel door. Refer to "Bezel Door" earlier in this chapter.
2. Push in the locking latch of the desired hard drive blank carrier (1).
3. With the locking latch still being pressed, hold the handle and slide the blank carrier out of the drive bay (2).

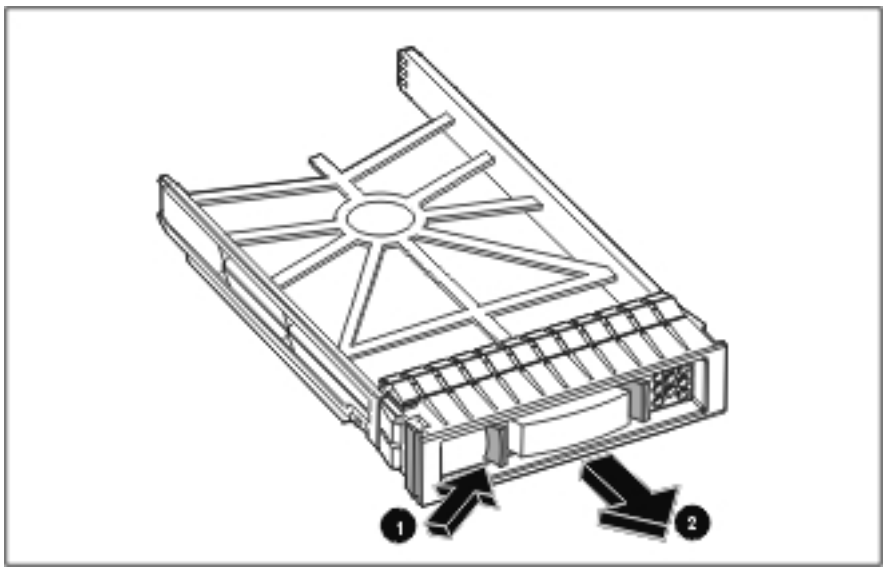

Figure 2-30: Removing a SATA hot-plug hard drive blank carrier

To replace the SATA hot-plug hard drive blank carrier, reverse steps 1 through 3.

SATA Hot-Plug-Hard Drive

NOTE: The server does not need to be powered off to complete this operation.

To remove the SATA hot-plug hard drive:

1. Open the bezel door. Refer to "Bezel Door" earlier in this chapter.
2. Push in the locking latch of the desired hard drive carrier (1) and then pull the ejector handle towards you (2).
3. Gently pull the hard drive carrier straight out to disengage the connection from the back plane and then out of the drive bay (3).

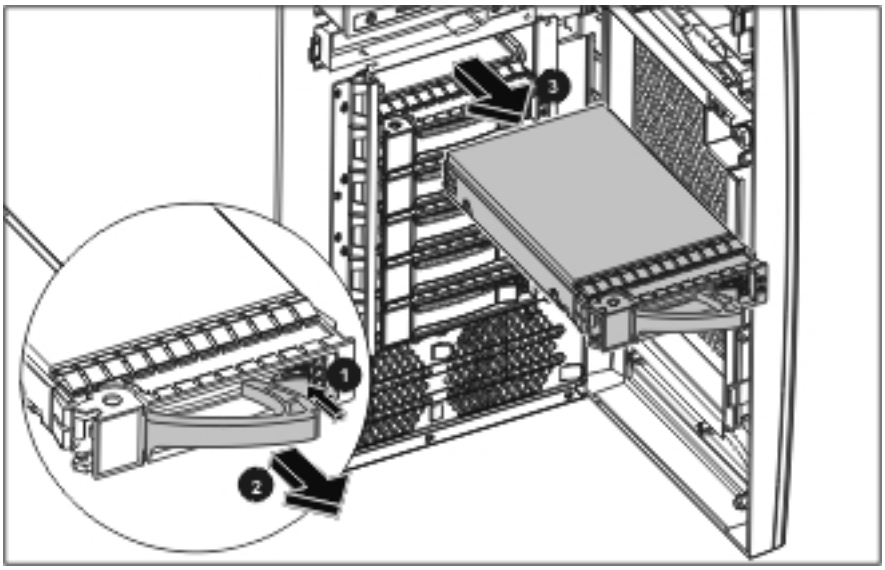

Figure 2-31: Removing the SATA hot-plug hard drive

CAUTION: You must remove the drive slowly about an inch to disconnect from the back plane, and wait 30 seconds for the drive to stop spinning to ensure the drive heads are parked prior to removal. Be sure you follow these instructions carefully to prevent handling damage, such as head slaps or head actuator unlocking.

4. Use your hand to support the bottom of the hard drive carrier while you slowly pull the carrier straight out. Do not allow the carrier to fall.

5. Separate the hard drive and the carrier.
   a. Remove the two screws on each side of the carrier.
   b. Lift the hard drive out of the carrier.

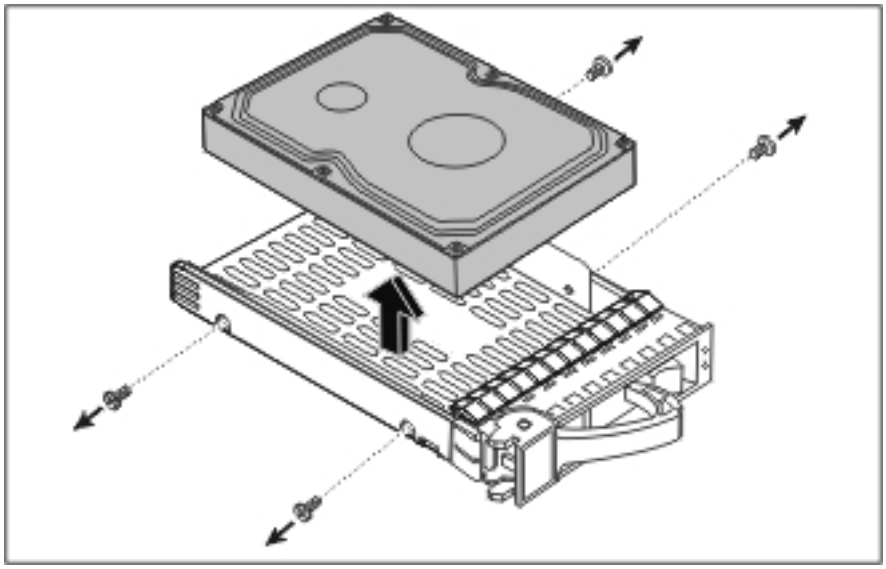

Figure 2-32: Separating the hard drive and carrier

6. Place the hard drive in an electrostatic protected container.

   Do not stack drives.

To replace a SATA hot-plug hard drive:

1. Assemble the hard drive and the carrier.
   a. Place the hard drive inside the carrier.
   b. Replace the two screws to each side of the carrier.
2. Slide the hard drive into the drive bay until you feel resistance, and then press firmly until the hard drive is fully seated into the connector on the back plane.
3. Verify the hooks behind the pivot end of the handle engage the hole in the edge of the hard drive cage.
4. Press the ejector handle in until you feel the latch click into place.

   Closing the ejector handle engages the hard drive with the electrical connector in the hot-plug hard drive cage and seats the hard drive.

SATA Hot-Plug Hard Drive Cage

To remove the SATA hot-plug hard drive cage:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Remove the bezel door. Refer to “Bezel Door” earlier in this chapter.
3. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
4. Disconnect the power cables from the back plane connected to the SATA hot-plug hard drive cage, and the SATA cable from the back plane connected to the SATA hot-plug hard drive cage and expansion board. Refer to “SATA Hot-Plug Hard Drive Cable” earlier in this chapter.
5. Remove all blank carriers and hard drives. Refer to “SATA Hot-Plug Hard Drive Blank Carrier” and “SATA Hot-Plug Hard Drive” earlier in this chapter.
6. Remove the three screws securing the back plane.
7. Pull the back plane slightly towards the exposed side of the server (1).
8. Remove the back plane from the hard drive cage and take it away from the chassis (2).

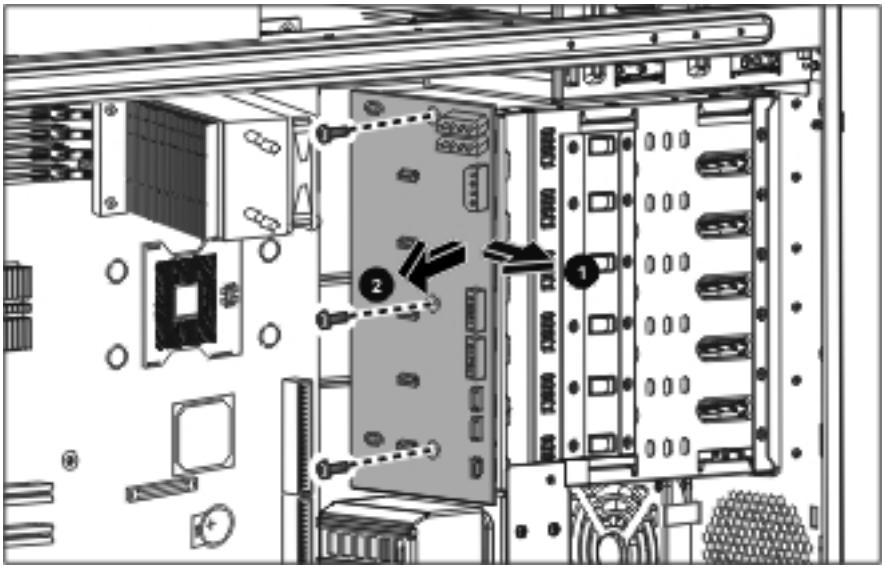

Figure 2-33: Removing the SATA back plane

9. Remove the screw on the side (1) and 10 screws on the front (2) securing the hard drive cage to the chassis with a T-15 Torx screwdriver.
10. Pull the hard drive cage out from the chassis (3).

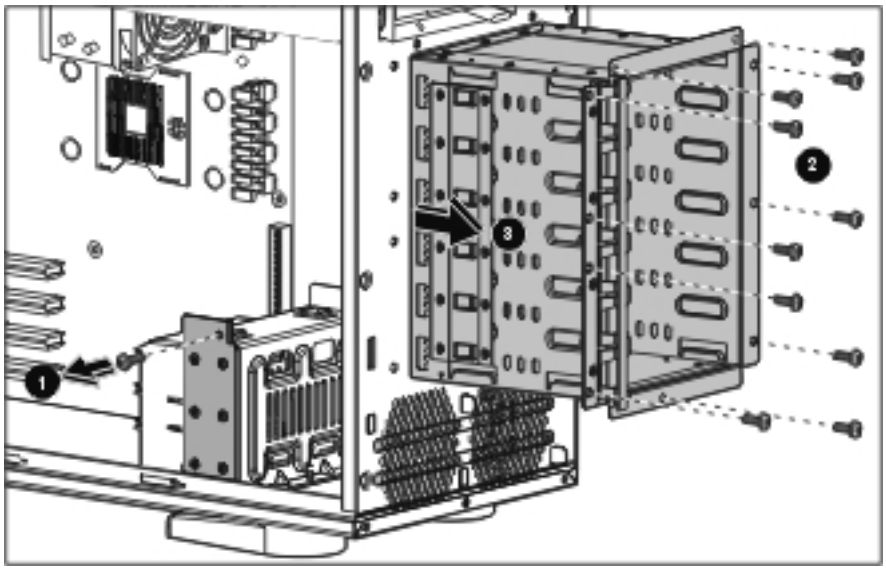

Figure 2-34: Removing the SATA hot-plug hard drive cage

To replace the SATA hot-plug hard drive cage, reverse steps 2 through 10.

When installing the hard drive cage in the chassis, be sure that the hard drive cage is seated properly on the supporter.

Expansion Slots

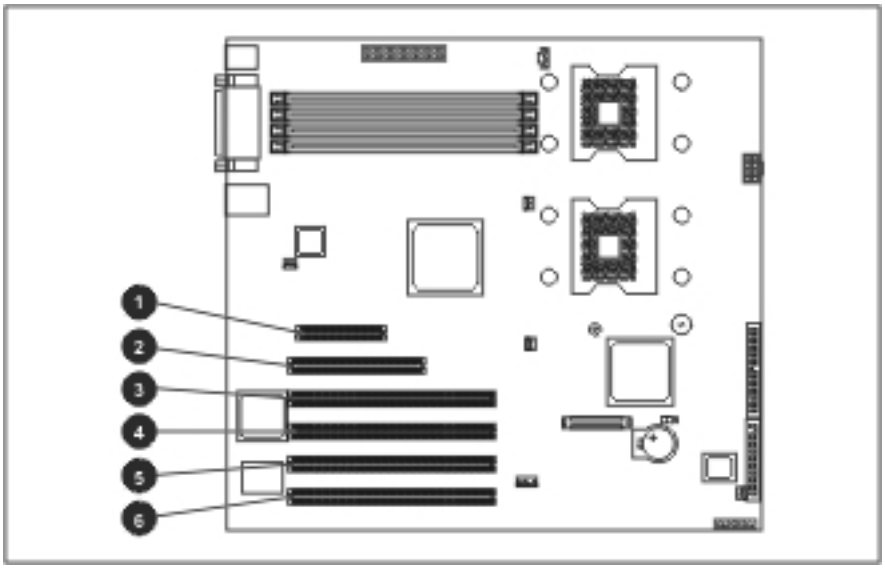

Figure 2-35: Expansion slot locations

Table 2-2: Expansion Slots

Item	Slot	Slot Number
1	PCI-Express x4	6
2	32-bit 33-MHz PCI, 5-V	5
3	64-bit 66-MHz PCI-X, 3.3-V★	4
4	64-bit 66-MHz PCI-X, 3.3-V	3
5	64-bit 66-MHz PCI-X, 3.3-V	2
6	64-bit 66-MHz PCI-X, 3.3-V★★	1

★Pre-installed with a SCSI or SATA card

★★Do not insert an add-on card with an RJ-45 connector into PCI-X slot 1.

Expansion Board

NOTE: The procedures described below apply to all SCSI hot-plug, SCSI non-hot-plug, and SATA hot-plug models.

To remove an expansion board:

1. Complete the preparation procedures. Refer to "Preparation Procedures" earlier in this chapter.
2. Remove the access panel. Refer to "Access Panel" earlier in this chapter.
3. Disconnect any cables connected to the expansion board.
4. Remove the IO locking bracket.
   a. Lift the bracket up.
   b. Rotate the bracket outwards to detach it from the chassis.

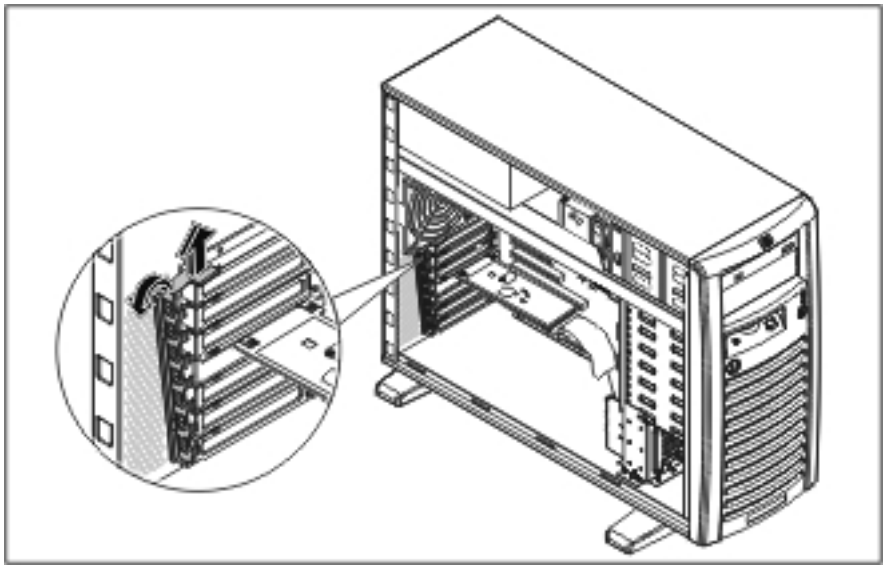

Figure 2-36: Removing the IO locking bracket

5. Remove the expansion board.

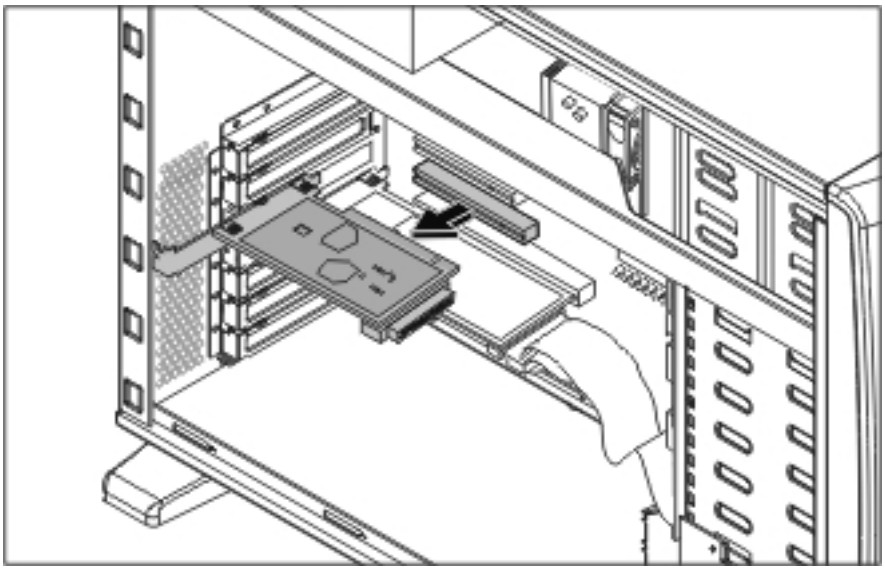

Figure 2-37: Removing an expansion board

6. Replace the IO locking bracket.

To replace an expansion board, reverse steps 2 through 6.

Expansion Board Holder

You may need to remove the expansion board holder when removing other components, such as the system board.

To remove the expansion board holder:

1. Remove the expansion board(s) on the expansion board holder. Refer to "Expansion Board" earlier in this chapter.
2. Carefully place the server upside down.
3. Remove the two screws securing the expansion board holder to the chassis (1).
4. Remove the expansion board holder from the chassis (2).

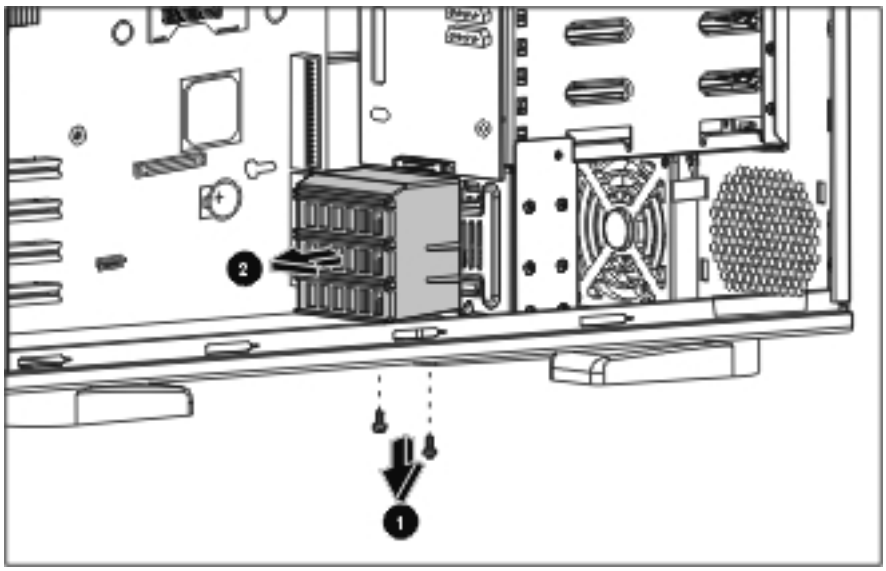

Figure 2-38: Removing the expansion board holder

To replace the expansion board, reverse steps 1 through 4.

Memory Module Guidelines

CAUTION: To prevent damage to equipment or loss of information, make sure that the server is powered down, all cables are disconnected from the rear of the server, and the power cord is disconnected from the grounded (earthed) AC outlet before removing the access panel.

CAUTION: To prevent damage to the system when handling components, refer to the *HP ProLiant 100 Series Server User Guide* available on the HP ProLiant ML150 G2 Server Support CD.

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

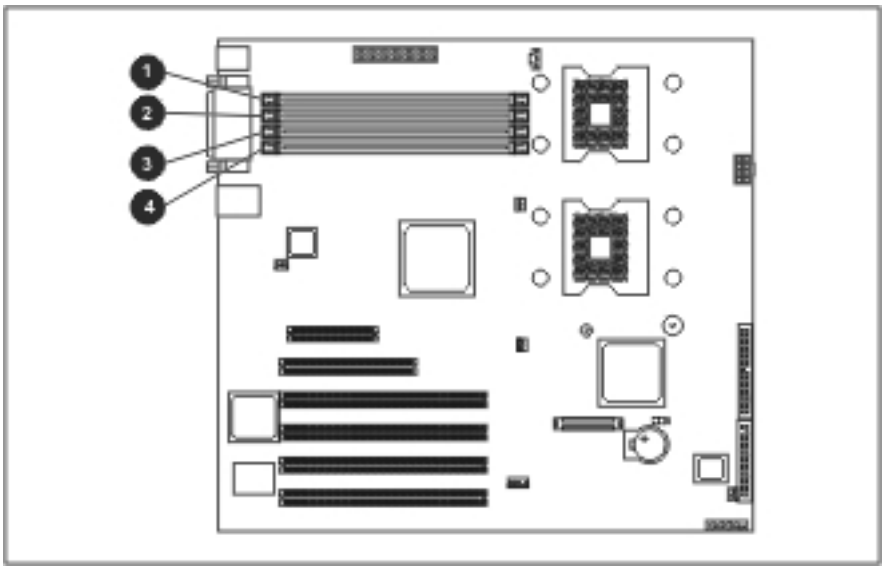

Figure 2-39: DDR DIMM socket locations

Table 2-3: DIMM Locations on the System Board

Item	Description
1	DIMM slot 1
2	DIMM slot 2
3	DIMM slot 3
4	DIMM slot 4

The following guidelines **must** be followed when memory modules are being added or replaced:

- DIMMs must be industry-standard 184-pin PC2700 333-MHz DDR registered ECC memory DIMMs. The DDR memory DIMMs must support CAS Latency 2, CL=2 or greater. They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information.
- DIMM sizes supported are 512 MB, 1 GB, and 2 GB, allowing a total of 8 GB maximum system memory (2 GB in each of the 4 DIMM slots).
- DIMM sizes may be mixed on the system board. HP recommends starting at slot 1 and filling the slots in order with the largest size first.
- If two-way memory interleaving is desired, identical DIMMs must be installed in socket pairs. DIMMs installed in Pair A (sockets 1 and 2), however, do not need to be identical to the DIMMs in pair B (sockets 3 and 4).
- Supported DIMM configurations are one single DIMM, one pair (two DIMMs), or two pairs (4 DIMMs). The configuration of 3 DIMMs is not supported in this server.
- Do not mix ECC and non-ECC DIMMs. Use only ECC DIMMs in the server. If different types of DIMMs are mixed, the server will not properly function.
- A DIMM will only fit one way in the socket. Be sure to match the two key slots in the DIMM with the tabs in the DIMM socket. Push the memory module into the DIMM socket, ensuring that it is fully inserted and properly seated.

Memory Modules

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure. Refer to "Electrostatic Discharge Information" earlier in this chapter.

To remove a memory module:

1. Complete the preparation procedures. Refer to "Preparation Procedures" earlier in this chapter.
2. Remove the access panel. Refer to "Access Panel" earlier in this chapter.
3. Press both memory module socket latches outward (1). This action releases the module and partially lifts it out of the socket.
4. Lift out the memory module (2).

IMPORTANT: A memory module can be installed only one way. Be sure to match the key sockets on the module with the tabs on the memory socket. Push the module down into the socket. Be sure that the module is fully inserted and properly seated.

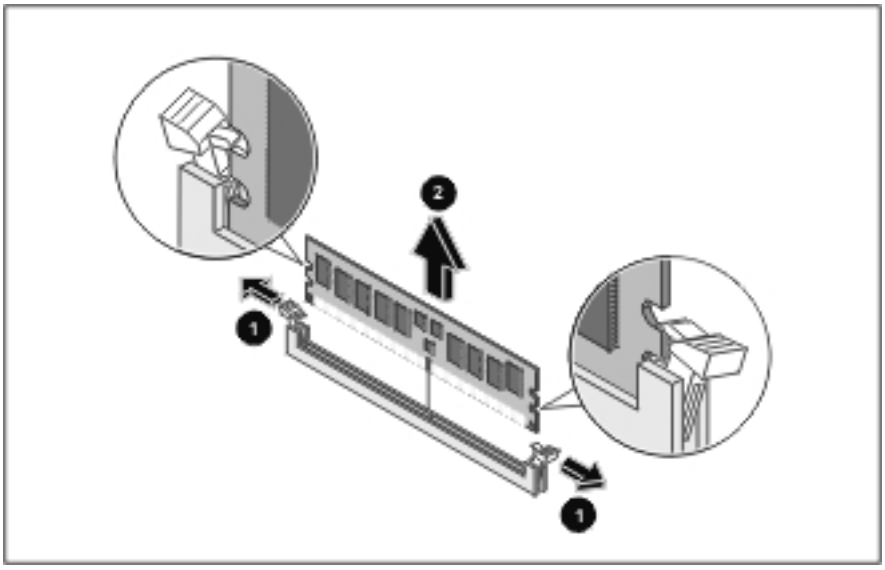

Figure 2-40: Removing a memory module

To replace a memory module, reverse steps 2 through 4.

Processors and Heatsinks

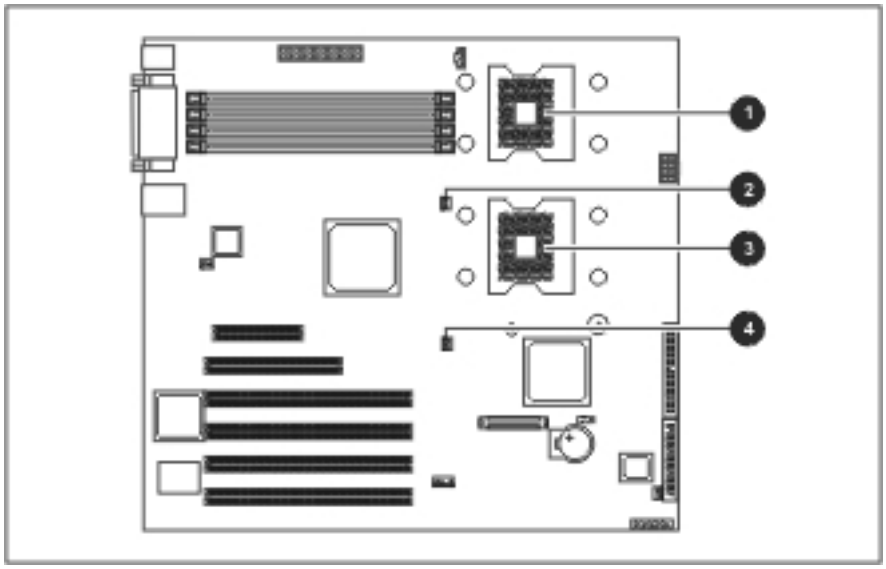

Figure 2-41: Processor locations

Table 2-4: Processor Locations

Item	Description
1	Processor 1 socket
2	Processor 1 fan connector
3	Processor 2 socket
4	Processor 2 fan connector

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure. Refer to "Electrostatic Discharge Information" earlier in this chapter.

To remove a processor and its heatsink:

1. Complete the preparation procedures. Refer to "Preparation Procedures" earlier in this chapter.
2. Remove the access panel. Refer to "Access Panel" earlier in this chapter.
3. Carefully lay the server on its unexposed side to gain access to the system board.
4. Locate the processor and heatsink assembly on the system board.
5. Disconnect the cooling fan connector from the system board.
6. Loosen the four screws securing the heatsink.

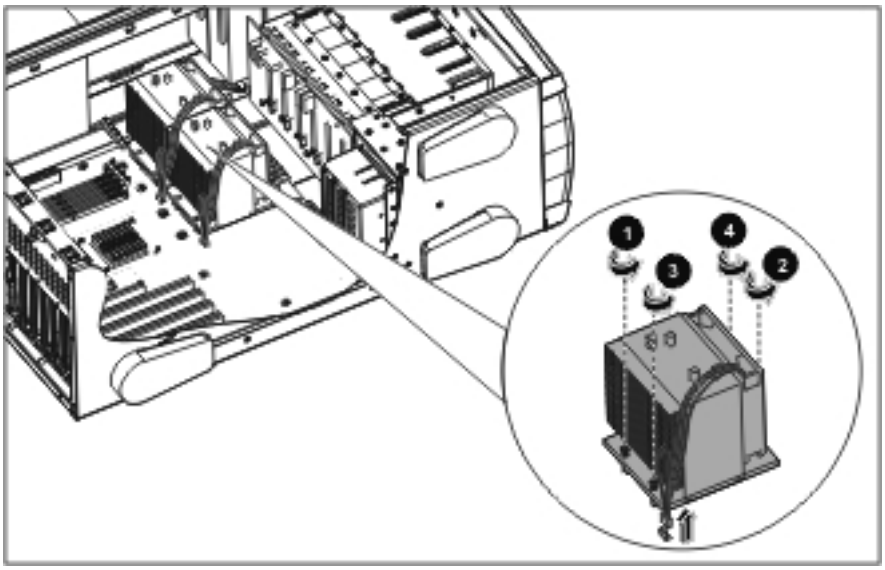

Figure 2-42: Disconnecting the cooling fan connector and removing the screws securing the heatsink

7. Lift the heatsink away from the processor and out of the server.

8. Open the Zero Insertion Force (ZIF) lever to allow the removal of the processor (1).

   To open the ZIF lever, pull the lever out away from the ZIF socket and rotate it to the vertical position.

9. Grasp the processor by its edges, lift it out of the socket (2), and place it on a static-dissipating work surface or into an anti-static bag.

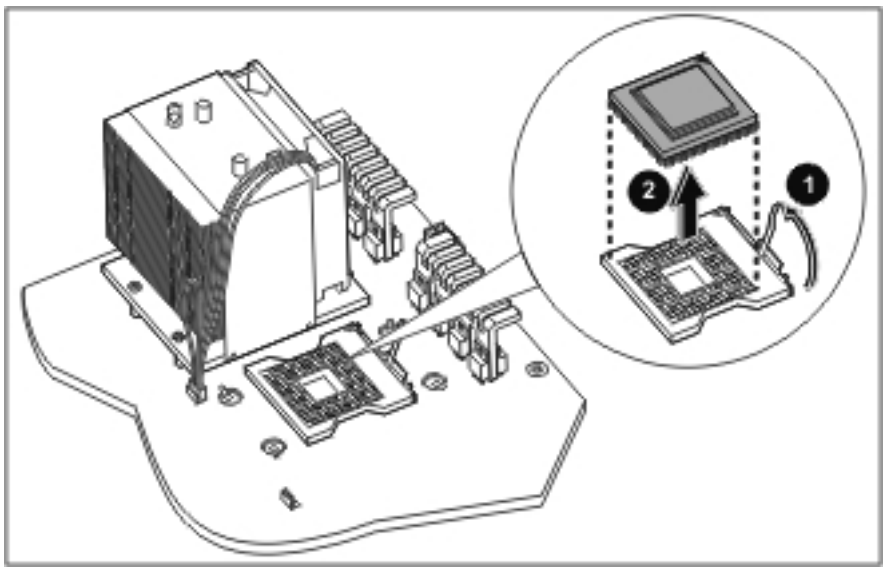

Figure 2-43: Removing the processor

To replace the processor and its heatsink:

1. Open the ZIF lever (1).

   To open the ZIF lever, pull the lever out away from the ZIF socket and rotate it to the vertical position.

CAUTION: Failure to fully open the ZIF lever will prevent the processor from seating properly during installation and can potentially lead to hardware damage.

2. Align the processor over the empty processor socket and insert the processor into the socket (2).

WARNING: Align pin 1 on the processor with pin 1 on the processor socket, or pin damage will occur.

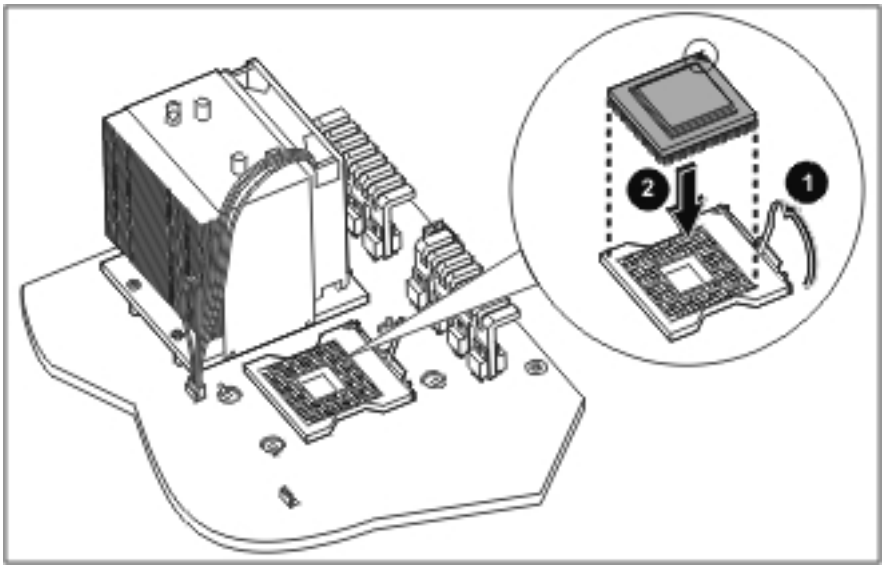

Figure 2-44: Installing the processor

3. Close the ZIF lever to fully seat the processor.

CAUTION: To prevent possible server malfunction, be sure to completely close the ZIF lever.

4. Place a new thermal pad on the processor.
5. Align the heatsink to the holes around the processor socket.

WARNING: Be sure that the processor heatsink sits squarely on the processor and is aligned with the fan facing towards the front of the server. Failure to install the heastink as directed may result in overheating or damage to the processor.

6. Tighten the four screws on the heatsink.

NOTE: Secure the screws in a diagonal, instead of clockwise or counterclockwise, order.

7. Connect the heatsink's cooling fan connector to the system board.

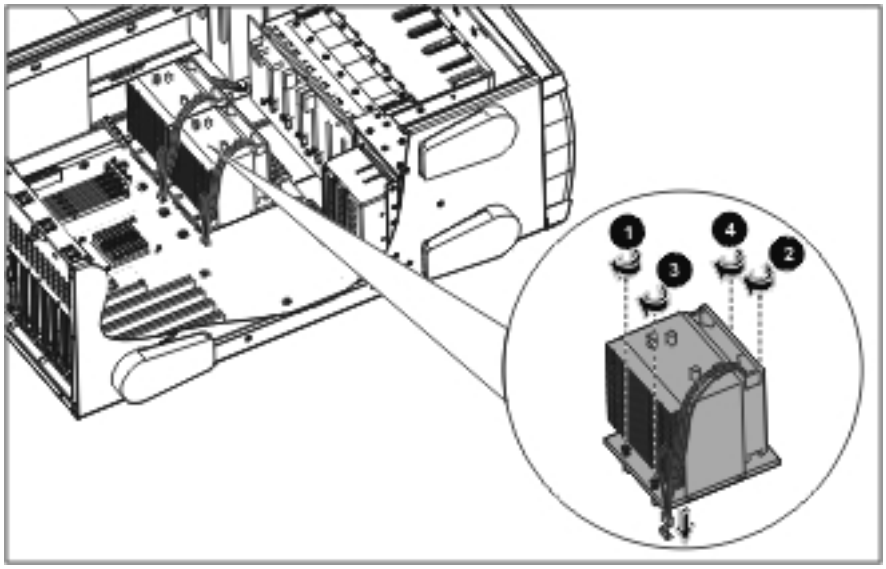

Figure 2-45: Installing the heatsink

8. Replace the access panel.
9. Carefully lift the server back to its upright position.
10. Reconnect all power cords.

System Board

To remove the system board:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
3. Carefully lay the server on its unexposed side to gain access to the system board.
4. Remove the system fan modules. Refer to “System Fan Modules” earlier in this chapter.
5. Disconnect all power cables, device cables, and the power button cable from the system board. Refer to “Cable Routing Diagrams” earlier in this chapter.
6. Remove all expansion board(s), expansion board holder, and memory module(s). Refer to “Expansion Board,” “Expansion Board Holder,” and “Memory Modules” earlier in this chapter.
7. Remove all processors. Refer to “Processors and Heatsinks” earlier in this chapter.
8. Remove the ten screws securing the system board to the chassis with a T-15 Torx screwdriver.
9. Lift the system board gently at its two front corners to unsnap the board from the chassis.
10. Slide the system board towards the front of the server (1) and then lift it out of the chassis (2).

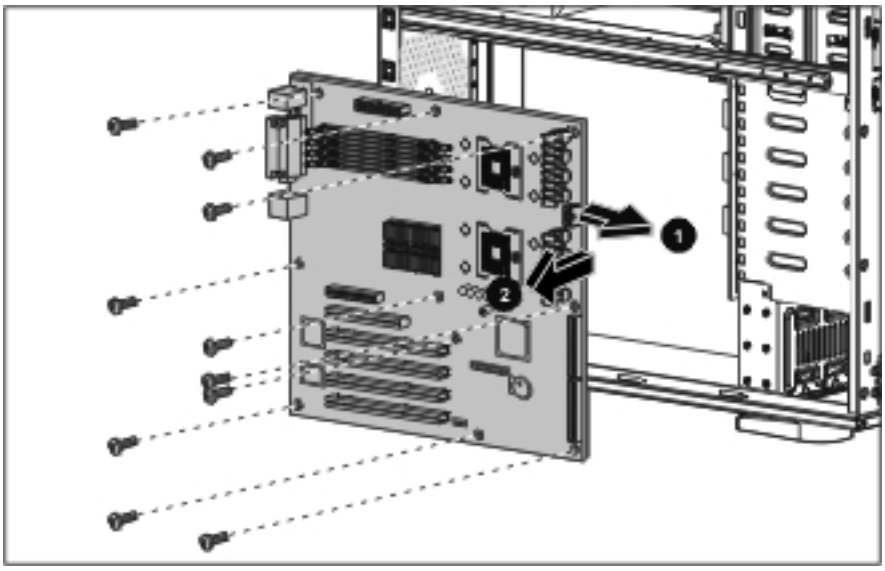

Figure 2-46: Removing the system board

To replace the system board, reverse steps 2 through 10.

System Battery

The server uses nonvolatile memory that requires a battery to retain system information when power is removed. The battery is on the system board.

System Board Battery

If the server no longer automatically displays the correct date and time, the system board battery that provides power to the real-time clock may need to be replaced. Under normal use, battery life is 5 to 10 years.

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

CAUTION: Static electricity can damage the electronic components of the server. Before beginning these procedures, be sure that you are discharged of static electricity by briefly touching a grounded (earthed) metal object. Refer to "Electrostatic Discharge Information" earlier in this chapter.

To remove the system board battery:

1. Complete the preparation procedures. Refer to "Preparation Procedures" earlier in this chapter.
2. Remove the access panel. Refer to "Access Panel" earlier in this chapter.
3. Locate the battery on the system board.

4. Press the battery release lever away from the battery (1).
5. Lift the battery up from that side and out of its holder (2).

NOTE: If expansion boards are installed, you may need to remove them to gain access to the battery.

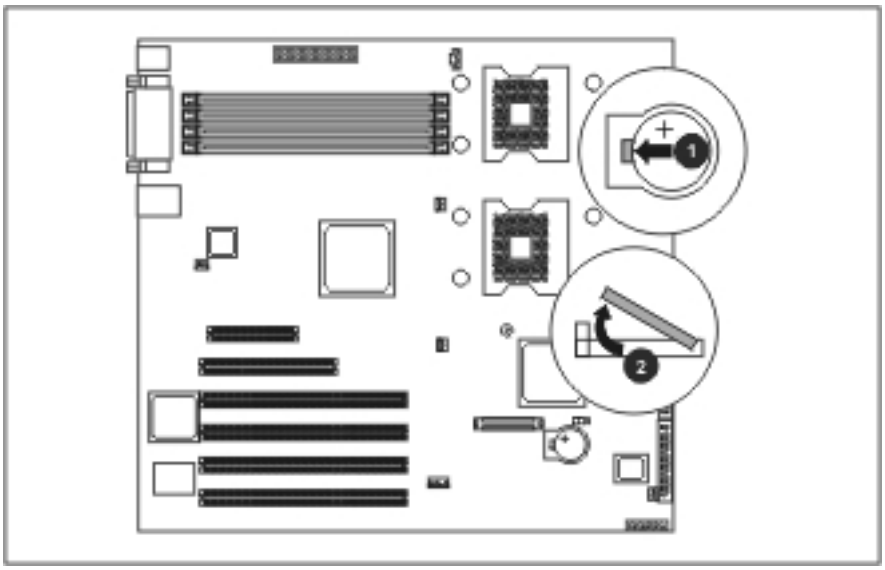

Figure 2-47: Locating and removing a system board battery

To replace the system board battery, reverse steps 2 through 5.

IMPORTANT: The battery should be installed with the positive polarity (+ side) positioned up.

Power Supply

To remove the power supply:

1. Complete the preparation procedures. Refer to “Preparation Procedures” earlier in this chapter.
2. Remove the access panel. Refer to “Access Panel” earlier in this chapter.
3. Remove the power cord from the power supply to be removed from the server.
4. Disconnect the power supply connections to the flexible diskette drive, CD-ROM drive, and back plane (for the hot-plug model) or hard drive (for the non-hot-plug model).
5. Unplug the power cables (J20, J40 and J19) from the system board.
6. Remove the four screws securing the power supply to the chassis (1). These screws are located at the rear of the chassis.
7. Slide the power supply towards the front of the server to the position indicated in Figure 2-48 (2).
8. Remove the power supply out of the chassis (3).

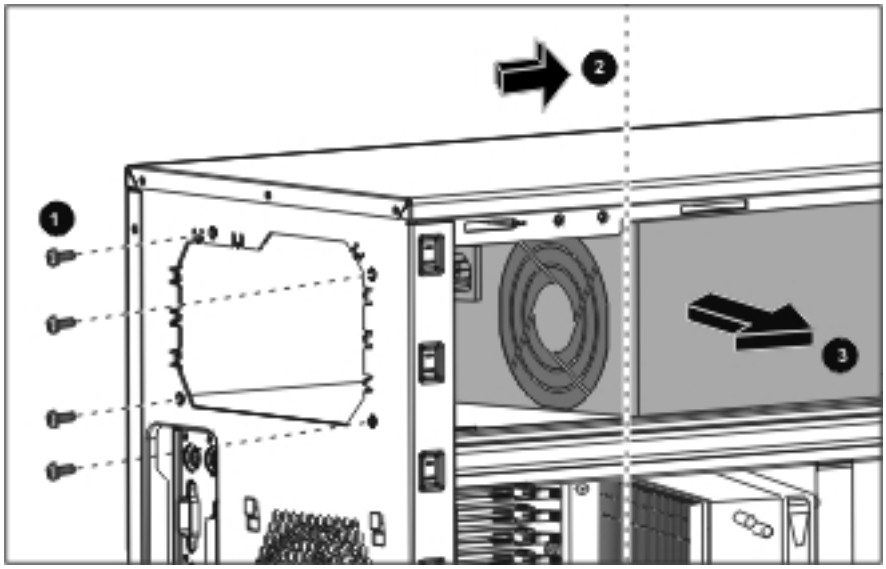

Figure 2-48: Removing the power supply

To replace the power supply, reverse steps 2 through 8.

Stands

To remove the four stands from the chassis, one at a time:

1. Complete the preparation procedures. Refer to "Preparation Procedures" earlier in this chapter.
2. Carefully place the server upside down.
3. Remove the T-15 Torx screw that secures each stand to the chassis (1).
4. Slide each stand towards the proper direction to detach it from the chassis (2) and pull it off the base of the chassis (3).

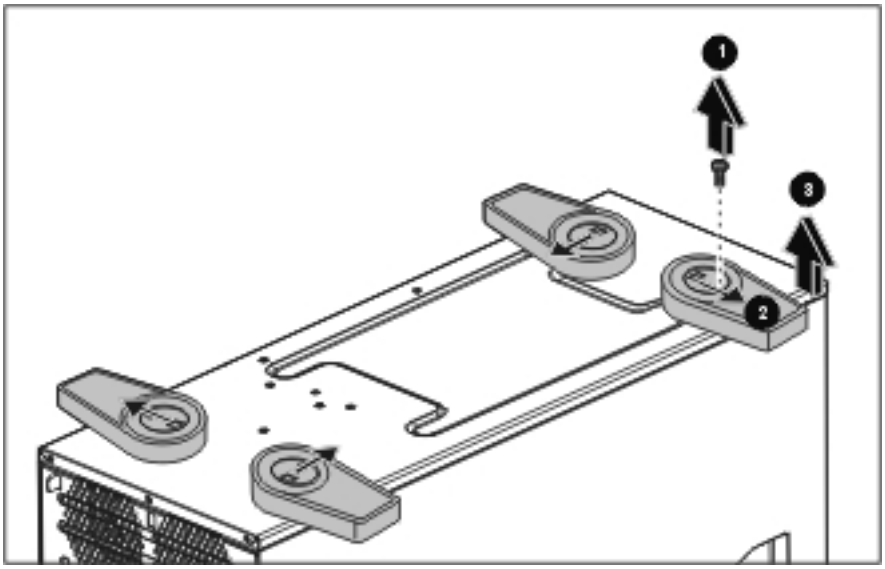

Figure 2-49: Removing the stands from the chassis

To replace the stands, reverse steps 2 through 4.

3

Diagnostic Tools and Setup Utilities

This chapter provides an overview of the Power-On Self-Test (POST), the POST error messages, and BIOS, SCSI and SATA setup utilities.

POST

POST is a series of diagnostic tests that checks firmware and assemblies to ensure that the server is properly functioning.

POST runs automatically on HP servers when the server is powered up.

POST Error Messages

Error messages that display during the POST process describe what prevents the server from completing the boot process. Refer to Table 3-1.

Table 3-1: POST Error Messages

Error Code	Error Type	Error Message
0200	Extend error	Failure fixed disk
0210	Extend error	Stuck key
0211	Extend error	Keyboard error
0212	Extend error	Keyboard controller error
0213	Extend error	Keyboard locked - Unlock key switch
0220	Extend error	Monitor type does not match CMOS - Run SETUP
0250	Extend error	System battery is dead - Replace and run SETUP
0251	Extend error	System CMOS checksum bad - Default configuration used
0252	Extend error	Password checksum bad - Passwords cleared
0260	Extend error	System timer error
0270	Extend error	Real time clock error

continued

Table 3-1: POST Error Messages *continued*

Error Code	Error Type	Error Message
0271	Extend error	Check date and time settings
0280	Extend error	Previous boot incomplete - Default configuration used
0281	Extend error	Memory size found by POST differed from EISA CMOS
02B0	Extend error	Diskette drive A error
02B2	Extend error	Incorrect drive A type - run SETUP
02D0	Extend error	System cache error - Cache disabled
02D1	Extend error	System memory exceeds the CPU's caching limit.
02F0	Extend error	CPU ID
02F4	Extend error	EISA CMOS not writeable
02F5	Extend error	DMA test failed
02F6	Extend error	Software NMI failed
02F7	Extend error	Fail-safe Timer NMI failed
02F8	Extend error	WARNING - The system is running in CPU Safe Mode. A CPU Soft Update error has been detected. Please perform the CPU Soft Update again.
0230	Extend error	System RAM failed at offset
0231	Extend error	Shadow RAM failed at offset
0232	Extend error	Extended RAM failed at address line
0233	Extend error	Memory type mixing detected
0234	Extend error	Single-bit ECC error occurred.
0235	Extend error	Multiple-bit ECC error occurred.
0238	Extend error	One or more RDRAM devices are not used.
0239	Extend error	One or more RDRAM devices have bad architecture/timing.
023A	Extend error	One or more RDRAM devices are disabled.
023B	Extend error	There are more than 32 RDRAM devices in the system.
0236	Extend error	Memory decreased in size
02F9	Extend error	Rear system fan failed or disconnected
02FA	Extend error	Front system fan failed or disconnected
02FB	Extend error	Warning! The plugin memory configuration get reduced memory size.
0A00	System monitor error	The system chassis has been opened.
0A01	System monitor error	The system performed an emergency shutdown.
		Warning! BIOS detect failed CPU fans or CPU fans not connected. Please check CPU fans.

BIOS Setup Utility

The HP server BIOS Setup Utility is used to configure the following options:

- Main
- Advanced
- Security
- Power
- Monitor
- Boot
- Exit

Accessing the BIOS Setup Utility

The BIOS Setup Utility menu offers the choices listed above, and the corresponding items are described in the topics below.

1. Power up the server and monitor.
2. Start the BIOS Setup Utility by pressing the **F10** key on the HP logo screen.

Using the Setup Screens

Online help explains the settings displayed on the BIOS Setup Utility screens. Instructions are also provided for navigating between the screens and entering or changing the setup data.

- Press the right-arrow and left-arrow keys to move between selections on the menu bar. The menu bar is present at the top of the main selections.
- Press the up-arrow and down-arrow keys to move between fields on each screen. The currently selected field will be highlighted.
- Certain fields ask you to select from a list of entries. In such cases, press the right-arrow or left-arrow key repeatedly to change the entries.
- Small arrow points (▶) precede some field names. This means the field is actually a sub-menu. To visit the sub-menu, select it with the arrow keys and press the **Enter** key. The sub-menu then displays in place of the current screen.
- The **Esc** key is the exit key. If you press the **Esc** key on one of the top-level screens, the Exit menu displays. If you press the **Esc** key on a sub-menu, the previous screen displays. When you are making selections from a pop-up menu, use the **Esc** key to close the pop-up menu without making a selection.

Menu Bar

The BIOS Setup Utility provides a menu bar with several menu selections. The menu bar choices are described in the topics below.

Main Menu

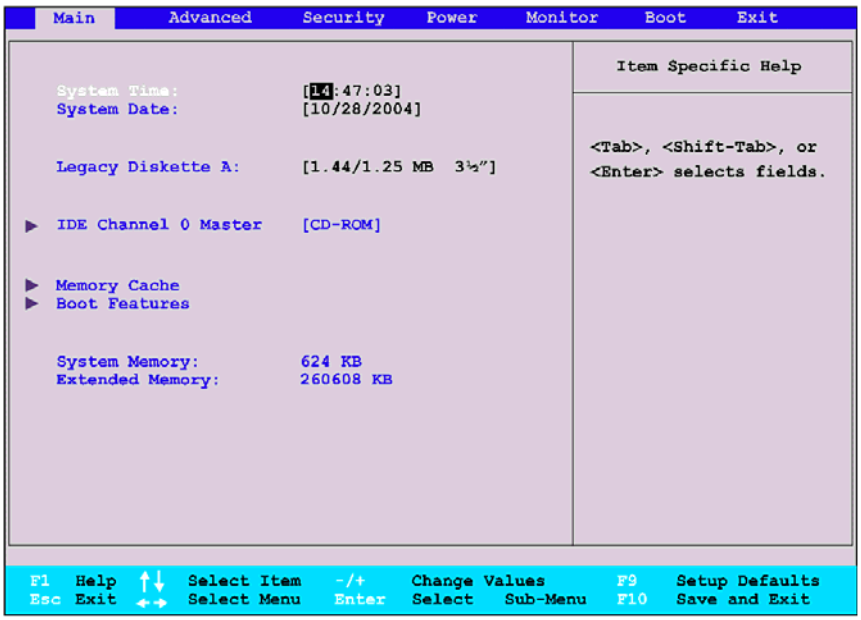

Figure 3-1: Main menu of the BIOS Setup Utility

Use this menu to set the server time and date, and configure the following items:

- **Legacy Diskette A** – Set the type of the flexible diskette drive.
- **IDE Channel 0 Master** – Set the type of the CD-ROM drive and related settings.
- **Memory Cache** – Set the cache settings.
- **Boot Features** – Set the boot settings.
- **System Memory** – Display the system memory information.
- **Extended Memory** – Display the extended memory information.

Advanced Menu

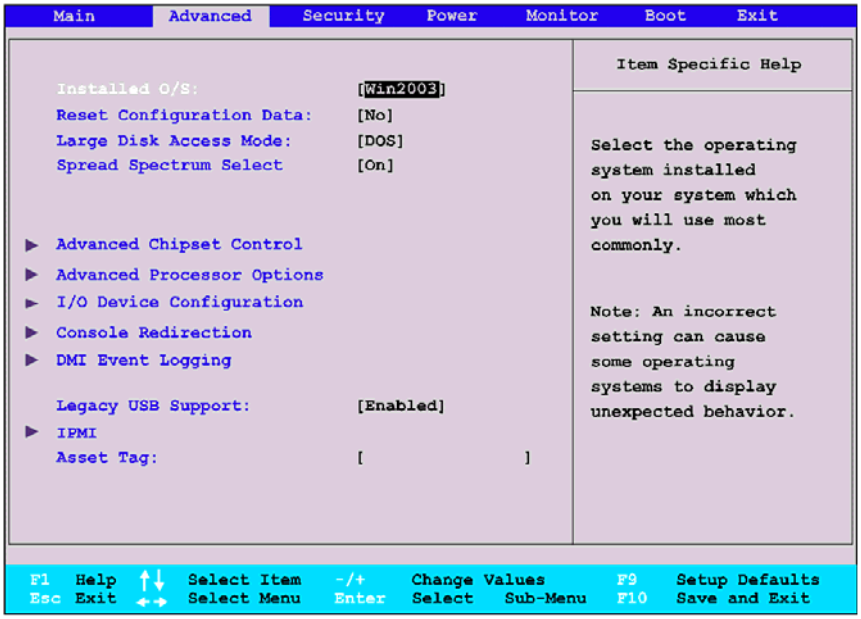

Figure 3-2: Advanced menu of the BIOS Setup Utility

WARNING: Incorrect settings may cause the server to malfunction. To correct the settings, press the F9 key to restore the default settings.

Use this menu to configure the following items:

- **Installed O/S** – Select the operating system that you use most often.
- **Reset Configuration Data** – Set if you want to clear the Extended System Configuration Data (ESCD) data.
- **Large Disk Access Mode** – Select **DOS** if DOS is available in the server. Select **Other** for other operating systems, such as UNIX.
- **Spread Spectrum Select** –Turning on this item reduces the electromagnetic interference.
- **Advanced Chipset Control** – Configure the advanced chipset settings.
- **Advanced Processor Options** – Enable or disable the Hyper Threading (HT) feature for the processor to utilize its execution resources more efficiently as two virtual processors.
- **I/O Device Configuration** – Configure the I/O settings of the server.
- **Console Redirection** – Configure the settings when redirect the console to a serial port.
- **DMI Event Logging** – Allow you to view the DMI event log, clear the log, enable or disable this feature, and mark the event as read.
- **Legacy USB Support** – Enable or disable Legacy USB Support.
- **IPMI** – Configure the Intelligent Platform Management Interface (IPMI) settings.
- **Asset Tag** – Allow you to enter the asset tag.

Security Menu

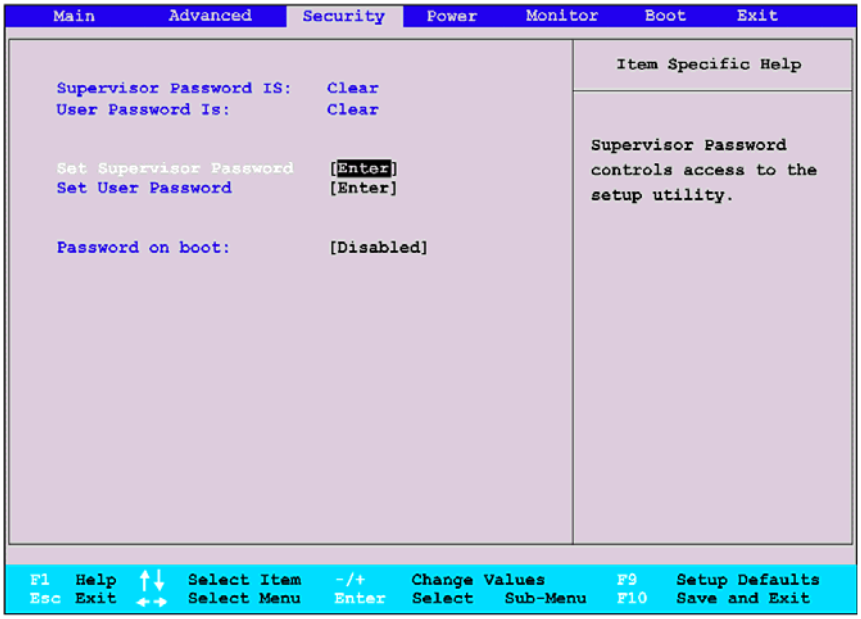

Figure 3-3: Security menu of the BIOS Setup Utility

Use this menu to configure the following items:

- **Supervisor Password Is** – Display if a Supervisor password is set.
- **User Password Is** – Display if a User password is set.
- **Set Supervisor Password** –Set the Supervisor password, which is required then to enter the BIOS Setup Utility. Once the Supervisor password is set, the Supervisor can access and change all fields in the BIOS Setup Utility screens.
- **Set User Password** – Set the User password. The User password gives restricted access to the setting options.

  The Supervisor password must be set before setting the User password.
- **Password on boot** – If a Supervisor password has been set, use this item to enable or disable the requirement of the Supervisor password when booting the server.

NOTE: To set a new Supervisor or User password:

1. Press the **Enter** key to enter a new password.
2. A pop-up menu displays. Enter the password in the **Enter New Password** field and press the **Enter** key.
3. Enter the password again in the **Confirm New Password** field and press the **Enter** key.
4. A pop-up menu displays, indicating that the changes have been saved. Press the **Enter** key. The setting of the selected item has been changed to **Set**.
5. Select **Exit Saving Changes** from the Exit menu and press the **Enter** key (or press the **F10** key) to save the change and exit the BIOS Setup Utility.
6. In the confirmation pop-up menu, select **Yes** and press the **Enter** key.

Power Menu

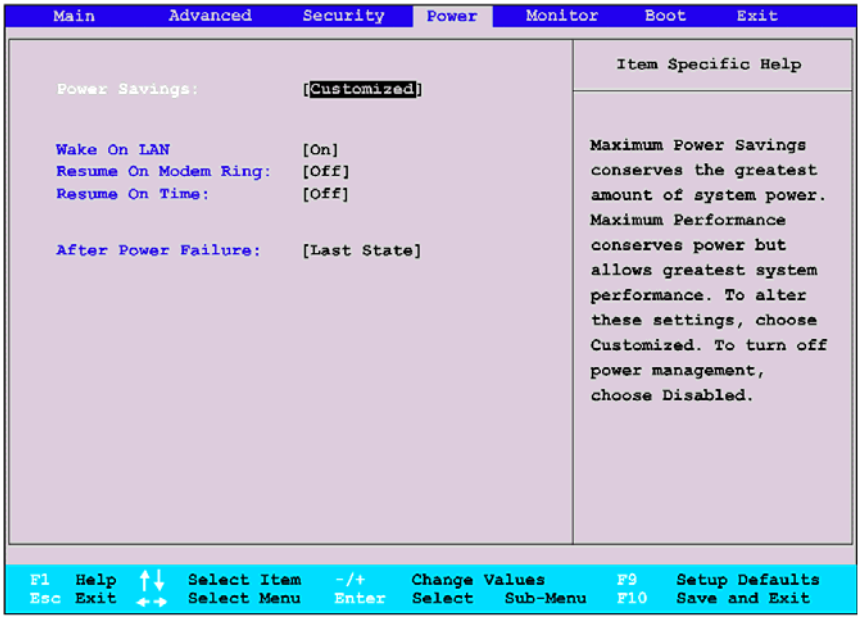

Figure 3-4: Power menu of the BIOS Setup Utility

Use this menu to configure the following items:

- **Power Savings** – Select the power management mode for the server.
- **Wake On LAN** – Enable or disable the Wake-On-LAN function.
- **Resume On Modem Ring** – Enable or disable waking up the server when an incoming call is detected on the modem.
- **Resume On Time** – Enable or disable waking up the server at a specific time.
- **After Power Failure** – Set the mode of operation if an AC power failure occurs.

Monitor Menu

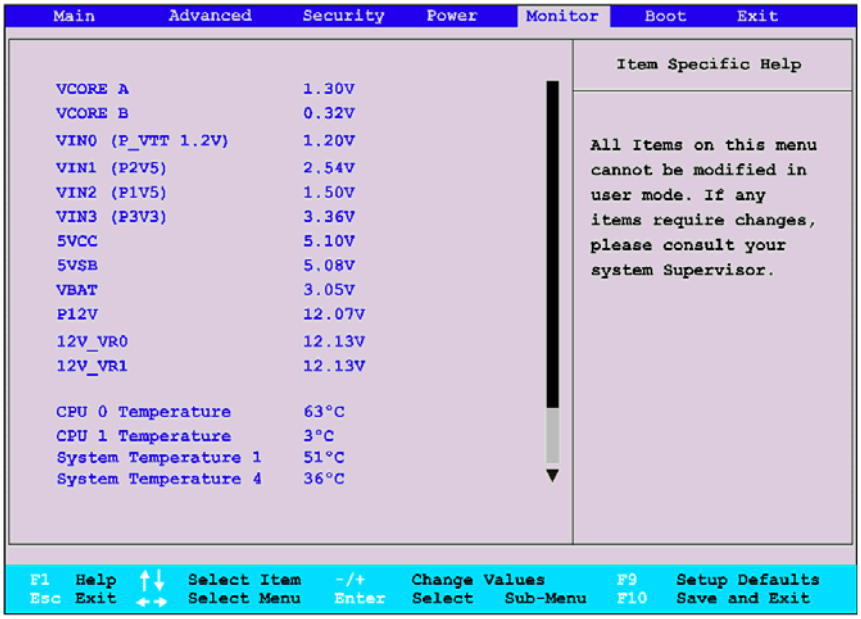

Figure 3-5: Monitor menu of the BIOS Setup Utility

This menu displays the data of the system monitoring. The items in this menu cannot be modified in the User mode. Consult the system supervisor if any changes are required.

Boot Menu

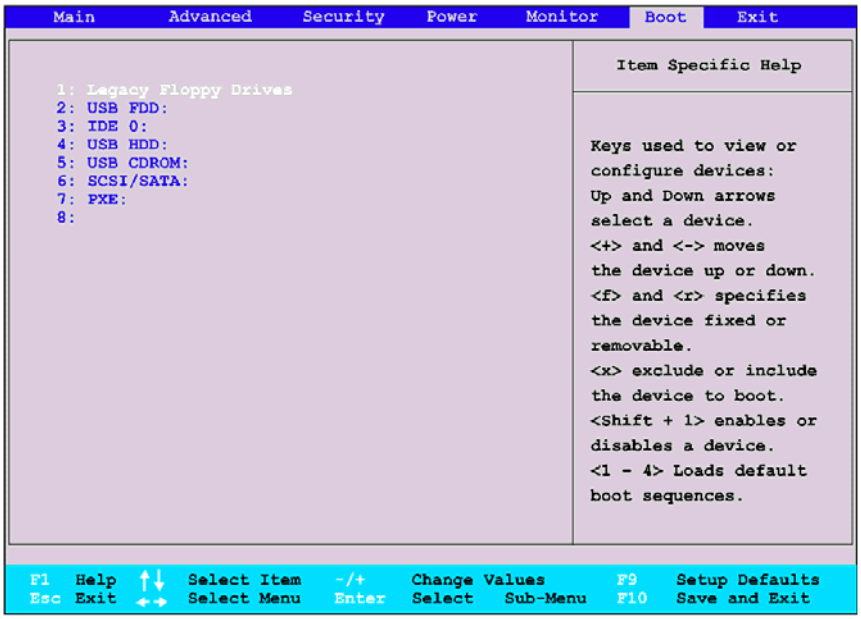

Figure 3-6: Boot menu of the BIOS Setup Utility

Use this menu to configure the boot priority.

Exit Menu

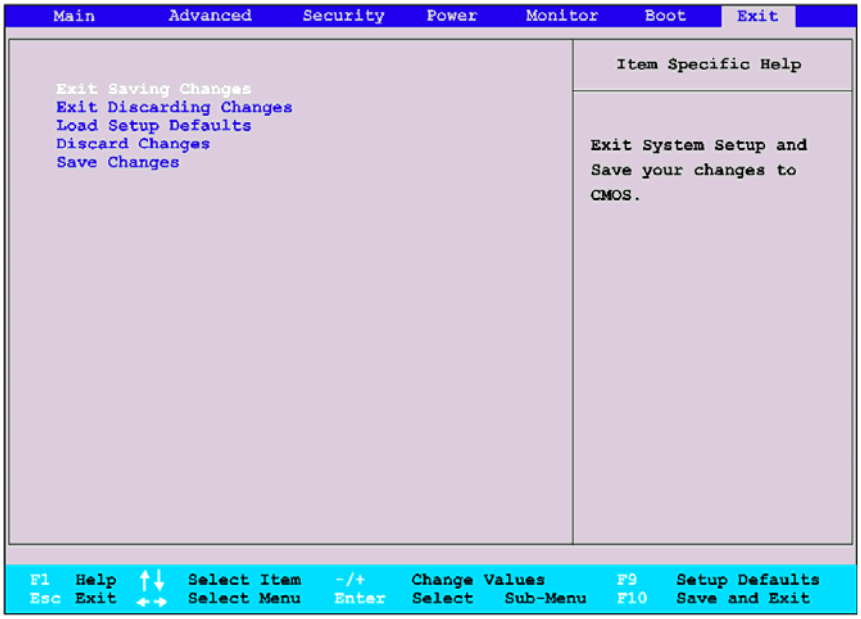

Figure 3-7: Exit menu of the BIOS Setup Utility

Use this menu to save changes or discard changes. When you exit, the server reboots.

- **Exit Saving Changes** – Save the changes you have made and exit the BIOS Setup Utility. (You can also press the **F10** key.)
- **Exit Discarding Changes** – Exit the BIOS Setup Utility without saving the changes you have made. (You can also press the **Esc** key.)
- **Load Setup Defaults** – Load the factory default values for all items. (You can also press the **F9** key.)
- **Discard Changes** – Discard any changes you have made.
- **Save Changes** – Save the changes you have made.

BIOS Update

To update BIOS, you need to create the BIOS Update diskette.

Creating the BIOS Update Diskette

1. Insert one blank, formatted 3.5" diskette into the flexible diskette drive of a PC running Microsoft Windows.
2. Insert the HP ProLiant ML150 G2 Server Support CD in the CD-ROM drive of the above PC.
3. Click the desired operating system from the System Support Software list in the navigation bar.
4. On the driver page, click the item in the BIOS – System ROM category.
5. Click the executable file and then click **Open** to proceed.
6. Click **Yes** to proceed if a confirmation screen appears.
7. Click **OK** to proceed.
8. Press any key to create the BIOS Update diskette for the server.
9. After the diskette is ready, press the **N** key to quit, or the **Y** key to create another diskette.

NOTE: Please note that the Support CD may not provide the most recent BIOS. Verify the server BIOS version against the latest BIOS version listed for your server on the HP website: http://www.hp.com

Updating BIOS

To update the server's BIOS Setup Utility with the latest version:

1. Create the BIOS Update diskette as described in the previous section.
2. Insert the BIOS Update diskette into the flexible diskette drive of the server.
3. Reboot the server from the BIOS Update diskette.

   Follow the on-screen instructions to finish the update procedure.
4. During POST, press the **F10** key to access the BIOS Setup Utility.
5. Make the necessary changes (such as system time, passwords, or boot device priority).
6. Press the **F10** key to save the changes you made, and exit the BIOS Setup Utility.

SCSI Configuration Utility

The HP server uses the SCSISelect Utility to verify or modify the SCSI controller settings for the devices connected to the system board. If you need to verify or modify SCSI controller settings, or if you need to low-level format SCSI disks or verify SCSI disk media, run the SCSISelect Utility.

NOTE: You typically would not need to use this utility unless you are an experienced administrator or requested to do so by a support provider.

Starting SCSISelect

1. Power up the server and monitor.

   During the startup process, pay careful attention to the messages that display on your screen.

2. When the following message displays on your screen, press the **Ctrl**-**A** keys simultaneously (this message displays for only a few seconds):

   ```
   Press <Ctrl><A> for SCSISelect(TM) Utility!
   ```

3. From the menu that displays, use the arrow keys to select the controller, and press the **Enter** key.

Figure 3-8: Controller menu of the SCSISelect Utility

4. From the menu that displays, use the arrow keys to select the option you want, and press the **Enter** key.

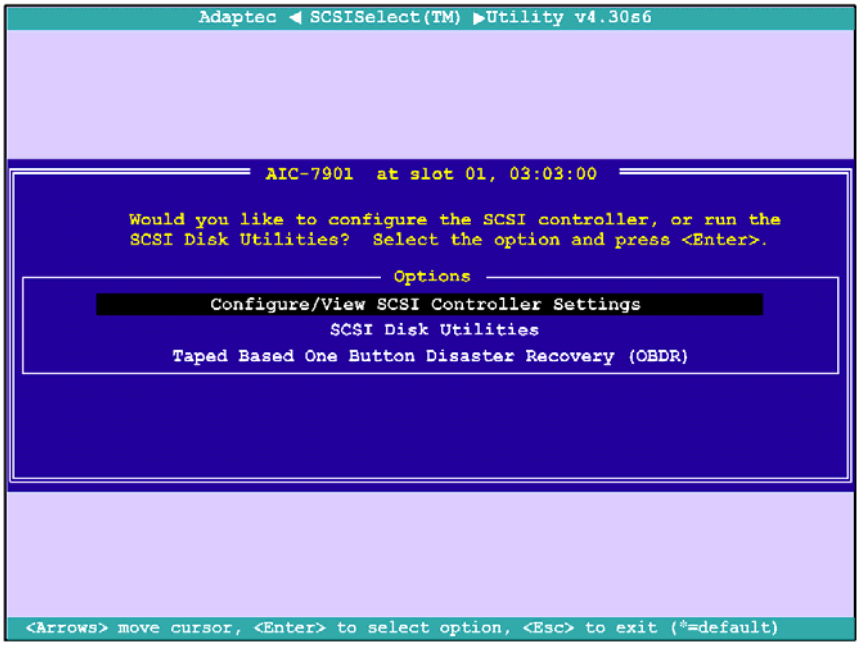

Figure 3-9: Options menu of the SCSISelect Utility

NOTE: If you have difficulty viewing the display, press the **F5** key to toggle between color and monochrome modes. (This feature may not work on some monitors.)

Exiting SCSISelect

1. Press the **Esc** key until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).
2. At the prompt, select **Yes** and press the **Enter** key to exit. Then press any key to reboot the server. Any changes made in SCSISelect will take effect the next time the server is booted.

Using the Menus

To select an option, use the arrow keys to move the cursor to the option, and press the **Enter** key.

In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing the **Esc** key.

To restore the original SCSISelect default settings, press the **F6** key from the main SCSISelect screen.

Configuring SCSISelect Settings

SCSI Bus Interface Definitions

- **SCSI Controller ID** (Default: 7) Set the SCSI ID for the SCSI host bus adapter. The Ultra320 SCSI Host Bus Adapter is set at 7, which gives it the highest priority on the SCSI bus. We recommend that you do not change this setting.
- **SCSI Controller Parity** (Default: Enabled) Verify the accuracy of data transfer on the SCSI bus when set to **Enabled**. Leave this setting enabled unless any SCSI device connected to the Ultra320 SCSI Host Bus Adapter does not support SCSI parity.
- **SCSI Controller Termination** (Default: Enabled) Determine the termination setting for the SCSI host bus adapter. The default setting for both the LVD/SE and SE connectors is **Automatic**, which allows the SCSI host bus adapter to adjust the termination as needed depending on the configuration of the connected SCSI devices. We recommend that you do not change this setting.

Additional Options

- **Boot Device Configuration** Display the information of the master SCSI controller.
- **SCSI Device Configuration** SCSI Device Configuration options can be set individually for each connected SCSI device.

NOTE: To configure settings for a SCSI device, you must know its SCSI ID (refer to "Using SCSI Disk Utilities" on page 3-15).

— **Sync Transfer Rate** (Default: 320) Determine the maximum synchronous data transfer rate that the SCSI host adapter supports. Use the maximum value of 320 MBytes/sec. If a device is not Ultra320, select the transfer rate of the device (80, 53, 40, ...).

— **Packetized** (Default: Yes) Packetization creates information units (IUs) comprised of commands, data, status information and other things. These IUs are passed as synchronous transfers, reducing overhead and improving overall efficiency.

— **QAS** (Default: Yes) QAS speeds up the arbitration process by eliminating the bus free phase. Combined with packetization, this significantly improves bus efficiency.

— **Initiate Wide Negotiation** (Default: Yes) When set to **Yes**, the SCSI host bus adapter attempts 16-bit data transfer (wide negotiation). When set to **No**, the SCSI host bus adapter uses 8-bit data transfer unless the SCSI device requests wide negotiation.

NOTE: Set **Initiate Wide Negotiation** to **No** if you are using an 8-bit SCSI device that hangs or exhibits other performance problems with 16-bit data transfer rate enabled.

— **Enable Disconnection** (Default: Yes) When set to **Yes**, allows the SCSI device to disconnect from the SCSI bus. Leave the setting at **Yes** if two or more SCSI devices are connected to the SCSI host bus adapter. If only one SCSI device is connected, changing the setting to **No** results in slightly better performance.

— **Send Start Unit Command** (Default: Yes) When set to **Yes**, the Start Unit Command is sent to the SCSI device at boot-up. The following three options have no effect when the SCSI host bus adapter BIOS is disabled. (The SCSI host bus adapter BIOS is normally enabled by default.)

— **BIOS Multiple LUN Support** (Default: No) Leave this setting at **No** if the device does not have multiple Logical Unit Numbers (LUNs). When set to **Yes**, the SCSI host bus adapter BIOS provides boot support for a SCSI device with multiple LUNs (for example, a CD "juke box" device in which multiple CDs can be accessed simultaneously).

— **Include In BIOS Scan** (Default: Yes) Determine if the BIOS will scan for SCSI devices.

- **Advanced Device Configuration**

  The following option has no effect when the SCSI host bus adapter BIOS is disabled. (The SCSI host bus adapter BIOS is normally enabled by default.)

NOTE: Do not change the **Advanced Device Configuration** options unless absolutely necessary.

— **Reset SCSI Bus at IC Initialization** (Default: Enabled) When set to **Enabled**, the SCSI host bus adapter generates a SCSI bus reset during its power-on initialization and after a hard reset.

— **Display <Ctrl> <A> Message During BIOS Initialization** (Default: Enabled) When set to **Enabled**, the SCSI host bus adapter BIOS displays the

```
Press <Ctrl> <A> for SCSISelect (TM) Utility!
```

message on your screen during system boot-up. If this setting is disabled, you can still invoke the SCSISelect Utility by pressing the **Ctrl**-**A** keys after the SCSI host bus adapter BIOS banner displays.

— **Extended Int 13 Translation for DOS Drives > 1 Gbyte** (Default: Enabled) When set to **Enabled**, provide an extended translation scheme for SCSI hard disks with capacities greater than 1 GByte. This setting is necessary only for MS-DOS 5.0 or above; it is not required for other operating systems, such as NetWare or UNIX.

CAUTION: Changing the translation scheme destroys all data on the drive. Be sure to back up the data before changing the translation scheme.

Use the MS-DOS `Fdisk` command to partition a disk larger than 1 GByte controlled by the SCSI host bus adapter BIOS, when using DOS, Windows 3.1.x, or Windows 95/98.

— **POST Display Mode** (Default: Verbose) When set to **Verbose**, the SCSI host bus adapter BIOS displays the host adapter model on the screen during system boot-up. When set to **Silent**, the message will not be displayed during boot-up.

— **SCSI Controller Int 13 Support** (Default: Enabled) When set to **Enabled**, the SCSI host bus adapter BIOS supports Int 13h extensions as required by Plug-and-Play. The setting can be either enabled or disabled if your system is not Plug-and-Play.

The following options have no effect if Int 13 support is disabled.

— **Domain Validation** (Default: Enabled) Determine the kinds of SCSI devices connected, reduce data transfer speed when legacy SCSI devices are detected, and display the resulting data transfer rate.

— **Support Removable Disks Under Int 13 as Fixed Disks** (Default: Disabled) Determine which removable media drives are supported by the SCSI host bus adapter BIOS. Choices are as follows:

Disabled No removable media drives are treated as hard drives. Software drivers are required because the drives are not controlled by the BIOS.

CAUTION: *You may lose data* if you remove a removable media cartridge from a SCSI drive controlled by the SCSI host bus adapter BIOS while the drive is on. If you want to be able to remove the media while the drive is on, install the removable media software driver and set **Support Removable Disks Under Int 13 as Fixed Disks** to **Disabled**.

Boot Only Only the removable media drive designated as the boot device is treated as a hard drive.

All Disks All removable media drives supported by the BIOS are treated as hard drives.

— **BIOS Support for Bootable CD-ROM** (Default: Enabled) When set to **Enabled**, the SCSI host bus adapter BIOS allows the HP server to boot from a CD-ROM drive.

Using SCSI Disk Utilities

1. Select **SCSI Disk Utilities** from the menu that displays after starting SCSISelect. SCSISelect scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the devices assigned to each ID.
2. Use the arrow keys to move the cursor to a specific ID and device, and press the **Enter** key.
3. A small menu appears, displaying the options **Format Disk** and **Verify Disk Media**.

   — **Format Disk** Allow you to perform a low-level format on a hard drive. *Most SCSI disk devices are preformatted at the factory and do not need to be formatted again.*

CAUTION: A low-level format destroys all data on the drive. Be sure to back up your data before performing this operation. You cannot abort a low-level format once it has started.

   — **Verify Disk Media** Allow you to scan the media of a hard drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them; if you select yes, those blocks are no longer used. Pressing the **Esc** key at any time aborts the utility.

Using the Taped Based One Button Disaster Recovery

1. Select **Taped Based One Button Disaster Recovery (OBDR)** from the menu that displays after starting SCSISelect. SCSISelect scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the devices assigned to each ID.
2. Use the arrow keys to move the cursor to the tape drive, and press the **Enter** key.
3. When prompted, press the **Yes** key to enable the OBDR support.
4. When prompted, insert a DR-compliant tape into the drive and press any key to continue.

   Both LEDs on the tape are on.
5. A message displays indicating that OBDR support is enabled. Press any key to continue.

Adaptec RAID Configuration Utility

The HP server uses the Adaptec RAID Configuration (ARC) Utility to verify or modify the SATA controller settings for the devices connected to the system board. If you need to verify or modify SATA controller settings, or if you need to low-level format SATA disks or verify SATA disk media, run the ARC Utility.

The ARC Utility includes the Array Configuration Utility (ACU) and Disk Utilities.

Starting the ARC Utility

1. Power up the server and monitor.

   During the startup process, pay careful attention to the messages that display on your screen.
2. When the following message displays on your screen, press the **Ctrl**-**A** keys simultaneously (this message displays for only a few seconds):

   ```
   Press <Ctrl><A> for Adaptec RAID Configuration Utility!
   ```
3. From the menu that displays, use the arrow keys to select the option you want, and press the **Enter** key.

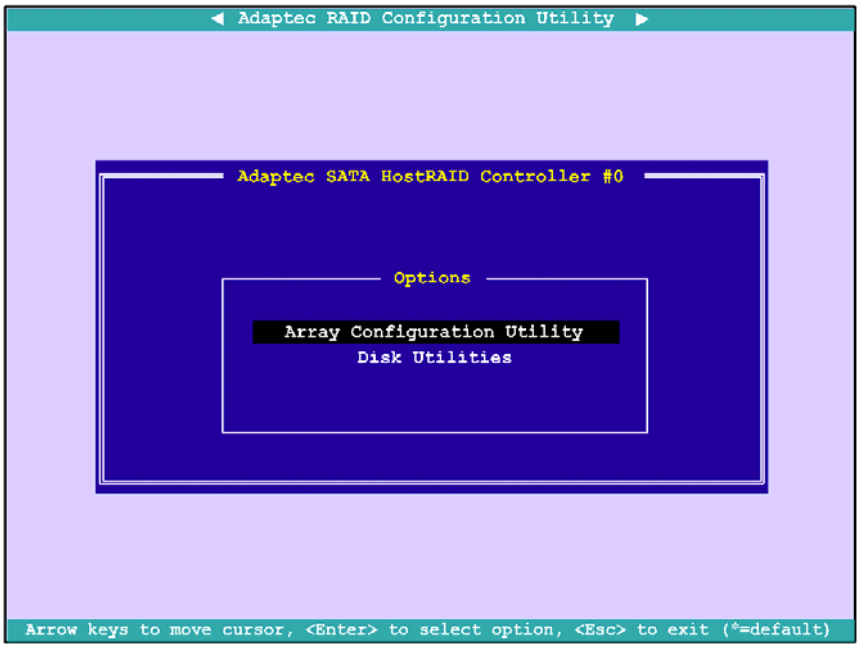

Figure 3-10: Options menu of the ARC Utility

NOTE: If you have difficulty viewing the display, press the **F5** key to toggle between color and monochrome modes. (This feature may not work on some monitors.)

Exiting the ARC Utility

1. Press the **Esc** key until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).
2. At the prompt, select **Yes** and press the **Enter** key to exit. Then press any key to reboot the server. Any changes made in the ARC Utility will take effect the next time the server is booted.

Using the Menus

To select an option, use the arrow keys to move the cursor to the option, and press the **Enter** key.

In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing the **Esc** key.

To restore the original default settings of the ARC Utility, press the **F6** key from the utility's main screen.

Using ACU

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility**.
3. From the ACU main menu, use the arrow keys to select the option you want, and press the **Enter** key.

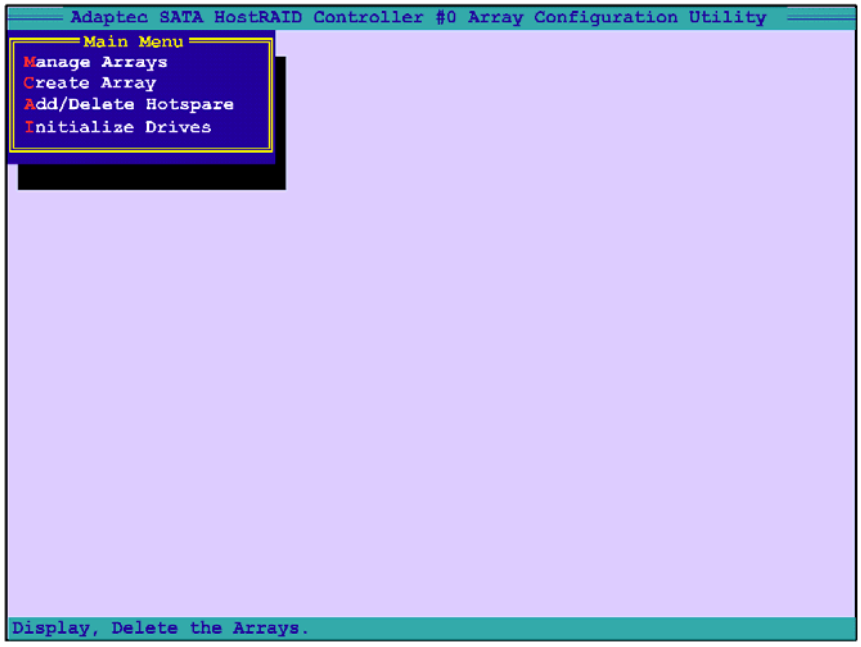

Figure 3-11: Main menu of the ACU Utility

Initializing Disk Drives

If a correctly installed disk does not appear in the disk selection list for creating a new array, or it appears grayed out, you need to initialize it.

CAUTION: Before initialization, note the following:

- During initialization, all data is deleted from the disk. Before proceeding, back up any data.
- If the drive is already used in an array, initialization may make the array unusable.
- Do not initialize a disk that is part of a boot array. The boot array is the lowest numbered array (normally 00) in the List of Arrays dialog box. For information on determining which disks are associated with a particular array, refer to "Viewing Array Properties" later in this chapter.

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Initialize Drives** and press the **Enter** key.
4. Select the disk you wish to initialize and press the **Insert** key.

5. Repeat Step 4 if you want to add another drive to be initialized.

   To deselect any disk, select the disk and press the **Delete** key.

6. Press the **Enter** key.
7. Read the warning message and make sure that you have selected the correct disk drives to initialize. Press the **Y** key to continue.

Creating Arrays

Before creating arrays, make sure the disks for the array are connected and installed in your system. Note that disks with no usable space are shown in gray and cannot be used.

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Create Array** and press the **Enter** key.
4. Select the disks for the new array and press the **Insert** key.

   To deselect any disk, select the disk and press the **Delete** key.

5. Press the **Enter** key when both disks for the new array are selected.

   The Array Properties menu displays.

6. Assign properties to the new array:
   a. Select an array type and press the **Enter** key.

      Only the available array types, RAID 0 and RAID 1 are displayed. RAID 0 and RAID 1 requires two drives.

   b. Type an optional label of no more than 15 characters for the array and press the **Enter** key.
   c. Enter the desired array size.
   d. Select the desired stripe size. Available stripe sizes are 16, 32, and 64 KB (default).

NOTE: You are recommended not to change the default setting.

   e. The **Create RAID via** option allows you to select between the different creation methods for RAID 0 and RAID 1. The following table gives examples of when each is appropriate.

Table 3-2: Creation Options

RAID Level	Create Using	When Appropriate
RAID 0	No Init	Creating a RAID 0 on new drives.
RAID 0	Migrate	Creating a RAID 0 and you want to preserve data on an existing drive. You will be asked to select the source drive. The contents of the source drive are preserved and any data on the new drive is lost.

continued

Table 3-2: Creation Options *continued*

RAID Level	Create Using	When Appropriate
RAID 1	Build	Creating a RAID 1 and you want to preserve data on an existing drive. You will be asked to select the source drive. The contents of the source drive are preserved and any data on the new drive is lost.
RAID 1	Clear	Creating a RAID 1 on new drives, or when you want to ensure that the new array contains no existing data.
RAID 1	Quick Init	Fastest way to create a RAID 1. Appropriate when using new drives.

CAUTION: Do not interrupt the creation of a RAID 0 using the Migrate option. If you do, there is no way to restart, and no way to recover the data that was on the source drive.

f. When you are finished, select **Done** and press the **Enter** key. The array build starts.

g. Read the warning message and press the **Y** key to continue.

h. Exit the utility and reboot the server.

Managing Arrays

Viewing Array Properties

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Manage Arrays** and press the **Enter** key.
4. From the List of Arrays dialog box, select the array you want to view and press the **Enter** key.

   The Array Properties dialog box appears, showing detailed information on the array. The physical disks associated with the array are displayed here.
5. Press the **Esc** key to return to the previous menu.

Making an Array Bootable

You can make an array bootable so that the server boots from the array instead of from a stand-alone (single) disk.

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Manage Arrays** and press the **Enter** key.

4. From the List of Arrays, select the array you want to make bootable, and press the **Ctrl**-**B** keys.

   This changes the selected array's number to 00, making it the controller's boot array.

5. Reboot the server.

Deleting Arrays

CAUTION: Back up the data on an array before you delete it. Otherwise, all data on the array is lost. Deleted arrays cannot be restored.

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Manage Arrays** and press the **Enter** key.
4. Select the array you wish to delete and press the **Enter** key.
5. In the Array Properties dialog box, select **Delete** and press the **Enter** key. The following prompt is displayed:

   ```
   Warning!! Deleting the array will result in data loss!
   Do you want to delete the Array?(Yes/No):
   ```

6. Press the **Y** key to continue.
7. Press the **Esc** key to return to the previous menu.

Adding/Deleting Hotspares

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Array Configuration Utility** and press the **Enter** key.
3. From the ACU main menu, select **Add/Delete Hotspare** and press the **Enter** key.
4. Select the disk you wish to designate as a Hotspare and press the **Insert** key.

   To deselect any disk, select the disk and press the **Delete** key.

5. Press the **Enter** key after the selection.
6. Press the **Y** key when the following prompt is displayed:

   ```
   Do you want to create a spare?(Yes/No)
   ```

   The specified drive is displayed in the Assigned Hotspare drives list.

Using the Disk Utilities

The Disk Utilities enable you to format or verify the media of your SATA hard disks.

1. Start the ARC Utility. Refer to "Starting the ARC Utility" earlier in this chapter.
2. From the ARC menu, select **Disk Utilities** and press the **Enter** key.
3. Select the desired disk and press the **Enter** key.

4. You can use the following options:
   - **Format Disk** Allow you to simulate a low-level format of the hard drive by writing zeros to the entire disk. SATA drives are low-level formatted at the factory and do not need to be low-level formatted again.
   - **Verify Disk Media** Allow you to scan the media of a disk drive for defects.

4

Connectors, Jumpers, and LEDs

This chapter contains illustrations and tables identifying and describing connectors, jumpers, and LED locations on the front panel, rear panel, system board and hard drives for the HP ProLiant ML150 G2 server.

Connectors and Components

This section contains illustrations and tables identifying connector locations and components on the server rear panel and system board.

Rear Panel Components

Figure 4-1 and Table 4-1 show and describe the locations of the components on the rear panel of the server.

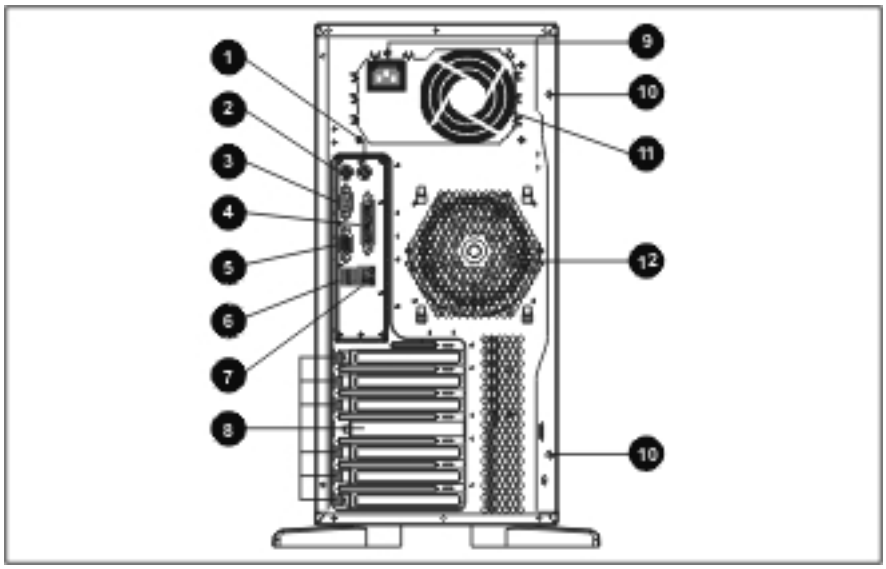

Figure 4-1: Rear panel components

Table 4-1: Rear Panel Components

Item	Description	Item	Description
1	PS/2 mouse port (green)	7	10/100/1000 LAN port (RJ-45)
2	PS/2 keyboard port (purple)	8	I/O slot covers
3	Serial port (teal)	9	Power connector
4	Parallel port (burgundy)	10	Thumbscrews for detachable access panel
5	Monitor port (blue)	11	Power supply unit fan
6	USB 2.0 ports (black)	12	System fan

System Board Components

Figure 4-2 and Table 4-2 show and describe the locations of the components on the server system board.

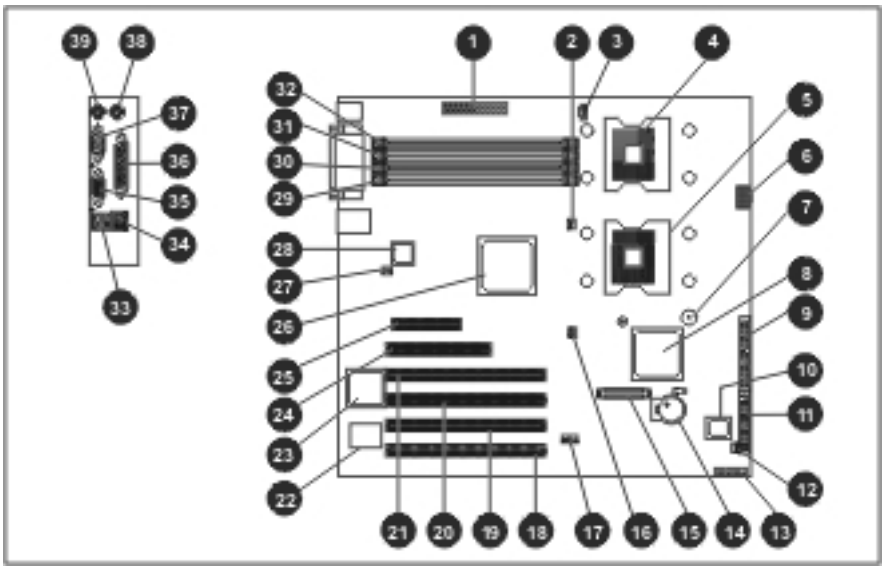

Figure 4-2: System board components

Table 4-2: System Board Components

Item	Description	Item	Description
1	24-pin power connector	11	34-pin FDD connector
2	3-pin CPU fan connector	12	3-pin front system fan connector
3	5-pin power connector	13	20-pin front panel I/O connector
4	Processor 1 socket	14	Battery
5	Processor 2 socket	15	ML150 G2 Lights-Out 100c connector
6	8-pin power connector	16	3-pin CPU fan connector
7	Internal buzzer	17	5-pin internal USB 2.0 connector
8	Intel south bridge chipset	18	PCI slot 1 (64-bit PCI-X)
9	IDE channel UDMA-33	19	PCI slot 2 (64-bit PCI-X)
10	BIOS flash ROM	20	PCI slot 3 (64-bit PCI-X)

continued

Table 4-2: System Board Components *continued*

Item	Description	Item	Description
21	PCI slot 4 (64-bit PCI-X)	31	DIMM slot 2
22	Winbond Super I/O chipset	32	DIMM slot 1
23	ATI Rage XL graphic chipset	33	USB 2.0 ports (black)
24	PCI slot 5 (32-bit)	34	10/100/1000 LAN port (RJ-45)
25	PCI slot 6 (PCI-E x4)	35	Monitor port (blue)
26	Intel north bridge chipset	36	Parallel port (burgundy)
27	3-pin system fan connector	37	Serial port (teal)
28	Broadcom GbE LAN chipset	38	PS/2 mouse port (green)
29	DIMM slot 4	39	PS/2 keyboard port (purple)
30	DIMM slot 3		

Jumpers

System Configuration Jumper Settings

The server system board has a 3-position configuration jumper (J29). Figure 4-3 and Table 4-3 show the use of the jumper.

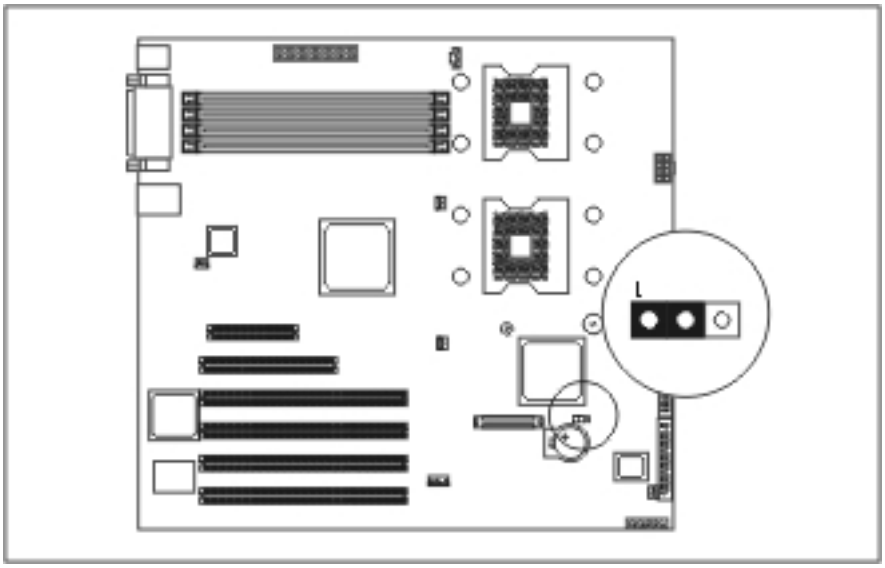

Figure 4-3: System configuration jumper settings

Table 4-3: System Configuration Jumper Settings

Jumper Position	Description
J ●●○	Normal
J ○●●	Clear CMOS

Clearing System Configuration Settings

It may be necessary at some time to clear system configuration settings. When the system configuration jumper J29 is set to the **Clear CMOS** position, the system is prepared to erase all system configuration settings from both CMOS and nonvolatile RAM (NVRAM):

IMPORTANT: Clearing NVRAM deletes the configuration information.

1. Complete the preparation procedures. Refer to "Preparation Procedures" in Chapter 2.
2. Remove the access panel. Refer to "Access Panel" in Chapter 2.
3. Set the system configuration jumper J29 to the **Clear CMOS** position. All configuration settings are now erased and all system operations halt.
4. Wait for five seconds, and then reset the jumper J29 to the **Normal** position.
5. Replace the access panel.
6. Power up the server.
7. Reset all system configuration settings.

LEDs

Several status LEDs and buttons are located on the front and rear of the server. Problem diagnosis is aided by the LEDs that indicate the status of the components and operations of the server. The following server LEDs and buttons are explained in this section:

- Power button
- System status LEDs (on the front of the server)
  - Power status
  - Hard drive status
- Hot-plug hard drive LEDs
- Network Interface Controller (NIC) LEDs (on the rear of the server)
  - Network activity status
  - Network link
  - Connection speed

Power Button and System Status LEDs

The power button and system status LEDs are located on the front of the server.

The power button:

- Powers up the server.
- Powers down the server.

The following system status LEDs are explained:

- Power status
- Hard drive status

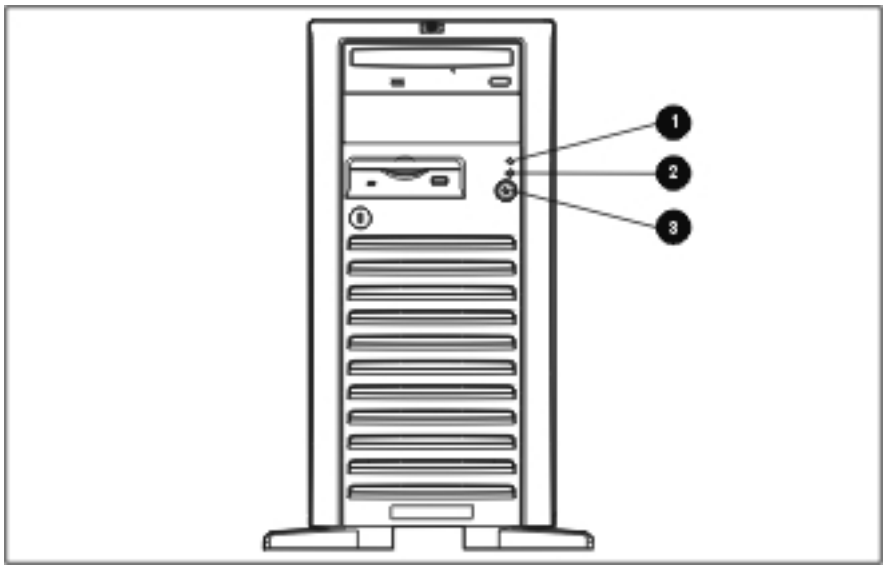

Figure 4-4: Power button and system status LEDs

Table 4-4: Power Button and System Status LEDs

Item	Description	Status	Description
1	Drive activity indicator	Off	Inactive operation
		Flashing amber	Disk drive activity
2	Power indicator	Off	System off (If the AC power cord is still connected, standby power is being supplied to the server.)
		Green	System is on with AC power applied.
3	Power button	N/A	Allows the user to power up the server and power down the server.

CAUTION: When the power indicator is green, it is unsafe to remove AC power from the system without performing a proper shutdown of the operating system.

Hot-Plug Hard Drive LEDs

The SCSI and SATA hot-plug hard drive LEDs, located on each physical drive, are visible on the front of the server.

- Status LED

  This LED indicates the drive operating condition: normal, warning, or failure.

- Activity LED

  This LED indicates the disk drive access activity. This LED is controlled by the disk drive directly. When a drive is accessed, the LED shows a green light.

SCSI LED Status

Table 4-5 and Table 4-6 describe the LED signals used to indicate the operating status of a SCSI disk drive.

Table 4-5: SCSI Hot-Plug Hard Drive Operation Status Conditions

Condition	LED	Signaling	Note
Drive access	Activity	Green (flashing)	Under HDD control*
Drive fault	Status	Amber (solid)	
Drive predictive fault	Status	Amber (flashing)	
Missing management PCA or jumper cable	Status	Amber (solid)	
Drive/slot normal (drive present)	Status	Green	Pass through mode
Drive/slot normal (drive not present)	Status	Off	Pass through mode

*During disk drive spin-up or a hung-up situation, the activity LED may stay solid green for a long period.

Table 4-6: SCSI Hot-Plug Hard Drive LEDs

Status LED	Activity LED
• **Off**: Normal or unit not powered	• **Off**: Normal
• **Green (solid)**: - Normal and under power - I/O activity	• **Green (flashing)**: I/O activity • **Green** (**solid** for more than one minute): Disk spinning up or “hung”
• **Amber (flashing)**: predictive failure	
• **Amber (solid)**: hard drive failure	

SATA LED Status

Table 4-7 describes the LED signals used to indicate the operating status of a SATA disk drive.

Table 4-7: SATA Hot-Plug Hard Drive LEDs

Status LED	Activity LED	Status Description
Off	Off	No power; offline; SATA disk drive is not configured
Off	Green	Power on; normal operation
Off	Flashing green	Ongoing I/O disk activity
Flashing amber	Off	Predictive failure; drive not being accessed; offline
Flashing amber	Green	Online; no drive activity; predictive failure
Flashing amber	Flashing green	Ongoing drive activity; predictive failure
Amber	Off	Offline; no activity; critical fault condition
Blue	Off	Drive selected
Off	Flashing green (at constant 1Hz)	Drive rebuilding

Network Interface Controller (NIC) LEDs

The NIC LEDs are located on the rear of the server. They provide the following information:

- The speed at which the network is being accessed
- If the server is linked to the network
- If there is current network activity

Refer to the *HP Servers Troubleshooting Guide* found on the HP website for more information on troubleshooting network controller problems.

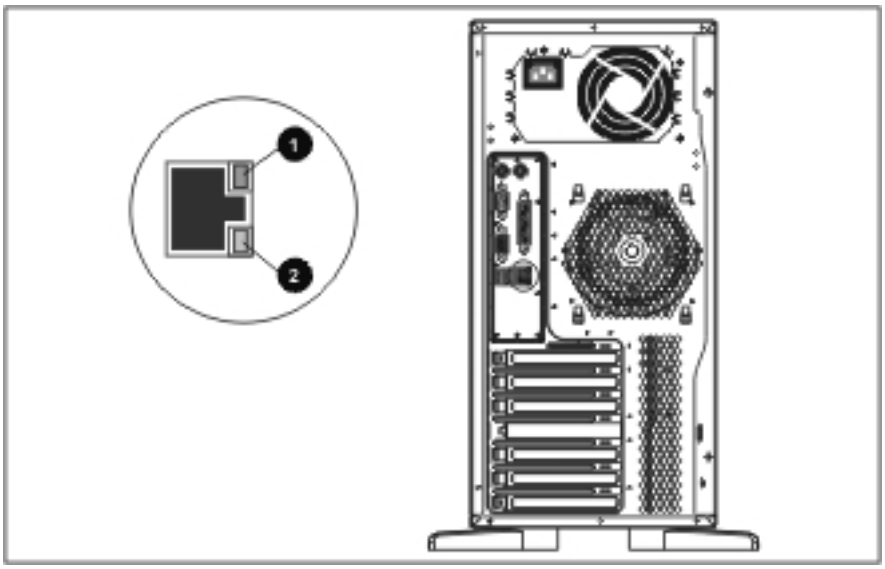

Figure 4-5: Network Interface Controller (NIC) LEDs

Table 4-8: Network Interface Controller (NIC) LEDs

Item	Description	Status	Condition
1	Green	On	Valid 100/1000 Mbps LAN link
		Flashing	100/1000 Mbps LAN activity
2	Amber	On	Valid 10/1000 Mbps LAN link
		Flashing	10/1000 Mbps LAN activity

Note: The 1000 Mbps LAN link or activity is shown when both the green and amber LEDs are on or flashing.

5

Physical and Operating Specifications

This chapter provides physical and operating specifications for the HP ProLiant ML150 G2 server. The following specifications are provided:

- System unit
- Memory
- 1.44-MB diskette drive
- IDE CD-ROM drive
- Wide Ultra3 SCSI hard drives
- SATA hard drives
- LAN-on-Motherboard (LOM)

System Unit

Table 5-1: System Unit Specifications

Item	Description
Height (without feet)	42.8 cm (16.85 in)
Height (with feet)	44.6 cm (17.56 in)
Depth (without bezel)	54.1 cm (21.30 in)
Depth (with bezel)	58.3 cm (22.95 in)
Width (without feet)	20.5 cm (8.07 in)
Width (with feet)	27.2 cm (10.71 in)
Weight (no drives installed)	22.5 kg (49.60 lb)
Input requirements	International Units (English Units)
Rated input voltage	200 VAC to 240 VAC (100 VAC to 120 VAC)
Rated input frequency	50 Hz to 60 Hz
Rated input current	5.0 A (10.0 A)
Rated input power	883 W
BTUs per hour	3,012
Power supply output	
Rated steady-state power	600 W
Temperature range	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-30°C to 60°C (-22°F to 140°F)
Relative humidity (noncondensing)	
Operating	10% to 90%
Nonoperating	5% to 95%
Wet-bulb temperature	
Maximum	29°C (84.2°F)
Acoustic noise	
Idle (hard drives spinning)	6.2 NPEL (BELS)/45 AVERAGE SPL (dba)
Operating (random seeks to hard drives)	6.8 NPEL (BELS)/49 AVERAGE SPL (dba)

Memory

Table 5-2: Memory Specifications

Item	Description
Size	512 MB, 1 GB and 2 GB
Speed	333 MHz
Type	PC2700 ECC Registered DDR SDRAM DIMMs

Note: DIMMs must be industry-standard 184-pin PC2700 DDR DIMMs. The DDR DIMMs must support CAS Latency 2 or greater. They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD).

1.44-MB Diskette Drive

Table 5-3: 1.44-M Diskette Drive Specifications

Item	Description
Size	88.9 mm (3.5 in)
LED (front panel)	Green
Read/write capacity per diskette (high/low density)	1.44 MB/720 KB
Drives supported	1
Drive height	15.2 mm (0.6 inch)
Drive rotation	300 rpm
Transfer rate bits/sec (high/low)	500/250 Kbps
Bytes/sector	512
Sectors/track (high/low)	18/9
Tracks/side (high/low)	80/80
Access times	
Track-to-track (high/low)	6 ms/3 ms
Average (high/low)	174 ms/94 ms
Settling time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

IDE CD-ROM Drive

Table 5-4: IDE CD-ROM Drive Specifications

Item	Description
Capacity	540 MB (mode 1, 12 cm)
	650 MB (mode 2, 12 cm)
Block size	2,048 bytes (mode 1); 2,340, 2,336 bytes (mode 2); 2,352 bytes (CD-DA); 2,328 (CD-XA)
Dimensions	
Height	41.3 mm (1.63 in)
Width	146 mm (5.75 in)
Depth	184.7 mm (7.27 in)
Weight	<720 g (<25.4 oz)
Data transfer rate	
Sustained	3,000 KBps (sustained 1X)
Burst	16.67 MBps to 33.3 MBps
Bus rate	48 MBps
Access times (typical)	
Full stroke	<100 ms
Random	<100 ms
Disk diameter	12 cm, 8 cm (4.7 in, 3.15 in)
Disk thickness	1.2 mm, 0.05 cm (0.047 in x 0.20 in)
Track pitch	1.6 μm
Cache/buffer	128 KB
Startup time	<7s (single session); <30s (multisession)
Stop time	<4s
Operating conditions	
Temperature	5°C to 45°C (41°F to 113°F)
Humidity	10% to 80%

Wide Ultra3 SCSI Hard Drives

Table 5-5: Wide Ultra3 SCSI Hard Drive Specifications

Item	36-GB Drive	72-GB Drive	146-GB Drive
Capacity	36 GB	72 GB	146 GB
Height	1 in	1 in	1 in
Width	4 in	4 in	4 in
Interface	Wide Ultra3	Wide Ultra3	Wide Ultra3
Transfer Rate	475~841 MBps	475~841 MBps	475~841 MBps
Rotational Speed	15,000 RPM	10,000 RPM	10,000 RPM
Bytes per sector	512	512	512
Operating Temperature	5°C to 55°C (41°F to 131°F)	5°C to 55°C (41°F to 131°F)	5°C to 55°C (41°F to 131°F)

SATA Hard Drives

Table 5-6: SATA Hard Drive Specifications

Item	80-GB Drive	160-GB Drive	250-GB Drive
Capacity	80 GB	160 GB	250 GB
Height	1 in	1 in	1 in
Width	4 in	4 in	4 in
Interface	Serial ATA	Serial ATA	Serial ATA
Transfer Rate	150 MBps	150 MBps	150 MBps
Rotational Speed	7,200 RPM	7,200 RPM	7,200 RPM
Bytes per sector	512	512	512
Operating Temperature	5°C to 55°C (41°F to 131°F)	5°C to 55°C (41°F to 131°F)	5°C to 55°C (41°F to 131°F)

LAN-on-Motherboard (LOM)

Table 5-7: Integrated Broadcom 5721 Server LOM Specifications

Item	Description
Network interface	10Base-T/100Base-TX/1000Base-T Ethernet
Compatibility	IEEE 802.3
Data transfer method	PCI-Express bus master
Network transfer rate	10/100/1000 Mbps
Connector	RJ-45
I/O address and interrupt	Plug and Play PCI

Index

F

G

H

I

L

M

N

P

R

S

T

U

W